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# Preface

The publication of the *Manual on Technology Transfer Negotiation* raises expectations of a normative instrument with definitive answers to all problems faced by practitioners of technology transfer, whether on the recipient side or the supplier side. While such an instrument was indeed the aim of UNIDO when it undertook to produce the *Manual*, the reality is that the subject of technology transfer is as dynamic as technology itself. New forms of technology business give rise to new issues of acquisition, and international developments affect the channels and patterns of technology flows. For instance, strategic partnership, a form of technology business that is now receiving attention in many developing countries, raises fresh issues owing to its two-way nature.

The traditional channel for technology transfer was licensing, whose importance has changed over the years. At one time, when developing country rules on foreign direct investment (FDI) presented a barrier to entry by this means, licensing was a common alternative means of entry. Then, as those countries adopted market-friendly approaches towards FDI, licensing became less important. Now, however, as international intellectual property systems became stronger following the Uruguay Round agreements, particularly the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), innovators may be more likely to patent their inventions, so licensing could once again become an important means of accessing technology.

At the same time, technology transfer is a key element in achieving international competitiveness, which firms need to survive in the global marketplace. Nowadays, the challenge is to achieve technological superiority, and this implies being able to use technology transfer in its various forms and channels as a negotiated opportunity for technology absorption, assimilation and innovation. Thus, while technology transfer may not be a new topic, the issues and concerns that it generates are never static; on the contrary, they are dynamic and evolving.

The search for technology and its evaluation, selection and negotiation by enterprises, technology managers and users is never a simple task. The decision-making process calls for information, knowledge and skill and requires tools, standards and parameters for evaluation. The idea behind the *Manual on Technology Transfer Negotiation* is to address those needs, that is, to make available in one publication practical information, guiding principles and quantitative approaches to the many aspects of technology transfer.

The *Manual* has grown out of UNIDO educational activities in technology transfer operations and is the product of sifting through, organizing and making systematic use of the many accumulated training materials and of the experience of UNIDO in technology transfer operations and in providing advisory services and mediation in technology transfer transactions. It comprises 19 modules whose subject-matters fall into four groups, the first three of which correspond to stages of the acquisition process:

- Modules 1-4 describe the macro-environment and deal with the role of technology transfer in achieving competitiveness and economic and social growth; the technology market; intellectual property protection; and success factors for technology transfer.
- Modules 5-10 give practical information on preparing for an acquisition: they cover finding, evaluating, selecting and procuring technology as well as negotiating its transfer and the legal environment for this in both developing and developed countries.
- Modules 11-17 advise on the contractual stage. They tackle basic legal notions, contract drafting, types of agreements, the general structure of agreements, training, valuation and methods of payment, and warranties in technology transfer.
- Modules 18 and 19 deal with complex forms of technology transfer, namely complex industrial projects and strategic partnering.

Although it is oriented to developing countries, the *Manual* can readily be used as a reference material by any technology negotiator. One of its goals is to help buyers and owners of technology to arrive at a common understanding of the issues. Such an understanding would lay the groundwork for a durable relationship advantageous to both parties. To achieve this goal, UNIDO and the Licensing Executives Society International (LES International) formed a joint working group to assess, revise and validate the content of the *Manual*. As an international organization whose members are technology transfer practitioners of the highest caliber and authority LES has played a crucial role: the perspective it brings to the *Manual* will broaden its use and promote international acceptance. The *Manual* asserts that a balanced transaction reflecting the legitimate interests of all parties is critical to the success of any technology transfer.

Although an attempt has been made to bring together as many as possible of the issues that are relevant and critical to technology transfer operations, it cannot be claimed that the issues have been exhausted. The *Manual on Technology Transfer Negotiation* is intended to be a living document: it will grow, expand its coverage and be revised as new developments take place. As it stands, however, it represents one of the most comprehensive bodies of knowledge on technology transfer and the contract negotiation process.

The *Manual* owes its completion to many. LES was represented in the working group by Edmund Astolfi, Michael Burnside, Robert Goldscheider, Paul Passley, and Arthur Wolff. Representing UNIDO were Jose de Caldas Lima, Rowena Paguio, Mladen Vukmir, Gyorgy Markos, Venkata Arni, Carlos Correa and Osama El-Kholy. Other consultants involved were Leal da Silva, Samuel Goekjian, Andres Moncayo, Ryszard Rapacki, Branko Vukmir, Vitor Simoes, Dennis O'Reilley and Marcia Rorke. Former UNIDO staff members Krishnaswamy Venkataraman and Joppe Cramwinkel also contributed.

# Contents



## *Tables*



## *Figures*

## EXPLANATORY NOTES

The following abbreviations are used in this publication:

| | |
|---|---|
| BER | block exemption regulations |
| BINAS | Biosafety Information and Advisory Network |
| BOT | build-operate-transfer |
| DIPP | Databank for Investment Promotion Programme |
| ECU | European currency unit |
| EFTA | European Free Trade Association |
| EPC | European Patent Convention |
| EPO | European Patent Office |
| FAST | Forecasting and Assessment for Science and Technology |
| FDI | foreign direct investment |
| GATT | General Agreement on Tariffs and Trade |
| GNP | gross national product |
| ICB | international competitive bidding |
| ICC | International Chamber of Commerce |
| IDA | Industrial Development Abstracts |
| IFB | invitation for bids |
| IIS | Industrial Inquiry Service |
| INDIS | Industrial Information System |
| INTIB | Industrial and Technological Information Bank |
| IPRs | intellectual property rights |
| ITB | instruction to bidders |
| JFTC | Japanese Fair Trade Commission |
| KEDS | Knowledge Express Data Systems |
| LDCs | least developed countries |
| LES | Licensing Executives Society |
| LIB | limited bidding |
| MNCs | multinational companies |
| NFPs | national focal points |
| NICs | newly industrializing country |
| NIEs | newly industrializing economies |
| ODM | own design and manufacture |
| OECD | Organisation for Economic Co-operation and Development |
| OEM | original equipment manufacture |
| PAT | profit after tax |
| PBT | profit before tax |
| PCT | Patent Cooperation Treaty |
| PGT | performance guarantee test |
| PS | profit share |
| PV | present value |
| PVC | polyvinyl chloride |
| PVR | plant variety rights |
| R and D | research and development |
| RFPs | regional focal points |
| ROI | return on investment |
| SCPA | Semiconductor Chip Protection Act |
| SMEs | small and medium-sized enterprises |
| TIES | Technology and Investment Enhancement Strategy |
| TLC | technology life cycle |
| TNCs | transnational corporations |
| TRIPS | Trade-Related Aspects of Intellectual Property Rights |
| UNCTAD | United Nations Conference on Trade and Development |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| UPOV | Union for the Protection of New Varieties of Plants |
| VCM | vinyl chloride monomer |
| WHO | World Health Organization |
| WINS | World Investment Network Service |
| WIPO | World Intellectual Property Organization |

# Module 1

## TECHNOLOGY TRANSFER AND DEVELOPMENT

*Technology's contribution to socio-economic growth and competitiveness has been widely recognized in recent years. In an increasingly interdependent world, real growth results mainly from technological innovation capability located in globally competitive enterprises. Technological strategies, decisions and actions at the enterprise level are therefore at the core of a country's socio-economic development process. This module discusses the economic and social development implications of technology transfer as an integral part of the technological innovation processes. The appropriateness of specific mechanisms for transfer is also considered, as is the need to gear transfer activity to enhance the development of a country's technological infrastructure. This first module introduces concepts and provides a general framework for issues addressed in the modules to follow.*

# Contents

# TECHNOLOGY TRANSFER AND DEVELOPMENT

## Technology, competitiveness and economic and social development

Technology has become a key to the competitiveness of businesses and the economic growth of nations. Investments in the development and deployment of new technology were recognized many years ago by economists such as Joseph Schumpeter [1] and Robert Solow [2] as engines for economic growth. New technology can provide more efficient ways of performing work and open new paths for human activity. It also offers possibilities for improving quality and productivity, for shortening the time it takes to get a product to the market, and for satisfying unmet human needs. By creating product and service differentiation in the marketplace, technological innovation, the process by which a firm plans, implements, controls and evaluates technical changes, brings new opportunities for enhancing the firm's competitiveness and growth.

Increased economic well-being benefits the whole of society, in so far as it allows a more broad-based satisfaction of human needs and better life for individuals and families. How those benefits are used and how widely their impact is felt are primarily matters of social and economic policy. However, the opportunities for creating economic benefits by means of technology are real and should be systematically exploited and fostered. Such an effort is particularly important nowadays, when a number of trends and new theories are showing the potential of continuous technological developments.

First, economic activities are increasingly knowledge-intensive. The emergence and expansion of information technologies and other generic technologies with transectoral impact are transforming the socio-economic fabric of countries and regions. A structural shift is taking place in the countries that make up the Organisation for Economic Co-operation and Development (OECD) to industries that are innovation- and skill-intensive, such as electronics and transport equipment* as well as to service industries. These new information-based technologies are affecting not only the high-tech sector but are also enhancing competitiveness, productivity and quality in industries where the technologies were considered to be mature and well diffused.

*The technology gap/product cycle theory has shed light on North-South asymmetries and on the impact of technological capabilities on international trade.

Secondly, the globalization of markets has changed the dynamics of comparative advantage. Countries can no longer rely on natural resource endowments and on favourable capital/labour ratios to predict and preserve the structure of their foreign trade. With the emphasis on trade liberalization that followed the Uruguay Round and on regional integration (exemplified by the North American Free Trade Agreement), the traditional distinction between producing for internal markets and for export markets is becoming blurred, and competitiveness in these two markets has become two sides of the same coin.

In this framework of increased global competition and shortened product life cycles, where competitiveness has to be measured in terms of present and future potential to enter into and survive in the international market, the effectiveness of technological innovation is an inescapable element. Sustainable competitiveness requires that the firms of a nation should steadily improve their performance in the international market by increasing productivity, quality and reliability. Enterprises have to be globally competitive, so technology strategies are becoming a mandatory part of their feasibility studies and business plans.

The accumulation of innovation-based advantages has become a prerequisite for international competitiveness. The interaction between a firm's technological capabilities and the environment in which it operates (including the national system to support innovation) plays a critical role in shaping trade advantages. Patterns of international trade are increasingly affected by the relative abilities of countries and firms to master technological innovation. In short, technology is a key factor in international trade.

Technological innovation is essential for creating and sustaining competitiveness. It is often said that product innovations are critical for adding value to the customer, while process innovations are instrumental in achieving increased productivity. But technological innovation goes beyond this: innovation activities relate also to internal and external logistics, and to the commercialization systems and services that create value for customers.

Thirdly, economic theory has formally acknowledged technology as an engine of economic growth.*

*See in this regard the new growth theories, which emphasize the role of expenditures on R and D, the formation of human capital and investments in the diffusion and promotion of technical change [3].

Knowledge *per se* is now regarded as a factor of production. It has been recognized that innovative efforts include not only investments in physical assets (machinery and equipment) but also intangible investments. The latter are paramount in strengthening a firm's competence base (through research and development, the acquisition of disembodied technology and design and engineering activities) as well as in exploiting investments in physical assets and other intangible investments (training, technical assistance, organization, information systems).* According to this theory, past investments and accumulated knowledge form a virtuous cycle in which physical and intangible investments are mutually reinforced.

In short, since technology is a critical asset for competitiveness at the micro level and for long-term economic and social growth, firms and governments must make greater explicit efforts to build up and preserve their technological advantages. Those efforts are reflected in several indicators of intangible investments and national science and technology, in budgets, and in the attitudes of firms and governments towards technological innovation, including technology transfer and diffusion.

*See Correa [4] and, in the same vein, OECD [5].

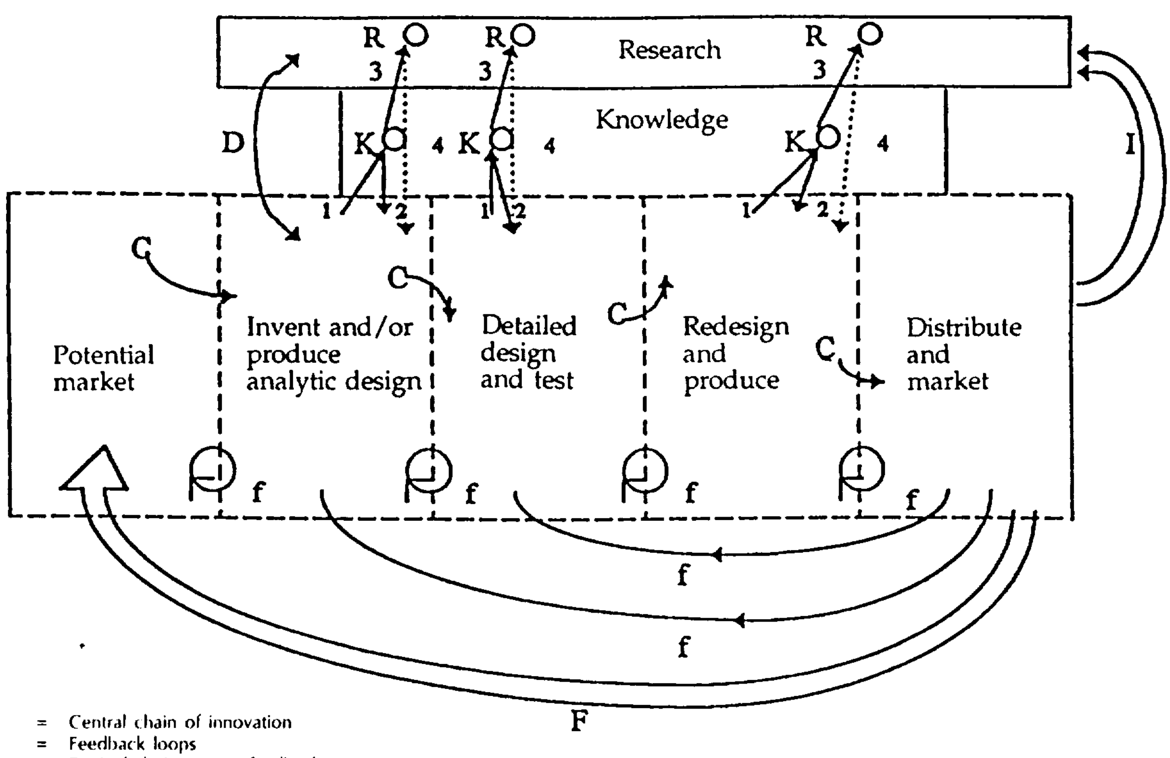
It is against this background that the present module examines in more detail the process of technological innovation. It goes on to analyse the role of technology transfer in the economic development of developing countries. It sets out to elucidate the manner in which industrial technology transfer affects *(a)* the structure of trade and industrial competitiveness, particularly in developing countries, *(b)* the building up of domestic technological capabilities and *(c)* the increase of technological capacity. It concludes with a look at the ways in which different mechanisms of technology transfer affect developing countries' technological capabilities and economic growth as well as the competitiveness of individual firms.

## Innovation and technological development

### *The innovation process: new perspectives*

The understanding of innovation underwent significant changes in the last decade: the view of it as a linear sequence, or ladder, from science and re-

**Figure 1. The chain-link model of innovation**




C = Central chain of innovation
f = Feedback loops
F = Particularly important feedback
K - R = Links through knowledge to research and return paths. If problem solved at node K, link 3 to R not activated as return from research (link 4) is problematic. dashed line is used.
D = Direct link between research and problems in invention and design.
I = Support of scientific research by instruments, machines, tools and prodecures of technology.
S = Support of research in sciences underlying the product area to gain information directly and by monitoring outside work. The information obtained may apply anywhere along the chain.

*Source:* Adapted from S. J. Kline and N. Rosenberg, "An overview of innovation", *The Positive Sum Strategy*, R. Landau and N. Rosenberg, eds. (Washington, D.C., The National Academy Press, 1986.)

search activities to market applications has been challenged. In fact, innovation is not a one-way sequence unleashed exclusively by scientific developments only ("science push") but an interactive process, with significant feedbacks. It may be characterized as a cumulative learning process that for the most part lies outside formal R and D activities and in which organizational aspects also play a key role.

This new understanding of the innovation process is well captured by the so-called "chain-link" model of Kline and Rosenberg [6], and depicted in figure 1. The model involves two main types of relationships. The first, characterized by horizontal feedbacks, refers to innovation inside the firm. The second, characterized by vertical linkages, concerns the interactions between the firm and the scientific and technological system of which it is part.

At the firm level, the starting point for the chain of innovation is the perspective of a potential market, followed by an invention and/or an analytic design of a new product or process. Invention marks a significant departure from past experience; it is a new way to achieve a function not evident for someone acquainted with the prior state-of-the-art. Analytic design "consists of various arrangements of existing components or of modifications of designs already within the state of the art to accomplish new tasks or to accomplish old tasks more effectively or at lower cost" [7]. Analytic designs are, therefore, largely based on experience, on knowledge accumulated within the firm or due to contacts with other firms. This means that non-inventive analytic designs may be—and often are—critical elements in the process of innovation. Inventions or analytic designs are then subject to detailed designs and tests to define more precisely the technical specifications, and operational procedures needed to develop the products or processes concerned, and to launch manufacturing activities. The final step corresponds to the distribution and marketing of the products concerned.

An essential element of the model is the feedback links. There are short feedback loops between contiguous phases of the process. One example is the link between production and detailed design: the identification of problems in manufacturing may lead to a redesign of some components or even of the whole product. There are also long feedback loops, linking one phase with non-contiguous upstream stages. The longest connects the end of one cycle (distribution and marketing) with the beginning of another one (potential market), showing how previous marketing and distribution experience enhances a firm's ability to identify potential new markets.

The second group of linkages connects firms with the available stocks of knowledge and with research activities. When problems are identified in the various phases of the innovation processes, the firm tries prima facie to have recourse to the stock of knowledge available. This may be done through linkages with local technological services or institutions that support industry. Alternatively, the firm may obtain knowledge available abroad, by means of technology transfer. Only when the accumulated knowledge from all known sources is insufficient to solve the problems it faces will a firm engage in mission-oriented research [8].

It should be acknowledged, however, that most firms in developing countries lack the resources, financial and human, to engage in research activities. Since the main purpose is to manufacture products locally and/or use processes already existing in other countries, technology transfer becomes an easier way to innovate at the firm level. As the model shows, this process will increase a firm's knowledge and may enhance its capability to innovate, especially in regards to the development of new analytic designs. However, this cannot be taken for granted. The outcome will depend on three main factors: the firm's technological base and its ability to create new technology; the efforts undertaken by the recipient firm to master the imported technology and its commitment to use it for further learning; and the linkages between the firm and the country's own scientific and technological system.

### *Firm capabilities and technological accumulation*

Every firm, regardless of its location, has a technology base, that is, a set of core competences that enable it to competitively transform inputs into outputs (products or services) that can be traded in markets. The technology base may be more or less sophisticated, but in every case it largely stems from a historical process of technology accumulation along specific paths. Sectoral factors also shape the configuration of the technology base, since industries differ in their patterns of technology accumulation: contrast, for instance, the textile industry, where most technical change comes from suppliers of equipment and materials, with pharmaceuticals, where in-house R and D activities play a crucial role.* The technological base consists of codified knowledge (designs, formulas, blueprints, manufacturing manuals), machinery and equipment, and, especially, knowledge held by individuals and teams working in the firm, part of it stored in operating and organizational routines. The greatest challenge to a developing country's enterprises is how to accelerate their accumulation of technological capabilities. In other words, how to go about building up the core competencies or bundles of knowledge, skills and technologies that would allow those firms to compete in global markets. The technology base necessarily includes technology in-

*See Pavitt [9].

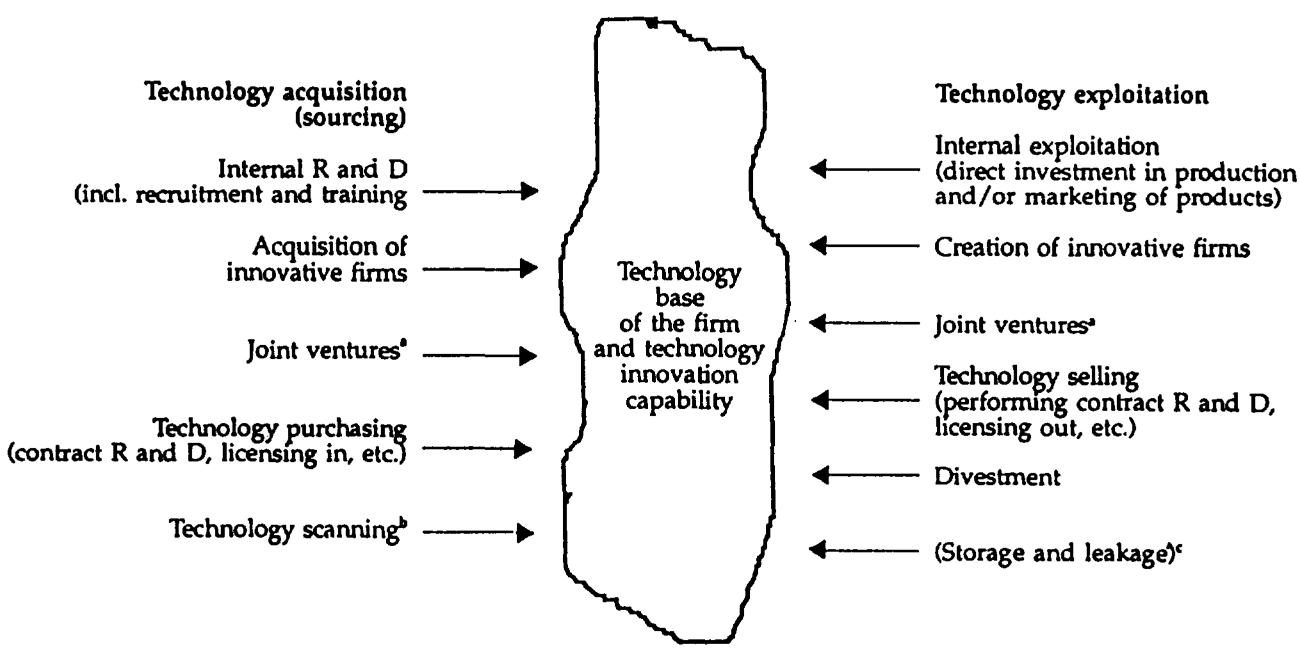
novation capability, that is, the core capabilities that will enable enterprises to generate new products, services and value-added activities and to build new relationships and other dynamic and value-adding competitive advantages that competitors cannot easily imitate or foresee. The effective management of these core capabilities and derived innovations, called technology management, is itself a core capability. Through technology management, an enterprise can effectively integrate and manage the interdependence between technological innovations and other innovations in organizational structures, systems, management methods, financial sourcing and others, required to achieve the enterprise restructuring for sustained competitiveness.

The management of strategic technological innovation at the enterprise level involves a blend of R and D and technology transfer in varying proportions. It needs to be carried out through multifunctional and transorganizational efforts, often cutting across organizational boundaries of the enterprise's cluster (clients, suppliers).

The technology base normally plays an important role in the process of technology transfer. Firms usually seek to improve their technology and product range by targeting areas relatively close to their existing technology base. At the same time, the technology base acts as a "translator" or as a "reaction space" that enables the conversion of technology inputs (technology sourcing) into outputs (products and/or tradeable knowledge and information). The triadic relationship between technology sourcing, the technology base and technology exploitation is illustrated in figure 2.

Technology sourcing corresponds to the different mechanisms for technology development and/or acquisition. Some of these mechanisms involve inhouse activities: internal R and D efforts, as well as the training of skilled personnel. Others involve the purposeful acquisition of technology from external sources. In some instances the mechanism entails acquisition from abroad, that is, international technology transfer. This may take place through the establishment of equity joint ventures, licensing agreements or subcontracting and original equipment manufacture (OEM) arrangements. An interesting feature of the model is its reference to technology scanning, the use of informal means (including copying, imitation and reverse engineering) to acquire technology without direct purchase.

**Figure 2. Relationships between technology sourcing, the technology base and technology exploitation**




[a]Joint ventures refer to interfirm R and D cooperation in general (not necessarily formalized); for example, with subcontractors.

[b]Scanning includes legal and illegal forms of acquiring technological know-how from the outside without any direct purchasing from its original source.

[c]This is not a strategy for exploitation but a kind of residual of unappropriated technology, possibly leaking to competitors through their technology scanning efforts.

*Source:* Adapted from Ove Granstand, "Managing innovation in multi-technology corporations", *Research Policy*, vol.19 (1990), pp. 35-60.

Technology sourcing activities will, of course, help to upgrade a firm's technological base. In some cases, the only alternative for survival, profit making and continuous growth is to target risky radical innovations situated beyond the areas adjacent to the firm's current technology base. All the above must be an integral part of a firm's technological strategy. When they make strategic decisions and implement them, firms in both developed and developing countries need to count on an adequate technological infrastructure.

### *The role of national systems of innovation in technology transfer*

The ability of firms in developing countries to undertake successful technology transfer strategies depends not just on their individual efforts but also on the characteristics of the national system of innovation in which they are operating.

A national system of innovation may be defined as a network of public and private institutions, located within national borders, whose activities and interactions enable the generation, importation, assimilation, modification, diffusion and use of economically useful knowledge.* In a national system of innovation there is an interaction between five main subsystems: productive (including public and private firms performing their activities in the country); scientific and technological (encompassing diverse institutions such as research centres or technology diffusion organizations); education and training (educational organizations at the various levels and training institutions); financial (including banking, insurance and, in general, all the organizations that provide financial support for launching innovative endeavours); and the administrative-regulatory system (public institutions that lay the groundwork, define the rules of the game and provide the incentives for innovative activities).

In most developing countries, national systems of innovation tend to be very weak and unstructured, possibly because of the lack of two things: demand from firms and adequate policies. There is, however, a growing awareness that in order to seize and exploit emerging opportunities, developing countries need to strengthen and integrate the various elements of their system of innovation to create a climate conducive to technological innovation and to develop a technical culture and entrepreneurial and risk-taking behaviours.

These efforts, besides supporting the development of firms, should focus on the following:

- *Human Resources.* No amount of institution-building, technical assistance or joint ventures can bear fruit if not coupled and carefully synchronized with effective human resources development. Technology is essentially a system of knowledge and experience. Humans are the social carriers who can apply knowledge and experience for a specific purpose.
- *Institutions.* Many agents together constitute a national system of innovation. Different innovations (product/process, knowledge/skills and methods/packaging) require the contributions of different institutions at different levels, acting in cooperation. Examples of institutions to be strengthened include organizations engaged in basic scientific research, including government laboratories and universities; industrial research and development laboratories; design, engineering and consultancy organizations; standardization, quality control and certification units; technology transfer and promotion agencies; training and manpower development centres; venture capital institutions; and information centres and systems. It is this diversity of institutions as well as of firms, that can help to enhance a developing country's innovative capacity, not only as regards the development of endogenous technology, but also regarding the ability to successfully assimilate and modify imported technologies. Besides institution building and strengthening, the promotion of linkages among all the elements of the innovation system becomes essential.
- *Information systems.* These provide personnel engaged in technology transfer and development with the raw data from which they extract knowledge of what is being done in the country and abroad, of new technological opportunities and of the possibilities available for solving specific problems. Information systems may also enable monitoring the international technology market, the technologies available, alternative sources and the range of conditions under which they may be obtained.
- *Technology management at the plant or cluster level.* Identifying the critical technological innovations needed for sustainable competitiveness, requires strategic and technology management capabilities. For firms and clusters of firms, this includes a technological diagnosis of competitive position, formulation of a technological strategy, development of a portfolio of technological projects and the use of product and service technological innovation guidelines. The development of these capabilities is neither automatic nor trivial, and require specific technology management methodologies, enabling national technological policies and the vision of possible future development provided by activities such as technological monitoring and forecasting.

*This definition was developed on the basis of the definitions suggested by Christopher Freeman [10] and Bengt-Ake Lundvall [11].

## Technology transfer: an overview

There is no universally accepted definition of technology. For the purpose of this manual, it will be defined as a system of knowledge, techniques, skills, expertise and organization used to produce, commercialize and utilize goods and services that satisfy economic and social demands.

It may be said that technology finds more application in the area of industrial development than in any other sector. New knowledge and skills are incorporated and diffused, through industrial activity, in products, production machinery, equipment, physical plant, commercialization systems, services and so forth in a more significant way than in other sectors of the economy.

A distinction is traditionally drawn between vertical and horizontal technology transfer. Vertical transfer was seen as the process that enabled technology to move between the different stages, from research and development activities (R and D) to the exploitation of an invention. However, as was earlier explained (figure 1), this linear model of innovation is no longer accepted; instead of a ladder going down R and D to industrial exploitation, we find a series of interactions demanding the joint involvement of the various departments of the firm.

Horizontal transfer involves the transmission of technology from one purpose or place to another. This *Manual* covers a subset of horizontal transfer: the international transfer of technology, which may be defined as the process whereby knowledge relating to the transformation of inputs into competitive outputs is acquired by entities within a country from sources outside that country.

International technology transfer takes place through different channels and mechanisms, both formal and informal. They include training abroad, the recruitment of key foreign personnel, reverse engineering, purchase of equipment, subcontracting and OEM agreements, licensing, joint ventures, strategic partnerships and so forth. These mechanisms will be analysed in more detail in other parts of this *Manual*.

If technology transfer in some cases stems from the day-to-day involvement of a firm in international business (contacts with foreign clients and suppliers, use of foreign competitor's benchmarks, imitation of solutions tested abroad), in many other cases it requires a decision to acquire technology from abroad through formal agreements. This process is diagrammed in figure 3, which makes three things clear.

### *Importance of implementation and absorption*

The first is that technology transfer is a process that does not stop with the selection and acquisition of a foreign technology. It also involves the implementation, adaptation and absorption of the technology. Acquiring appropriate technology at the best possible terms is no guarantee that it will be exploited effectively. In fact, contract implementation is a key issue in international technology transfer. The processes of plant design, plant erection and operation are just as important as, if not more important than, the conclusion of good technology transfer deals. Adequate technical assistance and training programmes are very important in ensuring an effective exploitation of the technology. The acquisition of know-how is not the ultimate step, however. The absorption, or "internalization", of the technology and its blending with the firms'own developments is critical in ensuring the firm's ability to remain competitive. This demands, of course, a strong technology management capability in the firm. The challenge is to go from know-how to know-why.

### *Basis for selecting a technology*

The second is the decisive inputs into the process of technology selection and negotiation by firms:

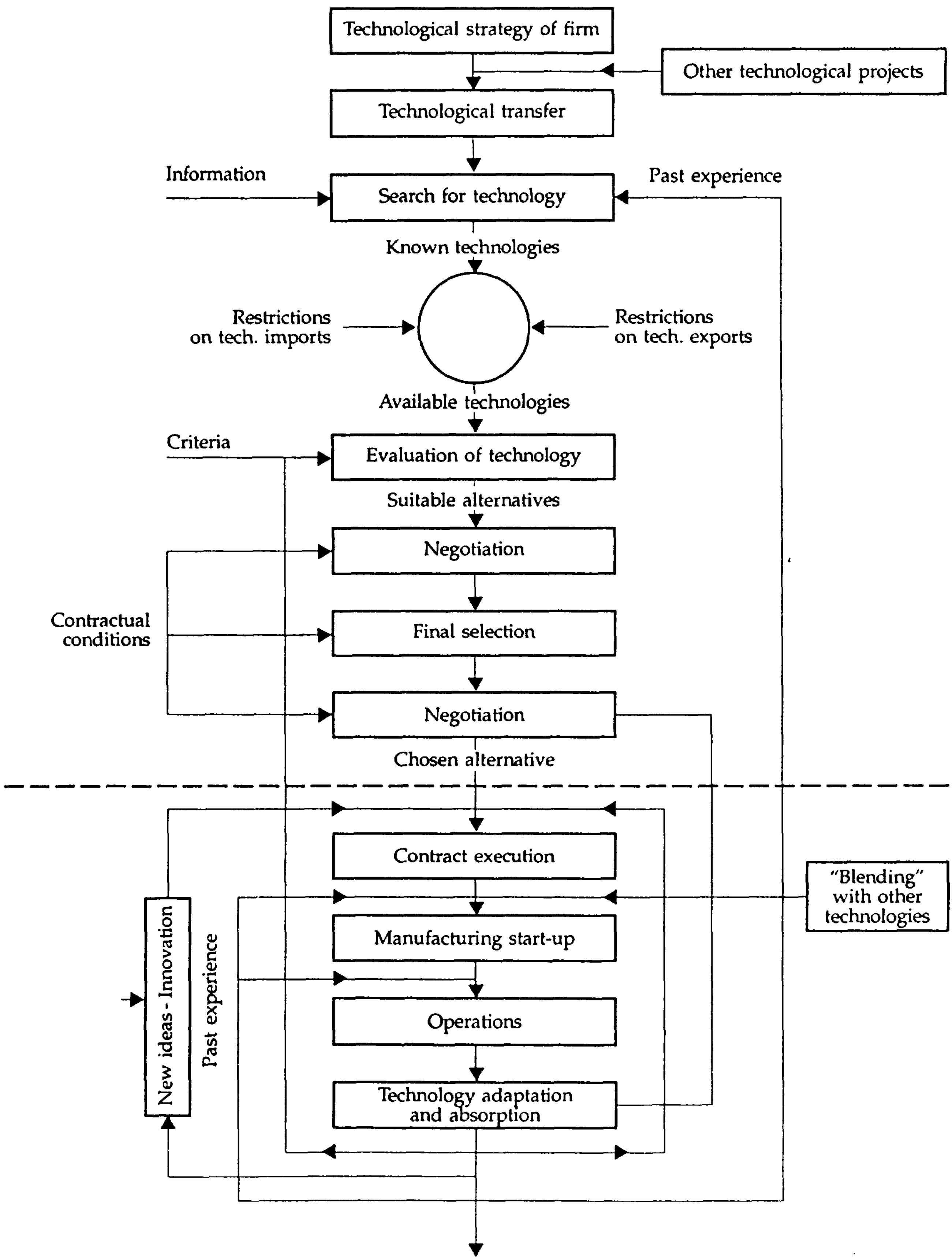
- The firm's technological innovation strategy.
- Information on technology and the technology market.
- Criteria for selecting the most appropriate technology.
- Legal and contractual conditions that shape the negotiation process, the final technology transfer contract and the ensuing implementation.

Information is probably the key word in the process of technology selection and negotiation. The more information about alternative technologies and markets that is available, the wider the scope for a better selection of process.*

The criteria for selecting the technology stem from a host of factors surrounding both the firm and the country. There are firm-specific aspects that shape the choice of technology, including the characteristics of the market, the specific competitive context and requirements of customers (quality, conditions of delivery, fast response etc.), the pursuit of flexibility, the skill levels available, financial indicators, expected profitability, compatibility with a firm's culture and bases of power, the ability of domestic suppliers to comply with technology requirements and learning opportunities. The module on evaluating and selecting technology elaborates on these.

*UNIDO has developed, and continues to develop, databases and information packages on technologies and their sources worldwide. Other sources of information on available technologies and how to acquire them are the subject of the module on finding technology.

**Figure 3. The process of technology selection, negotiation, adaptation and absorption**



National objectives may also influence technology selection, in two main ways. First, by direct government intervention in the process, which may happen particularly in the case of large, public-funded projects carried out by the Government itself or by public enterprises and usually involving the manufacture or provision of public goods. Examples are power generation, television systems or large infrastructures. Given the trend towards free market systems, privatization and liberalization, the opportunity for direct government intervention is declining fast. The second way is indirect influence, mainly through laws and regulations that encourage firms to behave in certain ways (e.g. to increase employment, to provide training or to strengthen local value added) or that discourage or even prohibit undesired behaviours (e.g. polluting projects, anticompetitive practices, the dissipation of scarce resources). Public policies will then attempt to broadly orient the actions of firms, excluding some technology choices, without interfering in their specific decisions.

Three sets of factors might be considered by a country: *(a)* development goals, *(b)* resource endowments and *(c)* the specific conditions under which imported technology will be applied. Examples of development goals are increased employment and output using local resources, creation or strengthening of industry clusters, better income distribution or improved quality of life in general. Resource endowments include matters such as the range of skills and skill levels of the manpower, natural resources and the general economic and financial implications of imported technologies. Conditions of application may include the physical infrastructure, links with existing domestic science and technology support organizations, environmental characteristics, and compatibility with national cultural and value systems.

To sum up, it may be said that when selecting foreign technologies, developing country enterprises make choices that help to meet both their business objectives (including competitiveness, growth, profit or entry into specific markets) and their social and economic needs (employment, skills creation, environment).

The last input mentioned above, legal and contractual conditions, is a vast subject that is covered in other modules of this *Manual* and that involves the national and international legal environments.

### *Opportunities for learning*

A third thing is clear from figure 3: technology transfer involves feedback loops that constitute negotiated opportunities for learning, at both the firm and country levels. These feedback loops are crucial in nurturing indigenous technological capabilities. Neglecting them may result in repetition of past mistakes and inappropriate decisions and actions. As can be seen from the feedback loop on the bottom left-hand side of figure 3, adaptation is one trigger of indigenous innovation that is able not only to increase the probability of success and consolidation of the absorption process but also to short-circuit the technology importation sequence (upper part of the figure) and allow the exploitation of locally developed technologies. The same is true for the blending of the technology acquired with the firm's own technological developments and the establishment of the absorption conditions during the final negotiation phase.

Technology selection, negotiation and adaptation processes provide endless opportunities for learning. At the firm level, lessons from the past should be learned so that the company will be better prepared to enter future deals. The process of technology acquisition should be seen not as a one-time affair but rather as a process that enhances the firm's in-house technological base. At the country level, mechanisms for encouraging technology diffusion should be created so that a private technology transfer benefits not only the importing firm but also other organizations, enhancing the technological capabilities of the country's industrial and industrial service fabric and infrastructure.

## Technology transfer: implications for developing countries

### *Technology transfer, economic development and catching up*

For developing countries, economic development means the growth of real per capita national income coupled with fundamental changes in the structure of their economies and the important social and political transformation that attends these chances. The dynamics of economic development in any country depend directly on the amount of resources available, their quality and productivity, the extent to which they are used, and their growth in both quantitative and qualitative terms.

Resources can no longer be envisaged as a given. They are, to a large extent, man-made. In other words, they are developed in a cumulative process that relies on the skills, commitment and ingenuity of people. As Schumpeter put it, "development consists primarily in employing existing human resources in a different way, in doing new things with them, irrespective of whether these resources increase or not" [12].

Technology transfer is one of the means of pursuing technological innovation. Imported technology may directly affect the economic development of the recipient country in three partly interrelated ways:

- Technology transfer may increase the physical stock of productive factors (resources) available. Such factors include expatriate personnel rendering technical services or holding key managerial posts in local companies, imported machinery and equipment, foreign raw materials, components and parts not available in the host country and accompanying technology transfer contracts. The increase in question may be short term (e.g. the temporary employment of foreign experts) or long term.
- Foreign technology may contribute to this increase by exploiting existing resources. As an example, it may generate new job opportunities for previously unemployed labour, decrease idle capacity in some sectors of the economy, extend arable land for new crops. In this category may also be included cases where the technology transfer is able to exploit local resources that had been idle owing, for example, to the weakness of the indigenous entrepreneurship or its limited technical capabilities.
- Transfer of foreign technology may result in substantial growth in the productivity of existing factors (labour, capital, and natural resources, including land) by *(a)* increasing the volume of outputs while the volume of inputs remains unchanged or *(b)* decreasing the volume of input while the volume of output stays the same.

However, the challenge is not just to increase productivity or utilize technology in the short run. The real challenge is to bring about technological change and catching up. If this is not achieved, the gap between the technology importer and the world technology frontier will widen, not narrow. What is therefore needed is to use the imported technology to generate technological change at an internationally competitive rate.*

Foreign technology has, indeed, been a major contributor to the industrial capabilities of most if not all of the newly industrializing economies (NIEs). Evidence shows that NIE firms have exploited foreign investments, technology and marketing channels to their advantage, gradually assimilating and adapting imported know-how and developing the skills needed to compete internationally. Foreign direct investments (FDI), joint ventures, licensing agreements, OEM and similar arrangements were instrumental to industrial success in NIEs. Technology imports were to a large extent used by NIEs as a learning device and as leverage for further innovation.

Technology transfer may play a similar role in enhancing the economic development of developing countries in improving the competitiveness of their firms in international markets, if it is used as a learning device and if it interacts effectively with domestic technological efforts.

*See on this subject Liu Wei [13].

### *The effects of technology transfer*

Technology transfer may have a wide-ranging impact on the countries that receive the technology. Generally speaking, technology imports increase the available stock of technological and managerial knowledge and may help to increase people's welfare and the country's competitiveness. The expected outcome of technology transfer may not materialize, however.

Technology transfer does not take place in a void: while offering new opportunities for both producers and consumers, new knowledge and behaviour may challenge existing knowledge and behaviour, and new professions may displace already established ones. Since the outcome depends on the interplay of many different factors, including the characteristics of the technology (inputs required, performance implications), the behaviour of the agents involved in the transfer, the profile of the domestic technological system and the effort devoted to mastering imported technologies, the analysis of technology transfer effects is not easy: it demands an appropriate timescale and a systemic approach.

Given its wide-ranging impact, the outcome of technology transfer may be assessed from different perspectives. For the purposes of this manual, the most impacts are those on economic structure, on trade and, especially, on domestic technological development. These will be briefly reviewed below.

#### *Structural changes in the economy*

Transferred technology may induce structural changes in the economies of recipient countries in three main ways. First, it may add new segments to the existing economic structure. This is achieved mainly by the launching of new investment projects, which gives the country new industries. Secondly, it may accelerate the rate of growth of some industries, increasing their share of the economy. This happens as a result of new investment projects or the expansion/modernization of existing projects. The superior technical performance and/or product characteristics enabled by imported technologies may strengthen the development of some industries. Thirdly, transferred technology may indirectly influence the conditions of activity in other sectors. It may help to strengthen the domestic industrial fabric and to enhance the capabilities and performance of related and supporting industries, which may be essential for domestic firms to gain competitiveness [14]. Assuming that adequate forward and backward linkages exist, transferred technology may induce structural adjustments in other industries. Examples would be the manufacturing of dyes for textile and clothing industries or the production of machinery for food industries.

All these adjustments may, in the longer run, produce positive outcomes such as the following:

- Accelerated growth of downstream and upstream industries and, hence, of the country's gross national product (GNP).
- More efficient exploitation of production factors in the recipient country.
- Increased international competitiveness of firms based in the country.
- A more balanced structure for the national economy.

The key determinant of the nature and extent of structural adjustments induced by imported technology in a developing country and of the ultimate impact on economic development is the degree of cohesion between technology transfer projects and the rest of the economy. The weaker the links between those projects and the national industrial and technological fabric, the more limited the scope of the change described above.

*Foreign trade*

Imports of technology to developing countries may have three types of consequences for foreign trade:

- An import substitution effect.
- An import creation effect.
- An export creation effect.

All these consequences will ultimately be transmitted to the recipient country balance of payments.

*Import substitution*

Technology transfer may lead to the substitution of domestically manufactured goods and/or services for imports. This happens for two reasons. First, imported technology may allow a reduction of unit production costs and/or increased quality and performance for the domestically manufactured goods, making them more competitive *vis-à-vis* their foreign equivalents. Secondly, it may allow the domestic manufacture of goods previously available only from abroad. In developing countries, the latter type of import substitution has been the most common. Import substitution could also cause shifts in the physical composition of imports as well as savings in foreign exchange once used to pay for merchandise purchased abroad. Import substitution policies may, however, also have detrimental side effects, particularly when tariff and non tariff protection creates an excessively sheltered environment that discourages learning and the pursuit of increased productivity. Thus, protection should be made very careful use of, the more so as it is increasingly limited under rules of the General Agreement on Tariffs and Trade (GATT). At the same time, incentives should be created for domestic firms to learn and increase their efficiency, which will allow them to compete successfully in international markets [15].

*Import creation*

Technology transfer often generates new streams of merchandise imports to the recipient country, thus changing the geographical and physical pattern of imports. The complexity of modern technological processes calls for appropriate productive inputs, most of which are not available in the developing countries and must be imported, e.g. high-quality raw materials, spare parts, and machinery and equipment.

In the extreme case, implementing imported technology in a developing country simply leads to the replacement of imported final goods by imports of the productive inputs needed for the new technology. Such a substitution occurs mainly when indigenous processing facilities are weak. It can also occur, however, even if the host country has a relatively well- established manufacturing base and supporting industries. In some instances, the global considerations of multinational corporate strategy, particularly their global purchasing policies, may neglect the resources available in the host country.

Apart from inducing imports directly connected with projects involving foreign technology, technology transfer may also induce merchandise imports not directly linked to those projects.

*Export creation*

Because foreign technology usually results in high quality (in terms of both type and workmanship) domestically produced goods and makes them more competitive in international markets, it may lead to the establishment of export sectors in the recipient country and in export expansion with new or modernized products.

Technology transfer may also stimulate indirect exports. One example can be found in licensing contracts covering the manufacture of intermediate goods (components, etc). If included in final products assembled locally, higher quality intermediates substantially increase the export potential of the country. Furthermore, some goods manufactured in the context of technology transfer projects may, when exported, gain a favourable reputation that opens opportunities for exporting other locally produced goods. Finally, technology transfer may induce exports from other sectors of the recipient's economy by virtue of the backward and forward linkages it creates.

In the longer run, imported technical knowledge may help to generate technology exports if improvements are made to foreign technology introduced by the recipient firm and if it induces innovative activity. This requires a commitment to mastering imported technologies as well as investments in R and D to improve the technologies concerned and to adapt them to the conditions prevailing in developing countries.

### *Domestic technological development*

Technology transfer may be an important means of enhancing the technological level of developing countries, as the experience of Japan and of NIEs clearly shows. In addressing this issue, a distinction should be made between the shorter and the longer run. In the short run, technology transfer enables the recipient firm (and hence, the recipient country) to increase and modernize its production capacity. In the case of product innovations, new products will be manufactured or the quality of existing ones improved. This allows manufacturing output to be upgraded, with positive consequences for domestic end-users or industrial customers and, eventually, for the firm, as it will be able to compete successfully in international markets. In the case of process innovations, the recipient firm obtains access to new technologies that enable it to manufacture existing goods more efficiently, to upgrade the performance of such goods or—if combined with product innovations—to manufacture of new generations of products. Technology transfer arrangements may also convey other elements of the modern manufacturing process, i.e. managerial, organizational and marketing knowledge.

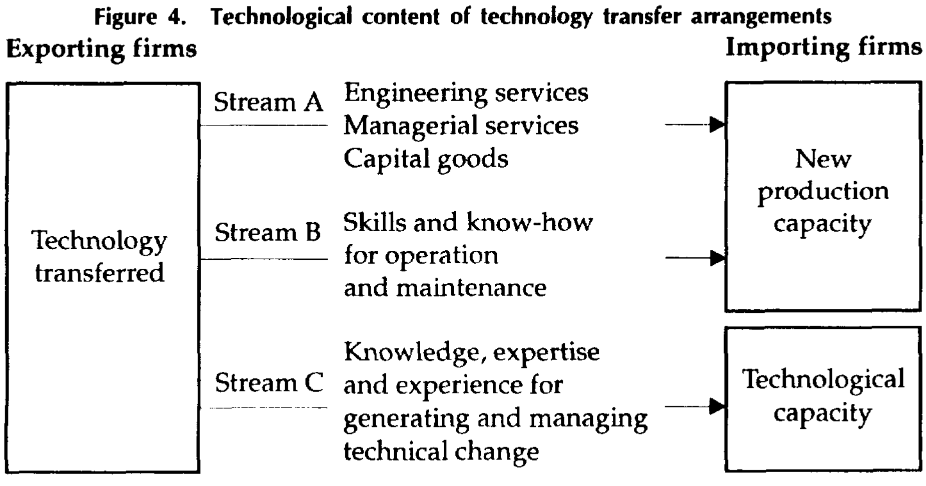
To assess the impact of technology transfer on domestic technological development, a longer run approach is needed, since an increase in production capacity does not necessarily raise the technological level of developing countries and firms. Such approach has to take into account both the importing firm's capability to cope with technical change and the diffusion, within national industrial fabric, of the technology concerned.

According to Scott-Kemmis and Bell [16], technology transfer flows may be broken down in three categories, as shown in figure 4. The first is stream A, which includes capital goods and technological services allowing the production capacity of the technology importing firm to be expanded. This flow basically corresponds to the inputs needed to deliver a new plant or to modernize an existing one. Taken in isolation, it does not enable the technology importer to efficiently use the facilities or to generate technical change.

The second category is stream B, which consists of operating and maintenance skills and know-how. It encompasses the various kinds of human-embodied knowledge and skills the recipient firm needs to operate and maintain the new or changed production system and to accumulate operating experience and learn by doing. Stream B is transferred through two channels: information codified in manuals, schedules formulae etc. and training and instruction, which may help to increase the human capital of the recipient. New and upgraded skills may thus be acquired through the training of the technology recipient's personnel, the employment of expatriate personnel during the implementation phase and the technical assistance provided by the supplier.

While the knowledge and skills communicated under stream B cannot, on their own, enable the recipient to master technological change, they unquestionably constitute a base from which recipient countries and firms can undertake intangible investments to upgrade their technological levels, going beyond skills that are purely operational. The possibilities of learning-by-doing (using stream B to improve the recipient firm's technology base in terms of operational skills and design knowledge) depend on the particular industry, on the absorptive capacity of the recipient firm and on the firm's effort to understand in depth the principles governing technology utilization.

**Figure 4. Technological content of technology transfer arrangements**




*Source*: D. Scott-Kemmis and M. Bell, "Technological dynamism and technological content of collaboration", *Technology Absorption in Indian Industry*, Ashok V. Desai, ed., (New Delhi, Wiley Eastern Ltd., 1988).

Finally there is stream C, composed of the knowledge and expertise required for implementing technological change. This stream corresponds to a deeper level of technological knowledge, since it goes beyond operational and maintenance knowledge to encompass design capabilities. It includes two types of flows. The first is the knowledge of the principles underlying production processes, product design and material inputs; usually called "know-why", this kind of knowledge enables the recipient to replicate and modify the production system [13]. The second encompasses "the particular types of expertise required to apply those principles in designing and implementing technical change, and to organize technological improvement programmes" [17]. It is the mastering of this stream that enables the recipient firm to cope with technological change, and to strengthen its technological capacity in the long run.

However, a significant portion of the supplier's stock of the latter type of knowledge is not easily transferable. In fact, it is highly firm- and location-specific, making the communication very difficult. Even when it is not so, suppliers will not be very interested in providing this knowledge to independent firms. Therefore, its acquisition requires a very committed effort from technology recipients. It implies a good absorptive capacity together with a strong emphasis on learning. It may even be necessary to launch R and D activities within the recipient firm in order to fully master technological principles and to build dynamic capabilities.

So far, the analysis has dealt with the relationship between technology transfer and technological development at the firm level, emphasizing the importance of a firm's in-house technological effort and learning commitment to internalize imported technology. However, as was pointed out above, a technology-importing firm is embedded in a national system of innovation, and its ability to master technological change very much depend on the overall level achieved by that system as well as on the efforts being made by its various elements. There must be a policy on innovations that will stimulate cooperation among the different institutions (industrial enterprises, research institutions, the educational system, financial organizations, government agencies) in building up technological, human, and organizational resources for assimilating foreign technologies and for generating technological change [18].

The World Development Report 1991 of the World Bank notes that one of the clearest lessons of the Japanese and East Asian experience is the value of importing and building on established technology from abroad. The countries that relied heavily on imported technology have also made very strong and deliberate efforts to build up their domestic technological capability.

In this vein, conditions should be created not only to improve the ability of domestic firms to acquire foreign technologies, but also to promote their diffusion throughout the industrial fabric. Diffusion is, in fact, essential to fully exploiting the benefits of international technology transfer in developing countries. The faster diffusion occurs and the greater its scale, the stronger its impact.

Diffusion can take place in three main ways, which partly overlap. The first is a consequence of current interaction between the technology importer and the set of organizations with which it works. Upstream and downstream relationships are probably the most powerful channels for technology diffusion. Suppliers influence their customers to adopt new technologies, particularly in those industries where technological modernization is mainly a question of new machinery and equipment or to intermediate inputs. Customers also play an important role, whether by directly communicating new technologies and organizational approaches to subcontractors or by specifying the desired product characteristics. The second way in which technology diffuses is by demonstration effects: competitors come under pressure to imitate imported technologies, by introducing the same or similar technical solutions to defend their competitive positions or by themselves engaging in technology transfer activities. The third diffusion mechanism corresponds to the purposeful activities of government agencies. Governments have launched demonstration agencies or technological centres to diffuse horizontal technologies, such as information technologies or biotechnology throughout the domestic industrial fabric. In many countries, a firm that agrees to adopt a specific technology is given strong financial support on the condition that it acts as a demonstrator, promoting the advantages to be reaped from adopting the technology.

The process of domestic technological development described above will enhance a domestic firm's absorption capabilities and bargaining power and will, therefore, improve technology transfer terms and conditions in the future. The more technologically capable a firm is, the better positioned it will be to select, negotiate and assimilate technologies. The content, including the contractual clauses, of a technology transfer transaction will in general be associated with the technological competencies the recipient firm has developed and with the innovative environment in which it operates.

## Technology transfer mechanisms

In discussing the role technology transfer plays in economic development within a host country, no distinction has so far been made between the impact of the technology itself and the impact of the means by which it is transferred. In developing countries, this distinction is very significant, especially when it comes to tailoring technology transfer and development policy packages and measures.

A first distinction has to be drawn between simple, one-shot transactions and more complex, packaged forms of transfer. In the former, the impact of technology transfer is short-term and confined to a limited number of economic agents and socio-economic relationships. For instance, the simple purchase of machinery conveys the knowledge that is embodied in the machine, but does not usually generate dynamic interactions between suppliers and customers that transfer additional knowledge. Even when accompanied by the transfer of knowledge and skills needed to operate it, the machinery does not give the purchasing firm unique capacities since it can be obtained in the marketplace by competitors. In more complex transfers, the links established between technology recipient and supplier tend to be deeper and more long lasting; while the assets exchanged may include hardware, the most important components are knowledge, expertise and industrial property rights. The changes brought about by these forms of transfer (e.g. licensing, joint ventures, subcontracting) reach much deeper and affect a much broader scope of economic subjects, including the socio-economic environment.

As was mentioned previously, there are many mechanisms for international technology transfer. Each has its merits and shortcomings. A judicious choice has to be made, bearing in mind the characteristics of the technology sought (the more codified it is, the easier it is to rely on arm's-length channels), the behaviour of potential suppliers, and the domestic firm's bargaining power and absorptive capacity. If not properly managed, these transfer processes can also produce undesirable side effects, such as balance of payments deficits or excessive technological dependence.

The analysis of the historical experience of the NIEs of East Asia (Hong Kong, Republic of Korea, Singapore and Taiwan Province of China) shows that different technology transfer mechanisms were chosen. A study by Hobday [19] identified the main mechanisms used by the firms of those countries to build bridges into international markets and to acquire technology (table 1). According to him, OEM was the most important channel for technology acquisition in the Republic of Korea, Taiwan Province of China and Hong Kong in the 1980s, whereas foreign direct investments was the most significant mechanism in Singapore.

Historical evidence also shows that the mix of mechanisms used changes over time. As countries and firms move along the learning curve and the technology development path, new alternatives are opened, in so far as absorption capability enables improved selection and adaptation. However, evidence shows that in recent years it has become more difficult for NICs to catch up as firms approach the technological frontiers of the industries concerned [20].

Special attention should be devoted to the more complex mechanisms for technology transfer to developing countries, such as foreign direct investment. Foreign direct investment can be considered as a package of economic assets representing various elements of competitive advantage, including technology, being transferred to the host country. Production technology is only one of the many assets, so its impact on the economic development of the recipient country should be evaluated jointly with that of the remaining assets in the economic package. The following ought to be taken into account:

- Foreign capital as a means of financing economic development and increasing the efficiency of resource utilization.
- The effect on the balance of payments, bearing in mind the inflow of foreign capital, the (expected) outflows of profits, dividends and royalties as well as influence on trade flows (namely, export performance and the terms of trade).
- The impact on job opportunities, not only in quantitative but also in qualitative terms (do the jobs require more sophistication and expertise).
- The influence on wages and salaries, bearing in mind the skill requirements of the job created.
- Foreign investment as a source of tax revenues, taking into consideration not only the increase in taxable income due to foreign subsidiaries' activity but also the income eventually forgone by having granted tax incentives to induce the foreign investor to establish itself in the country.
- The locus of effective control over national assets.
- The effects of foreign investment on the exploitation of national resources.
- The impact on domestic competition and the market structure, by either the creation of new industries and the encouragement of new initiatives or the displacement of existing domestic competitors.
- The internationalization and modernization of the economy, by attracting other foreign investments, by promoting the internationalization of domestic firms or by facilitating contacts with foreign banks, financial markets, sales organizations etc.
- The influence of foreign subsidiaries on the diffusion of new skills, managerial, organizational and technical, throughout the domestic economic fabric. It may take place through job mobility, demonstration effects on domestic firms and

the establishment of linkages between foreign firms and the domestic industrial, scientific and technological fabric.

- The impact of foreign investment on domestic suppliers; foreign firms may energize local industries (suppliers and subcontractors).

Company acquisitions and strategic partnerships require, at the outset, that the firms in developing countries are capable of entering such relationships. Company acquisitions may be an interesting way to achieve three objectives: to acquire technology, to have a presence in dynamic and sophisticated markets and to keep abreast of technological change. They imply, however, significant resources, not only financial but also technological. To enter strategic partnerships, these firms need to have enough assets to be accepted as partners by foreign companies. If the purpose is to undertake joint technological developments, a significant existing technological capacity will be needed. These two mechanisms are important, therefore, but they are beyond the reach of the overwhelming majority of developing country firms. Indeed they are relevant only for the most dynamic firms in those developing countries that have achieved higher levels of technological development [21].

**Table 1. Mechanisms of foreign technology acquisition and market entry used by Asian NIEs**

| | |
|---|---|
| Joint ventures | Under jointly owned companies, the newly industrializing partner gains direct access to training and technology. The foreign firm secures low-cost production. The firm in the newly industrializing county is a junior partner and a recipient of technology. |
| Licensing | A local firm pays for the right to manufacture a product under license from a foreign firm. This normally requires more technical capacity on the part of the local firm than does a joint venture. |
| Imitation | A local firm imitates the activity of the foreign transnational company (e.g. in the production of consumer electronic goods). |
| Subcontracting | A local firm manufactures a component or sub-assembly for a foreign manufacturer located either in the newly industrializing country or overseas. |
| Foreign buyers | A foreign buyer contracts a local firm to supply products for distribution into advanced markets (e.g. J. C. Penney in the United States and Mitsui in Japan). |
| OEM | Original equipment manufacture is a specific form of subcontracting. Like a joint venture, it requires a close connection with the foreign partner. In an OEM arrangement, the local firm produces a product to the exact specification of the foreign company. The foreign firm then markets the product through its own distribution channels, under its own brand name. OEM often involves the foreign partner in the selection of equipment, training of managers, engineers and workers. It is to be contrasted with own design and manufacture, ODM, where the local firm designs the product to be sold by the transnational. |
| Informal means | Informal mechanisms include hiring-in key foreign engineers and managers, training in universities abroad, copying, reverse engineering, and recruiting local engineers trained in foreign companies. |
| Company acquisitions | Firms in NIEs have recently purchased overseas companies to acquire skilled workers, managers, equipment and distribution outlets (for example, the purchase of small Silicon Valley companies in California). |
| Strategic partnerships | These are arrangements in which the firm in the NIE develops a technology in equal (or near equal) partnership with a foreign company. |

*Note*: The mechanisms apply to each of the four countries to varying degrees.

*Source*: M. Hobday, "Export-led technology development in the four Dragons: the case of electronics", *Development and Change*, vol. 25 (1994), pp. 333-361.

Informal means are an important way for developing country firms to build up their technological base and increase their organizational ability. If these companies want to be internationally competitive they need highly skilled human resources: it is people who acquire and apply knowledge. Furthermore, the upgrading of skills enables firms to increase their absorptive capacity, thereby increasing their possibilities for further progress.

Imitation activities are a fact of life. They are continuously occurring in business. A highly lauded management tool such as benchmarking is, in essence, based on the ease with which the behaviour of the "best in class" can be identified, understood and learned from. Developing country firms may, in the short term, be able to resort to imitation, because they have the advantage of lower wages. However, simple imitation is not enough for a firm to achieve a sustained competitive advantage. It must become "creative imitation". In any case, imitation is not that easy: to successfully imitate, a great deal of prior knowledge is needed.

The recourse to foreign buyers, to subcontracting and to OEM arrangements are all good devices to simultaneously obtain technology and get acquainted with foreign markets. These mechanisms need, however, to be used judiciously. Excessive dependence on just one partner should be avoided, and there should be a learning perspective, to enable the firm to build on the technological and marketing knowledge acquired.

To sum up, the characteristics of the technology to be acquired are not independent from the mechanisms to be used. The mix of mechanisms depends not only on technological aspects but also on the resources and absorptive capabilities of the firms and on the development level of the countries concerned. Careful choice of mechanisms and careful management of relationships are essential for maximizing the potential positive impact of technology transfer.

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# Module 2

## THE TECHNOLOGY MARKET

*Businesses and countries alike approach a technology transfer market as they do any other, as suppliers and buyers. This module discusses the technology transfer market: its nature, the determinants of price for technology (the strong position of sellers and the weak position of buyers) and the market's basic features (high concentration by country and industry). The motivations and strategies of technology suppliers are discussed and their reasons for choosing foreign direct investment, exporting or licensing are considered. The module then addresses the technology buyers and the advantages and risks that await them in the marketplace. Lastly, it recommends strategies that technology buyers should employ when seeking a partner for technology transfer.*

# Contents

# THE TECHNOLOGY MARKET

### Introduction

For the purpose of this module, technology can be thought of as the system of knowledge, skills, experience, and organization used to produce and utilize goods and services to satisfy human demand for sustenance and comfort. Thus, technology transfer means much more than the simple exchange of a product, process or service. It includes all of the supporting systems and development processes for a product, process or service that may result from an exchange of knowledge, skills, experience and organization. This distinction is important because there are fundamental differences in each party's rights and liabilities when negotiating for technology either in its embodied or disembodied form as compared to buying goods. The definition of technology used here is fairly broad and roughly similar to other definitions available in the literature.

### Technology transfer market

Businesses trade in technology in world markets just as they do in other services and goods. That is, they trade the knowledge used to produce goods and services. Mostly, this is proprietary technology, knowledge that a firm can control, much of it protected under laws of the legal systems of many countries. Traded technology includes management methods and techniques, as well as knowledge that becomes embodied in tangible products such as operating manuals, specifications, patents or computer software. It also includes disembodied knowledge, know-how, that exists only in people's heads or in organizational routines.

#### *Non-commercial technology flow*

A substantial part of technology flow occurs outside the technology transfer market itself. That is, technical knowledge spreads internationally by non-commercial forms means, and it may even be transmitted free of charge. When foreigners who have studied engineering and science at a country's universities eventually return home, they take technology with them. Competitors engage in reverse-engineering, pervasive in the semiconductor technology. Foreign subsidiaries of multinational companies (MNCs) are staffed largely by local people; when they leave for other jobs, their knowledge goes with them. National and international professional societies hold meetings at which considerable amounts of technical knowledge are presented, both in formal and informal sessions. These examples illustrate the iceberg theory, which claims that visible, commercial technology transfer (reflected in financial transactions) constitutes only a small portion of all technology flows.

One common form of non-financial technology exchange, especially in the computer and microelectronics industry, is cross-licensing. It is for many companies a way of spreading the risk of R and D and is carried out with almost any firm, domestic or foreign, capable of generating comparable technical knowledge. The most important reason potential competitors agree in advance to share all patents is to avoid having to perpetually monitor possible patent infringements around the world and the costly lawsuits that result. Also, they can avoid worrying about infringing each other's patents. Another reason is simply to gain access to technologies that can help fill out product lines.

Technology transfer may also be effected through long-term international cooperation of the kind known as joint ventures. Both non-competing and competing companies use this practice. Motives for joint ventures range from market entry (for one of the partners) to limiting exposure to financial loss in an unfamiliar setting. Escalating costs have also pushed firms to form joint ventures. Such combinations are successful if each partner meets its own objectives, which may involve matters such as taxes, financing and risk, in addition to technology.

#### *Commercial technology flow*

Arms-length agreements between unaffiliated companies for technology, though large in number, are considerably smaller in value than technology that flows between affiliates. At most, they are estimated to account for 30 per cent of the total. This means that a substantial portion of technology flows in the world are actually internal transactions within MNCs, i.e. between the parent company and its foreign subsidiaries or between subsidiaries in different countries. Intra-corporate licensing remains largely hidden from government view, primarily because charges between divisions of the same company will seldom adequately reflect the value of the technology flow. For this and other reasons, statistics on the technology transfer market have many distortions.

With the above in mind, this module includes internal corporate markets in the notion of a technology transfer market. A technology transfer market is defined as technology transactions effected on a commercial basis and reflected in corresponding financial flows.

### Nature of the technology transfer market

The properties of the international market for technology derive to a substantial degree from the nature of the commodity being traded, i.e. technical knowledge. Compared to other goods, technology reveals several peculiar features:

- Knowledge is intangible
- Knowledge is cumulative
- Knowledge cannot be consumed
- Knowledge is easily transmitted
- Knowledge is transnational.

The peculiar nature of technology stems from the fact that, unlike material goods, it constitutes an intellectual commodity. Its essence is information that enables the production process. Whereas their physical content and structure largely determine the utility of material goods, the utility of technology is an ever-increasing knowledge base that enables the production of a continuous stream of new products and services for mankind.

The process of generating technical knowledge differs substantially from the process of producing material commodities. It has a cumulative character, which means that the present stock and level of technologies in the world result directly from the scientific and technical developments achieved by past generations. In other words, the "production" of technical knowledge has been made possible by the creation and accumulation of inconsumable resources in the past. The cumulativeness of technology means that it is sometimes difficult to directly link a discovery that extends our understanding of the surrounding world and a concrete innovation that derives from the general idea. This contrasts with the manufacturing process, where we can easily identify the origin and components of material products.

Technology, as a production factor, does not wear out physically. However, because technical knowledge accumulates continuously, existing technology becomes obsolete and is replaced regularly. In other words, technical knowledge wears out only economically, whereas material goods wear out both physically and economically. The physical inconsumability of technical knowledge implies one more salient feature of this commodity, particularly important from the perspective of its market value: a given technology can be sold and used for a practically unlimited number of times without diminishing its substance. Depending on the number of transactions, sales revenues may be many times greater than the costs of technology "production". In other words, the elasticity of supply of technical knowledge is, in the short run, close to infinity, which is not the case with any other commodity.

The ever-growing scale and rate of technology dissemination outside national boundaries stems from the ease with which it is transmitted. Owing to the rapid development of telecommunications and computer communication networks, technology has become more mobile than ever. As a result, the lag-time between discovery or technical development and worldwide dissemination of the relevant information has shortened dramatically. Indeed, the flow of information around the world today is so much faster, cheaper and easier than ever before that many refer to earth as "the global village".

The cumulative process of generating technical knowledge has a transnational, worldwide nature. Technology flows around the world through many channels. Almost any technology is available to almost any firm with the money and skills to use it. General ideas created in one place often are appropriated and developed by people in other places. This dynamic process involves both non-proprietary and proprietary technical knowledge. Despite the differing degrees of access to them in the short run (non-proprietary knowledge flows freely between countries whereas proprietary knowledge is strongly protected), in the long term technology is diffused on an international scale, either when it is sold or when competitors develop similar innovations or introduce their improved versions.

### Price determinants for technology

Markets for technology do not work as well as markets for products. The nature of a given technology is secret and seldom advertised. Buyers and sellers have trouble finding each other. Proprietary technologies may be available from only one firm, with a scattering of near and not-so-near substitutes. Because technologies have fewer buyers and sellers than more ordinary goods, pricing becomes uncertain. Neither party, particularly the buyer, has a clear idea of a technology's worth. Considerable adaptation and re-engineering may be needed before a technology developed in one country or company can be used in another. The cost of this, which may be high and uncertain, can reduce the potential returns. For such reasons a technology package may be priced by rules of thumb and may depend on negotiating skills and relative bargaining power rather than the "value" of the technology that a better-developed market would establish, and price-setting is one of the most distinctive features of the technology transfer market. With these comments in mind, the unique nature of the factors influencing technology pricing are examined more closely.

*Dual protection for proprietary technology*

A key determinant of the price of technology stems from the fact that suppliers are in a monopolistic or oligopolistic position most of the time, while recipients have insufficient knowledge about the technology package before a transaction takes effect. This differs significantly from the situation for nearly all other conventional commodities. The roots of technology monopoly can be found in the intellectual nature of technical knowledge. Technical information constitutes the very core of this commodity and cannot be revealed before the transaction is effected. The owner of technology, in other words, has an information monopoly that is strengthened by legal protection under patent systems and other intellectual property rights. The supplier's exclusive advantage remains in place during the life of those rights.

Proprietary technology, then, often consists of technical information in the form of trade secrets and know-how that are protected by legislation on intellectual property. This gives the owner of the technology something of a double security system. Even if the technology monopoly is broken, the legal monopoly still provides protection: a potential buyer can access proprietary technology only when he legally acquires rights to the use of such technology.

*Unequal bargaining positions*

Restricted access to technology stemming from the character of technology monopoly and the essence of the commodity being traded make the bargaining position of the buyer and seller much different from in other, even highly monopolistic, commodity markets. The weak negotiating position of a buyer derives from a lack of information regarding the technology he is endeavoring to acquire. Additionally, the buyer often has very limited possibilities of comparing the contract terms and conditions offered by a technology supplier with the conditions granted to other customers (they are subject to commercial secrecy). As a result, a substantial portion of the price and other conditions for acquiring a technology, as opposed to a commodity, reflects the monopolistic nature of technology.

*Relative technological knowledge bases*

An additional factor impairing the bargaining position of a technology buyer, which may be particularly strong in developing countries, is discrepancy between the levels of technological and economic development of supplier and recipient—both in general and with respect to the given technology. The greater the technological gap, the lower the buyer's general economic efficiency, the less capable he is of effectively absorbing, assimilating and implementing imported innovations and the knowledge he has of the technology to be purchased and alternative technical solutions. The relative ignorance of the technology buyer is a key factor in the balance of strength between the parties involved in technology transfer transactions. In other words, the less a buyer knows about the essence and characteristics of the technology he wants to acquire, the higher will be the price.

*Buyer's development capability*

The generally low level of development in developing countries creates another disadvantage in establishing the price buyers pay for technology. One of the best ways to keep the price competitive is to have other alternatives. If similar technology is not available from a different seller, another option for the buyer is to develop the needed technology on its own. In general, however, the circumstances prevailing in many developing countries make developing technology very difficult, time-consuming and risky, if not impossible. Consequently, the buyer may have no choice but to pay a price for the technology that will be higher rather than lower.

## Technology transfer market features

To better understand the features of technology transfer markets, the world trade in licences was analysed. Technology in its pure form has been most frequently transmitted between countries by means of licences covering patented inventions, blueprints, technical assistance, trade marks, copyrights and know-how.

*Geographical concentration*

The most striking property of the world technology trade is its extremely high degree of concentration. The overwhelming majority of licence exports come from developed market economies. The share of developing countries and centrally planned economies does not exceed 1 per cent. Consequently, most of the technology sold to developing countries comes from the developed countries. Studies by the United Nations Conference on Trade and Development (UNCTAD) show that such transactions represent a mere 10 per cent or so of the worldwide total, as most technology sales are concluded between the industrialized countries. A report by UNCTAD on the growth, direction and composition of technology flows between 1985 and 1988 described the rapid expansion of technology flows among developed market economies and the continued low level of technology flows to developing countries.*

A study prepared for the Forecasting and Assessment for Science and Technology (FAST) programme of the European Community in June 1992 confirms those findings. A sampling of international collaborative agreements between firms in the field of technology showed the overwhelming predominance of agreements made within and between the developed economies. In general, nearly 90 per cent of the surveyed agreements registered in the 1980s were made between companies from the "triad" of Europe, Japan, the United States of America and other advanced economies. Technology sharing between the triad and newly industrializing countries (NIC) companies and between the triad and developing country companies accounted for shares of just over 6 per cent and nearly 4 per cent, respectively.

At the country level, the huge concentration of technology licences (much higher than for other commodity markets) is even more striking. As much as 90 per cent or more come from France, Germany, Italy, Japan, Switzerland, the United Kingdom of Great Britain and Northern Ireland and the United States of America, with the last-mentioned having about 50 per cent of the total and the other countries having shares from 4 to 10 per cent.

*UNCTAD, "Transfer and development of technology in a changing world environment: the challenges of the 1990s" (TD/B/C.6/153).

### *Company and industry sector concentration*

World trade in licences is highly concentrated not only at the country level but also at company and sectoral levels. The bulk of technologies in the world up to 80-90 per cent are disseminated through MNCs. It is worth stressing again that intra-company trade (so-called internal transactions) accounts for the major part of technology flows channeled via MNCs. The share of internal transactions in the total world license turnover has grown continuously (see table 2). The general trend is a high number of transactions between affiliated, as compared with non-affiliated, companies. In the 1950s this share amounted to approximately 50 per cent; by 1975 it had grown to 65 per cent, and in the 1980s it was 70 per cent. High-technology industries displayed the highest share of internal transactions.

Technology flows within the MNCs have as a rule taken only one direction, i.e. from headquarters to subsidiaries. This regularity stems, among other factors, from the existing division of labour between the parent firm and its foreign affiliates in generating and diffusing innovations. According to some recent estimates, the share of the foreign subsidiaries of United States companies in the total R and D expenditures of those companies has totaled only 10 per cent.

## *Broader technology transfer market economic context*

### *Technology trade vs. technical position*

The technology transfer market is strongly related to innovative (R and D) activity. The position of countries in the international technology transfer market is positively correlated with their innovative potential, the extent of their technology utilization, and produc-

**Table 2. Composition of technology receipts (royalties etc.), 1975-1990**

| | *United States* | | | *United Kingdom* | | | *Germany* | | |
|---|---|---|---|---|---|---|---|---|---|
| *Year* | *Total receipts (million $)* | *From affiliates (per cent of total)* | *From unaffiliated licensees (per cent of total)* | *Total receipts (million £)* | *From affiliates (per cent of total)* | *From unaffiliated licensees (per cent of total)* | *Total receipts (million DM)* | *From affiliates (per cent of total)* | *From unaffiliated licensees (per cent of total)* |
| 1975 | 2 643 | 1 886 (71.36) | 757 (28.64) | 274 | 87.75 (31.75) | 187 (68.25) | | | |
| 1980 | 4 998 | 3 693 (73.89) | 1305 (26.11) | 488 | 201 (41.19) | 287 (58.81) | | | |
| 1985 | 6 121 | 4 222 (68.97) | 1899 (31.03) | 969 | 500 (51.60) | 469 (48.40) | 1 693 | 1 559 (92.08) | 134 (7.91) |
| 1988 | 10 968 | 8 455 (77.09) | 2513 (22.91) | 1 098 | 656 (59.74) | 442 (40.25) | 1 898 | 1 769 (93.20) | 129 (6.79) |
| 1990 | 15 507 | 12 062 (77.78) | 3445 (22.22) | | | | 2 434 | 2 271 (93.30) | 163 (6.69) |

*Sources*: Based on data from the United Nations Department of Economic and Social Development, *World Investment Directory* (United Nations publication; Sales No. 93.II.A.9), vol. III; United States Department of Commerce, *Survey of Current Business*, various issues; Deutsche Bundesbank *Monthly Report*.

tivity of their R and D, as measured by the number of patents granted at home and abroad for local inventions. A country's overall technical position is often referred to as its technological orientation.

The absolute amount of resources devoted to R and D activities and to the productivity of those activities, as reflected in the number of patented inventions abroad, helps to explain the dominant position of the United States as the greatest exporter of licences (about 50 per cent of the world total). Research expenditures in the United States exceed by several times those in other major industrialized countries.

### *Licensing and patenting/licensing and exports of technology-intensive products*

It is generally accepted that there is a correlation between licensing of technology and patenting of inventions in the recipient country. Technology owners would feel more inclined to license their technology to countries where it has been granted patent protection. The findings of several studies support this contention. There is also believed to be a correlation between licensing of technology to a certain country and that country's exports of technology-intensive products. However, this correlation is not so obvious, and results recorded by countries in these two fields attribute a high level of technology that is, capability to generate technical knowledge, to implement production and to proliferate it inside and outside the economic system, to the efficiency of a country's innovative potential.

### *Technology trade vs. foreign direct investment*

An essential characteristic of the technology transfer market is the strong relationship between technology trade and direct foreign investment. A distinct, positive correlation exists between exports of licences and exports of capital. The case of the United States is illustrative: that country has been the leading world exporter of capital, and its firms have the highest level of international, commercial and financial activities. In 1980, the United States share in the cumulated stock of foreign direct investment amounted to 48 per cent of the world total, while its share in the total export of licences equalled about 50 per cent.

### *Technology trade and markets for other services*

Trading in licences has also displayed a close relationship with markets for investment goods and highly skilled labour. This derives from the fact that technology acquisition, as a rule, constitutes one element in a larger contract (e.g. turnkey plant) or includes a flow of machinery and/or equipment. The start-up of licensed production, in turn, often requires technical assistance from technology suppliers, consultancy services, training of personnel etc.

### *Sophistication level of licensed technology*

Frequently, MNC licences to non-affiliates are for technologies of an intermediate generation, i.e. not their latest technology. Technologies licensed to independent companies by MNCs may be significantly older than those licensed to their foreign subsidiaries. A non-affiliated licensee looking for the most recent technology should be aware of this during negotiations.

### *Main features*

The above analysis highlights the following salient characteristics of the technology transfer market:

- Monopolistic features in many segments of the market
- Weak bargaining position of buyers
- Easy segmentation of the market
- High degree of geographical concentration of supply and demand
- Strong correlation between technology trade and R and D activity
- Correlation between patenting and licensing and between technology-intensive exports and licensing
- Close linkage between technology trade and foreign direct investment
- Enhanced markets for investment goods and skilled labour
- Relative obsolescence of technologies sold, particularly to independent firms
- Deeper and stronger links between recipient and supplier than in the case of merchandise trade.

## Technology suppliers: motivations and strategies

Under the circumstances prevailing in developed countries (strong competition, oligopolistic market structures, high average incomes and relatively small disparities in income distribution), technology has become one of the most valuable assets and an important means of securing and strengthening a company's competitive position. Contemporary competition, particularly in the most research-intensive industries, has been based on a continuous effort to innovate and a constant implementation of innovations. A technology-based competitive advantage enables companies from developed countries to undertake foreign expansion even though faced with the high costs of market entry resulting from a lack of experience and knowledge of the local environment.

### *Methods of foreign market entry*

Technology, as defined herein, is not usually produced for sale. Instead, it is seen as a key asset. Firms in developed countries use technology, together with marketing and managerial expertise, to increase their market share in both domestic and, to an increasing extent, foreign markets. The export of technology and technological products can be an important source of additional income and is a strategy practised by most technology-based companies. The main entry methods for technology into foreign markets are the following:

- Licensing
- Exporting commodities that embody technological innovation
- Setting up sales networks abroad
- Establishing an assembly and/or packing facility
- Establishing a joint-venture company
- Establishing a fully owned or majority-owned foreign subsidiary.

If the goal is foreign market entry for a technology-based product, however, there are only three alternatives: make it abroad yourself, export it or license it.

The technology transfer market itself is imperfect. In general, technological dependence arises when most of a country's technology comes from abroad. In the present worldwide situation, the international technology transfer market is essentially a seller's market, particularly for developing countries. Practically all of the technology transferred to developing countries comes from developed countries. This enables technology-based companies to expand abroad by direct investment in fully owned affiliates, thereby maintaining a competitive advantage for a relatively long time. This strategy provides maximum profit but entails greater risk than, for instance, licensing should the market entry prove unsuccessful.

Foreign direct investment is deemed the preferred option in foreign expansion when a firm's competitive edge rests on technological innovation and the related know-how. The possibility of greater profit explains, in part, this strong desire for direct investment, as does the greater control over and protection of technology that direct investment allows. Among company strategies for foreign market entry, exporting, if viable, is also preferred to licensing because it offers much greater profit potential. Licensing an independent company abroad is considered third-best option for foreign expansion. Once its risks diminish or completely cancel out a competitive advantage (because it is very difficult to control a licensed technology), and it returns the least profit. To protect the technology advantage, it is therefore safer to export a ready product embodying the technology or, even better, to manufacture it in a wholly owned or a majority-owned foreign subsidiary, thereby maintaining maximum control over the technology.

In summing up, licensing a technology to independent foreign firms as a method of entering foreign markets has seldom been a real alternative to foreign direct investment or exports, mainly because of the high risk of losing control over the technology and decreasing profit potential. Comparisons between licensing, exporting and foreign direct investment, as methods of servicing foreign markets, are relevant only in situations where a real choice exists, that is, mostly for large and medium-sized corporations. For many small companies, the choice is between exports and licensing, and sometimes the latter is the only possibility of exploiting technology advantages abroad, owing to limited resources, lack of experience in foreign operations and the small scale of production, among other factors. Despite the priority generally given to foreign direct investment and exports as vehicles of international expansion by companies from developed countries with a technology advantage, there are situations where licensing technology to independent firms becomes a preferred option.

### *Reasons for licensing technology*

For technology suppliers, technology transfer is not necessarily an objective in itself, but it can be a way of achieving certain objectives to fit their worldwide business strategy. A number of objectives favour licensing:

- Optimizing limited resources
- Gaining or keeping a market
- Acquiring production factors at lower prices
- Gaining access to raw materials supplies
- Maximizing the use of assets not usable otherwise
- Establishing a strategic relationship.

### *Technology licensing strategies*

The choice of licensing as a means of penetrating foreign markets should be related, first, to company strategy and, secondly, to the type and amount of resources owned. The first factor has two parts: technology generated by the company and the extent of product diversification. The second relates to the relative size and financial strength of the company, its level of experience in foreign operations and several other factors.

*Technology supplier's research intensity*

A strong positive correlation exists between the supply of technology in a company and its research intensity, on the one hand, and the number of licenses sold and the value of receipts on the other. This correlation stems from the technological supremacy of the licensor that has a secure position and no reason to fear being undermined in the future by the licensee. Equally important, a high research intensity enables frequent replacement of obsolete technologies by new generations of technology, which increases the stock of innovations to be licensed out.

Such a firm also frequently makes minor process innovations (e.g. galvanization of the steel, anodization of aluminium) that are by-products of R and D or whose commercialization is not feasible at the moment. Such innovations, often called peripheral technologies (as opposed to core ones), are most likely to be licensed since they are not of strategic importance to the company.

*Degree of product diversification*

Diversified companies tend to license more of their innovations than one-product or non-diversified firms. Their risk of losing competitive advantage to a licensee is not too significant when only a single product out of an entire range of products is involved. Moreover, since diversified companies must stretch their resources to cover the whole product mix, they grant licences abroad to gain revenues with which to support foreign operations.

*Company size*

As a rule, smaller firms tend to license their technologies because they simply do not have the management or cash resources to operate international subsidiaries or to establish export businesses. In these situations, licensing is an effective way to expand international business and generate additional income.

*Foreign operations experience*

Companies that lack experience in foreign operations are likely to license their technology to independent foreign firms until they gain the needed knowledge from their licensees.

*Technology exchange reciprocity*

This approach to licensing known as cross-licensing aims to gain reciprocal access to technology and markets controlled by competitors. Cross-licensing takes place mainly in industries such as electronics and pharmaceuticals, which have high R and D costs, fast expanding markets, diversified production and fast technological progress. This approach precludes the need for excessive monitoring of patent infringement.

*Technological pace*

In situations where technological changes are very dynamic, innovations quickly become economically obsolete. For example, in semiconductors, licensing a technology entails a risk albeit a small one, of creating a competitive threat from the licensee.

*Licensing late life cycle products*

Licensing products that are becoming obsolete carries little risk. As technology nears the end of its life cycle, it will be replaced with new technology products anyway. Generally, companies do not license products in the early or middle stages of their product life cycle. Licensing is more likely for mature products.

*Government policies*

Government policies on technology transfer may influence the options of the technology owners, in some cases limiting or preventing direct investment in the country or exports to it. Licensing a well-financed, technically competent firm in such a country can be an effective solution.

*Relationship building*

Licensing can also be a prelude to further cooperation between the technology seller and buyer. Such cooperation may include a future share in the equity capital of the licensee, continuing cooperative transactions after the contract expires, and/or setting up a joint venture in the buyer's country or in a third country.

*Additional revenue sources*

Another incentive for licensing stems from the possibility of achieving extra profits from accompanying transactions such as the following:

- Sale of raw materials and parts to the licensee
- Purchase of the licensee's products for less than it would cost the licensor to produce them
- Advance fees for future improvements
- Joint participation in tenders and construction ventures
- Technical assistance
- Quality control and product testing for the licensee
- Training of personnel
- Erecting turnkey plants.

Revenues from accompanying transactions often may exceed the value of licence fees. Sometimes the extra activities related to a licence contract are so broad that the licence in question remains only a cover for them. For example, the income from a licensor's sale of the raw materials needed for the licensee's production of the licensed product will almost always exceed the income from royalties.

## Technology buyers: potential advantages and risks

### *Advantages of buying technology*

A prospective licensee's point of view is naturally narrower than the licensor's. The technology buyer focuses on assessing the business opportunity in his home country, the market and customer needs and the competitive environment. He is primarily interested in being able to profitably use the technology to expand current business, enter new markets, offer new products, or upgrade existing operations to be more cost-efficient and productive.

Smaller companies often have little or no formal R and D, so new technology or improvements must be sourced externally. For this reason and for many of the same reasons that a licensor seeks qualified foreign companies, a company in the market for new technology usually looks to an industry leader as the potential supplier of the needed technology.

The advantages of buying technology can substantially outweigh the disadvantages, provided the technology package can be obtained at a fair value and that it offers the licensee an economically feasible business proposition. Usually, the key factor is obtaining "appropriate technology," which is discussed later in this module.

The potential advantages of licensing technology are as follows:

- Licensing of a developed product can be the fastest, least expensive means to enter a market with a new or proven product and/or process.
- Avoiding the high cost of research and development, the often lengthy time required to take a product concept to the commercial stage, the risk of failure in the marketplace, and/or the high cost of re-design make the purchase of proven technology attractive.
- A technology transfer licence can provide one or more of the following: exclusive or non exclusive patent and/or trade secret protection; technical, manufacturing and marketing assistance; training; improvements to the licensed product, if they are included in the agreement.
- A technology buyer may be able to access superior raw materials through the licensor that would allow for optimum manufacture of the licensed product in the shortest time.
- Test market quantities can be obtained to allow market development even while the licensee tools up to produce the new product.

Being in the market first is sometimes more valuable than anything else, as it provides a chance to establish a leadership position. Sometimes buying technology is the only way to produce a product locally, owing to home country trade restrictions. Moreover, the licensor may be a potential joint venture partner or source of future capital.

### *Risks of buying technology*

There are also a number of potential disadvantages to buying technology:

- Buying technology from a respected industry leader does not guarantee success in every foreign market. The seller must know how to transfer the technology to fit the buyer's needs, and the buyer must have the necessary personnel, capital, sales ability and overall expertise to make the technology acquisition a success.
- Patents can be infringed or become obsolete. Even when patents are carefully evaluated, unforeseen competition is always a risk.
- The fact that there is a patent does not necessarily ensure technological superiority. It helps to purchase the latest generation of a given technology, one that is also being utilized by the licensor. It also helps to have any improvements that may be generated included in the licence to keep the technology in a leading position.
- Buyers that are dependent on the sellers for raw materials can be severely affected if supply is disrupted due to strikes, shortages or other problems in the seller's country.
- Technology is usually purchased under a licence agreement subject to many terms and conditions. If the agreement sours, it usually can be terminated, but compensatory payments can be quite costly to the buyer.
- Especially in developing countries, but everywhere to some degree, a buyer of "secret" technology is at a disadvantage. His lack of knowledge about the technology and of appropriate skills and experience, and the nature of the supplier's technological monopoly makes the buyer vulnerable to extra (hidden) costs and, sometimes, to disadvantageous terms and conditions. Overpriced imported technology and other unfavourable acquisition terms will negatively affect the efficiency and profitability of both the recipient company and the country's economy.

### *Buying appropriate technology*

The entire discussion of advantages for the technology buyer assumes that the selected technology is indeed "appropriate technology." This term became a key phrase in the debate between developed and developing countries in the 1970s and 1980s. When first used in the 1970s, it simply meant technology that satisfied the needs and conditions of the buyer. Economists and others have subsequently made the meaning much more complex. Now it often involves a wide range of considerations such as low investment cost for the work place, organizational simplicity, the sparing use of natural resources, and the potential for employment.

A developing country chooses an appropriate technology based on its development goals, its resource endowment and the conditions under which the imported technology is used. For a company, the task is simpler; it has to evaluate the technology to determine whether it meets company's needs and whether the company has the staff, raw materials, capital and plant to allow it to use the purchased technology.

Appropriateness of technology depends on the objectives, the situation and the time. To evaluate and select an appropriate technology, a company needs to undertake at least the following measures:

- *Identify and target specific technologies.* Sources of technology transfer information are available in module 5 on finding technology. The technology should be related to the individual company's needs and to the country's needs.

- *Evaluate available technical information.* Existing literature and publicly available information provided by the seller should be studied by the buyer's technical staff. The buyer should consider retaining, on a project basis, a consultant or consultants in the field.

- *Investigate alternative sources of technology.* More than just a single source of technology should be considered unless a search reveals there are no alternatives available.

- *Evaluate the patent situation of targeted technologies.* Obviously the degree of exclusivity or non-exclusivity will affect the value and, consequently, the price of a given technology. The strength of the patents and the protection from infringement they offer must be evaluated.

- *Investigate the technology seller.* The seller's business and financial standing should be looked into, references and other licensees should be checked with. The seller's ability to fulfil obligations can be the determining factor in the success of the purchased technology.

- *Determine cost and conditions for acquiring the technology.* It is important for costs and conditions to be determined early so they can be evaluated against alternatives.

- *Negotiate for additional information.* Frequently, a thorough evaluation requires the cooperation of the seller. As much detail as necessary should be obtained and record made of precisely what is to be transferred. If it is necessary to sign a confidential agreement to accomplish the evaluation, its content should not preclude selecting and using other technologies.

- *Negotiating the technology purchase.* This step requires in-depth study as it has many complications. See module 8 on negotiating.

### *Strategies for technology buyers*

It is recommended that companies seeking technology, especially companies in developing countries, should adapt the following strategies:

- *Information.* Seek up-to-date, reliable and comprehensive information on available technologies, their present scope and future prospects; on the standing of technology suppliers; on transactions similar to those envisaged; and on new, emerging technologies.

- *Negotiation.* Acquire the technical and legal negotiating skills needed to conduct technology transfer negotiations in a professional manner that secures the best agreement commensurate with the true value of the technology.

- *Technical capability.* Develop and/or hire personnel with the technical ability to:
  - Install, operate and maintain the licensed technology in a manner that maximizes the return on investment for as long as possible.
  - Adapt the licensed technology to local physical conditions and raw materials and to local social demand.
  - Upgrade licensed technologies to maintain competitiveness in world markets and to meet the increasingly stringent expectations of the local market.
  - Eventually develop and market new technologies and identify niches in the local or world market that exploit the relative advantages of the company, country or region and that would be reasonably long-lasting.

A thorough review of module 5, on finding technology, should give the reader an excellent start towards implementing the strategies outlined.

# Module 3

## INTELLECTUAL PROPERTY PROTECTION

*This module discusses the role of intellectual property protection as an incentive to innovation and technological development, the forms such protection takes and the principles embodied in international conventions and treaties. It deals with the impact on competitiveness and development of patents and other devices for protecting intellectual property and pays particular attention to new technologies, e.g. biotechnology and informatics. The module goes on to describe the options open to industrialized and developing countries when it comes to policy and legislation to protect intellectual property.*

# Contents

# INTELLECTUAL PROPERTY PROTECTION

## The role of intellectual property in industrial development

The present-day world is characterized by technology-led competition, in which intellectual capital and technical knowledge constitute the main assets. Possession of these assets has become the hallmark of a country's technological capabilities. Technological innovation requires not only venture capital and technical inputs (developmental research, engineering design and testing, prototype development and refinement of working models etc.) but also intellectual capital in the form of specialized skills and entrepreneurial prowess [1].

Any economic activity aimed at producing goods or services is based on specific technologies that are not always freely available but are subject to exclusive rights. Thus, technological innovation and commercialization are characterized by a need to consider intellectual property rights. Such rights are important from the inventive stage through the stage of commercialization (marketing and post-sales), as well as in any further innovation stages when the products/processes or technologies are improved. Singh acknowledges the significance of intellectual property rights as follows: "Any transaction for technology collaboration/transfer is, in fact, a transaction in these rights" [1].

Acquiring technology by one or another means, such as the licensing of patents or know-how, engineering designs, joint ventures, turnkey agreements, research and development (R and D) collaboration agreements, necessarily entails evaluating the industrial property assets involved. Negotiation between the supplier of the technology and the recipient focus on the compensation for proprietary rights.

In many instances, for an enterprise to have access to new knowledge and to absorb complementary skills that may be needed to develop a new product or process, it has to give up part of its know-how and industrial property assets by sharing and exchanging them with other firms. This barter of technological knowledge and industrial property rights increasingly takes place within a framework of strategic alliances between enterprises mainly from developed countries. Such barter is generally institutionalized in R and D collaboration agreements based on reciprocity; they provide the means to enforce reciprocity, which allows parties to combine the complementary industrial property assets necessary to develop a new product or process. This means that for an enterprise to have access to strategical knowledge protected under intellectual property laws, it must be able to exchange and share part of its background knowledge and industrial property assets with other firms or competitors.

The increasing importance of technological information and industrial property assets has led universities to change their approach to intellectual property. As differences between basic and applied research become blurred in some fields, e.g. biotechnology, and industrial property rights are more and more considered an important business asset, universities and research centres are increasingly willing to reap the benefits of their research results. Industrial property rights and the ownership thereof are, therefore, a live and relatively recent issue for negotiation in university-industry contracts. In the past, industry expected to own any technologies and industrial property rights arising from university research they funded, even partially. Universities no longer accept this position, and the issue has become critical in technology transfer negotiations. One-way technology transfer, from a university to a firm, has been replaced by a two-way exchange of technological knowledge between a university and a firm [2].

One of the important factors governing potential access to technology is the effective functioning of patent systems. Patents confer exclusive rights to an inventor for a certain period of time in exchange for disclosure of an invention. Although patent laws may be enacted partly to recognize the concept of an owner's inherent right to his invention, the principal purposes of patent legislation, in both developed and developing countries, are widely regarded to be the encouragement of inventions, public disclosure of those inventions and the promotion of technological and economic development. While not all current technology is covered by patents, an effective patent system nevertheless embodies the most comprehensive, accessible source of non-secret technology for potential utilization on a national and international scale. This is why an increasing number of countries, including developing ones, stress the information function of a patent system and the relevance of patent documentation as a source of technological innovation. The proper use of such information by national industrial property offices in developing countries may strengthen the bargaining position of firms based in those countries when negotiating technology transfer agreements.

Other categories or titles of protection, such as utility models (petty patents), industrial designs and copyrights, also foster creativity, originality and inventiveness. As new technologies emerged in recent decades, industrial property protection was extended to new areas such as biotechnology, computer programs and mask works (topographies), mainly by means of *sui generis* regimes of protection. These differ from traditional categories of protection because they were conceived to protect investments in these fields rather than to encourage originality or creativity [3].

The purpose of this module is to describe the legal mechanisms by which intellectual property is protected and the main principles governing such protection at the international level. The new areas covered by intellectual property, such as computer programs and computer-related inventions, as well as the protection of new plant varieties (biotechnology), and mask works (semiconductor topography) will also be discussed. Finally, the strengthening of intellectual property protection resulting from the GATT negotiations that led to the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) will also be dealt with. Discussion will focus on the advantages or disadvantages associated with each industrial property described and its importance to technology transfer as well as to the promotion of innovation and investments.

The second section deals with the different objects of protection such as patents, utility models, trade secrets, trade marks, appellation of origin, design protection and copyright. The third focuses on the protection of new technologies such as biotechnology and computer-related inventions. In the last section the TRIPS negotiations in the framework of GATT will be described. The diverging views of developed and developing countries expressed during those negotiations and the role of industrial property in industrial development (in the context of reinforcing industrial property protection) will also be highlighted.

## Forms of protection available

### *Patents*

When an inventor finds an original solution for a technical problem, after investing money and time in it, he or she wants to recoup such investments and obtain an advantage over competitors. The patent system is one of the most important ways to achieve this goal. Governments grant patents protecting inventions that allow exclusive rights for a limited time. That protection provides a means for the inventor to obtain a reward for his achievement and encourages the disclosure and working of the invention in the country where the patent is granted.

Thus, a patent is a document issued, upon application, by a government office or a regional office acting for several countries normally belonging to a free trade association or common market. This document describes the invention and creates a legal situation in which it may normally only be exploited (manufactured, used, sold or even imported) with the authorization of the title-holder. The protection acknowledged by the patent is limited in time (generally 15-20 years).

Not every invention may claim patent protection. For an invention to be patentable it must *(a)* be new, *(b)* involve an inventive step, i.e. not be obvious and *(c)* be industrially applicable. These conditions are usually referred to as the substantive conditions of patentability because they concern the essence, the technical content of the technical solution, claimed as an invention in the patent application.

Certain fields of technology are excluded in some countries from patent protection. Therefore an invention that fulfils the substantive conditions must necessarily belong to a field of technology for which patents are acknowledged, that is, that are not excluded from patent protection. Finally, another requirement contained in most patent laws is that the subject-matter must not be contrary to public order or morality. Therefore, patents are not available for all inventions. By way of example, the following are excluded from patent protection in some countries.

- Inventions contrary to public health or morality.
- Scientific discoveries, scientific theories and mathematical methods.
- Plant or animal varieties or essentially biological processes for their production.
- Processes of treatment of human beings, animals or plants.
- Pharmaceutical products.
- Schemes, rules and methods of doing business, performing purely mental acts or playing games.
- Substances produced by chemical processes.
- Computer programs and logic circuits.

It is important to note that, on the one hand, some patent laws exclude some inventions in specific technological fields (e.g., pharmaceutical products, food-related inventions, plants or animal varieties) from patent protection on policy grounds, for instance, for public health reasons or owing to concerns associated with development strategies or industrial policy. Thus, even if an invention meets the patentability requirements set forth in the corresponding law, protection will not be granted. On the other hand, in a number of countries mention is made of discoveries, inventions or activities that are not considered as inventions for which patent protection may be claimed. Such is the case with processes for treating human beings, animals or plants; scientific discoveries; scientific theories; mathematical methods; schemes, rules and methods for doing business; and performing purely mental acts or playing games.

The most evident requirement of patentability for an invention is that it must be new or novel. An invention is new (or in patent law terminology, novel) if it is not yet contained in the state-of-the-art, the latter being defined as everything that had been disclosed to the public before the application date. The technical problem solved by the invention may itself be old or new. However, the solution, to deserve the name of invention, must be one that has never been thought of before or, at least, if thought of by someone, not disclosed by him so that it has become accessible to others. Exclusive rights to exploit an invention are therefore justified only if the inventor contributed something to the prior art. When one refers to prior art, a distinction should be made between printed knowledge and oral knowledge. The former comprises knowledge that stems from publication in tangible form. Oral knowledge refers to prior use of the invention and disclosures. Some countries refer only to written or published knowledge as belonging to the prior art. In other countries oral knowledge may also constitute prior art if it occurs in the country where protection is sought. In any event, an invention is new if it is not anticipated by prior art as defined or referred to in the law of the country in which protection is claimed.

For an invention to qualify for patent protection, it is not enough that it be new; it must be the result of a creative idea (inventive) and it must constitute a step, that is, it must be noticeable. The claimed invention must therefore be distinct from the state-of-the-art at the application date. "Inventive step" means that, given the prior art, the invention must not be obvious to a person having ordinary skills in the art. In other words, it must not be possible for an average worker in the art to make the invention by routine exercise of his or her standard skills. The difference between the claimed invention and the state-of-the-art must be non-obvious; it must be the result of a creative idea as opposed to something that comes automatically to one's mind.

An invention always relates to solving a technical problem, which means that it must be useable in practise, i.e. capable of industrial application, and must do more than merely recognize a law of nature (such recognition is called a scientific discovery and not a technological invention). If an invention is conceived as a product or part of a product, that product must be capable of being made. If the invention is supposed to be a process, that process must be capable of being carried out and used in practice.

"Industrial application" is to be understood in a broad sense, including application not only in manufacturing but also commerce, agriculture, handicraft, fishery and services; it means that the invention can be made (in the case of a product) or used (in the case of a process) in those fields.

A patent normally confers upon its owner the right to prevent others from exploiting the invention by manufacturing the patented product, or using the patented process, or by putting on the market products that have been manufactured without the owner's authorization. As long as the owner does not give others such an authorization to exploit, the exploitation of the patented invention is illegal. As far as inventions in the form of products are concerned, most laws tend to acknowledge exclusive rights with regard to three acts, namely:

- To make the product.
- To use the product.
- To sell the product.

In the case of inventions contained in processes, most laws tend to grant protection with respect to the following acts, namely:

- To use the product directly obtained through the process.
- To make the product directly obtained through the process.
- To sell the product directly obtained through the process.

One question arising with respect to making a product or using a patented process is whether the exclusive right covers only making the product or using the patented process exactly as described in the patent for invention or whether it also covers the making of a similar product or applying the process for a use not originally foreseen. This question is significant in practice since "around" an invention a great number of technical variations may be developed by persons skilled in the art on the basis of the invention disclosure in the patent. Thus, it may be possible to change the dimension or size of a product, or use other materials in the device than those mentioned in the description specified in the patent. To answer such a question, it may be necessary to evaluate the description and the claims filed in the patent application and admitted in the patent for invention by the patent office.* Some laws or practices confine the scope of protection to what is stated in the patent claims. In this context an applicant will tend to specify the imaginable variations, uses of the invention and similar solutions in the claims in order not to lose protection for any such variations. According to

*A patent application is basically composed of two parts: *(a)* the description, where the invention and its industrial application, inventive steps and novelty are explained and *(b)* the claims, in which the applicant asserts the scope of protection and defines the fields in which protection by means of exclusive rights is sought.

some other laws and practices, the claims do not restrict the scope of protection exactly and exclusively to the solution specified but also extend to variations of solutions not expressly detailed in the claims, provided that those variations are covered by what is called the inventive concept. Other laws or practices apply an intermediary approach, according to which the claims determine in principle the scope of protection but the description may be used to interpret the claims. In such a case, the specific statements in the claims may determine the limits of the scope of protection. That scope will go beyond those statements if, in the light of the description, they may be considered or interpreted as also covering solutions similar to the ones expressly referred to in the claims.

In any event, if anyone exploits a patented invention without authorization of the patent owner (the patentee), the latter can initiate legal proceedings against that person or entity. In most countries this is done before the courts. If infringement is found, the courts may order the infringer to refrain from infringing the patent and award damages to the patentee (and/or the licensee) for any loss suffered.

In most countries, there are at least three exceptions to the exclusive rights of the patentee:

- Public interest.
- Scientific research.
- Prior use manufacture.

Some patent laws allow a patented invention to be exploited without the patentee's authorization by or on behalf of a government when the public interest justifies it, or on the basis of a compulsory licence. A compulsory licence is an authorization to exploit the invention, given by a governmental authority, in very special cases defined by law, e.g. if the entity wishing to exploit the patented invention is unable to obtain the authorization from the patent owner or if the title-holder has failed to exploit the invention within the period of time specified in the law. In the latter case, the compulsory licence constitutes a sanction imposed on the owner of the patent who failed to make the product that includes the invention, to make the products by a process that includes the invention or to use the process that includes the invention in the country where a patent was granted. It must be noted that bodies of legislation including this sanction do not consider importation as an exploitation act. The most recent patent laws dealing with compulsory licences tend to require the government granting a compulsory licence to fix a remuneration for the patentee; this decision may be subject to appeal.

The second exception applies where the patented product is made or used for the sole purpose of scientific research and experiment. Such an exception may facilitate research and make it cheaper because scientific institutions will not be required to negotiate with the patentee to obtain an authorization and will not pay anything to the title-holder.

The third exception applies where an entity or person other than the applicant begins making or using a product or process before a patent is filed. Such a situation may arise when an invention is made or used by two persons or entities independently, e.g. where two inventors or firms reside in, or are incorporated in, different countries. When one inventor or entity has no patent protection and has begun making or using the product or process (later patented by the other inventor or entity), a question arises whether the inventor or the entity with a patent should be entitled to exercise exclusive rights against the other inventor or entity who/which started manufacturing or using the product or process. If exclusive rights are invoked in this case, the unprotected inventor's (or entity's) investment would go to waste. For that reason, most patent laws provide for a limited exception to the exclusive rights of the title-holder. As a corollary to this exception, most patent law favours an inventor or entity already making or using the product or process when the patent application was filed. Under such laws the inventor (or entity) may continue to make or use the product or process. Most patent laws further acknowledge special rights if the person or entity made serious preparations towards making or using the product or process (e.g. if the entity had already built the necessary infrastructure to manufacture the product, investing huge amounts of money). Finally, it is important to note that several national laws provide for an "exhaustion" of patent rights (the right to sell or distribute the patented product) in the case where a patent owner or licensee has marketed patented products and the products are sold again (for instance, by a retailer to the consumer). This limitation is designed to keep a patent holder from controlling the entire distribution process after being rewarded for his or her invention.

Patents have a limited duration, normally 15-20 years from the date of application or 14-18 years from the grant of rights. Patent protection needs to last long enough to encourage substantial investments in R and D, as well as in industrialization, so that inventions can be extensively exploited in the interest of the country. Normally, the period of protection provided by law cannot be extended, but some countries provide for extensions in certain circumstances. Thus, British law permits the courts to grant an extension if the invention has not received a satisfactory reward as a result of circumstances beyond the inventor's control, e.g. awaiting government approval. Finally, most patent laws tend to include a grace period allowing an entity or person disclosing an invention, e.g. at an exhibition, to file a patent application for the invention within six months or one year of such disclosure (or as the corresponding law may provide).

Patents are granted, after application, in a formal procedure governed by a set of legal provisions. The most important condition is that the invention be clearly and fully described so that persons with ordinary skill in the art involved are able to practise the invention.

The scope of protection is defined in the claims, and a summary is frequently required in the form of an abstract. The patent office first examines whether the formal application requirements have been fulfilled, e.g. whether the application contains a description and claims, whether the indications concerning the applicant are complete and whether the fees have been paid. This examination is normally referred to as a preliminary or formal examination. In some countries, where certain inventions or technological fields are excluded from patent protection, a preliminary examination usually investigates whether the application relates to one of the excluded kinds of inventions. If the invention is one of those for which patent protection is not available, the patent office will refuse the application and the procedure will end there. In several countries only preliminary examination is undertaken by the patent office. Such offices have no examination system and are not capable of performing an examination, primarily because of cost. These countries have what is commonly known as a registration system.

In many other countries, the patent office examines whether the grant of a patent is justified on substantive grounds, i.e. whether the conditions of patentability are fulfilled (substantive examination). In those countries, the patent office will investigate the prior art. It is important to note that patents granted without examination of substance may be held invalid. Examining substance has the advantage of reducing the risk of granting invalid titles of protection, which are particularly dangerous for potential licensees.

Several industrialized countries use a deferred examination system. Under that system, examination does not begin until requested and after a significant deferral period. If examination is not requested at the end of that time, the application automatically lapses. This approach assumes a number of patent applications will lapse and, therefore, will not be examined, resulting in considerable savings. Nevertheless, experience shows that in some countries the number of patent applications allowed to lapse has not been sufficient to solve the application backlog problem. Consequently, the number of applications submitted for examination has been so great that examination cannot be readily handled; examination will not occur for several years.

A significant number of countries publish applications 18 months after the filing of the application. Publication means offering copies for sale to members of the public. The main purpose of publication is to advise the public of pending applications. Publication is probably more relevant in those countries with deferred examination, to keep investors from making significant commitments only to find they have infringed a patent issued some years later. However, the claims eventually allowed by the patent office may differ from the claims initially published. Frequently, it will not be possible to determine the best development action despite being aware of an application. For this reason, some countries do not permit the publication of applications. In those countries, it is assumed that knowledge of an application does not outweigh the benefits resulting from the secrecy of a non-published application.

In any event, if a request for substantive examination is made, the patent office will undertake that examination. If patentability requirements are met, a patent is granted; then it is published by the patent office in the same form as the application (if the law provides for publication of an application).

Countries differ as to who should be granted patent protection: the inventor or entity first conceiving the idea or the inventor or entity first applying for protection at the patent office. Most countries have adopted the so-called application (first-to-file) system conferring patent protection on inventors who filed a patent application first. Under the invention (first-to-invent) system, which still exists in the United States, patents are granted to the inventor who can prove he was the first to conceive an idea or solution to a technical problem.

It is clear that no matter how valuable an invention may be, it cannot contribute broadly to the progress of mankind if it is kept under lock and key. Nations grant exclusive rights to inventors in exchange for disclosure of the information necessary to practise an invention. Therefore, in countries using the invention system, it is not sufficient for an inventor merely to have an idea; he must also put the idea into practise and prove due diligence in completing the invention and filing a patent application. In any event, for an inventor to obtain a patent, it is disclosing the invention to society that really counts.

### *Basic principles of international protection*

Throughout the world, patent law is governed by the principle of territoriality, that is, a nation can grant industrial property rights only in its own territory. As trade and industry develop more complex international links and transactions, the principle of territoriality becomes an impediment to effective patent protection. This was acknowledged in the last century, and subsequently efforts towards international cooperation in the patent field resulted in various multilateral agreements. The same holds for the other industrial property institutions that will be dealt with in this module.

*The Paris Convention*

The Paris Convention established the Paris Union to protect industrial property at the international level; it is composed of the countries that are parties to it. It contains a set of basic principles that members abide by and that are applicable not only to patents but also to utility models, trade marks and industrial designs.* Two of the basic principles common to all industrial property subjects of protection should be mentioned: the principle of national treatment and the right of priority.

National treatment means that each member country of the Paris Union must grant the same protection to nationals of the other member countries as it grants its own nationals. Moreover, national treatment must be granted to nationals of countries that are not party to the Paris Convention, if they are domiciled in a member State or if they have a real and effective industrial or commercial establishment in such country. This principle guarantees that foreigners will be protected and that they will not be discriminated against in any way. Without such a rule, it might be very difficult, sometimes even impossible, to obtain adequate protection in foreign countries for inventions, trademarks and other subjects of industrial property [4].

Another principle contemplated in the Paris Convention is the right of priority. This right ensures that if an applicant files for industrial property rights in one member country, the same applicant may, within a specified period of time (6 months in the case of the trademarks or 1 year in the case of patents), apply for protection in other or all other member countries. Such applications will be considered as if they had been filed on the same day as the first (or earlier) application. They thus enjoy priority with respect to all applications relating the same invention filed after the date of the first application. They will, therefore, prevail over any act accomplished after that date, which normally would destroy the applicant's rights or ability to patent. The practical advantage of this right is that an applicant wishing to protect his invention in different countries is not required to present all applications in all countries simultaneously, because he has 6 to 12 months to decide where he will request protection. That time can be used to reasonably organize the tasks required to secure protection in the various member countries where he believes he may exploit the patent (or trade-mark or industrial design as the case may be).*

In addition to the above-mentioned principles, the Paris Convention contains other provisions specifically applicable to patents. The most relevant are those referred to as independence of patents and compulsory licences. The independence of patents rule means that a patent granted in member countries to nationals or residents of member countries must be treated as independent of a patent obtained for the same invention in other countries, including non-member countries. Consequently, granting a patent in one country does not bind any other member of the Union to grant a patent for the same invention. In this context, a patent cannot be denied, invalidated or otherwise terminated in any other member country on the ground that a patent for the same invention has been refused or invalidated or that it is no longer maintained or has terminated in any other member country. The fate of a patent in a given member country cannot be linked to and does not influence the fate of a patent for the same invention in any other member country. The main argument in favour of the independence of patents is that national laws and administrative practises vary considerably among countries since it would not be fair to refuse or grant a patent in one country merely because it has been refused or granted for the same invention in another country.

The Paris Convention deals also with the question of compulsory licences to prevent abuses that might result from exercising exclusive rights, for example, failure to practise the patented invention. It acknowledges the right of each member country to take legislative measures providing for the granting of compulsory licences. The main reason for enforcing compulsory licences for this reason is that to foster industrialization in the country, patents owners should not be allow to use their patents to prevent practising the invention in that country or to monopolize the importation of patented products. Patents should be used to introduce new technologies and to facilitate the transfer of such technology through licensing domestic enterprises. According to the Convention, compulsory licences may not be requested or granted less than four years from the date of filing a patent application or three years from the date of a patent grant, whichever period expires last. Moreover, a compulsory licence will be refused if the patentee justifies his inaction, for example by producing evi-

*The Paris Convention for the Protection of Industrial Property was signed in 1883 and afterwards revised on several occasions. Revision conferences were held in 1886, 1890 and 1891, 1897, 1900, 1911, 1925, 1934, 1958 and 1967. Each of these conferences, starting with the Brussels Conference in 1900, ended with the adoption of a revised Act of the Convention. With the exception of the Acts concluded at the revision conferences of 1900 and 1911, which are no longer in force, all those earlier Acts are still of significance, although the great majority of countries are now party to the latest Act, that of Stockholm of 1967.

*The right of priority can rely only on the first application for the same industrial property right, which must have been filed in a member country. Consequently, it is not possible to follow a first application by a second, probably improved application and then to use that second application as a basis of priority. The reason for such a rule is that one cannot permit an endless chain of successive claims of priority for the same subject, as this could considerably prolong the term of protection for that subject [5].

dence of legal, economic or technical impediments to practising the invention.

*The Patent Cooperation Treaty*

The Patent Cooperation Treaty (PCT), signed at Washington in 1970, entered into force in 1978. PCT is basically an agreement among contracting countries to harmonize patent application filing formalities. Its main objectives are as follows:

- To perfect the legal protection of inventions and to simplify the obtaining of protection when this is sought in several countries.
- To facilitate access to technical information contained in documents describing new inventions.
- To contribute to the progress of science and technology and to facilitate the access of developing countries to the ever-increasing volume of modern technology.

The Government of the United States began working toward these objectives in 1966 to offset a European initiative establishing a common system of patent protection within the European Common Market. The United States initiative was conceived to overcome some of the traditional patent system's disadvantages reflected in the Paris Convention articles: relying on individual patent applications in each country where protection is sought. Under the traditional system (Paris Convention), an applicant is required to file a separate application in each country where he wishes to protect the same invention. Each patent application has to be processed by patent offices in the different countries, submitted to diverse procedures and translated into different languages, and filing fees and professional advice must be paid a number of times over. All this costly and time-consuming activity must be carried out by the applicant at a time when he has no objective basis for determining whether the invention will be granted a patent.

According to the PCT system, it is possible to file a single international application, which has the same effect as filing separate applications with the patent office of each participating country designated by the applicant in the application. This application is normally filed with the applicant's national office which in the context of PCT becomes the receiving office. The latter checks the application formally.

Before this application is submitted to offices in other countries designated in the application ("the designated Offices"), it is subject to an international search. This search is carried out by an international searching authority, which has all the facilities to execute an in-depth search of relevant prior art. Its results are included in an international search report, which is made available to both the applicant and, ultimately, the designated offices.

In addition to the international search, an international preliminary examination (a substantive examination that is preliminary and not binding on the national offices) is provided for under PCT. This stage is optional for the applicant and, again, the results are published in a report that is also sent to the national offices designated in the application, which, in turn, will proceed to grant or refuse a patent.

The PCT system enables an applicant to file one application in one language in his own country. This filing has the immediate effect of a regular national filing in all other PCT countries designated in the application. The international search report permits an applicant to be more easily determined if the invention can successfully claim patent protection and, therefore, if it is worthwhile to continue applying in other countries. This decision becomes even easier if an applicant requests an international preliminary examination that will yield an opinion concerning the patentability of the invention claimed in the application [6].

The information contained in the above-mentioned report constitutes an important tool for national patent offices to determine whether a given invention merits patent protection.

*Regional conventions or cooperation schemes*

In Europe, after the Second World War, several conventions were concluded to standardize the patent law and to rationalize the elaborate procedures for granting patents. The Convention on the Unification of Certain Points of Substantive Law in Patents for Inventions, known as the Strasbourg Convention, was executed on 27 November 1963. It standardizes the substantive patent prerequisites — novelty, non-obviousness, industrial application and disclosure of practicability—for the grant of a patent, as well as the effect of the declaration of revocation and the definition of the scope of protection. It has come into force in 11 European countries and forms the basis for the European Patent Convention.

The European Patent Convention (EPC) of 5 October 1973 is now in force in most European countries. It is aimed at rationalizing the procedure for granting patents in member countries and avoiding duplication of work by national European patent offices. The EPC established a system of law common to all members for the granting of patents for inventions, called European Patents. Member countries created the European Patent Office (EPO), a supranational institution, and conferred upon it the sovereign right to grant European patents effective in the member countries. EPC defines, above all, the uniform substantive prerequisites for a European patent. Moreover, it regulates the procedure for granting a patent to be carried out by EPO, including an opposition and appeal procedure.

In individual member countries, a European patent has the effect of a national patent, which is effective only in the territory of the individual contracting countries and is independent of the European patents in the other contracting countries. An applicant may request a European patent for any number and combination of contracting countries. It is also possible to file a European Patent application relating to one and the same invention by several applicants for different contracting countries. The European patent and the European patent application may be separately transferred or encumbered for each contracting country. Therefore, the principle of territoriality may be superseded by EPC with respect to the procedure for granting patents.* It is important to note that European patent law and the differing member countries' patent laws coexist. An inventor is free to choose whether he wants to file a European patent or a national patent. EPC also allows simultaneous protection of an invention by a European patent and a national patent, provided that both applications are filed with the same priority.

The first supranational regional mechanism for protecting industrial property was established in Africa (1962) by former French colonies, the Libreville Agreement Relating to the Creation of an African and Malagasy Office of Industrial Property.** This agreement was replaced by the Bangui Agreement Relating to the Creation of an African Intellectual Property Organization (OAPI), concluded in 1977 and entered into force in 1982. Based on uniform legislation, OAPI acts as a common office for national industrial property service.

The Bangui Agreement contains a set of common substantive and procedural rules concerning patents, utility models, trade marks, industrial designs and models, trade name protection and unfair competition, geographical indications, copyright and cultural heritage protection that are applicable in all member countries.*** The Bangui Agreement considerably extended intellectual property protection because the Libreville Agreement had been confined to patents, trade marks and industrial designs. The Libreville Agreement excluded from patentability "pharmaceutical compositions or remedies of any kind, the said products remaining subject to the special laws and regulations in the matter, and the exclusion not applying to processes, means and apparatus serving to obtain them" (Article 3(2) of annex I to the Agreement). This exclusion was deleted from the wording of annex I to the Bangui Agreement, making both pharmaceutical compositions and the processes used to obtain them patentable. The Bangui Agreement also contains a common procedure for granting patents: according to it, an invention must meet the three conditions set by most patent laws, namely, novelty, inventive step (not required by the Libreville Agreement of 1962) and industrial application. The term of a patent is 10 years, on average. Such a term may be extended to 20 years by means of two successive extensions of five years each. The first extension, which is a matter of right, is subject to the condition that the invention is being worked in one of the member countries, unless there are legitimate reasons for not doing so. Importation is not deemed an act that fulfils the requirement of working. The second extension is at the discretion of the OAPI and is subject to the absolute requirement of working.

The Bangui Agreement contains a special section related to compulsory licences for those cases in which an invention is not exploited in at least one of the member countries. It also foresees ex officio licences for national defence purposes, for creating public wealth and in cases when a protected product cannot be obtained in the market at reasonable conditions and in reasonable quantities.

It is important to note that a definitive judicial decision dealing with the application of an agreement, including the patent provisions, emanating from one member country takes effect in all other member countries. In other words, when a patent granted by OAPI is considered void in one member country, it is also deemed void in the other member countries [7].

In Latin America the most important regional legal framework with practical significance is provided by decision 344 (1993) of the Andean Pact. This decision articulates a common regime on industrial property, specifying the main legal principles applicable to all member countries with respect to patents, utility models, industrial designs and trade marks.* Decision 344 establishes common principles for filing patent applications as well as stating common substantive principles. The decision also provides for a system of compulsory licences. According to the common regime, computer programs, animal species and processes for their obtention, and inventions related to pharmaceutical products included in the list of essential medicines provided by the World Health Organization (WHO) are excluded from patent protection. While patents confer the right to prevent exploitation by third parties without the consent of the patentee, decision 344 does not allow a patentee to prevent importation of the patented product if a product is being marketed in a country with the consent of the patentee or in any other lawful manner.

*In some aspects, however, European patents must conform to the national law of the contracting countries.

**Anglophones countries in Africa have also established a cooperation mechanism similar to that contemplated in EPC.

***The geographical competence of OAPI extends to 14 African countries: Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Gabon, Guinea, Mali, Mauritania, Niger, Senegal and Togo.

*Bolivia, Colombia, Ecuador, Peru and Venezuela are members of the Andean Pact.

*The importance of patents from a business point of view*

The traditional concept of patent protection is that by preventing others from imitating an inventor's invention or by putting the inventor in a position to license imitators only in exchange for compensation (e.g. payment of royalties), patents allow inventors to appropriate the benefits flowing from their inventive contributions. The expectation of such rewards is what provides an incentive to invent. In the absence of patent protection, imitation might occur so swiftly that an inventor could appropriate at best a small fraction of his invention's benefits, and if the expected amount were too small, there would be no incentive and desirable inventions would not be forthcoming. Inventive activities having shifted from the realm of independent or individual inventors to corporate or university R and D laboratories, it has been questioned whether this logic still holds.

First, invention is only one part of the activity required to bring new technology into a marketplace. Substantial expenditures may be incurred in perfecting the invention for commercial exploitation, i.e. reducing it to practise, and for introductory marketing. In this context, the patent system's objective is to encourage investment as much as it is to stimulate invention in the narrow sense.

Secondly, patents are a far-from-perfect means of appropriating the benefits flowing from an investment in invention, R and D. Patents are not always immune to competitor's intense efforts to circumvent them or challenge their validity in courts. Thus, the patent system seems to rely on a sort of paradox, because disclosing technical details in exchange for the grant of exclusive rights often helps potential imitators in their circumvention efforts. Indeed, inventing around a patent requires substantially less cost and time than developing the original invention.

Thirdly, in some instances patents may not be necessary to motivate investment in R and D. In oligopolistic industries, existing barriers to entry may protect incumbent firms from rapid imitation of an invention. In addition, product differentiation and image advantages may accrue to firms that successfully introduce new inventions. In this context, firms may be able to hold substantial market shares and sell at prices exceeding production costs even in the absence of patent protection [8].

Fourthly, some empirical studies have shown that the importance of patents as a means of gaining rewards from invention varies widely by industry and by firm size, with small firms placing more weight on the need for patent protection than large. Patents are deemed a critical inducement to investment in R and D in industries such as pharmaceuticals and chemicals and in some mechanical engineering lines but of less significance in other industries [9].

Despite these drawbacks, the growing importance of technical information and innovation as a source of comparative advantages among corporations and nations causes the information function of the patent system to play an important role in technological development, which has been acknowledged by governments wishing to promote innovation and competitiveness. Corporations are increasingly involved in joint R and D activities within the framework of strategic alliances.

The patent system officially publishes new inventions and compensates inventors by granting patents, or exclusive rights, for a certain period of time. The better the invention, the more mankind stands to lose if the inventor keeps it undisclosed, making it necessary to give inventors an incentive to disclose their inventions.* Patent documents and patent literature contain solutions to a vast number of the technical problems that have confronted scientists and technologists during the last 150 years in many fields of endeavour.

Because patents serve a variety of legal, technical and economic purposes, the information they contain is important not only for current industrial activities but also for future possibilities. Governments of developing countries may also use this information to help domestic firms assess whether a technology is appropriate for acquisition. Patent information, if properly stored and used, may contribute to the transfer of technology to developing countries and may improve the bargaining position of firms in these countries when negotiating technology transfer agreements. In other words, patent information assists industry and governments in planning future activities making policy decisions and monitoring technological development.

Patent information may be used to orient R and D efforts and to implement the results thereof in new technology, products and markets. Patent documents and the information they contain also help avoid duplication of research efforts.

Patent documents, and even patent applications in industrialized countries, may be an important information source for managing exports in developing countries. Since much R and D in developing countries is devoted to imitating new technologies or adapting them to local requirements, patent owners in developed countries, may keep product manufactured in developing countries from gaining access to markets in developed countries. Careful use of patent information by firms in developing countries may help to avoid the risk of patent infringement in industrialized countries.

The threat of patent infringement in developed countries by firms in developing countries may grow

*Recognition of this fact gave rise to the idea of compensating an inventor for the disclosure of his invention by granting him exclusive rights. Herein lies the genesis of the patent system.

as exports to those countries increase. Therefore, developing country firms could diminish the risk of patent infringement by filing patent applications in countries to which they export. Such filings would identify existing patents that might constitute a legal barrier for scheduled exports.*

Finally, it is important to clarify the meaning of the fundamental characteristic of all patents: exclusivity, for a limited time, for a product or process narrowly defined by the claims of a patent. This narrowly defined right to exclusivity must not be confused with monopoly power. Economists define monopoly as a situation in which one firm is the only supplier of a product or service for which there are no close substitutes. Because there is common competition among patented products in most technical fields, a new patented product seldom renders alternative technologies obsolete. An abundance of technology provides a large variety of goods and services, patented or not, which are more or less equivalent. These goods and services compete with one another, which means that the conditions for effective monopoly are not met.

Indeed, a patent system that favours technical progress yields more economic benefits. Policies that create a competitive environment, modern competition laws and efficient control systems all help to increase economic benefits. In such an environment, diverse entities compete using the incentives of patent protection to temporarily prevent competitors from exploiting an invention. By contrast, if the economic environment does not favour competition, a firm that enjoys a dominant position will not need patent protection to keep competitors from exploiting its invention. In a competitive environment, restrictions on competition caused by the exclusive rights acknowledged to patentees may, paradoxically, enhance competition in innovation.

### *Utility models (petty patents)*

One purpose of a patent system is to encourage indigenous inventiveness and to stimulate innovation. Such encouragement could result in a significant number of merit-worthy inventive products, some of which, however, might not meet all the requirements for patentability. The concept of utility models fills the gap by providing a type of industrial property with less stringent requirements: the technological progress required is less than the technological progress ("inventive step") required in the case of an invention for which patent protection is available, and the maximum term of protection provided is normally much shorter than for a patented invention—5, 8 or 10 years.

*See Pretnar [10].

The same three requirements apply for utility models: novelty, inventive step and industrial application. However, the interpretation of inventive step is different than for patents. Under utility model laws (or patent laws containing special provisions for utility models), a device has the character of a small invention; some national law covers a wide range of technology at a low level and the standard for judging an inventive step is not as stringent as under patent law. Some countries do not even require an inventive step to grant utility model certificates.

Utility models are used mostly to protect inventions in the mechanical field. In some countries they cover only devices, not the method or process to produce them, as is the case in most patent law. A number of countries provide utility model protection to protect the shape, constitution or combination of articles. Some of these countries protect functional designs, that is, designs of products whose new shape influences technical effect or is closely connected with the functional result, e.g. plastic boxes for storing photographic slides, folding chairs, etc.

The scope of protection conferred by utility models is similar to that conferred by patents for inventions. Thus, an inventor of a useful device may exclude others from making, using, selling and (according to certain laws) even importing that device for which a utility model (or patent for utility model or petty patent) is obtained. Thus, for competitors to perform any of these acts, they will need an authorization from the owner of the petty patent, obtained by concluding a licensing agreement.

Since utility models are also covered by the Paris Convention, the principles of national treatment and right of priority and of independence and the provisions concerning compulsory licences, discussed above, apply to utility models as well. In addition, the PCT mechanism is also available for utility models.

Industrialization in developing countries has relied extensively on adapting and improving imported technologies. Some countries* have reached technological levels that were further enhanced by significant R and D efforts, mainly led by the private sector. Others developed a myriad of minor product and process innovations to meet local conditions in terms of scale of production, available materials and components and user demand. Incremental innovation, based on knowledge developed on the shop floor and in engineering departments, often unmodified or "tacit", is generally derived from effective intellectual property protection in developing countries. The mobility of personnel may cause substantial losses for enterprises introducing process and other hard-to-codify innovations. The problems posed by creation of externalities, a well-known problem in eco-

*For instance, the Republic of Korea and Taiwan Province of China.

nomic theory on innovation, are exacerbated by the lack of rules that would give a reasonable degrees of legal certainty and appropriateness.

Utility models should be distinguished from improvement patents. The latter generally require the innovative step and universal novelty, even though the subject-matter is based on the modification of an existing invention. This type of patent may be granted to the title-holder of an improved invention or to a third party. Know-how consists of knowledge that, by its nature, is generally non-patentable and often tacit (non-codified or formalized). It refers to processes and product innovations. When the latter entail new configurations and are at least original or novel, utility models may be granted. As shown by the experience of countries that confer this kind of protection, utility models, unlike patents, are usually owned by nationals. They stimulate innovativeness, particularly in small and medium enterprises, and they may reward employee creativity and improve working relationships. Increasing the use of this protection may create familiarity with intellectual property. Only a few developing countries recognize utility models or petty patents.*

### *Trade secrets*

There are secrets in every business and technological field that people want to protect against misappropriation by others. Trade secrets and "know-how" are terms that have acquired new significance as technology becomes so important in international commerce. In modern economies where innovation constitutes a major source of competitive advantage, research does not rely so heavily on the independent inventor. It is increasingly conducted by large research teams and within the framework of strategic alliances between partners who exchange and share know-how to develop a new product or process. Therefore, trade secrets are receiving increasing attentions, particularly with respect to unpatentable or unpatented technical knowledge or know-how used in operating a business.

The basic elements of a trade secret can be summarized as follows:

- It is information.
- It is a secret, but not necessarily an absolute one.
- There is an intent to keep the secret.
- It has an industrial application (in some countries also an application in trade or finance or a similar field).
- It has economic value.

*Costa Rica and Uruguay and the Andean Group countries, following the revision of decision 344 (October 1993), also provide for the granting of utility models. A draft law on this subject-matter is under consideration in Argentina.

It is difficult to define a trade secret in general terms. Industrial property laws do not always provide a definition. In several countries that acknowledge the protection of trade secrets, the definition is left to case law. Thus, the Supreme Court of Switzerland has ruled in its AFT 88 II 322 and AFT 103 IV 283 that technical and commercial secrets are composed of information that may influence the commercial results of an enterprise, that is neither well-known nor in the public domain and that the holder does not intend to disclose because of a legitimate interest [8].

In the United States, the Uniform Trade Secrets Act of 1979 (a set of model laws that may be adopted by state legislative bodies) defines a trade secret as follows:

> . . . information including a formula, pattern, compilation, program, device, method, technique or process that: (i) derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by other persons who can obtain economic value from its disclosure or use, and (ii) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy.

Typically the subject-matter of a trade secret must be kept a secret. Matters of public or general knowledge in an industry cannot be appropriated as a trade secret. Matters that are completely disclosed by the goods that one markets cannot be a secret. Substantially, a trade secret is known only in the particular business it is used. In other words, for an idea, process or other information to be protected as a trade secret it must possess "at least a modicum of originality which is separate from everyday knowledge." This concept appears to have made its way in common-law countries, e.g. Canada and Great Britain, through case law. It is not normally required that only a business proprietor knows it. He may, without losing any protection, communicate it to employees. He likewise may communicate it to others within the framework of confidentiality agreements preventing them from divulging it to third parties. Others may also know it independently, for instance, if they discover a process or formula by independent invention. A substantial element of secrecy must exist, so that it would be difficult to acquire the information except by improper means. In most countries that acknowledge trade secrets protection, courts tend to consider that the secret must be a relative one and not absolute, that is, that more than one firm may know and use the secret. In addition, an intention to keep information secret serves to indicate that the holder recognizes it as a trade secret and attributes commercial value to it. There are various ways to express this intention, one of them being to impose confidentiality responsibilities on employees involved in using the secret.

Assuming that innovation fits within the operative definitions provided by law or case law, the trade secret originator obtains no exclusive right to make, use, sell or reproduce the innovation as under patents or other statutory intellectual property rights. Rather, third-party acquisition of secret knowledge becomes actionable only when obtained by improper means, that is to say, in a manner that is excluded or prohibited in a contractual arrangement or in a manner that violates a confidential relationship, or in a way that offends public policy. Although the elements mentioned above are generally mentioned in court decisions and even in some legislation, the legal protection granted to trade secrets varies considerably between countries. Some countries have enacted special trade secret laws. Others have introduced special provisions regarding trade secrets or know-how in their industrial property legislation. In still other countries, such protection has not been acknowledged by special laws that take into account the peculiarities of protecting intangible goods, but is left to labour law (duty of fidelity on the part of employees), criminal law and/or the law of unfair competition.

The duration of trade secret protection depends on whether its originator wants to disclose it or not. In the former case, trade secret protection will coincide with that of a contractual relationship that prohibits disclosure to third parties. For example a contractual relationship may exist between employer and employee, in joint ventures/partnerships/licensing agreements including non-disclosure clauses, or when an obligation of confidence or prohibition to use confidential information may be inferred from the terms of an agreement or the nature of a relationship. However, frequently contracts include non-disclosure obligations that survive termination of an agreement or contractual relationship for a specific period of time, say, 2, 3 or 5 years after termination.

If a competitor independently develops another's trade secret, the trade secret owner has no right to enjoin that competitor from using the information. In independently developing such information, a competitor may examine and dissemble anything legitimately purchased in the public domain. If the competitor publicly purchases a product made via the trade secret owner's process and is able to determine the secret information by examining the product, the trade secret owner cannot enjoin the competitor from using the information. This is the essence of reverse engineering.

Reverse engineering occurs frequently in the computer industry. It appears irrefutable that in practice, industry throughout the industrialized world, as well as in several developing countries, relies on reverse engineering for competitive purposes. The European Union has launched an ambitious R and D programme in the field of information technologies; it funds several projects within, for example, the ESPRIT programme of the European Union, which is aimed at improving reverse engineering tools and methods.

It is important to recall that the Council Directive of 14 May 1991 on the legal protection of computer programs (91/250/EEC) seems to "recognize the fact that access to ideas and information underlying successful products is a necessary ingredient of market dynamism. Companies should not be obliged to waste resources in re-inventing an overprotected and eventually obsolete wheel" [11].

The growing importance of technological information has led industrialized countries to place more emphasis on protecting trade secrets. This concern is reflected in the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) which compels States to protect trade secrets. Trade secret protection is increasingly conceived as a means to protect innovators against commercial bribery and industrial espionage. At the national level, this trend is seen either in specific legislation dealing with unfair competition or trade secret protection or in case law concerned with the economic importance of trade secret protection.

However, the scope of protection generally acknowledged for trade secrets is not as wide as that granted to patented inventions. One reason is because trade secret protection is frequently resorted to when non-patented know-how or technological information does not meet patentability requirements. Therefore, incremental innovations or know-how for which no patent may be claimed is either kept secret or only disclosed to third parties through contractual agreements containing clauses protecting confidentiality. Indeed, once unpatented goods are put on the market, other traders or competitors are generally free to inspect them, to take them apart, to reverse engineer goods or processes and to glean whatever information they can from them. Patents prevent independent development, but trade secret protection does not.

This is not necessarily a pitfall. Reverse engineering is used for competitive purposes all over the world, including in industrialized countries. It is a matter of each country's public policy to determine to what extent contractual restrictions on the flow of ideas will be permitted. In addition, incremental or minor innovations, not eligible for patent protection, may be protected through petty patents (utility models).

Frequently, non-patented or unpatentable information having economic value and not easily available to the public is disclosed and protected by means of specific contractual arrangements. An express contractual obligation to respect confidentiality often implies or is coupled with a non-competition commitment. As a result, because of the confidentiality and non-competition obligations surviving termination of the agreement, ideas are kept out of the public domain.

While such a contract exists, the interests of the contractual partners converge. However, after contract termination, they are quite different. Some partners may be tempted to use the knowledge acquired during the agreement's life, including information classified as confidential. Other partners may regard much of the information as theirs. Here there may be both diverging interests between the parties and a conflict between several public policies, for example, a policy encouraging maintenance of confidences versus one favouring the mobility of labour, the free flow of information and free competition. One of the most difficult tasks in this area of law is to draw the dividing line between confidential information and general knowledge and skill that may be freely used [12].

### *Trade marks*

A trade mark is a sign that is used or intended to be used by a manufacturer, producer or trader to distinguish his products or services from those of other producers, manufacturers or enterprises. Because a trade mark's function is to distinguish, only distinctive signs may be trade marks. The main purpose of protecting trade marks is to ensure that only distinctive signs are used and to prevent confusion among trade marks. If products or services are different in nature or serve different purposes, they are already distinguished by their nature or purpose.

The secondary purpose of a trade mark is to identify a particular enterprise offering specific products or services in a market. Trade marks do not distinguish products or services as such. They do distinguish products' and services' relationship to a particular enterprise, the enterprise from which they originated. This implies that trade marks distinguish one source of identical or similar products or services from enterprises offering similar products or services.

From the point of a person interested in buying goods, a trade mark may influence his or her decision to buy. This decision is based on the expected properties of goods (colour, weight, taste, durability etc.), with a prospective buyer looking for goods with a certain set of characteristics.

There are two types of marks, trade marks, and service marks.

A trade mark is a sign that serves to distinguish the products of one enterprise or producer from the products of other enterprises or producers. Product means any item that is sold and, therefore, needs to be distinguished, in order to allow the customer to make his choice. This choice is greatly facilitated if the product being offered bears a trade mark, because customers may identify a particular item through that trade mark.

An increasing number of enterprises and traders provide services to the public, which they distinguish with service marks. Services comprise a wide range of activities, such as financing, messengers, couriers, education, communications and transportation.

In addition, many countries contemplate collective marks in their legislations. A collective mark usually belongs to a group or association of enterprises; its use is reserved for the members of the group or association. Collective marks serve to distinguish characteristic features of the products offered by those enterprises, for example, compliance with certain quality standards.

Legislation in some countries provides for certification marks, which have the same purpose as collective marks. However, their use is not confined to the members of a particular group or association of enterprises. Instead, they may be used by any entity that fulfils certain conditions.

The exclusive rights to use trade marks is typically acquired by registration, but in a few countries that exclusive right is attained by first use. Where trade mark protection is based on registration, the principal legal requirement is that a mark is visible rather than audible or olfactible. Nevertheless, in some countries the distinctive features of radio and other advertising may be offered protection as service marks. A mark may consist, for instance, of any of the following elements, all of which constitute visible signs:

- Fanciful denominations: Kodak, Coca-Cola, Pepsi
- Arbitrary denominations: Blaupunkt, Camel
- Surnames: Ford, Levi's
- Numbers: 4711 cologne
- Letters: RCA, VW, BMW
- Emblems: the Mercedes Benz star
- Images or symbols: the Lacoste crocodile
- Combinations or arrangements of colours: the red spot on the heel of Kicker's shoes
- Characteristic shapes of the product: the Coca-Cola bottle
- Slogans

According to most laws, exclusive rights in a mark are acquired by registering the mark in the country's Register of Marks. Mark registration does not automatically last indefinitely. It would be unjust if marks no longer of interest to a title-holder, remained protected, preventing the use of identical or similar marks by others. This is the reason registration is limited in time: frequently the duration provided by national laws is 10 years. The registered owner of a mark may renew its registration for indeterminate additional 10-year periods by paying a renewal fee.

This gives the owner the opportunity to decide whether to maintain protection or give it up.

The scope of protection varies depending on whether a trade mark has been registered or is protected on the basis of its use.

Typically trade mark registration provides protection only in the country of registration. To obtain protection in other countries, the trade mark needs to be registered there; in countries without a registration system the trade mark must be used to be protected. In countries where use is the basis of protection, the territorial scope may be limited to the geographic area, inside the country, in which it has been used.

Registered trade mark owners have exclusive rights to preclude others from certain activities using the mark. A basic principle of trade mark law in most countries is that trade marks are protected both against the unauthorized use of the same sign and the unauthorized use of a similar sign, to avoid confusion among consumers. In addition, trade mark protection is not limited exactly to the products or services offered by the trade mark owner but extends to similar products or services, provided there is a risk of confusion in the mind of consumers. In general, trade mark owners enjoy the right to prevent the unauthorized use of the trade mark by other enterprises. This means others are prevented from manufacturing products bearing the trade mark, from offering those products or services in the market and from advertising such products or services bearing the same or a similar trade mark, including sale and importation.

The Paris Convention for the Protection of Industrial Property also covers trade marks. It refers to the compulsory use of trade marks [article 5 C (1), (2) and (3)]. Some countries that provide for trade mark registration also require that the trade mark, once registered, be used within a certain period. If the use requirement is not complied with, a trade mark may be cancelled and expunged from the register. In this context, use is frequently understood as meaning the sale of goods bearing the trade mark, although national legislation may regulate or define the concept of use more broadly to include advertising, serious preparations for sale etc. The Paris Convention specifies that if member countries require compulsory use of trade marks, the owner's registration may be cancelled for failure to use the trade mark only after a reasonable period has elapsed, and then only if the owner cannot justify the failure. Another relevant provision of the Paris Convention is article 6, which obliges a member country to refuse or cancel registration and to prohibit the use of a trade mark capable of being confused with another already well-known trade mark in that member country.

A trader or manufacturer wishing to protect his trade mark in several countries must comply with the trade mark registration formalities of the national office of each individual country. This means that *(a)* the trader or producer must submit its trade mark to different procedures; *(b)* it will have to file an application in different languages; *(c)* the trade mark will be subject to varying terms of protection, resulting in differing renewal dates; *(d)* the trader or producer will have to appoint a local agent; *(e)* the producer will have to pay different fees in each country (registration fees, agents fees, etc.). The purpose of the Madrid Agreement, signed in 1981 and entered into force in 1982, is to avoid these inconveniences. Under its terms, it is possible to file an international registration having effect in the countries party to the Madrid Agreement. Thus, an applicant needs to comply with only one set of formalities within the International Bureau of WIPO [13]. Therefore, a trade mark covered by international registration enjoys the same protection it would have enjoyed had it been filed directly in those countries.

A system for classifying goods and services is necessary to supplement the substantive protection granted under trade mark laws, particularly in countries that undertake some preliminary examination of marks whose registration has been applied for. The establishment of a classification is a difficult task and makes it more difficult for traders to register trade marks in different countries. To simplify matters, many countries have adopted the international classification established by the Nice Agreement Concerning the International Classification of Goods and Services for the Purposes of Registration of Marks.

The Nice classification consists of a list of classes of goods and services and an alphabetical list of goods and services indicating of the classes into which they fall. In countries applying a national classification of their own that differs from the Nice classification, the results of trade mark searches are given according to the national classification systems. It is difficult to compare the search results made in those countries with those made for the same trade marks under the Nice classification. The latter would thus be of great interest for industries wishing to extend their operations in foreign markets.

Originally, trade marks were mainly a sign serving to distinguish the products of one enterprise from those of other enterprises or competitors. Now, however, they serve a commercial purpose as well in so far as they are important competitive tools for protecting or maintaining market share and for entering new markets and expanding production to new fields.

Indeed, like patents or industrial designs, trade marks give the title-holder exclusive legal protection against imitation by competitors. However, the scope of protection of trade marks is wider. Thus, the owner may prevent the sale of products bearing the trade mark in a way which may affect the reputation of the mark.

Market implantation has become an operation demanding substantial resources, a high degree of sophistication, an in-depth analysis of market structures and trends and a careful selection of commercial strategy. Moreover, the increasing competition that results from trade liberalization means that consumers have a wider choice and more complex preferences.

Innovative products that cater to the personal tastes of consumers have a better chance of succeeding. Only the possibility of protection in the form of a trade mark, that is an original sign or symbol, justifies the huge investments needed for studies to determine market trends and consumer tastes. It is also the existence of trade mark protection that justifies the R and D efforts which are necessary to create new products or processes and the specialization demanded by increasingly sophisticated markets and consumers.

In any event, it is the legal protection associated with trade marks that guarantees a degree of stability in the market, without which the exploration and penetration of new markets would be too risky. In the absence of trade mark protection, all the marketing studies and R and D efforts to modify production to suit market trends and new preferences and tastes could go to waste.

## *Copyright*

Creative ideas that provide solutions to technical problems ("inventions") are protected by industrial property laws, generally patent or utility model laws. They are protected regardless of their physical embodiment. The protection given by law to the author of an invention comprises a protection against the use of that invention without the authorization of the author.

Copyright law, by contrast, protects only the form of expression of ideas, not the ideas themselves. The creativity protected by copyright law is creativity in the choice and arrangement of words, musical notes, colours, shapes and so on. Copyright law protects the owner of property rights in literary and artistic works against those who would copy or otherwise take and use the form in which the original work was expressed by the author [14].

For these reasons, legal protection for inventions differs from that for artistic works: it grants an exclusive right in the exploitation of an idea. Such protection is limited in time (normally about 20 years) and is acknowledged by the State in exchange for disclosure of the technological information contained in the invention. In other words, the protection for the invention must be known to the public and fully described by the inventor, that is, disclosed in an official register, open to the public, with the owner being bound to ensure that his invention appears in the register.

The protection of literary and artistic works under copyright law prevents only the unauthorized use of the forms of expression of ideas, taken from the work from another person. Such protection may extend over considerably longer periods of time without harming the public interest. The law can be (and in most countries, is) purely declaratory. Thus, it simply states that the author of an original work has the right to prevent other persons from copying or otherwise using his work. Under such law, a public register of works protected by copyright is not necessary, and in most countries the protection is not submitted to any formality.

Copyright law is a branch of law that deals with the rights of intellectual creators and is generally conceived to foster individual creativity and to make the results of that creativity available by disseminating it on the widest possible scale.

### *Main characteristics of systems for copyright and author's rights*

What are the works generally protected by copyright? The subject-matter of copyright protection includes every production in the literary, scientific and artistic field, whatever the form of expression. However, for a work to enjoy copyright protection, it must be an original creation. The ideas themselves do not need to be new, but the form, be it literary or artistic, in which they are expressed must be an original creation of the author, the result of his intellectual labour. The protection is independent of the quality of the work or the value attached to it or even of the purpose for which it is intended. This shows that it is the form of expression that is protected rather than the ideas themselves.

Almost all national copyright laws grant protection to the following categories of works:

- Literary works (novels, short stories, poems, dramatic works, advertisements, oral works etc.).
- Musical works (songs, choruses, operas, instrumental works for one, some or many instruments etc.).
- Artistic works, whether two-dimensional (drawings, paintings etc.) or three-dimensional (sculptures, architectural works).
- Photographic works (portraits, landscapes, current affairs etc.).
- Motion pictures or cinematographic works (television broadcasting, film dramas, documentaries etc.).

In many countries, copyright laws provide protection for works of applied art (furniture, lamps, wall-paper etc.) and choreographic works. Some laws also consider phonograph records, tapes and broadcast also as works to be protected under copyright.*

The owner of copyright in a protected work may use the work as he likes and is entitled to exclude others from using it. The acts requiring authorization of the copyright owner are usually spelled out in copyright laws. They consist of *(a)* the right of reproduction, *(b)* the right of public performance, *(c)* the right of broadcasting and communication to the public and *(d)* translation and adaptation rights:

- *Right of reproduction.* One of the most logical corollaries of copyright is that acts such as copying or reproducing a work requires the permission of the author. The act of making copies of a protected work is the act performed by a publisher who wishes to distribute the work to the public. The right to control this act is the legal basis for agreements between owners of copyright and publishers for the publishing of protected works.**
  Another form of reproduction is making sound recordings of works protected by copyright. Words may be communicated by sound recordings as easily as they can be communicated by writing. Where music is concerned, sound recording is one of the most favoured means of communicating a musical work to a wide public. Gramophone records, also known as phonograms in copyright law jargon, serve much the same purpose for musical works as books serve for literary works [15].

*Article 2 of the Berne Convention for the Protection of Literary and Artistic Works, which dates from 1886 and has been amended on several occasions since then, contains a list of works that may be protected by copyright:

The expression "literary artistic works" shall include every production in the literary, scientific and artistic domain, whatever may be the mode or form of expression, such as books, pamphlets and other writings; lectures, addresses, sermons and other works of the same nature; dramatic or dramatico-musical works; choreographic works and entertainments in dumb show; musical compositions with or without words; cinematographic works to which are assimilated works expressed by a process analogous to cinematography; works of drawing, painting, architecture, sculpture, engraving and lithography; photographic works, to which are assimilated works by a process analogous to photography; works of applied art; illustrations, maps, plans, sketches and three-dimensional works relative to geography, topography, architecture or science. Translations, adaptations, arrangements of music and other alterations of a literary or artistic works such as encyclopedias and anthologies which, by a reason of the selection and arrangement of their contents, constitute intellectual creations shall be protected as such, without prejudice to the copyright in each of the works forming part of such collections.

All countries that are party to the Berne Convention give protection under their national copyright legislation to the categories of works mentioned in the Convention.

**Publishing contracts frequently deal not only with the right to authorize the making of copies of the work but also with the right to authorize other acts covered by copyright laws, such as the translation and adaptation of the work.

- *Right of public performance.* A work covered by copyright may be communicated without necessarily being copied or reproduced. Thus, a drama or musical work can be performed or a lecture can be read aloud before an audience without copies being made. The right to control this act of public performance is of interest not only to the owners of works originally conceived for public performance. It also concerns the owners of copyright, and to persons authorized by them, when others may wish to arrange the public performance of works originally designed to be used only through reproduction and publication. Thus, a written story conceived originally to be read at home or in a library may be transformed or adapted into a drama to be performed in public on the stage of a theatre [15]. Such an adaptation also requires the permission of the author.

- *Right of broadcasting and communication to the public.* Copyright also includes acts of broadcasting works and communicating them to the public, for instance, by means of wires or cables. A work is communicated to the public by cables when a signal is diffused that may be received only by persons who possess such equipment linked to the cables used to diffuse the signal. On the other hand, a work is broadcast when a wireless signal is emitted into the air that can be received by any person within range of the signal, who possesses the necessary equipment (e.g. radio or television receiver) to convert the signal into sounds, images or sound and images [16]. According to the Berne Convention for the Protection of Literary and Artistic Works and copyright laws in a number of countries, owners of copyright have the exclusive right of authorizing both the wireless broadcasting and other communication to the public (e.g. by cable) of their works. In other countries, the exclusive right of the copyright owner to control the broadcasting of his or her work is replaced, in certain cases, by a right to remuneration for use of such works.* New copyright problems have emerged as a result of technological developments in recent years. With the use of satellites in space, which extend the range of wireless signals, the possibility of transnational broadcasting has increased tremendously and has therefore rendered more complex the exercise of exclusive rights of copyright owners.**

*In addition, some national laws may determine the condition of the exercise of this right by introducing compulsory or statutory licences.

**See in this respect Lipsye [17].

- *Translation and adaptation rights.* The act of translating or adapting a work protected under copyright also requires the authorization of the copyright owner. It is important to note that translations and adaptations are themselves works protected by copyright, provided, of course, that they had been previously authorized by the copyright owner of the original work. To reproduce and publish a translation or adaptation, the publisher must be granted an authorization from both the owner of the copyright in the original work and the owner of copyright in the translation or adaptation.

### Duration

Copyright protection is limited in time, that is, the law provides for a period of time during which the exclusive rights of the copyright owner exist. The period of protection by copyright normally begins with the creation of the work and extends beyond the life of the author in order to enable her or his successors to have economic benefits after the death. In most countries, the duration of copyright protected under national laws is the life of the author and fifty years after his or her death.

### Exceptions or limitations on copyright protection

Under particular circumstances defined by the national copyright law, certain acts normally prohibited by copyright may be done without the authorization of the copyright owner. Such use is generally referred to as fair use. In a number of countries fair use includes the following:

- Reproduction of a work exclusively for the personal or private use of the person who makes the reproduction.
- The making of quotations from a work protected by copyright, provided that the source is mentioned.

Some countries do not acknowledge protection for works if they are not fixed in a material form. Texts of laws or court decisions are also excluded from copyright protection in some countries. When broadcasting of a work has been authorized by the owner of copyright, several national laws allow broadcasting organizations to make temporary recording for the purposes of broadcasting, even if no specific authorization of the act of recording has been granted.* Finally, some national laws provide for the granting of compulsory licences or statutory licences for specific uses.* Compulsory licences are used, for example, to permit the broadcasting of protected works without the authorization of the owner of copyright. Statutory licences are contemplated in some national laws in order to divulge or translate works for the purposes of teaching, scholarship and research.

Since, copyright law is conceived to foster the development of new works, creativity could be hampered if exclusive rights were to be granted to authors with respect to the ideas themselves [20]. It must be noted that an idea developed by one person is frequently taken up again and improved or adapted to other uses by others.

The fact that copyright only protects the form of expression of ideas does not imply that ideas that may have an industrial application will remain unprotected. Appropriation by others of ideas having an important economic value may be considered unlawful under the law of unfair competition, trade secret laws, industrial designs or patent laws as the case may be.

### Basic principles of international protection

#### The Berne Convention for the Protection of Literary and Artistic Works

The main and oldest treaty in the field of copyright is the Berne Convention for the Protection of Literary and Artistic Works. The Berne Convention has undergone several revisions in order to improve the system of protection foreseen in the original text to cope with the new problems that have arisen as a result of rapid technological advances in the utilization of authors' works. The aim of the Berne Convention is "to protect, in as effective and uniform a manner as possible, the rights of authors in their literary and artistic works".**

The Berne Convention relies on three basic principles:

- National treatment, according to which works originating in one member country are to be given the same protection in another member country as the latter grants to works of its own nationals.

*See WIPO [18].

*Compulsory licences are normally referred to as a particular form of permission to be granted obligatory, by the competent authority and under special circumstances, for specific kinds of uses of works. Unlike statutory licences (also referred to as legal licences) directly authorizing the use of protected work by virtue of law without any previous application or notification, compulsory licences "are subject to prior application for a formal grant of the licence or at least previous notification of the owner of the copyright"[19]. It must be recalled that compulsory licences do not confer exclusive rights, are usually non-transferable and are confined to the country where they were granted. Equitable remuneration to the owner of the copyright is also a condition for the exercise of a compulsory licence.

**As in the case of the Paris Convention on the Protection of Industrial Property, already discussed, those countries to which the Berne Convention applies constitute the Union for the Protection of the Rights of Copyright Owners.

- Automatic protection, according to which such national treatment is not dependent on any formality, that is, protection is granted automatically and is not subject to the formality of registration, deposit or the like.
- Independence of protection, according to which enjoyment and exercise of the rights acknowledged is independent of the existence of protection in the country of origin of the work.

The works protected under the Berne Convention are included in article 2, which contains a vast but non-limitative list of such works, which may include any original production in the literary, scientific and artistic domain, whatever the mode or form of its expression. Derivative works (that is, those resulting from other, pre-existing works) such as translations, adaptations, or arrangements of music receive copyright protection. However, the protection of some categories of works is optional, that is, countries may decide to what extent they are prepared to grant protection to official texts (laws, court decisions, works of applied art etc.).

Member countries are also required to acknowledge certain basic rights, for example, the right of translation; the right of reproduction in any manner or form (which includes any sound or visual recording), the right to broadcasting and communicating to the public by wire, broadcasting or loudspeaker or any analogous instrument of the broadcast of the work; the right of public recitation; the right of making adaptations, arrangements or alteration of the work. Besides giving the authors economic rights, the Berne Convention provides for some basic moral rights, namely, the right of the author to claim authorship of the work and to object to any distortion, mutilation or other modification of, or other derogatory action in relation to, the work that would be prejudicial to his honour or reputation. In addition, the Berne Convention establishes a minimum term of protection: the life of the author and 50 years after his death. However, there are certain exceptions concerning cinematographic works, where the term of protection is 50 years after the work has been made available to the public, and photographic works, for which the term of protection is 25 years from the making of the work.

Finally, since the Berne Convention was developed initially according to the standards of protection of industrialized countries in Europe but then, after the Second World War, extended to other parts of the globe, it became clear that some adaptations were necessary. While it was universally acknowledged that authors and other creators needed protection for their intellectual creations it became difficult for newly independent countries to gain access to certain copyrighted works that were needed for educational purposes.

It became necessary in 1971 to convene a revision conference in Paris to cope with some problems developing countries were facing. As a result of that revision process, the appendix to the so-called Paris Act (1971) of the Berne Convention provides for special facilities open to developing countries regarding translation and reproduction of works of origin. The appendix also increases the number of exceptions to an author's exclusive rights, allowing developing countries to depart from the minimum standards of protection provided for in the Convention. The Berne Convention allows developing countries to grant non-exclusive and non-transferable compulsory licences with respect to *(a)* translation for the purpose of teaching, scholarship and research and *(b)* reproduction for use in connection with systematic instructional activities.

#### *The Universal Copyright Convention of 1952*

The Universal Copyright Convention of 1952 was an attempt to make uniform or at least reconcile and extend the protection under the Berne Convention and the Inter-American conventions. While the Berne Convention was conceived according to European standards of protection and perceived as a treaty to protect mainly intellectual creations among Europeans, the Inter-American conventions system was confined to countries from the American continent.

The need for a universal convention was formally acknowledged at the Revision Conference of the Berne Convention held at Rome in 1928 and reasserted on several occasions afterwards. In 1947, UNESCO took up the initiative and insisted on the need for a universal convention. A diplomatic conference was convened at Geneva in 1952 in which 50 countries from different parts of the globe participated. The Universal Copyright Convention adopted by that conference was not intended to replace the Berne Convention or any other multilateral or bilateral treaty in the field of copyright. The Universal Copyright Convention is structured much like the Berne Convention. It provides for national treatment and contains a set of basic rights, which are, however, spelled out in less detail than in the Berne Convention to facilitate the accession of as many countries as possible. The Universal Copyright Convention also includes the right of authors to make or authorize the translation of the work. However, countries are entitled to grant compulsory licences to translate the work provided that certain conditions are met.

### *The importance of copyright from a business point of view*

Technological advances in recent years have caused the scope of application of copyright to be expanded to new industries (e.g. textiles and computers) and to organizations that contribute and assist creators to reproduce and disseminate their works to a wide public.

In any society, great or small, industrialized or developing there are always some people who possess, more than others, capacity for intellectual creation. Because most authors are interested in having some control over how their creations are used and to reap some benefit from that use, the protection available under copyright law may encourage their creativity and help to enrich the country's wealth of literature, music and art.

It is important to note that the significant investments that are sometimes required to create and disseminate works of the mind will be easier to come by if effective protection exists under the law. In book-printing, film-making and sound-recording, legal protection seems to be indispensable. No one would engage in such expensive efforts if there was no possibility of taking action against those who use the products without permission. Therefore, copyright laws tend increasingly to grant protection to producers of gramophone records, compact disks and tapes, to performing artists and to broadcasting organizations involved in the dissemination of cultural goods.

In addition, if copyright protection exists for a work, the author is encouraged not only to create the work but also to make it public and disseminate it widely, because he can be certain that he will not lose control over it simply because it is made known to others. A wide dissemination of works is generally beneficial for the society as whole. A lack of adequate protection for individual creations in fields such as education, music (folk music and popular music, for instance) or software may hamper the growth of industries that help to disseminate a country's cultural heritage and may force the creators to emigrate in search of better incentives in other countries.

## Protection of new technologies

New developments and techniques in biotechnology such as genetic engineering and the cultivation and breeding of micro-organisms, plants and animals, because they are made possible by heavy investment in R and D and global collaboration among firms, have underlined the need for safeguarding proprietary rights. The technological significance of inventive activities in this field has led to the creation of new international conventions, which make it unnecessary to keep new plant inventions secret.

In informatics, new *sui generis regimes* for the protection of intellectual property rights emerged during the 1980s. The United States, in 1984, enacted the Semiconductor Chips Protection Act, which has provided a *sui generis* protection. Other industrialized countries followed suit. Another area of information technology, computer software, has been accorded more extensive protection as it is now protected by copyright laws not only in industrialized countries but also in some developing countries.

### *Biotechnology*

#### *The patent system*

The United States, Japan and Europe have made significant advances in defining the extent of intellectual property protection to be conferred to biotechnological inventions. At the international level, the EU is preparing a directive that will harmonize the legislation of member countries on the matter; in the framework of GATT and WIPO, meanwhile, industrialized countries are proposing an almost universal recognition of that protection.

The debate among industrialized countries on the matter shows a consensus on the main direction of the process and on the principles to be followed. There are, however, some unresolved differences with regard to the most appropriate form of protection for certain inventions and to the content of the rights to be granted.

Two areas of consensus are microbiological processes and micro-organisms, which are generally held to be patentable in Europe, Japan and the United States.* The lack of a written description is not deemed sufficient ground to reject a patent grant, provided that a deposit of the relevant strain is made.**

Trends are also converging with respect to the appropriability of materials existing in nature. In EU countries, a patent can be granted if a substance found in nature can be characterized by its structure, by its process of obtention or by other criteria and if it is new in the sense that it was not previously available to the public. In the United States, an isolated and purified form of a natural product can be patented if it is found in nature only in an unpurified form.*** As a result, a very thin line separates "invention" from "discovery" in these countries.

When more complex organisms are considered, differences start to emerge. In the United States, special patents (based on the Plant Patent Act of 1930), breeders' rights and, since 1986, utility patents can be conferred on different types of plants. In European countries, "plant varieties" and the "essentially biological processes" for their obtention are excluded

*In the area of micro-organisms, the Chakrabarty decision by the Supreme Court of the United States (1980) was a landmark case with significant worldwide impact.

**Germany admitted this possibility only in 1987, after the decision of its Supreme Court in a case relating to the rabies virus.

***Notwithstanding these generally agreed lines, the standards for patentability may be stricter in some European countries. In a recent case in the United Kingdom, a court established that a naturally occurring gene sequence is not patentable [21].

from patent protection. There are, however, important changes under way in Europe. On the one hand, the concept of plant variety is restrictively interpreted. Other plant classifications may be patentable, as well as parts of a plant or uses of a variety, according to the EEC draft directive on biotechnology, as revised in December 1990. On the other hand, the exclusion based on the use of essentially biological processes would not apply when there is a human intervention, even if it is purely biological.*

Animal patents have also generated disagreement. The United States has accepted them since the Ex Allen decision in 1987, but there is still considerable debate on the matter.** In Europe, animal varieties are not patentable nor are the biological processes for their production. This did not prevent the Board of Appeals of the European Patent Office from deciding (October 1990) that the "Harvard mouse" was a patentable subject-matter [23].

In sum, in the last 10 years, legislation in industrialized countries has begun to accommodate and grant property rights in inventions relating to living materials. This has largely been in response to the demands R and D based industrial firms seeking wider protection. The next section covers plant protection and the revision of the International Convention for the Protection of New Varieties of Plants known as the UPOV Convention in more detail. It illustrates how intellectual property is being expanded in that particular field, while, as mentioned above, issues of germ plasm and farmers' rights remain undecided [24].

### *The Union for the Protection of New Varieties and national plant breeders protection schemes*

As mentioned earlier, for an invention to be eligible for patent protection, it must fulfil three criteria:

- Be novel.
- Represent an inventive step in relation to the existing state of the art.
- Be industrially applicable.

In addition it must be the subject of an enabling disclosure, i.e. it must be so described in the patent application that a person skilled in the art to which the patent application relates can, by following the description of the invention, reproduce or repeat the invention. In many countries plant varieties were deemed not to fulfil one or other of the requirements mentioned above and, therefore, not to be eligible for patent protection. In other countries, patents were occasionally granted that included plant varieties within their scope of protection, but the practise was controversial and the validity of the patents was dubious. There were a number of reasons why plant varieties were thought not to be eligible for patent protection:

- There was no enabling disclosure (it was suggested that it was impossible to describe the process of selection of a specific variety so that a person skilled in the art could repeat the selection of the same variety);
- Living material was not appropriate subject-matter for the patent system or, alternatively, exclusive rights should not be granted to plant varieties constituting an essential step in the food production process;
- The process of selecting of a plant variety addressed an obvious objective with known technology and did not represent an inventive step [25].

It was also maintained that, since plant varieties were frequently capable of self replication, a patentee's rights would be exhausted after the first sale and would not extend to subsequent replication, making the patent an ineffective form of protection for a plant variety [25]. The precise position differed from country to country depending on its patent legislation and on its patent practise and case law. The need for a special kind for protection was clear. Accordingly, the United States enacted, in 1930, the Plant Patent Act.* Although it is part of the Patents Code, the Act, as consolidated in 1952 and amended in 1954, is a *sui generis* system that anticipates in many respects the International Convention for the Protection of New Varieties of Plants of 1961, which is known as the UPOV Convention** because it established the Union for the Protection of New Varieties of Plants (UPOV).

The UPOV Convention was the result of pressure from interested circles who perceived the lack of effective protection for plant varieties and also of the desire of governments to provide incentives for this activity [25]. It eventually led to the setting up of an international system of plant variety rights (PVR).

*The existence of a technical intervention would not be necessary. See, in connection with the Lubrizol case, Gomez Segade [22].

**Several bills were submitted to the United States Congress in order to specifically exclude or limit patentability on animals.

*It is now consolidated into Title 35 of the United States Code (Patents) as sections 161-164.

**Mention should also be made of Law No. 128 of Czechoslovakia of March 1921. This country was to take the lead with its law on the recognition of the originality of types, seeds and seedlings, and the testing of horticultural types. It provided, in particular, that entry into one of the registers or lists held for plant material of various kinds entitled registered horticulturalists and producers to put their material into commerce, but only under the registered indications (but other seed or plant owners could obtain the same authorization from the Qualification Committee). In addition, individuals and establishments that produced original material were the only ones allowed to make use of a registered trademark.

The Convention was subsequently modified by the contracting parties in 1972, 1978 and 1991.*

The PVR system of protection shares similarities with the patent systems. PVR are well-defined, exclusive rights granted to a plant breeder in relation to a new variety of plant. These exclusive rights last for a fixed period of time (under the 1978 text, no less than 15 years or 18 years in the case of vines, fruit trees, forest trees and ornamental trees). There is an examination procedure and a registration system. The examination procedure determines whether it satisfies the technical requirements for protection (namely distinctness, uniformity and stability).

The UPOV Convention of 1978 provides that the effect of the right granted to the breeder is that his prior authorization shall be required for the following acts:

- The production for the purposes of commercial marketing.
- The offering for sale.
- The marketing of the reproductive or vegetative propagating material, as such, of the variety.

The UPOV text of 1991 provides a wider scope of protection. It requires the authorization of the breeder for the following acts in respect of the propagating material of the protected varieties:

- Production or reproduction (multiplication).
- Conditioning for the purpose of propagation.
- Offering for sale.
- Selling or other marketing.
- Exporting.
- Importing.
- Stocking for any of the first four purposes.

These exclusive rights extend to at least 20 years from the grant and to 25 years for trees and vines.

The 1991 text, unlike the UPOV Convention of 1978, expressly provides that the breeder's exclusive rights do not extend to "acts done for experimental purposes" or to "acts done privately and for non-commercial purposes".

There is an important difference between the UPOV Convention of 1978 and the revised text of 1991 with respect to the so-called farmer's exception. The term farmer's exception (or farmer's privilege) refers to the principle that it is not an infringement of PVR for a farmer, who has validly (that is, with the consent of the holder of PVR) purchased some seed (or other reproductive material) of a protected variety, to save some of the subsequently produced seed for sowing to produce a further crop. This activity is not an infringement under the UPOV Convention of 1978, since it is a production of reproductive material not for the purpose of sale but for the purpose of further production.

In contrast, infringement of PVR may occur under the UPOV Convention of 1991 when reproductive material is produced, irrespective of the use to which it is ultimately put. Accordingly, there would be no implicit farmer's exception. Furthermore, this activity does not come within the express private and non-commercial purposes exception contemplated in the 1991 version. The saving of seed by a farmer may be private, but it is nevertheless commercial since the saved seed is ultimately used to produce a crop for sale. However, member countries have the option to restrict breeder's rights "in order to permit farmers to use for propagating purposes, on their own holdings, the product of the harvest which they have obtained by planting on their own holdings" (article 15 (2) ).

The UPOV Convention paved the way for the establishment of *sui generis* schemes of protection at a national level. A number of countries enacted domestic legislation embodying some of the principles contained in the Convention, and other countries enacted national legislation that implements their obligation as contracting parties. A case in point is the United Kingdom Plant Varieties and Seeds Act of 1964, amended by the Plant Varieties Act of 1983.

### *Computer industry*

The issue of legal protection of computer software arose when software affirmed itself as goods that could be traded separately from hardware, and particularly with the expansion of packaged software. Before 1983, only three countries had specific legislation on the matter: Bulgaria, the Philippines and United States. After that year more than a dozen countries introduced rules regarding software protection: Hungary (1983), Australia (1984), Federal Republic of Germany (1985), France (1985), India (1985), Japan (1985), United Kingdom (1985), Taiwan Province of China (1985), Republic of Korea (1986), Spain (1987), Singapore (1987), Malaysia (1987), Indonesia (1987), Brazil (1987) Canada (1988) and Argentina (1993).

There was considerable debate in both developed and developing countries over the appropriate legal framework. In some of them, attempts were made to devise special rules for software protection, in order to take into account its functional character and the peculiarities of its commercialization and use. In Japan, the Ministry for International Trade and Industry (MITI) proposed a special regime in 1983 that would exclude moral rights, limit protection to 15 years and regulate the use of software so as to bal-

*The UPOV Convention of 1991 was open to signature for member States of the Union until 31 March 1992 and for developed countries wishing to join the Union until 31 December 1993. It is still open for signature for developing countries until 31 December 1995.

ance the private and public interest. In France, the National Institute of Industrial Property also proposed a *sui generis* optional protection (1984). In Brazil and Argentina some draft laws also proposed special rules (although in Argentina, a decree of 1993 considers software as a work to be protected under copyright).

The protection of software under copyright laws is the predominant trend worldwide. Besides the cases where specific amendments were introduced to copyright laws, in a number of other countries (including Belgium, Chile, Italy, Mexico and Switzerland) judicial or administrative decisions also followed that trend.

In most cases, the copyright approach has been effected by amendments to copyright laws specifying that software is a copyrightable work and the rights relating to copies and adaptations. In a few countries, such as Brazil, France, Indonesia, the Republic of Korea and Japan the reforms have been deeper.

### *Patent protection for algorithms and software related inventions*

Many national patent laws exclude mathematical methods, schemes, rules and methods for performing mental acts, methods for doing business and computer programs (also referred to as computer software) from patent protection. These provisions have served on several occasions as a basis for excluding algorithms and computer-related inventions from patent protection.

As far as algorithm inventions are concerned, the problem is "that they are very frequently expressed in mathematical relationships, such as lines of code which may include mathematical operations to be performed upon the data. This stems from the reasoning that modern computers are physical electronic devices which operate in accordance with physical laws, which are frequently modelled using mathematical relationships" [26].

In addition, at its foundational level the processing unit of a computer may perform only limited operations which are characterized as mathematical. This influences the nature of programming methods, applications and programming languages and has often raised the issue of whether an algorithm is to be considered a patentable process or an unpatentable mathematical method.

Until recently criteria for the patentability of computer-related inventions diverged substantially between countries. In some, computer-related inventions were not deemed eligible for patent protection unless a separate hardware invention was also present. However, some common criteria now seem to be emerging, particularly in industrialized countries. Thus, in September 1989 the European Patent Office, the Japanese Patent Office and the United States Patent and Trade Mark Office issued a trilateral cooperation document containing the following conclusion:

> It would appear that the concepts of patentable inventions, including those which are computer-related, are not fundamentally different from each other. The basic patentability criterion, namely the technical character of an invention considered as a whole, appears to be commonly accepted. The tests or methods used to assess patentability appear to lead, in spite of their different approach, to substantially the same results as can be seen from the typical cases and examples.*

Administrative practice and case law in Europe, Japan, United States and even in some countries of Latin America and a number of countries of the Pacific Rim seem to reflect that patent protection for computer-related inventions is being acknowledged. The following criterion is emerging: claims to computer programs or software *per se* are unpatentable, but claims that include an application of computer software in a patentable process or apparatus may be patentable [27].

In Europe, for example, the European Patent Office relied originally on the idea that if the sole novelty over the prior art was in the computer software, the claim was not patentable. However, in 1985, it revised its Guidelines for Examination** which state as follows with regard to the exclusion of computer programs as patentable subject-matter:

> A computer program claimed by itself or as a record on a carrier, is not patentable irrespective of its content. The situation is not normally changed when the computer program is loaded into a known computer. If however the subject matter as claimed makes a technical contribution to the prior art, patentability should not be denied merely on the ground that a computer program is involved in its implementation. This means, for example, that program-controlled machines and program-controlled manufacturing and control processes should normally be regarded as patentable subject-matter. It follows also that, where the claim subject-matter is concerned only with the program-controlled internal working of a known computer, the subject matter could be patentable if it provides a technical effect [28].

### *Copyright protection for software*

Abundant literature has analysed the different legal institutions under which software may be protected, namely, copyright, trade secrets, contractual law, patents and a special regime. The application of utility models has also been proposed. As mentioned before, the prevailing trend, after some unsuccessful attempts to establish special regimes, is software protection under copyright.

*"Patentability of Computer Related Inventions. A Comparative Study", cited by Bigel, [27].

**EPO publishes guidelines for its examiners.

The trend has been strongly influenced by the United States position on the subject, particularly after the amendment, in 1980, of the United States copyright law, which was, in turn, determined to a great extent by the domestic and international interests of the large software producers. The main advantages for them in relying on copyright derive from the following:

- The possibility to apply well-known and generally respected principles and rules.
- The assimilation of software producers' rights to those of literary, artistic or scientific authors, in spite of the functional character of programs.
- The access to established legal remedies against unauthorized reproduction.
- The long term of protection conferred.
- The commencement of protection on the date a program was created.
- The lack of registration requirements to obtain protection.
- The existence of international conventions that give universal protection.

The last mentioned point is crucial for the international operation of the industry. To the extent that the copyright approach is admitted, under the Universal Copyright Convention or the Berne Convention, a computer program created in one country automatically receives protection in almost every country.

Case law has played, a decisive role in shaping the scope of protection afforded in the United States. One important development has led to a reinterpretation of the principle that confines copyright protection to the program's expression. In Whelan Associates v. Jaslow Dental Laboratory, while the court recognized that copyright protection did not extend to the idea or function of the program, it held that such protection covered the sequence, organization and structure of the code-program.* Furthermore, in Broderbund Software v. Unison World, it was decided that the protection of the underlying program extends to all elements of its audiovisual display.** Courts need to decide on the imprecise frontiers of copyright protection in specific cases. After an intense debate, they decided, in NEC Corporation v. Intel Corporation to support the copyrightability of microcode, which controls the sequence of operations carried out within the computer in response to a particular instruction received despite its clear mechanical and utilitarian nature.

*A similar decision was taken in the Gem Scan case in Canada.

**This interpretation has also been embraced by the United States, Copyright Office, although other decisions have ruled that a separate protection for such displays should be sought.

Computer programs and software-related inventions have been recognized as works eligible for protection as trade secrets either by specific laws dealing with such protection, which is not the usual case at present, or by case law in a number of developed countries. Thus, information, formulas, compilations or programs having an economic value are expressly characterized as trade secrets by the Uniform Trade Act of 1979 of the United States. Trade secret contracts in the form of leases or licences are the legal protection mechanisms most commonly used by the producers of commercially oriented computer software packages. This is especially true when there is uncertainty about whether a software-related invention or program having economic value may claim patent protection.

First and foremost, the information that is sought to be protected must indeed be secret, and certain factors must be evaluated in reaching this conclusion:

- The extent to which the information is known to those other than the proprietor of the business.
- The extent to which the proprietor intends to keep the information secret and adopts measures to prevent its divulgation.
- The extent to which the information may have industrial application (in some countries application in trade, finance etc. as well) and the effort expended in developing the information (in some countries case law requires a certain degree of originality that may differentiate the information from the common or public knowledge).

The factors listed above illustrate the strengths and weaknesses of trade secret protection for software-related inventions or information. As long as the secret is maintained, the protection is effective, but once it is disclosed, or if an examination of the product that embodies it allows a purchaser of the product to discover the secret, the secret can no longer be protected as a trade secret. Furthermore, there is generally no protection through civil law liability against third parties who may acquire the secret in good faith.

### *Mask works (semiconductor topography)*

The development of semiconductor topography requires considerable investment of human, technical and financial resources. The process starts with the creation of a logical design for a particular function, such as an arithmetic logic unit or random access memory. That design must then be translated into an electronic circuit capable of being incorporated into the semiconductor chip. Before the design is implemented in hardware form it is subject to intensive testing.* Leaving aside national defence interests, the semiconductor industry is a leading sector because of its widespread economic impact in different market segments and its strategic importance for competitiveness in computers, telecommunications and consumer electronics among others [29].

The need for a regime of rights protecting semiconductors is indicated by the trend towards *sui generis* legislation. In the United States, for instance, the Semiconductor Chip Protection Act (SCPA) was placed on the statute books in 1984, and in 1985 Japan enacted the Legal Protection for Circuitry Layouts of Semiconductors Integrated Circuit Act. Inevitably the issue also gained the attention of the European Economic Community. In 1986, in order to harmonize the laws of the Member States, the Council of the European Community adopted a directive on the protection of topographies of semiconductor products.

In the United States, SCPA introduced a special title of legal protection for mask works fixed in a semiconductor chip product. Regulations adopted later in other countries avoided the use of "mask work" terminology, in view of the technological advances taking place in semiconductor design and manufacture.

As under copyright, SCPA makes protection conditional on the originality of the work. No protection is thus available for a mask work that consists of designs that are basic, commonplace or familiar in the semiconductor industry or of variations of such designs combined in a way that, considered as a whole, is not original.

Protection of a mask work commences on the date of its first commercial exploitation (unless it is protected by registration under United States law). To maintain protection, registration must be effected within two years of the first commercial exploitation. Where first commercial exploitation proceeds the registration, protection expires at the end of the tenth calendar year from such exploitation.

According to SPCA, "commercial exploitation" means the distribution to the public for commercial purposes of a semiconductor chip product embodying the mask work, with the proviso that the term includes an offer to sell or transfer a semiconductor chip product only when the offer is in writing and occurs after the mask work is fixed in the semiconductor product.*

SCPA also refers to the exception of "reverse engineering". The law does not consider it an infringement for a person to reproduce the mask work solely for the purpose of teaching, analysing or evaluating the concepts or techniques embodied in it, or to perform the analysis or evaluation to incorporate the results in an original mask work that is made to be distributed. With this provision, "competitors may not only study protected mask works, but may use the results of that study to design, distribute and import semiconductor chip products embodying their own original mask works" [30].

Another important element of SCPA relates to immunity for innocent purchasers of pirated chips. Such a purchaser is not liable for merely using the chip product or for importation or distribution of the infringing product that occurs before he or she (the innocent purchaser) has had notice of protection with respect to the mask work embodied in the product. He or she will be liable only for reasonable royalty on each unit of the infringing semiconductor chip product purchased prior to notice and imported or distributed after having received such notice. The amount of the royalty will be determined in a civil action for infringement unless the parties resolve the issue by voluntary negotiation, mediation or binding arbitration.

A provision that has influenced countries to adopt *sui generis* regimes for integrated circuits in other developed countries concerns the treatment of mask works belonging to foreigners. SCPA establishes a well-defined system of strict material reciprocity, i.e. protection in the United States is made conditional on similar protection in the country of the foreign applicant [30]. SCPA had a considerable influence on legislation in other developed countries. The first country to react to the United States law was Japan, which in 1985 enacted a special law on the matter, modelled on SCPA.

Similarly, in 1986 the Council of the European Community adopted a directive on the legal protection of topographies of semiconductor products. One important innovative feature of the directive was its adoption of a new term, "topography", to define the subject-matter of protection, this terminology has subsequently applied in the relevant European laws. The directive requires the existence of "an intellectual effort" (not "originality") for protection. It authorizes

*Each chip is made up of a number of interconnecting layers of semiconductor material such as silicon, sealed in a plastic or ceramic coat. The circuitry is etched into the various layers by a photochemical process in which parts of a layer are exposed to ultraviolet light. This can be done using a glass template embodying the pattern of the circuit in the form of transparent and opaque ares. When the layer is exposed to the light, reaction takes place in those areas where the light is allowed to pass through the template. Alternatively, in some techniques, a beam of light controlled by a computer traces the pattern of the circuit.

*In the United States, an owner of a mask work may apply to the Register of Copyrights for registration of a claim of protection. The Regulation issued by that Register in 1985 permitted the title-holder to retain trade secrets. Indeed, the treatment of the information for which a trade secret is claimed depends, according to such Regulations, upon whether or not the mask work was commercially exploited before the application to register the claim.

member States to establish registration as a condition for protection and to require the presentation of material identifying or exemplifying the topography (such material should not be made public, however, where it is a trade secret). The provision on reverse engineering presents some differences from the United States model. Further, the directive includes a provision on non-voluntary licences, which establishes the case in which member States cannot grant them, i.e., for the sole reason that a certain period of time has elapsed, automatically, and by operation of law [31].

A number of other countries have subsequently adopted *sui generis* laws to protect semiconductor layout designs, among others Australia, Austria, Denmark, France, Germany, Italy, Spain and the United Kingdom.

This *sui generis* approach, that is to say, the creation of a new legal regime for specific and new technologies, has been criticized. As an expert from Germany warned at a session of the Committee of Experts convened by WIPO on the matter, there was a risk "of creating separate systems of *sui generis* protection for all new technologies".*

## Negotiations on the trade-related aspects of intellectual property rights and the General Agreement on Tariffs and Trade mechanism for the protection of intellectual property

After almost five years of negotiations, a draft agreement on trade-related aspects of intellectual property rights, (TRIPS) was submitted by the Director General of the General Agreement on Tariffs and Trade (GATT) in December 1991 as part of a proposed final agreement of the Uruguay Round, which was finally accepted in 1993. The TRIPS Agreement is one of the most far-reaching international instruments ever subscribed on intellectual property rights (IPRs). It covers all types of IPRs, with the sole exception of breeders rights (only incidentally referred to) and utility models (petty patents). The Agreement establishes minimum universal standards on patents, copyrights, trade marks, industrial designs, geographical indications, integrated circuits and undisclosed information (know-how). It supplements with additional obligations the Paris Convention, the Berne Convention, the International Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations (Rome Convention) and the Treaty on Intellectual Property in Respect of Integrated Circuits (IPIC Treaty) in their respective fields. Although freedom remains to legislate on various aspects at the national level, the TRIPS Agreement harmonizes to a great extent the substantive (and some procedural) rules on IPRs.

*Quoted by Correa [32].

### *Key provisions*

In addition to the well-established principle of national treatment, the TRIPS Agreement extends to IPRs the most-favoured-nation clause. These principles tend to ensure non-discrimination, on the one hand, between foreigners and nationals and, on the other hand, among nationals from different countries. This latter type of discrimination has occasionally arisen in intellectual property as a result of unilateral actions that led to concessions that only benefitted the nationals of the country that pressed for the reforms. The TRIPS Agreement also contains detailed provisions on judicial and administrative procedures and other measures relating to the enforcement of rights, as well as specific rules to combat trade in counterfeit-trade marked goods and pirated works.*

Finally, the TRIPS agreement contains transitional provisions that would allow developing countries to delay the implementation of most of the TRIPS rules for up to 5 years (10 years in the case of least developed countries). Special rules are provided for the protection of subject-matter that becomes patentable, including the establishment of exclusive marketing rights in relation to pharmaceutical and agrochemical products.

Non-compliance with the new rules can be the basis of a dispute settlement procedure under the GATT rules and, eventually, of commercial retaliatory measures in any field (and not only in IPRs) by the country whose nationals are affected by such non-compliance. Since respect for the new universal standards becomes, within GATT, a quid pro quo in the commercial arena, the likelihood of deviations from those standards is drastically reduced, unless a country is prepared to absorb the costs of trade restrictions that may be imposed against it.

During the TRIPS negotiations, the developing countries' proposals were grounded on the perception that intellectual property law is an instrument for economic and technological progress that must strike a proper balance between the granting of exclusive rights to stimulate the creation of new technology and the dissemination of both new and old technological skills and knowledge. Consequently, the nature and scope of protection will necessarily vary from country to country and from one time to another, depending on the degree of development and the policies chosen to implement differing national views of the public interest.

In fact, the position of developing countries in this respect does not differ from that of developed countries at earlier stages of their own industrial growth. Those countries, too, used to limit the scope of patent protection while denying protection altogether for

*Such rules may also be applicable, in accordance with national legislation, to other infringements of IPRs (article 51).

certain technologies or product categories. Thus, the international system of intellectual property rights evolves gradually and consensually as the participating countries grow, establish innovation capabilities and gain competitiveness in international markets [33]. It is on the basis of this perception that developing countries sought, in the 1960s and 1970s, to obtain a balance between public and private interests through specific measures provided for in their national legislations, such as the strengthening of the patentee's obligation to work a patent locally, the limitation of the scope and duration of the patentee's exclusive rights in certain fields and the regulation of the conditions under which technology was to be transferred in order to prevent restrictive and abusive trade practices.

However, during the Uruguay Round negotiations, that is, in the late 1980s and early 1990s, several developing countries softened their transfer-of-technology regulations aimed at curbing restrictive practices of industrial property owners, most of them firms from industrialized countries. In addition, many of them enacted new legislation on intellectual property, strengthening its protection and widening the scope of protection for technological innovations. Such attitudes are the result of changes in the strategies of developing countries on the one hand and the pressure exercised by industrialized countries on developing nations to acknowledge higher standards of protection on the other. From the outset of the negotiations, developing countries expressed the view that the concern of GATT is with the liberalization of international trade and not with the elaboration and enforcement of the intellectual property rights of individuals, which are within the competence of WIPO and already covered by the traditional conventions discussed above (the Paris and Benrne Conventions, among others).

Developed countries, on the other hand, generally agreed on the need to elaborate minimum standards for the protection of intellectual property and provisions for its enforcement and to link it to the GATT dispute settlement machinery. Some of them suggested that existing international agreements did not contain strong enough requirements regarding intellectual property protection and lacked effective dispute settlement mechanisms [34]. Other factors underlay the new wave of reforms of the international system for the protection of intellectual system advocated by the developed countries:

- The increase in R and D expenditures, which in developed countries have grown more rapidly than GDP.
- The intensification of technology-based competition and the relative decline of the technological leadership of the United States in certain fields, e.g., micro-electronics.
- The growing capacity of manufacturers in certain developing countries to penetrate distant markets for traditional industrial products, which has forced the developed countries to rely more heavily than in the past on their competitive advantages in the production of intellectual property goods.
- The ease with which valuable intellectual goods can now be imitated, particularly in fields such as software, pharmaceuticals and audiovisual works.
- The lobbying strength of organized industrial groups, such as those representing the pharmaceutical, software and semiconductor chip sectors.
- The globalization of the world economy and the advantages that large corporations may derive from a harmonized legal framework.

The complaints of developed countries regarding the protection in developing countries (it was these complaints that caused the Uruguay Round to focus on the matter) related mainly to *(a)* the lack of subject-matter protection in certain fields (principally pharmaceutical products) and the uncertainty about the extent of protection for new technologies (software, data banks, biotechnology etc.), *(b)* limitation on title-holders rights (e.g. as regards imports and compulsory licences), *(c)* inadequate enforcement of conferred rights (lack of rapid administrative and judicial procedures) and *(d)* inadequate duration of protection, particularly in the patent field, which is said to discourage innovators from introducing new products or processes and to limit their ability to recover the expenditures incurred in R and D.

These concerns are reflected in the final text of TRIPS Agreement. Patentability and the exclusion thereto was one of the main issues in the TRIPS negotiations. It was evident from the outset of the Uruguay Round that the extension of patentability, particularly to pharmaceuticals, in countries that did not so far acknowledge it was a major goal of the proponents of GATT involvement in intellectual property questions. When the Uruguay Round started, nearly 50 countries did not confer patent protection to medicines or, in some cases, to other products such as food and beverages. In this respect, the TRIPS Agreement states that patents shall be available for any inventions, whether products or processes, in all fields of technology. It further emphasizes that patents should be available without discrimination as to the field of technology.*

*These provisions may be regarded as one of the main concessions of developing countries in TRIPS, at least from the standpoint of the original position of a number of them in the negotiations and *vis-à-vis* their existing legislations. During the negotiations a number of developing countries, including Indonesia, Mexico, the Republic of Korea, Saudi Arabia, United Republic of Tanzania, modified their patent and other intellectual laws to meet higher standards of protection.

As far as biotechnological innovations are concerned, the TRIPS Agreement entitles countries to exclude from patentability plants and animals other than micro-organisms as well as essentially biological processes (as opposed to non-biological and microbiological processes) for the production of plants and animals. However, countries are required to protect plant varieties either by patents or by an effective *sui generis* system or by any combination thereof. This obligation is another important basis for expanding the scope of intellectual property protection in a field that most developing countries have neglected until now. Although there is flexibility with respect to the form of protection, the fact is that all GATT member countries are now bound to protect plant varieties.

The TRIPs Agreement will have a powerful harmonizing effect worldwide in respect to the duration of intellectual property protection in general and of patents in particular: it establishes, as a minimum, 20 years of patent protection counted from the date of filing the patent. This provision outlaws any special duration period determined on the basis of field of technology, extent of exploitation of the invention or any other grounds that national laws may contemplate.

It is important to note that the Agreement sets forth the right that a patent should confer to its title-holder by referring to the two traditional categories of inventions: products and processes. Product patents confer the right to prevent third parties not having the patentee's consent "from making, using, offering or importing for those purposes the product". One significant aspect of this provision is that it expressly refers to importation as one of the exclusive rights of the patent-holder.* Such a right considerably widens the scope of patent protection while limiting the possibility for countries to grant compulsory licences when title-holders do not manufacture or grant a licence to authorize the making of their inventions in their territories. The mere importation of the patented product is thus deemed an act of exploitation that prevents, in principle, the grant of non-voluntary licences. Derecognition of the obligation to work patents locally, which follows from the recognition of the exclusive right to import the patented product, may at first glance harm developing countries wishing to promote industrialization in their territories. However, the TRIPs Agreement allows developing countries directly to address the primary concern underlying the old local-working requirement, namely, monopolistic pricing. To this end, it implicitly allows member countries to impose compulsory licences when, despite negotiations with right-holders, the latter have failed to licence the patented technology "on reasonable commercial terms and conditions" [36].

*In several countries, however, including some industrialized ones, an exclusive right of importation is not recognized as such (see Dhanjee and Boisson de Chazourness [35]).

In any event, the TRIPS Agreement limits the scope for lawful compulsory licensing, and it subjects the licences to equitable compensation and reasonable restrictions on the exportation of the resulting products, (i.e. the products manufactured under such a compulsory licence).

With the adoption of the Agreement as part of the overall agreement reached by member countries of GATT in the framework of the Uruguay Round, a basic feature of the international intellectual property system discussed above—the freedom of each country to frame, within certain limits, the regime of intellectual property protection that it considers best suited to its own level of development—will "necessarily give away to a universal set of norms based on the current level of protection granted in the most technologically advanced countries" [37].

### *Possible effects on the global flow of technologies*

It is difficult to predict how and to what extent higher standards of international protection of intellectual property may influence the transfer of technology. The economic rationale for intellectual protection, simply stated, is to reward the frequently large R and D expenditures to develop new processes or products that enhance the welfare of society. This "assumes that, on the one hand, investment in innovation would be sub-optimal in the absence of protection; and, on the other, that the social benefits from productivity gains and economic growth, on balance, offset the added costs created by legal monopolies" [38].

In countries that have achieved a certain degree of technological and industrial development, intellectual property protection may well be an important tool to promote innovation to the extent that it ensures the exploitation of R and D results. Developed countries, which control an overwhelming share of the world's scientific and technological resources, therefore benefit most from the strengthening of intellectual property protection at the international level. Reinforcement of protection is also viewed by large corporations, as well as by innovative and dynamic small and medium-sized enterprises in developed countries as a condition to be met before they will share and exchange their strategic knowledge with other firms or research institutions in order to create new products or processes. The primary value of new technologies and products or processes lies in the skills and insights needed to create and refine them. Accordingly, firms will be willing to transfer and share their knowledge in countries where absorption capabilities and technological upgrading are encouraged and where legal protection deters competitors from copying or appropriating their technologies.

For developing countries lacking the necessary capabilities and human resources to absorb new technologies and carry out competitive R and D, the reinforcement and expansion of intellectual property protection is not likely to create, in and of itself, more favourable conditions for technological development. Legal protection is only one of the factors conducive to innovation: the general macroeconomic environment, the investment rate, the availability of qualified personnel and size of the market are other factors. Nevertheless, the benefits of strong intellectual property protection may be expected to increase as the economy of a developing country grows and its technological infrastructure develops.

In any case, in a world economy in which innovation has become one of the most important sources of comparative advantage for nations and corporations, potential suppliers will be reluctant to transfer their knowledge to countries where technology can be easily copied and where the exclusive rights of titleholders are difficult to enforce. The willingness of a firm to license its intellectual property assets thus appears to be strongly linked to the guarantees it can be granted to ensure respect for its property rights. In this situation, developing countries are bound, in their own interests, to provide a reasonable degree of intellectual property protection.

Efforts to implement higher intellectual property standards will, however, put increasing strains on competition law, which is not covered by TRIPS. The negative impact of stronger protection or of potential abuses by industrial property owners on free competition and trade can thus be neutralized or attenuated by competition laws in developing countries. These laws may compel the authorities to take domestic factors into account (for example, market size, the existence of concentrated markets and barriers to entry in particular technological fields and the existence of competing or substitute technologies) when they analyse restrictive trade practices.

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# Module 4

## SUCCESS FACTORS

*The perspective from which a technology transfer is approached will determine the criteria for judging its success. Proprietors of technology, prospective licensees (in developed or developing countries) and Governments seek different things from technology transfer and will, accordingly, judge its success in different ways.*

*This module views a hypothetical technology transfer from each of these perspectives to illustrate the objectives that define success for each of the parties involved. It considers the various objectives and options available to licensors and licensees in both developed and developing countries, as well as the role that Governments, in developing countries especially, can play in encouraging technology transfers to their countries.*

# Contents

# SUCCESS FACTORS

### Introduction

There are, essentially, two ways to approach technology transfer. One way is to focus on making arrangements for as many technologies as possible in the hope that, through sheer volume of activity, economic benefits will naturally occur. Such an approach relies largely on serendipity to achieve success.

The second approach takes a more rational view. It carefully considers factors for success in terms of specific benefits sought: that is, it determines the objectives sought for the technology transfer before entering negotiations with potential partners. This module is based on the assumption that a rational approach is better suited to achieving success.

The perspective from which one approaches a technology transfer will determine the criteria for judging its success. Proprietors of technology, prospective licensees (in advanced or developing countries) and Governments seek different things from technology transfer and will, accordingly, judge its success in different ways. Proprietors and acquirers of technology may have very different goals, but they can nevertheless collaborate effectively to realize those goals. Other interested parties, particularly Governments, including different agencies with different missions, can also influence and be affected by technology transfers, and their legitimate preoccupations must also be taken into account.

The following analysis therefore will focus on four different types of "players" involved with international technology transfers:

- Proprietors of technology seeking parties in the other countries that can collaborate in the commercialization of products by using elements of the proprietor's portfolio of intellectual property rights.
- Persons and companies, usually in advanced countries, who are already active in a particular field and who are seeking licences for the purposes of growth or diversification.
- Persons and companies located in developing countries* who seek to develop indigenous businesses based on technology and ancillary skills to be acquired from abroad.
- Governments who wish to influence technology transfers that affect their economies by encouraging arrangements that are likely to create benefits or by regulating arrangements that could be inconsistent with some aspects of public policy.

This analysis considers the complexities of the licensing process, which encompasses many forms of transaction, one or the other of which will be most suitable in a given situation, depending on the relative skill of the parties, their marketing and financial strengths and weaknesses, the special qualities, stage of development and novelty of the technologies involved, and the condition of the markets in which the envisaged business is to be conducted.

Another set of issues depends on the existence and strengths of the intellectual property rights. Are there patents and what is their significance? To what extent are there important trade secrets? Is there also a body of more mundane know-how, and is the potential recipient equipped to absorb this rapidly or will extensive training be necessary? Does the proprietor possess valuable trade marks, and would use of these be advantageous or limiting to the licensees? Is there copyrighted software or ancillary documentation involved?

Thus, success depends on the rational employment of available positive factors and the avoidance of negative ones. If a party has established clear objectives at the outset, perseveres, and is also flexible in dealing with the array of problems and choices that invariably arise along the way, the chances of success in transferring technology can be enhanced for all parties involved.

The win-win result is not easily attained, but it can be achieved with patience, sensitivity to the strengths, weaknesses and reasonable interests of all parties and respect for intellectual property rights. Understanding the rules and using them creatively can lead to success.

### Objectives of technology proprietors

The successful development of a new invention into a commercially viable product or process is an important achievement. Such success does not occur routinely and, in fact, is realized in only a small minority of R and D projects. When it does occur, it

*See, Robert Goldscheider, *Technology Management* (New York, Clark, Boardmax, Callaghan, 1987-1993), chap. 7.

behoves the proprietor to do everything possible to maximize benefits on a global scale, both to realize a return on investment in the successful project and to recoup the costs of initiatives that were unsuccessful.

An optimum strategy to achieve such results depends on many factors. If the proprietor is a large transnational corporation with an existing family of controlled subsidiaries and joint ventures around the world, it may decide to restrict foreign exploitation of the invention to its related companies. If these affiliates do not have a strong market presence in all the relevant economies, the proprietor may seek to transfer the technology to an unrelated party but will probably be careful not to create new competitors that could detract from the success of its related companies. If sufficient production capacity exists, the proprietor would probably appoint unrelated distributors or sales agents in countries where it lacks them. This would avoid exposing sensitive trade secrets and know-how pertinent to the production of the products involved.

A large company with the financial means to obtain intellectual property protection for its technology would be likely to file for patent protection in all countries where the products or processes covered by this invention could logically be expected to be manufactured or used. The most important export markets for such products would also be considered for patent filings, although they would perhaps have a somewhat lower priority. If a new trade mark was intended for the new technology, or if goods not covered by the existing trade mark were involved, additional filings would be likely.

Thus, it is assumed that procedures to safeguard the proprietor's trade secrets and know-how would already be in place. No special filing would be necessary to secure copyright protection for any software or documentation relating to the technology, but appropriate markings, consistent with the Universal Copyright Convention of UNESCO (1974) should be affixed to such materials.

If the proprietor is a smaller company lacking an existing global business apparatus, it should logically resort to various forms of the licensing process to maximize its return. To buttress its bargaining position, it should obtain the broadest possible intellectual property protection. If, however, it could not afford to file as widely as a larger company, it would probably file only in North America, Europe, the European Patent Convention countries, and Japan, and this might force it to impose stricter conditions when it licenses its trade secrets and know-how in other countries, including the least developed countries (LDCs).

When formulating its strategy, a smaller company should consider using different forms of technology transfer, each tailored to the specific conditions in a potential market. The different forms are listed in order of increasing commitment on the part of the proprietor:

- Sales agencies, in which persons and companies are appointed to seek customers for products of the new technology. Such products are sold directly by the proprietor, or by one of its licensed manufacturing sources, to the customer, with the agent receiving a commission on sales.
- Distributorships, in which an unrelated party is authorized to purchase the goods for its own account and then to resell, at prices set by the distributor, in a defined territory.
- Assembly agreements, in which knocked-down kits or subassemblies are sold to the assembler, who puts the products into final form for re-sale.
- Ordinary licences, in which the proprietor grants rights under its intellectual property rights and reveals to the licensee all the information necessary to enable it to make and/or sell specified products and/or use a proprietary process.
- Joint ventures, in which the proprietor and the licensee each own an equity interest in the licensed entity in a ratio that they negotiate: majority or minority ownership by the proprietor, or 50-50.
- 100 per cent subsidiaries, one or more of which the proprietor may be able to finance, either directly or else with help from a host country government authority seeking to attract industries that would provide desirable jobs and other economic benefits.

By astute use of these different licensing tools, a proprietor can maximize the returns on proprietary technology by concentrating on capital expenditures in areas where they can be leveraged, while also efficiently focusing the activities of the users of the technology. It should also be noted that the various listed licensing forms are dynamic and can be converted to higher or lower rungs on the ladder in response to, for example, growing sill levels of the licensee, market realities, and changing requirements of national Governments or regional authorities.

The use of different forms of transfer can be illustrated by the following hypothetical case: A small company in the United States has developed a patented electronic smoke detector that can be either powered by battery or connected to the building's wiring system. It makes obsolete designs based on a thermal principle, in which paraffin fuses are melted by heat, breaking the circuit and setting off the alarm. The heart of the new product is an optimized application specific integrated circuit (ASIC) that the proprietor has had designed at considerable expense. The product itself is easily assembled, but the final settings must be varied to take into account local building and fire codes in countries around the world. The product is being sold and publicized under the trade mark Ajax, which the proprietor has registered in most of the developed countries and which it is prepared to register in all developing countries that show an interest. Patents have been obtained or applied for in North America, the countries of the European Patent Convention, Japan, and Australia.

Based on this set of facts, the following scenario can be envisaged:

- The proprietor directly makes and sells the product in the United States and Canada, purchasing the ASICs from two approved suppliers in the United States, and allowing them to be sold back to the proprietor or to designated customers.
- A wholly owned subsidiary is established in the Republic of Ireland, with a monetary grant and tax holiday having been negotiated with the Irish government. This establishes a manufacturing source within the European Community.
- An arm's-length exclusive licence is established in Japan, and an agreement is made with a Japanese chip-maker to design at the chip maker's own expense, and be prepared to manufacture in volume, ASICs for use in the product, with ownership of the designs being the property of the proprietor. The Japanese licensee is authorized to export the products to any countries, on a non-exclusive basis, in which the proprietor does not now or in the future, have a manufacturing licensee or assembler.
- Several candidate Japanese licensees are considered by the proprietor before the final choice is made. Interest is shown by a company that designs and sells lighting fixtures, by a battery manufacturer and by a producer of fire extinguishers. The licence is ultimately granted to a manufacturer of electronic door chimes and burglar alarms, which is a member of a *keiretsu* to which a leading chip maker also belongs. The licensee is considered to have marketing strengths in both the domestic and commercial markets for smoke alarms, to be able to efficiently assemble the products itself, and to have access to the ASICs on very favourable terms.

The ASIC manufacturer agrees to pay the proprietor a royalty on all its sales of these ASICs except those to the proprietor or to a controlled subsidiary of the proprietor.

- Distributorships are established in each of the European countries, whether or not they are members of the European Community, because of variations in local building codes. Distributors are also appointed in Argentina, Chile, Israel, Mexico and South Africa. Each distributor agrees to purchase assembled products from the Irish subsidiary for resale primarily in its own country.
- Sales agents are appointed in the Arab countries of the Middle East and in North Africa, Côte d'Ivoire, Kenya, Nigeria and Zaire. Additional national agencies are available to local businesspersons who can demonstrate credibility.
- A 50-50 joint venture is established in Australia, with the proprietor contributing the technology and a licence, under its patents and trade marks, but no cash. This joint company may purchase its ASICs either from the proprietor in the United States or from a Japanese licensee, which would pay the proprietor a royalty on such sales.
- No other arrangements have been made elsewhere, but the proprietor is interested in additional relationships. Because the Ajax smoke detector is famous, as a result of advertising and successful use in many countries, additional proposals are expected by the proprietor.

The variety of technology transfer arrangements entered into by the proprietor in this hypothetical case should, for a number of reasons, maximize the chances for successful commercialization of its technology: the proprietor is maintaining direct control over the home market. As an actual participant in the market, by continuing to learn about the business and to acquire the know-how to keep products technically up-to-date. This information can be shared with licensees and distributors to improve their performance and keep their enthusiasm high. The proprietor has nevertheless minimized the need for working capital in several ways:

- By purchasing rather than attempting to produce its ASICs, while nevertheless maintaining control of the basic circuit designs through patents and in virtue of the fact that integrated circuit manufacturers contractually recognize ownership of such designs by the proprietor.
- By taking advantage of investment and tax incentives where available (e.g. in Ireland) to establish an overseas, strategically located manufacturing base.
- By licensing an appropriate Japanese company that possesses both national and international marketing ability for this product and giving it realistic incentives, by opening export markets. The markets are not limited to the Pacific Rim but also include several South American countries, specifically Brazil, where the Japanese licensee has a successful subsidiary. The licence provides for a significant initial licence fee plus realistic running royalties (backed up by a mini-

mal royalty obligation), thereby insuring continual cash flow to the proprietor. Additional royalties from Japan are generated from ASIC sales to the Australian joint venture and perhaps from additional future licensing and assembly agreements.

- By appointing a series of distributors who were both financially strong and well introduced into their respective markets. Each distributor was required to purchase for cash a substantial initial stock of the Ajax smoke detectors and to maintain an effective marketing and advertising programme.
- By marketing the products, worldwide, under the proprietor's Ajax trade mark, which was acquiring substantial value and good will. This serves to promote the continued loyalty of the contracting parties to the proprietor and also to attract potential collaborators who are prepared to pay up-front cash to the proprietor or to purchase an initial stock of Ajax smoke detectors, in return for being included in the worldwide programme.
- By imposing licence and joint venture agreement requirements that the other parties inform the proprietor of any product improvements or new applications of the technology, together with grantbacks for any innovation developed by the licensee or joint-venture partner. Distributors and sales agents must likewise report to the proprietor any new applications coming to their attention. This type of input enables the proprietor to maintain its position in the field.
- By achieving substantial cash flow, the proprietor is in a position to support a vigorous domestic marketing programme, to fund ongoing research to expand the technology base and to pursue infringers.

## Objectives of potential licensees in developed countries

Companies usually seek licences to use another company's technology when they think their own R and D projects will not provide them with new products or processes that let them keep pace with their competitors.* Considering the unremitting surge of technological innovation that has occurred throughout the developed world during the twentieth century, few if any companies can remain isolated from this reality. As a result, most companies, large and small, have become sensitized to the possibility of acquiring technology via licences. Indeed many have organized regular teams whose mission is to search the world on a continuing basis to locate opportunities for growth, profit and diversification.* This work can assume vital, emergency dimensions if one or more competitors introduces new products or processes that can render existing technology obsolete or too costly.

The most common approach of sophisticated companies to innovation is to maintain their own R and D capability and simultaneously keep watch worldwide for potentially valuable innovations being developed by outsiders. This must truly be a global effort because advanced research is now being conducted in virtually every nation, including many LDCs. Moreover, since individuals and small entrepreneurial groups, as well as university-based research teams, have historically been among the most fertile sources of breakthroughs, the searches should not be confined to well-established companies in a particular sector of industry.

The principal advantages to a potential licensee of acquiring technology via licensing are the avoidance, or at least reduction, of the risks of introducing new products and processes, a shortening of the time needed to introduce the product, and a saving on the costs of independent research, which might in any event duplicate earlier efforts. Each of these factors, is examined below.

### *Reduction of risk*

Even though there are literally hundreds of thousands of patent applications filed around the world each year, truly important innovations that have a long-term run commercial impact will always be rare. Several qualities, in a harmonious combination, are required.

First, there must be a widely perceived need for the innovation, or at least its originality should be readily perceived by consumers in the relevant market. It must be cost effective. It must be timely, because many innovations that ultimately prove to be important were introduced ahead of their time and therefore initially failed. It must also be environmentally friendly, because ecological issues have assumed increased importance in the minds of consumers and government regulators.

Many highly sophisticated companies have incurred huge losses as a result of faulty new product introductions, despite extensive market research that predicted success. The Edsel automobile introduced by the Ford Motor Company in the 1960s and the

*This section does not discuss simple patent licences sometimes sought by a company that learns an existing product may infringe a patent owned by an unrelated party. The principal motivation behind such deals is relief from the threat of infringement litigation and not the positive transfer of technology as a learning exercise.

*It is outside the scope of this module to discuss the variety of methodologies employed in locating outside technology. See, however, the discussion in Goldscheider.

more recent attempt by the Coca-Cola Company to market "new Coke" are but two of many examples of this type that could be cited. The market is a merciless judge of success and failure.

Of all the steps in the innovation process, the most risky is to create a new invention that is the foundation of all that follows. Many trial-and-error experiments are usually needed before truly important basic new concepts crystallize. Despite the many advances of modern science, such experimentation remains an inefficient process.

Potential licensees of technology can virtually eliminate this risk with the "wisdom of hindsight." In the hypothetical case of the Ajax smoke detector, the Japanese licensee is able to note that the product is protected by issued patents or pending patent applications, that it is achieving commercial success in the home market of the proprietor and that it seems to be appropriate for the Japanese market, where similar conditions exist. The extreme risks of initial invention, product development and market introduction have already been taken by another party, the proprietor. It is much less risky to extrapolate that experience to Japan. If the licensee can be the first to introduce the radical new Ajax smoke detector into Japan, and can do so on an exclusive basis, the lesser risk will be more than counterbalanced by the perceived advantages.

### *Shorter time to product introduction*

Licensed products can be commercially introduced much more rapidly than original innovations. The rights to use intellectual property, including trade secrets and know-how that may have originally been developed over considerable time and at substantial expense, will usually be granted as part of a package that can include the following:

- Product and parts drawings, detailed product and process specifications, plant layout and other necessary information needed to manufacture the product.
- Marketing information, including cost and pricing formulas and promotional materials.
- Exposure to the operations of the proprietor's manufacturing operations; training there as well as at the licensee's plant.

A well-organized licensee can be in operation in a fraction of the time that it would take to start from scratch and attempt to duplicate a similar type of product or technology, without infringing any patents.

The right to use a trade mark can also accelerate commercial success, provided that the mark has achieved a sufficient degree of recognition and has already earned goodwill in the licensed territory by the time the licence commences. Thus, if the Coca-Cola Company decided to enter a new territory, the world renowned Coca-Cola trade mark would be an asset that the licensee would be eager to use.

If the trade mark to be licensed is not well known at the outset, however, taking a licence for it would be a mixed blessing to a licensee. Use of the mark would create goodwill that would accrue to the proprietor, not the licensee, and that goodwill would progressively increase the bargaining power of the proprietor over the licensee. Similarly, if a patent is involved, and assuming that the licence endures until the patent expires, a licensee might be forced to to market the product under a new trade mark of its own, in direct competition with the proprietor's well-established and well-known trade mark, whose reputation it had helped to build.

Returning to the hypothethical case of the electronic smoke detector, if the proprietor has already developed some effective and attractive sales literature featuring the Ajax trade mark that was successful elsewhere in the world, this will tend to accelerate introduction of the product in the licensee's territory. In Japan, for instance, advertising and sales promotion copy showing the licensee has acquired rights to the Ajax electronic smoke detector, the market leader in the United States, will be an asset that can hasten success.

### *Saving the cost of independent research*

Once a prospective licensee identifies technology that can contribute to its competitiveness, diversification and growth, it has to compare the price of the licence with the expense of attempting to achieve equivalent goals without a licence. The prospective licensee will need to calculate the cost equivalent of the greater risk of acting independent, and the delay that would be likely to attend its own R and D efforts.

Several aspects of this comparison are subtle but nevertheless highly relevant. While a licence will reduce the licensee's risk, it will not totally eliminate it. The prospective licensee needs to ask several questions to determine advantages and potential risks:

- What competitive forces will continue to exist in the form of other companies in the territory having rights to non-infringing alternatives? What are the trade-offs in advantages and disadvantages with the products or processes of these competitors? And how financially powerful and aggressive are the potential competitors? (If competition with the competitor exists with regard to other aspects of the licensee's established business, the fact of obtaining this licence, and thereby preventing the competitor from getting it, is a factor to be taken into account.)

- What investment in plant, equipment, newly trained personnel and working capital will the licensee have to make, in addition to the cost of the licence in terms of down payments, running royalties and (perhaps) technical assistance fees?
- What side benefits is the licensee likely to acquire from the licence? Such benefits might be in the form of general management, production and marketing skills, as well as introduction into a market niche in which the licensee might eventually be able to manufacture and/or market companion or supplementary products?

Taking into account both the cash investments and the intangibles, if it is more advantageous to have a licence than not to have one, the potential licensee should proceed with the arrangement. The benefits to the licensee should influence the price that it pays for the licence.

In the hypothetical case of the Ajax smoke detector technology, taking a licence can provide a licensee with rights to a major innovation in a large market. The market is likely to expand because the electronic devices are more sensitive and accurate than older thermal designs. Assuming broad patent protection of this important innovation — which might even qualify as a "pioneer patent", it is unlikely that a similar product could easily be made using another design. No special or high-precision manufacturing skills are required. While a substantial investment might originally have been needed to design and produce the ASICs employed in the product, such devices can now be purchased by licensees in substantial quantities for acceptable prices.

Because the new technology is more efficacious than the old, and because the invention can save lives and prevent substantial property losses from fire, the comparative advantage of having such a licence over having no licence appear to be substantial for a qualified candidate. For these reasons it is likely that a licence can be successfully negotiated and that the proprietor will realize considerable revenues, in the form of royalties and related fees, from its technology.

## Objectives of potential licensees in developing countries

Licensing to entities in developing countries involves not only all of the considerations discussed above for developed countries, but also some other important considerations, which will be focused on here. Mainly they relate to infrastructure and the national interest of the host country.

When operating in developed economies, the parties to a transfer of technology take a variety of institutions for granted. Many of these are either not present, or exist to only a limited extent, in developing countries. If licensing is to be successful in this environment — in the fullest meaning of the term — these other considerations must be taken into account.

### *Need for the technology and its appropriateness*

Resources in LDCs are relatively scarce and should therefore be focused on projects that can improve the national economy and the quality of life of its citizens. A shortage of hard currency is also common. There is no legitimate place for licences of frivolous technology, unless these can be expected to generate substantial hard currency for the country that can then be employed for more beneficial purposes.

### *Urbanization and high unemployment or underemployment*

The relatively recent arrival of industrialism in developing countries has brought with it many of the conditions experienced in the United States and western Europe during the nineteenth century, including massive migrations from rural areas to the cities. There is, however, a key difference: a rapidly expanding demand for factory produced goods accompanied the original industrial revolution. Today, global industrial capacity greatly exceeds demand. A high rate of unemployment exists in many countries of the world, with the LDCs by and large experiencing higher rates of unemployment than developed countries.

One advantage developing countries possess is their generally lower price of labour, which allows them to manufacture a variety of products by more labour-intensive means and still be competitive from a cost standpoint.

When acquiring technology, developing countries must therefore decide whether to seek the most automated and advanced version of a technology or whether an older, more labour-intensive version of the technology might be more appropriate, especially if this could provide more employment for indigenous workers.

Another worldwide trend in the developed countries is a shift from industries that emphasize long production runs of identical products to industries featuring customized, flexible manufacturing in relatively short runs, usually with greater value added. There nevertheless continues to be a worldwide need for mass-produced articles as well as the products of heavy industry, e.g. ships, rolling stock, many auto parts and building materials. These needs, combined with the steadily increasing world population, represent potential market and employment opportunities for prospective licensees in developing countries.

### *Training and infrastructure*

Many resources taken for granted in developed countries are lacking in developing countries and must be taken into account when structuring licences. The increasing globalization of telecommunications, including facsimile, should alleviate this problem somewhat, because supplemental information can be transmitted almost instantaneously to cope with problems that arise.

Nevertheless, technology transfers involving manufactures usually require more involvement by the licensor: additional training, more elaborate quality control procedure and troubleshooting during start-up and operation. Since other institutional resources, such as banking, insurance, transportation facilities, and power utilities, may be inferior or lacking altogether, the licensor must incur additional cost and risk to compensate for these weaknesses. Accordingly, for these more "difficult" transactions to be attractive, special compensation is often necessary. This could take the form of rights for the licensor:

- The chance to sell certain key components to the licensee.
- The right to purchase some mass-produced components or subassemblies from the licensee on favourable terms.
- The right to invest in an indigenous enterprise under preferred conditions, with local government approval.

As a result of the extra risk and complexity proprietors from developed countries often face when licensing to entities in developing countries, the relationships frequently commence at a more elementary stage of the licensing process and then evolve into a higher form. To illustrate this, return to the hypothetical case of the Ajax smoke detector.

The proprietor is approached by an Indian company, controlled by a wealthy family, that is an established manufacturer of electrical fixtures, including sockets, relays and switches that it sells throughout India and exports to surrounding countries and to the United Kingdom, where there is a family-owned subsidiary. The proprietor is interested in entering into a relationship with this company but realizes that applying for a manufacturing licence is likely to require two years of delay and considerable red tape in getting approval from the Government of India. The proprietor has no patent on the device in India, but the prospective Indian licensee would not be able to purchase the customized ASICs from any existing sources because of restrictions the proprietor negotiated to the effect that the ASIC manufacturers could sell these circuits only to duly-authorized licensees of the proprietor.

In the short run, the Indian company and the proprietor decide to test the Indian market for the Ajax product. If results are positive they will be brought to the attention of the Government, speeding approval of a manufacturing licence. The following events may then occur:

- The Indian company, through its affiliate in the United Kingdom, purchases an agreed-to initial quantity of Ajax smoke detectors from the proprietor's Irish subsidiary and ships them to the Indian company, which distributes them in India. This process can be repeated several times, in which case the Indian company is acting as a distributor.
- A year or so later, the Indian company requests the right to assemble the products in India from kits composed of all parts, including the ASIC, which it plans to purchase from the proprietor's Japanese licensee. This is approved by the Government of India provided that the Indian company has the right to export the products. The proprietor agrees and authorizes the Indian company to export to Pakistan, Sri Lanka, Myanmar and, most significantly, to the Commonwealth of Independent States, where the Indian company traditionally exports. In this stage, the Indian company acts as an assembler.
- The operation is successful and the Indian company then requests the right to manufacture and assemble the units, except for the ASIC, in India, with the right to purchase the ASIC from a source approved by the proprietor. The export territory is expanded to include the right to sell in China and in Hong Kong and through the proprietor's sales representatives in the Middle East, if the Indian price proves to be competitive with that of the products made in Ireland. The continuation of such export rights is contingent on the appointment by the proprietor of an exclusive manufacturing licensee in the various export territories.
- Additionally, it is agreed that the proprietor and its Irish subsidiary are to purchase subassemblies from the Indian company if the quality of the products is acceptable and their price competitive. The proprietor's Japanese licensee are encouraged to do likewise.
- In this mode, the Indian company is acting as an arm's-length licensee of the proprietor. The royalty rate negotiated is somewhat lower than that realized by the proprietor in Japan, where it owns a patent. Nevertheless, the proprietor also receives royalties from the Japanese licensee on its sale of ASICs to the Indian company and can perhaps realize additional benefits by being able to purchase subassemblies more inexpensively from the Indian source.

- The Indian company will benefit by gaining exclusive rights to an important new product that it could sell throughout India and abroad.

## Objectives of Governments in developing countries

Although the licensing process falls essentially within the private sector, the Government of a developing country can play a number of roles:

- Create a legal climate for the acquisition and enforceability of intellectual property rights — patents, trade secrets and know-how, trade marks and copyrights — and for commercial contracts in general.
- Encourage investments in infrastructure such as telecommunications, insurance and transportation while investing itself — perhaps with financing from United Nations agencies, foreign Governments through bilateral aid and private banks — in airport and seaport facilities, highways, electrification and water supply.
- Regulate access to foreign exchange in an enlightened manner to prevent abuses in international dealings without discouraging legitimate and reasonable transactions.
- Set and maintain national priorities that will protect the country's resources from unwise exploitation and improve the quality of life for the general population.

Countries that have generally followed these principles have been able to attract private industry and technology. Neglect of these principles, overly zealous initiatives in interpretating the national interest, are usually counterproductive.

In the hypothethical Ajax case, the sensitive presence of the Government of India at all stages of the transaction helped keep the relationship on track:

- Permission to import the initial consignment of Ajax smoke detectors into India involved the use of foreign exchange but was consistent with a serious business purpose.
- The Government's permission to license foreign trade marks in India made possible the use of the Ajax mark on these goods, which satisfied an understandable objective of the proprietor.
- The long-standing policy of promoting exports induced the parties to focus on a range of export opportunities for the Indian company.
- The effectiveness of the Indian judicial system satisfied the proprietor that a reasonable climate existed for the conduct of this business.

From the point of view of the Government, this transaction would be judged a success, since it strengthened and generated profits to an indigenous company; it made widely available within India a device that could save lives and reduce fire damage to property; it created employment at the manufacturing, marketing and distribution levels; and it generated foreign exchange from exports. Unenlightened action or inaction by the Government could have killed or badly distorted the described relationship.

# Module 5

## FINDING TECHNOLOGY

*For parties looking to acquire technology, the collection and effective use of information will help ensure success and reduce the risks that attend transfer agreements. While information that permits informed decision-making is not always readily available in developing countries, it is not too difficult to find if one knows where to look or who to contact. This module provides a variety of sources for information on technology transfer (publications, databases, national and international agencies, and professional and consulting organizations) and suggests effective ways these various sources can be used. Sources for identifying potential suppliers and suggestions for using the information are also provided. The module also considers means of processing information to ensure reliability and to refine calculations and provides some tips for assessing project-related expenses, costs and fees when specific information on these is unavailable.*

# Contents

# FINDING TECHNOLOGY

## Introduction

As used here, information means systematically collected facts, findings, results, ideas and thoughts. There is no human activity in any socio-economic sector that does not require information. However, the availability of information is not enough. The ability to assess it and to use it effectively is a basic element in the successful conclusion of any endeavour. This is the fundamental difference between "information" and "knowledge."

Scientific information is on the whole freely available at almost no cost. However, it has a limited useful life, after which it either trickles down to school curricula and becomes general knowledge or is superseded by better science.

Technological information differs from scientific information in that it is intended for use to produce an added value and a profit. Hence, it is a commodity that may have a price tag on it, and it is in fact traded in a market that has distinctive features. It consists of information on the nature, attributes, sources and cost of the technologies used to produce particular goods or services. Industrial information is a much broader term than technological information and refers to all parameters influencing the techno-economic success and financial viability of the manufacturing activity as a whole. Since the types of information needed for industrial use are so diverse, it is not generally possible to obtain meaningful answers in all industrial fields from one information source. Instead, referral systems redirect seekers of such information to a wide range of sources.

Information is important for general reasons:

- It indicates who has and does what.
- It indicates what others have done and with what results.
- It gives both positive and negative results (or indications).
- It shows what is needed to achieve results.
- It tells how certain problems were solved.
- It embodies a collection of information relative to particular and related fields; if correctly interpreted and used, it can indicate future trends.
- It gives a competitive advantage.
- It saves money and repetitious work.

Thus, in any situation or sector of activity, important or critical decisions need to be based on sufficient information, as well as on its proper evaluation and use. It is important to emphasize that everyone needs information: individuals (in both their private and professional lives), leaders (i.e. managers) of institutions and companies and policy makers, from those in lesser positions to those in high places in Government. No one can do their job without sufficient information.

Generally speaking, information is required on all aspects of solving a problem or realizing an investment; information clarifies risks and gains, inputs and outputs, prerequisites and results and all the conditions involved and it is essential to making the right decision. As a rule, the decision maker needs as much information as is required to clarify siginificant aspects of the decision and to judge the correctness of any part of the information. Without significant and correct information, a faulty decision having advance consequences could be made.

In summary, information is a very important and valuable commodity, with its own price. If one is not prepared to go to the trouble of obtaining the information or to pay its price, then the risks, potential damage and final costs may greatly exceed that initial investment in good information.

Since the main concern here is technology transfer as a means of industrial development, this module will concentrate on the requirements for information in this process, not on information in general.

Different people need different types of information depending upon their position in the development or innovation cycle. Researchers would need, for example, scientific information describing the physical or chemical characteristics of a product and the various parameters involved in the production process.

At the enterprise level, the following kinds of information would be needed:

- Available technologies and possible alternative sources
- Conditions for obtaining such technologies
- Conditions in the potential product market
- Infrastructural requirements
- Labour demands
- Financial involvements
- Research and development facility requirements
- Intellectual property protection.

A manager's decisions always have to be based on technical, financial, marketing and managerial information.

Government policy makers probably need most to have information that will identify technologies to serve national development objectives, e.g. information on the appropriateness of a technology to the local environment, its use of local materials and skills, its contribution to increasing self-reliance and its impact on the social and financial situation of the country.

Because special problems arise with company-to-company transfer agreements, this module will also focus on an entrepreneur's need for industrial and technological information when he contemplates starting a business, selecting a technology or technology supplier or negotiating a transfer of technology agreement.

It should be added, however, that a company-to-company technology transfer agreement can be only successful if it is in accord with the laws and regulations of the country(s) involved and is mutually beneficial for all parties to the agreement.

## Weaknesses of developing countries in the field of information

Developing countries are at a great disadvantage in collecting, assessing and effectively using information. Still, everything that follows about the need for information applies to any company in any country.

The developed countries already have national policies for the effective management and use of information for industrial activities. Although national industrial and technological information policies and national information systems within the framework of these policies vary as to completeness and efficiency, enterprises can and do avail themselves of these information services. In this era of information technology, large and small companies alike obtain much of their information through personal computers connected to national information services. This is the way to get details on new products and services and their relative advantages. The information available usually covers most of the world's industrialized and newly industrialized countries. Furthermore, developed countries generally have the capability, or know where and how to get help, to assess the collected information and to use it to support decisions relating to techno-economic matters.

Most Governments in developing countries are aware of the need for and importance of national information policies. In fact, some have already started to develop a coherent and comprehensive information policy and a system covering all related types of industrial and technological information. This is not always the case, however, nor are enterprises in developing countries on a par with potential partners in the technology transfer process or potential competitors in the market.

Factors and problems other than a lack of complete and comprehensive information systems aggravate the task of managing an enterprise in a developing country. This module draws attention to a few of the many problems, in the interest of helping to solve them.

One obstacle to supplying industry with the information it requires is geographic (e.g. national frontiers and great distances). In many developing countries, industrial enterprises are thinly spread over a large area, which is sometimes a considerable problem.*

Another set of problems relates to infrastructure. Developing countries lack the essential capabilities required to transfer industrial and technological information and channel it to ultimate users. In some countries, no infrastructure exists at all. In many others, it is too embryonic to meet growing requirements.

Another difficulty is a lack of freely convertible currency, which is needed to obtain information from literature, data banks and other forms of information storage.

Another problem is language. Much of the information in which an engineer or manager is or should be interested may be in a language with which he/she is unfamiliar; this could be one of the greatest barriers to the supply of information to industry. Some national libraries or national information centres in industrialized countries have established a panel of translators with backgrounds in appropriate subjects to provide translations that are good from both the substantive and linguistic points of view. Unfortunately, this is not the case in developing countries, where translations and information are needed most.

Last, but certainly not least, experience in many developing countries with formulated information policies and established information systems indicates that this "supply push" is not matched by a "demand pull" from those who stand to benefit from the efficient use of industrial information. This unhealthy situation deprives the nascent information services of the feedback they need to organize their information systems in a manner that would meet user needs effectively.

Appreciation of information's value tends to increase with the stage of industrial development and the size and past experience of the enterprise. A para-

*Gerritsen, however, points out as follows: "Although distance is not necessarily a question of a hundred miles—it may only be, say, ten feet—a different room may constitute a barrier to information." (Quoted in Sun Jin Choi, "Guidelines for the formulation of national industrial and technological information policies—based on Korean experience", paper presented for UNIDO (IS.596)).

dox that has bedeviled industrial and technological information systems is that some entrepreneurs in small- and medium-scale industries neither appreciate how such information can save them from making mistakes they can ill afford nor know where to get it. Furthermore, they are incapable of articulating their information needs clearly and lack the ability to achieve the full benefit of industrial and technological information in reaching optimum decisions.

Generally speaking, this situation calls for an extra layer, or interface, of communication between the provider and the user of the information. In many cases, a consultant to the entrepreneur seeks relevant information, digests it and uses it wisely to make recommendations.

Why is it important to dwell so much on the need for information and the weakness of developing countries in this field? Experience shows that in many cases investors considering a new manufacturing entity do not know where to look for potential suppliers of technology. When they decide to install the new manufacturing facility, they have to find answers to many questions to ensure production of the right outputs, at the desired quality and at competitive conditions. It is not uncommon for huge amounts of money and work to be spent on the installation of industrial plants that never achieve the expected results, especially when the recipient of the technology is a company in a developing country. While failure may be due to unforeseen circumstances such as unexpected competition from a new product or the closure of a market as a consequence of political events, In most cases it arises from insufficient or misleading information that may have led to a poor choice of technology, wrong size of plant, a poor choice of partner or a faulty, imprecise or unfairly conceived contract.

To select the right (or appropriate) technology also requires a great deal of information and the skill to use it properly. The right transferor (or supplier or licensor) of the technology is the one who has the right technology, who is willing to transfer it under acceptable and equitable conditions, who is willing to help the developing country achieve its goals by offering the needed training and technical assistance and who is a partner who can be trusted and does not let the licensees down.

## Information needs

For the sake of methodology, the module distinguishes between two main types of information required when making a decision on investing in a new technology or process: industrial and technological information relating to the project itself and information about the potential supplier of the technology.

### *Information relating to the project*

It is not an easy task to identify all the types of industrial information that are needed. For a start, however, they may be thought of in terms of categories such as the following: technical, economic/financial, commercial/market and industrial (or intellectual) property. Schwoerbel, using a somewhat different approach, prepared a list of some of the kinds of information that are essential to the activities of modern industry and that must be covered during project preparation.*

- Market information in the broadest possible sense: domestic and foreign markets; consumer habits and fashions; tariffs, taxes and other market restrictions; prices, including the prices of goods produced by competitors; availability of transport and distribution schemes.
- Information on industrial equipment, machinery and technologies: available alternatives, prices, capacities, spare-parts situation; maintenance and repair facilities.
- Information on raw materials and semi-finished goods: opportunities to replace imported raw materials by domestic ones; new raw materials such as artificial fibre; prices; qualities; local appropriateness.
- Infrastructural information: availability and supply costs of energy, water and transportation; quality of electric power; labour situation, training opportunities, wages and social benefits; availability of qualified managerial personnel.
- Information on the industrial environment: services; research facilities; industrial legislation, including legislation on patents; licensing, inquiry and extension services; export promotion.

Incomplete as it may be, this list shows the variety of information that has to be acquired and utilized when preparing and running industrial projects and enterprises.

Information requirements, and in some respects also sources for information, are different in different stages of the project. In the pre-feasibility study (first) stage, information is needed on subjects such as the following:

- Product quality and trends.
- Alternative products.
- Potential competitors that may produce the same or a closely related product.
- Market situation and analysis of trends.
- Available technologies.
- Required equipment.

*See, Sung Jin Choir, "Guidelines for the formulation of national industrial and technological information policies–based on Korean experience", paper prepared for UNIDO (IS.596).

- Raw materials, utilities and labour requirements.
- Process and design development status.
- Intellectual property status (patent situation).
- Technology feasibility under indigenous conditions.
- Possibility of developing an indigenous technology (starting of indigenous research).
- Capital investment requirements.
- Operating and manufacturing requirements and costs.
- Return on capital estimation

In the feasibility study (second) stage, the same kinds of information are needed. However, the needs have in one sense been partly narrowed down (some alternatives may have been discarded as not feasible) and in another sense broadened and deepened for the alternatives that remain. At this stage, it will be necessary to obtain information on financing possibilities and the associated constraints as well as on legislative and registration conditions.

In the bidding (third) stage, the following apply:

- Iteration of the preceding stage, based mainly on the quotations or bids of the potential suppliers or licensors.
- Technical services and assistance to be obtained from the licensor and the associated prices or expenses.
- Licence fees to be paid and their terms and conditions.

The contracting (fourth) stage envolves iteration of the preceding stage on the basis of the negotiations. The investment implementation (fifth) stage needs information on how the investment is developing in the light of the technical, time and budget schedules.

In the technology maintenance (sixth) stage, information on the following will be needed:

- Product quality and quality control methods.
- Product application, including potential new applications.
- Alternative products and alternative applications.
- Alternative raw materials.
- New developments (methods, legislation etc.) in environmental protection.
- Improvements in equipment design.
- Improvements in manufacturing techniques.
- Improvements in unit operations techniques.
- Improvements in the organization of production.
- Improvements in recovery and use of secondary and by-products.
- Market information on quantities and prices.
- Requirements of consumers/consumer acceptance.
- Potential competitors and the overall competitive situation.

*Information on potential suppliers of technology*

Another type of information is related to the supplier of technology. Some of this information is subjective in nature. Technology transactions usually demand wide-ranging and long-lasting negotiations. It is, therefore, essential that every effort be made to minimize the possibility of frustrating disagreements, misunderstandings or differences of purpose and intention. Due consideration must therefore be given to the standing, reputation and interests of the potential supplier. It should be remembered that a technology transfer agreement is not simply a legal document but is also a business vehicle. It is not a simple sell/purchase agreement but one that constitutes a basis for cooperation among the parties for many years. Before accepting a company as a supplier of a technology, the recipient should collect reliable information on a number of elements:

- Experience and past performance concerning the technology to be transferred, including past projects, names of recipients and achievement of goals.
- Personnel, equipment capabilities and facilities to support the recipient with technical assistance, supply of spare parts (if supply of equipment is involved) and training of personnel.
- Financial status, which may include: statement of assets and liabilities; business turnover in past years; banker's references; bonding company references; average company references; average working capital during the preceding financial years; existing commitments, which should be considered in order to judge the ability of the supplier to fully meet contractual requirements in a timely manner.

## Sources of information

There are many sources of industrial and technological information to address the interests of potential licensees and investors (looking for a supplier of technology or a product to manufacture) and potential licensors (looking for an appropriate licensee). However, potential entrepreneurs in developing countries often have no idea where to find a suitable technology supplier or partner. Despite the large amount of information available, the people who need it often do not know that it exists or do not know where to find it. There are some ideas that may help (the first five are then discussed in more detail):

- Industrial fairs and trade shows.
- Engineering or consulting engineering bureaux.
- UNIDO and other international organizations.

- Private technical information services.
- Patent literature.
- Technical journals.
- Trade and professional associations such as the Licensing Executives Society (LES), which is active in 28 countries. LES publishes an international technology directory that is updated every two years or so. It lists, under 29 broad technology categories, companies, universities, non-profit organizations, brokers and consultants that have technology for licence to others or for which they want to obtain a licence. It is an excellent source for finding not only technology for licence but also names of organizations and individuals who can assist in all aspects of the technology transfer process.
- Technology, patent and licensing brokers and consultants.
- The commercial sections of embassies. Commercial departments in charge of promoting business relations for countries that have foreign embassies in the recipient country will probably be glad to assist in finding a potential supplier in their own country. It should be borne in mind that it is not always the most advanced high-technology that is being sought but an appropriate technology, i.e., an available technology that best suits the conditions and needs. This should be brought to the attention of the person contacted in the embassy. Remember that suitable technologies and manufacturers may also be found in countries, developing or developed, that are not usually thought of as suppliers of technology, so these should be contacted also. The commercial departments of embassies of recipient developing countries may also be asked to look for possible manufacturers and potential technology suppliers.
- Universities or other academic institutions.
- Scientific reviews.
- Professional referral periodicals such as *Chemical Abstracts*.
- Engineering handbooks.
- Documentation centres.
- Chambers of commerce (may help to find potential suppliers or manufacturers of products).
- Information services of libraries.
- Engineers working in R and D for companies in the field.
- Personal contacts.
- Contacts with manufacturing companies.
- Publications of industrial promotional agencies. In many industrialized or industrializing countries, government institutions or industrial associations in charge of promoting local technology publish catalogues that identify technology sources. Annex I illustrates the kind of information that can be found in such catalogues or directories. If they do not publish catalogues with technology sources, these institutions or associations may have lists of suppliers of specific products or may provide names, addresses and pamphlets of manufacturers of these products. Manufacturers should always be considered as potential suppliers of technology.
- Proceedings of technical meetings.
- Trade directories.
- *Who's Who* and *Who Does What* directories.
- Licensing news services.
- Institutional special technology information services.
- Market research services.

The first five sources of information listed above merit further comment.

### *Industrial fairs/trade shows*

Industrial fairs and trade shows offer a number of opportunities:

- Many of the important suppliers of products present the choicest of their latest developments, providing a good means for assessing the state of the art.
- Such fairs offer an opportunity for personal contacts with a great many potential technology suppliers, saving a lot of time and expense for the prospective licensee. Needless to say, these fairs are not organized every month but once a year or less often. The main meeting of the chemical industry, for instance, is the ACHEMA fair at Frankfurt, which takes place every third year.
- Fairs provide a good opportunity for a first screening, to find out who would or would not be prepared to enter into a technology transfer agreement.
- They provide a great deal of technical information on products. Such information will be very valuable and useful in the later stages of project preparation and contract negotiation, even if no one has indicated a willingness to enter into a licence agreement.
- They offer a good opportunity for detecting other potential suppliers, even if they are not present at the fair.

There are some ways to get the most out of an industrial fair or trade show:

- If possible, obtain the show brochure before attending (advance registration by fax or mail often means your badge and the show brochure will be sent to you in advance of the show). This will allow time to review the vendors exhibiting, determine those of interest to you and mark their locations on the show floor map. If it is not possible to get the brochure ahead of time, spend the first half hour when you arrive at the show reviewing the brochure and marking locations.

- Spend the first half of the first day getting an overview of the show; seek out new vendors and products that you are not already familiar with. Pick up product literature for later review.
- Spend the second half of the first day visiting the booths of the vendors you have identified as top priority for you. Do not spend a great deal of time at each booth; instead pick up product literature for later review and take a quick look at demonstrations that may be available.
- The evening of the first day is used to review product literature from vendors of interest. Draw up a list of questions for each vendor, including product features on which you need more information. Determine products for which you need detailed demonstrations.
- Spend the second and third days on in-depth visits to vendors' booths. Watch the demonstrations that are offered. Ask for an individual demonstration if the canned one does not answer your questions. Either tape record these sessions or take thorough notes for future reference.
- Ask about other customers in your country. Ask for references. Ask for telephone/fax numbers of individuals so you can contact them for more detailed information. Ask about availability and support in your country.
- As appropriate, set up meetings with booth personnel to explore solutions to your particular business problem or need. Vendors generally have access to meeting space in the booth, on the show floor or in adjacent hotels. These meetings offer a chance to get high quality, detailed (and free) advice on issues of interest to you.
- As time permits, attend specialized seminars and information sessions put on by vendors. These generally offer in-depth information and examples of the product in use. They can also be an excellent way to meet other customers and learn about their experiences with the vendor's product.
- Remember the objective of a visit to a trade show is to learn enough about the products to determine which one is right for your business and how you can use it in your business.

### *Engineering bureaux*

Engineering bureaux, sometimes called consulting engineering bureaux, play a considerable role in technology transfer. Their activities range from simple consulting and advice to the transfer of complex know-how and other knowledge, including the supply of turnkey plants.

They vary greatly in their focus and in the nature and purpose of their connections.

- Some of them acquire know-how from the owner (usually a large manufacturing works) under contract, add their own design, know-how and engineering and sell the complete package, including the grant of licence.
- Some of them do main-contracting and license the know-how (patented or not) and sell the engineering, and they may also procure equipment or even a complete plant.
- Some of them do such business transactions jointly with chemical works or mechanical engineering works.

Some large manufacturing companies have their own engineering bureaux through which they market their own processes or technologies in any one of the above-mentioned forms. Engineering bureaux can be commissioned to collect and evaluate information as mentioned above, to prepare pre-feasibility and/or feasibility studies and to assist the investor in all the above-mentioned work.

### *UNIDO and other international organizations*

UNIDO is the United Nations specialized agency whose primary objective is to promote and accelerate industrial development in developing countries. Within this general mandate lie priority areas. One of these involves the collection and dissemination of industrial and technological information to users in developing countries. INTIB has been designed to provide a window on technology for developing countries. Its task is to compile and disseminate information requested by developing countries and to help strengthen their own industrial information systems. It offers a number of services, among them the following:

- The Industrial Inquiry Service (IIS), a facility through which industrialists, policy makers and entrepreneurs may make inquiries on technology sourcing and selection. Apart from being able to offer advice from in-house experts and data on a large number of number of subsectors, IIS can tap the resources of 300 network correspondents and on-line databases.

- A network of national focal points (NFPs) and regional focal points (RFPs) that serves to decentralize information generation and dissemination. NFPs and RFPs also provide industrial inquiry and advisory services, with INTIB providing support.
- An international referral system, which is designed to redirect queries received by INTIB (either in Vienna or in NFPs) to a wide range of well-chosen sources of industrial and technological information. The main tool for this decentralized approach is directories of rational organizations that can answer questions on a raw material, a technology, a supplier, a potential partner, a product or a manufacturing process.
- The Industrial Information System (INDIS), is a computerized form of Industrial Development Abstracts (IDA), which contains UNIDO-generated information held in over 20,000 titles and abstracts.
- The Technology Supply DataBase contains information on technology offers and requests and joint-venture opportunities.
- Sectoral information networks. The Energy and Environment Information System is a source of industry-specific environment information for small- and medium-sized enterprises (SMEs) in developing countries.

The Biosafety Information and Advisory Network (BINAS) aims to strengthen national biosafety capabilities and facilitate international technology transfer by providing information on national biosafety regulations and enforcement authorities.

The Regional Programme on Co-operation in Informatics and Microelectronics in Latin America and the Caribbean (REMLAC) collects and disseminates information and gives advice on informatics dispersion in SMEs; the monitoring of economic and technological trends and the design of integrated circuits.

Other sources of information in UNIDO include:

- The World Investment Network Service (WINS), which consists of Investment Promotion Service (IPS) offices at Athens, Milan, Paris, Seoul, Tokyo, Vienna, Warsaw, Washington and Zurich, as well as the Centres for International Industrial Cooperation in Beijing and Moscow, and other focal points in developing and industrialized countries. IPS offices establish contacts with enterprises of the host country interested in business conditions and potential business partnership opportunities and sectors of interest in the developing countries. They help the potential partners to make contact and negotiate agreements for project implementation.
- The Technology and Investment Enhancement Strategy (TIES) which is a network of technology transfer and development institutions in developing countries that share and exchange information and experiences on such topics as characteristics and conditions of technology transfer transactions, trends in technology flows and other issues relating to technology transfer and development. A primary instrument for disseminating the information is the TIES newsletter, which contains news about technology transfer and related typics at the national and international levels.
- *How to Start Manufacturing Industries* series, in loose-leaf format. These are two- to four-page profiles of manufacturing processes, machinery and equipment, labour, investment and production cost factors. They are intended to stimulate project promoters and sponsors in developing countries and to help them identify suitable products for local manufacture. Four hundred profiles have been published to date and a similar number are in the pipeline. One typical profile, adapted from the original, is presented in annex II.
- The *Monitor* series comprises periodicals that keep specialists and policy makers abreast of technological developments in microelectronics, genetic engineering and biotechnology, materials technology, marine industrial technology, high-tech spin-offs and environmentally friendly technologies.
- Databank for Investment Promotion Programme (DIPP) is an integrated software package designed to automate the maintenance and use of information necessary for an investment promotion programme. It integrates information on projects, sponsors and investors.

Two highly visible instruments of UNIDO that have a significant information generation and dissemination component are TECHMART and INVESMART. TECHMART is a business forum where SMEs can find, offer, negotiate and eventually buy and sell the kinds of technology that are suitable for their operations. A comprehensive, indexed compendium of the technologies offered and requested is prepared and distributed in advance of the event to enable potential customers to compare and select technologies of interest. INVESMART is an investment forum that brings together potential investors from developed and developing countries to discuss a list of investment projects that have been identified beforehand.

Regional development banks such as the African Development Bank, the Asian Development Bank and the Inter-American Development Bank may also be a source of technology information.

The World Intellectual Property Organization (WIPO), also offers technical assistance to developing countries. One of its programmes is State-of-the-Art Search, which has been created mainly for the use of government organizations in developing countries. It enables the user to receive, free of charge, a report on the latest achievements and general technological level in a particular field and also copies of patent documents.

### *Private technology information services*

#### *Newsletters*

There are a great number of (usually) private organizations, often attached to journals or publishing companies, with a subscriber network and computerized database system; they periodically issue information letters, advising clients on available licences. Some of the organizations publishing such information letters are listed in annex III. The list is not complete.

#### *On-line services*

If a developing country has a central computer database information system that can access other national or international systems or if it can commission an organization that has such a connection, the recipient may tap any of the on-line services indicated in annex IV.

There are, in addition, some relatively new computer approaches in the field of technology information services.

##### *Knowledge Express Data Systems*

Knowledge Express Data Systems (KEDS)
900 West Valley Road, Suite 401
Wayne, PA 19087
United States
Tel: (610) 687 6937
Fax: (215) 687 2704
Internet address: johnsw@univel.telescan.com

KEDS currently has a technology bank of 17 large databases intended to facilitate technology transfer. They describe ongoing research, emerging technologies and recent innovative discoveries. One example of the information contained in its databases is shown in annex V.

Recently, KEDS agreed with the Licensing Executives Society (LES) to develop databases and host an on-line database service containing LES information. Subscribers can search the KEDS databases by computer at their own locations. Thousands of abstracts and reports can be viewed on the computer screen and those of interest can be immediately saved and printed for detailed study.

Access to the databases requires only a personal computer, a modem and a password is issued by KEDS when you purchase the service. The fees are modest.

##### *TELTECH*

TELTECH
2850 Metro Drive
Minneapolis, MN 55425-1566
United States
Tel: (612) 829 9000
Fax: (612) 851 7599

TELTECH offers a range of services for companies seeking fast answers to science and technology questions. The subscriber to the TELTECH service does not do the search. Instead, he/she places a call to TELTECH, which has experts to do the search.

Several kinds of searches can be done:

- Interactive literature searching. A call to TELTECH starts a simultaneous telephone and computer screen contact (computer and modem are required) between the client and the searcher. Results are immediately available for review.
- Network of experts. A call can give you fast access to a leading specialist in many areas of science and technology to help you resolve a technical problem or guide you in a technology search.
- Vendor Service. This can be used to quickly find a supplier of materials, parts, equipment or services to meet the subscriber's needs.
- Intelligence updates. These are weekly, monthly or quarterly reports meant to keep the subscriber informed of important technology developments.

##### *Internet*

The Internet is a network for on-line computer communications based on Transmission Control Protocol/Internet Protocol (TCP/IP). It is the world's biggest and most widely used computer network and in early 1994 connected 1,000 networks in 60 countries involving millions of computers and 25 million users. The most popular services on the Internet are electronic mail (e-mail), file transfer, remote log-in and USENET. E-mail is probably the most widely used as it allows computer users to exchange messages. New services are appearing every month, however, and new resources are continually being made available. For example, many of the UNIDO information resources mentioned above will be available via the Internet in 1995, as well other important business, technology and economic information. Many of the services available on the Internet are described in the on-line Internet Resource Guide. This is provided by the National Science Foundation Network Service Center at BBN Systems and Technologies, Bolt Beranek and Newman Inc., 10 Moulton Street, Mail Stop 6/3B, Cambridge, Massachusetts 02138, United States.

### *Patent literature*

The term patent literature, as used here, means patent documents and referral publications. Patent documents means published patents for inventions and published patent applications. Referral publications refers to patent gazettes issued by patent offices and information on patents released by various national and international information services.

Patent documents represent a valuable source of information for a number of reasons, with only a few of the most important ones being stated here.

- Scientific and technological development is advancing very rapidly, and information concerning it is primarily found in patent documents.
- Patent documents have more practical importance than periodicals and books because they more clearly disclose the solutions to technical problems (if they did not, the disclosure would not qualify as a "patent for invention" in accordance with the provisions of the Patent Acts) and because, owing to the international classification system, it is easier to find what one is looking for in patents than in books.
- The style and structure of patent specifications are prescribed by law, which makes it easier to assess their content; the documents must clearly indicate what is novel in the product or process and in what way it is superior to the prior art.
- Patents indicate the company owning the new technology, helping the searcher in his quest for a potential licensor.
- A deeper and broader analysis of a great number of patent specifications may disclose trends in fields of interest.

With all these advantages, there are also limitations, which one should be clearly aware:

- A new technology is not always found by a patent office to be sufficiently inventive to be patentable in accordance with the patent legislation. Consequently, technologies may exist that may be suitable for the searcher's purpose but that cannot be found among the patented solutions.
- There are excellent technologies for which the owner does not seek patent protection, preferring to hold them as secret know-how. These also cannot be found in the patent literature.
- Since the applicant for a patent is obliged to disclose only as much information as required by legislation and/or by the examiner in charge of the patent office examining the application, it is only natural that he or she will be reluctant to voluntarily disclose valuable know-how free of payment the might otherwise be sold in a licence agreement. This somewhat limits the value of patent information.
- There is no guarantee that a patented technical solution has been put into practice (i.e. that it is in actual production).

These limitations do not mean that patent documentation is not an important source of information, but they serve to warn the searcher to handle it with care and also to look at other sources of information.

How can patent literature be used as a source of information for a potential technology recipient who is looking for a product and a technology that is right for his purposes and for a supplier of that technology or product?

#### *INPADOC*

On International referral services, the largest computerized data bank in the world, was established in 1972, when the International Patent Documentation Center (INPADOC), since merged with the European Patent Office (EPO), was set up in Vienna by virtue of an agreement between the World Intellectual Property Organization (WIPO) and the Government of Austria. INPADOC stores, in a machine-readable data bank, the most important bibliographic data for each patent document published in more than 60 countries and areas.*

The EPO data bank can be used to answer many kinds of questions. The prospective licensee should formulate questions and consult a patent attorney in order to ask the right questions in the appropriate manner.

Patent documents can be selected and reproduced for a fee, by EPO (Schottenfeldgasse 29, A-1072 Vienna, Austria, tel: 52126-0).

Annex VI illustrates the kind of information that can be obtained from the data bank of INPADOC.

#### *ROMARIN*

ROMARIN is a new CD-ROM, just launched by WIPO. It contains information on all trade marks registered in the International Register maintained by the International Bureau of WIPO and which are currently in force. ROMARIN, which stands for

*Argentina, Armenia, Australia, Austria, Azerbaijan, Belarus, Belgium, Brazil, Bulgaria, Canada, Cuba, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Georgia, Germany, Greece, Hong Kong, Hungary, India, Ireland, Israel, Italy, Japan, Kazakhstan, Kenya, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Malawi, Monaco, Mongolia, Netherlands, Norway, Philippines, Poland, Portugal, Republic of Korea, Republic of Moldova, Romania, Russian Federation, Slovakia, South Africa, Spain, Sweden, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, United Kingdom, United States, Uzbekistan, Yugoslavia and Zambia.

Read-Only-Memory of Madrid Actualized Registry Information and has been available since June 1992, was developed jointly with Jouve Systèmes d'Information in Paris. The total number of valid international registrations in the International Register is around 280,000, approximately one third of which have been imaged. The oldest valid mark was first registered in 1893. Further details are available from Paul Claus, Director Advisor, WIPO, 34 chemin des Colombettes, CH-1211 Geneva 20, Switzerland, Tel: 22/730 9144, Fax: 22/734 1446.

## Gathering information: some special cases

### *How to get information on a product/project you read about in an announcement or article*

When you read about a new product or project using products/processes that may be of interest to your business, you usually need more information to make a final determination. Here are some avenues to explore to get that information:

- Contact the company directly either by phone or fax and request product literature.
- If the item in question is a process or project rather than a product, ask for the press release describing it. What you read in an article is generally extracted from a press release, which is far more detailed.
- When requesting product information or press releases, find out who to contact to answer questions you may later have.
- You can obtain detailed information on many product from one of the many on-line services. You search databases on computer hardware and software, aerospace products, chemical products and the like. On-line services also usually offer vendor-sponsored fora where potential and existing product users trade information on use of the product in specific situations. A wealth of information can be obtained from these sources.
- If your company subscribes to an on-line news service, you can obtain press releases relevant to your interests on a daily basis. Detailed financial and ownership information can be obtained on potential suppliers from on-line sources (see annex IV).
- Gathering all this data can make you an educated consumer. You will then have enough background on the products/processes so that when you actually sit down with a potential supplier to discuss terms you know what competitors are offering and each product's/process's relative advantages and disadvantages.
- Meet with many vendors/suppliers and ask as many questions as you need to know enough about the products and processes to make an informed, intelligent decision about the best way to solve your business problem.

### *How to get information on a supplier*

How can a technology seeker obtain information on the experience, capabilities and finances of the potential supplier of the technology, all of which were mentioned earlier in this module. A first approach would be to ask the right question directly (legal status? history? capital structure? employees?) and, of course, questions on the licensing contact.

Information on the supplier can also be obtained indirectly, from customers and licensees (or licensors, if there are any), from suppliers, from the banking system, or, for publicly traded corporations, from the companies themselves in the form of annual reports.

Other potential sources of supplier information are business investigating firms or information service companies and the local commercial section or attaché of the recipient country's embassy in the foreign supplier's country.

### *How to get information on price*

There are cases where the information needed by a technology recipient or investor cannot be found in the literature or in the data banks. This is particularly true of financial terms, which normally are negotiated confidentially and consequently are not publicly disclosed.

The information that technology recipients want most concerns the price of the technology (royalties and entry fees or lump sums, technical assistance fees), because it may influence the profitability of a project. It is similarly important to be able to assess the expenses of design, erection, assembly and similar activities.

One way to obtain information on the price of a given technology is to use the services of a consultant or consulting engineering bureau that has demonstrated in-depth knowledge of the field. Another is to follow some common-sense rules, based on one's own experience and on guidance provided by the relevant literature, government institutions or international organizations who usually conduct systematic research in this area. Here are some suggestions.

- The good or reasonable price is the best that can be obtained when several potential suppliers compete. However, when comparing the offers, the purchaser should be able to take into account the scope and extent of the supplies, the quality of the materials and services, and the technical characteristics of the equipment.

- The purchaser can increase the transparency of the contract price and strengthen his bargaining position by obliging the supplier to give an adequate cost breakdown. This means explicitly breaking out the amounts allocated under the licence for use of the know-how, the amount and number of supply deliveries and project activities (for example, the engineering, procurement of equipment, inspection services and supervision of the erection and commissioning).

There are several ways of making a rough judgement about the amounts a supplier requests. For example, it may be known that the assembly or erection of a certain type of equipment costs 5-10 per cent of its price, or that the erection of a plant costs 10-15 per cent of the total investment, or that the engineering costs 3-12 per cent of the cost of the plant, depending on the technology involved. Ratios of this kind may be identified with some accuracy for a certain type of industry on the basis of previous experience of the purchaser or exchange of information with operators in the same field, with industrial associations or through access to specialized data banks.

Likewise, for certain project components, there are empirical rules that can be successfully applied. For example, the cost of civil works can be assessed in terms of the area of the buildings or of the estimated volume of concrete. The cost of the metal structure is a function of the respective weight and such an indicator is well known by firms operating in the sector.

A substantial part of the supplies related to an industrial project may be directly assessed from the human power resources allocated to them and from the corresponding technical fees. As a rule of thumb, it can be said that the technical fees to be charged by a supplier of a service should amount to roughly 2.5 times the salary received by the personnel. Such fees naturally depend on the professional category of the personnel, on the employing company, on the country of origin and also on the field of activity.

### Some thoughts on processing information

The sole purpose of collecting information in the project preparation phase is to assist in making a right decision-namely, a correct and proper selection of a suitable technology and of the right licensor to set up a plant of a size appropriate to produce, economically, the right product with the least possible risk. As suggested earlier, success in this area requires both information and the ability to correctly assess and use it. There are no rules for this ability, and it cannot be taught. It is the product of common sense and experience. Experience, of course, includes both success and failure. If we do not have sufficient experience, which is often the case, we have to try to reduce the risk of including more failures into our bag of experience.

Much depends on how the available information is processed. To reduce the risks involved, steps in processing information should be kept in mind:

- The most relevant parts of the information, should be cross-checked using at least two or three different sources.
- Progress in the preparation of a project is a repetitive screening of alternatives, making the same calculations on the basis of more and more precise data on fewer and fewer alternatives, but covering ever-broader correlations.
- The more advanced the screening, the greater the need to cooperate personnally with potential suppliers.
- Experts from all activities or professions should be involved as members of a team. This team should start its work at the very beginning of a project, i.e. during its preparation.
- This work requires building good relations with all potential suppliers, with prospective clients, with bankers financing the project and with the agency, if any, that will approve the future contract.

## *Annex I*

## SAMPLE ENTRIES IN TWO CATALOGUES THAT IDENTIFY SOURCES OF TECHNOLOGY

**New Technologies: Demands and Offers from the High-Tech World/Catalogue 1/94***

Ref. AGR-O-I-002
ECOLOGIC TRAP B.G.R. "SUPREMA BLITZ"

*Description.* Ecological trap B.G.R. consisting of a system patented in Italy and Europe for the selective elimination of insects (flies, blowflies, wasps, bumble-bees, crepuscular and night-time lepidopters etc.) that can cause damage to agriculture, animal husbandry and people.

*Main advantages and applications.* This technology is suitable to destroy any insects noxious to agriculture and animal husbandry.

*Degree of development and cooperation requested.* Cooperation sought: patent or licence agreements.

Form published by: Unioncamere Emilia-Romagna, Bologna, Italy

*Published by the Centro Estero Camere di Commercio Piemontesi, Centro Scambi di Tecnologia, Via Ventimiglia 165, 10127 Turin, Tel: (011) 696 0096, Fax: (011) 696 5456.

Ref. AGR-O-ISR-002
THE USE OF POLYAMINES IN RETARDING STRESS-INDUCED DAMAGE AND SENESCENCE IN PLANT TISSUES

*Description.* The use of polyamines as exogeneous growth factors or as intrinsic effectors in retarding plant senescence has an enormous potential for reducing damage and loss of plants in the field owing to biotic and abiotic stress, as well as reducing the losses of fruits and vegetables in storage. The problem of the resistance of plants to stress conditions and early senescence has, for a long time, been under attack by agriculturists and researchers. The use of known hormones to overcome plant deterioration due to stress conditions has mostly been exploited. During the last 5-6 years, several laboratories have been studying the effect of polyamines on the growth of plants under stress conditions such as water deprivation, increase of soil salinity and the rapid deterioration of organs after being cut from the plant to be sent to market. It has shown that senescence due to stress conditions is accompanied by a change in the level of polyamines and that polyamines bind to and stabilize plant DNA and also affect plant membranes.

*Main advantages and applications.* Applications for this innovation are in the field of biochemicals for use in the field and by agricultural trade and transport companies.

*Degree of development and cooperation requested.* Cooperation sought: open.

Form published by: Yissum, Jerusalem, Israel

Ref. AGR-O-ISR-003
BIOCONTROL OF LOCUST INFESTATION WITH A NEWLY DISCOVERED VIRUS

*Description.* It was recently discovered that a certain well-known virus can also infect locusts and cause their death. The virus is specific to two insect species and can be prepared on a large scale. A certain type of the above virus has been isolated that replicates in locusts, causing their death.

*Main advantages and applications.* This development may make it possible to control locusts by a specific viral infection in an efficient, low cost and environmentally safe way. The advantages over chemical controls are specificity towards the target insect (not killing other beneficial species) and lack of hazards to man and the environment. Similar preparations (for other cases) have already been licenced for commercial use. This innovation can be used in the production of bio-pesticides.

*Degree of development and cooperation requested.* Tested. Cooperation: open.

Form published by: Yissum, Jerusalem, Israel

Ref. ALI-O-ISR-001
CHEMILUMINESCENCE-BASED METHOD FOR THE ASSESSMENT OF FRESHNESS OF FISH AND MEAT PRODUCTS

*Description.* Chemical tests for assessment of the degree of freshness of meats, fish and lobsters have long been of interest. Such tests need to overcome the disadvantages of currently used methods for spoilage assessment, such as the measurement of bacterial numbers or sensory judgement (smell, colour, general appearance). The bacteriological method, which requires at least 48 hours of incubation, is too lengthy for meat processing firms. In addition, it requires a well-equipped laboratory and skilled technicians. Sensory judgement, on the other hand, is not objective and cannot provide accurate results. Chemical tests reflect the biochemical changes which occur in the food product during storage. Since the majority of deteriorative changes are caused by bacteria, chemical indicators are frequently sought among the decomposition products of bacterial metabolism.

*Main advantages and applications.* This methodology can be applied by health authorities and food producers to monitor the quality of meat and fish. It can also be extended to include the assay of diamines and polyamines in biological fluids.

*Degree of development and cooperation requested.* Cooperation sought: open.

Form published by: Yissum, Jerusalem, Israel

Ref. ALI-O-ISR-002
DIRECT DETECTION OF PENICILLIN, SULFONAMIDES AND OTHER ANTIBACTERIAL DRUGS IN MILK, FOOD, ANIMAL BLOOD AND TISSUES

*Description.* New procedure for rapid detection of penicillin, sulfonamides and other bacterial agents contaminating milk, meat or any animal product intended for human consumption. Available tests that employ physical, chemical or immunological tools require multi-step procedures or specialized laboratory equipment and services. Alternative tests, generally based on the use of microbial cultures, require several hours of incubation; the theoretical minimum that one can expect on the basis of bacterial growth kinetics is two hours under optimal conditions.

No existing test is suitable for rapid, reliable screening or for on-farm testing. The direct screening of livestock or milk and meat products for residues of sulfamethazine and other sulfa drugs is increasing in importance as the United States Food and Drug Administration (FDA) appears to be moving towards banning the use of sulfamethazine, "proceeding on the basis that this compound causes tumors".

Sulfamethazine, like other sulfa drugs, is widely used to prevent bacterial disease and to promote growth in domestic animals. It is mixed into the feed and water of millions of pigs raised each year in the United States alone. Dairy farmers often administer the drug to cows to treat diseases, although its presence is prohibited in milk.

*Main advantages and applications.* The following attributes of the present method should be noted: no specialized skill or instruments are required; no special sample preparation is needed; all reagents are safe and stable; the testing procedure consists of simple steps; the method is suitable for field use. It can be fairly readily applied to other areas where antibacterial agents need to be detected or their levels estimated. One obvious example is the monitoring of potentially toxic antibiotics (e.g. gentamycin) in the bloodstream. The present method can be adapted to register actual blood levels by direct blood sampling in real time.

*Degree of development and cooperation requested.* Prototype. Cooperation sought: open.

Form published by: Yissum, Jerusalem, Israel

Ref. ALI-O-ISR-003
DEVICE FOR SELF-SORTING PULLETS ACCORDING TO THEIR WEIGHT

*Description.* A device has been built and installed in the middle of a separation fence in a chicken house on a large kibbutz in Israel. The fence divides the coop into two growing zones. On one side of the fence are mixed chickens whose food supply is limited. On the other side the food is not limited. To reach the unrestricted food zone, a chicken has to pass through the weighing device, the only opening in the fence. If the chicken is heavy, a mechanical arm pushes it back to the mixed chicken zone, but if it is lighter than a pre-determined value, the arm pushes it to the other side of the fence. Since the average weight of the group increases as the growing season proceeds, the threshold has to be changed every week.

Form published by: Yissum, Jerusalem, Israel

Ref. AUT-O-ISR-001
INCREASING THE RESOLUTION OF DIGITAL IMAGES BY REGISTERING MULTIPLE FRAMES

*Description.* This method can create higher resolution images from any given sequence of displaced images, where the displacement is initially unknown. Images are registered at sub-pixel accuracy and then combined to produce a higher resolution image. The image has a higher simple rate and is sharp.

*Main advantages and applications.* It is possible to increase the resolution of digital images by registering multiple frames. This approach can save costs associated with the physical replacement of a sensor when higher resolution is needed. In some cases, it is possible to replace the sensor, because of the limitations of sensor technology or the inaccessibility of the camera (as, for example, in a satellite). The method can bring immediate benefits to satellite and aerial imaging, medical imaging, infrared imaging, document transmission by fax, visual industrial inspection and other applications.

It is also able to enhance the stability of pictures from a mobile or vibrating source. This has obvious applications in areas such as hand-held video cameras and aerial imaging.

*Degree of development and cooperation requested.* Cooperation: implementation of this innovation.

Form published by: Yissum, Jerusalem, Israel

Ref. AUT-O-ISR-002
UNMANNED VEHICLE TELE-OPERATION KIT (PR.NO. 709)

*Description.* A modular, universal, add-on kit can be adapted to any vehicle, allowing it to be converted, for a specific mission into a remote-controlled vehicule at a fraction of the cost of developing special-purpose telerobots. The system is designed to require minimal pre-installation preparations

*Main advantages and applications.* The automatic function facilitates the operation, making it a supervised/part-time autonomous vehicle for a range of 3 kilometres. The teleoperated vehicle can be utilized for civilian purposes as an integrated Real Time Environmental Monitoring, Disaster Control and Emergency Response System. It can perform detection, mapping risk, assessment and emergency response at disaster/contaminated sites, with minimum risk to human health.

*Degree of development and cooperation requested.* Prototype. Cooperation: joint venture.

Form published by: Matimop, Tel-aviv, Israel

Ref. AUT-O-I-024
LOCATING AN OBJECT PROVIDED WITH PASSIVE TARGET PATTERNS (REF. 19)

*Description.* The system includes an approach sensor. Such a sensor measures the position of an object relative to three reference axes and in a given volume, the said object having several passive references fixed thereto. The measurements performed generally include, an angle measurement, a distance measurement and a speed measurement. Optical microwave sensors can be used to achieve the desired results.

*Main advantages and applications.* The passive references are bar-code patterns, which add to the above information the identification or other useful message. This innovation can find its main application in robotics.

*Degree of development and cooperation requested.* Operational. Cooperation sought: non exclusive licence.

Form published by: Centro Estero Camere Commercio Piemontesi, Turin, Italy

Ref. AUT-O-I-025
FORCE CONTROL GRIPPER SYSTEM (REF. 20)

*Description.* Robot two-finger gripper with four independent degrees of freedom. The main element of the gripper system can be seen as a tactile sensoring system mounted onto the finger joints. The tactile sensors enable the fingertips to determine the direction, magnitude and position of incident forces. This enables the gripper to optimize the grip forces according to external forces applied to the gripped object and determine the parameters of the object, such as dimension, weight and elasticity.

*Main advantages and applications.* Programmable gripper for universal use with greater flexibility than to present gripper systems. Application fields: remote or tele-operated handling of risky objects; autonomous grasping of primary undefined objects in shape or size; gripping of similar but in a certain way different objects (difference in weight, size); insertion of joining of objects with compliance behaviour of the gripped object.

*Degree of development and cooperation requested.* Prototype. Cooperation: open.

Form published by: Centro Estero Camere Commercio Piemontesi, Turin, Italy

## Korea Technology Opportunities 1990, Industrial Technologies and Plants Available from Korea*

A. *Project Summary*

1. Project title: High Currency Lightening Circuit of Half-Bridge Type
2. Project description: Simple circuit, light and compact size, 30% saving of electricity, free of noise, long life cycle and instant lightening
3. Project products: Electronic ballast
4. Planned capacity/output ($): 40,000 set

*Published by the Korea Institute for Economics and Technology, Center for Industrial and Technical Information, Republic of Korea.

5. Total project cost ($)

    Machinery and equipment: 1,140,000
    Working capital: 142,800

6. Foreign cooperation sought: Sale of technology, distributorship

*Profile of Project Sponsor*

1. Seo Poong Electronics Co., Ltd. 72-14 Busong-Ri, Chiksan-Myun, Chunwon-Kun, Chungnam, Republic of Korea

    Tel: (0417) 567-6106
    Fax: (0417) 567-6110
    Person in charge: K. W. An

2. Present status of the sponsor

    Date of establishment: 1985
    Registered capital ($): 71,500
    Total assets ($): 571,500
    Latest sales ($):
    Number of employees: 50

3. Type of current business: Domestic and export

B. *Project Summary*

1. Project title: Programming Software and Manufacturing Technology for Applying electronics and Its Circuits
2. Project description: Programming software of PCB circuits in the application for boiler, etc. Designing PCB circuit for applying for remote control system for electronics apparatus
3. Project products: Electronics control apparatus for boilers and electronics control apparatus
4. Planned capacity/output: 8 million/year
5. Total project cost ($)

    Equipment/machinery: 1,500,000
    Working capital: 200,000

6. Foreign cooperation sought:

*Profile of Project Sponsor*

1. Korea Digital Electronics Co., Ltd.

    Chun-Nam Hwasun-Kun Nungju-Myon Chamjong-ri 7-7
    Tel: (0612) 73-5000-3
    Fax: (0612) 73-5004
    Person in charge: Kim In Sik

2. Present status of the sponsor

    Date of establishment: 81.2.7.
    Registered capital ($): 143,000
    Total assets ($): 450,000
    Latest sales ($): 7 million
    Number of employees: 65

3. Type of current business: Domestic and export

C. *Project Summary*

1. Project title: Manufacturing Facilities for Loudspeakers
2. Project description: Production line for loudspeaker manufacturing with technical know-how transfer including training of engineers
3. Project products: General speakers; professional musical speakers; public address system speakers, hi-fi speakers; driver units
4. Planned capacity/output: to be further discussed
5. Total project cost ($)

    Equipment/machinery:
    Working capital:

6. Foreign cooperation sought: Sale of technology, equipment supply, expertise supply

*Profile of Project Sponsor*

1. Sammi Sound Technology Corp.

    # 231-4, 2ka, Sungsudong, Sungdongku Seoul, Republic of Korea
    Tel: 463-2121
    Fax: 465-0317
    Telex: K26225 SAMMIRO
    Person in charge: In Ho Yook

2. Present status of the sponsor

    Date of establishment: 1961
    Registered capital ($): 3,100,000
    Total assets ($): 12,000,000
    Latest sales ($): 20,000,000
    Number of employees: 800

3. Type of current business: Domestic and export

D. *Project Summary*

1. Project title: Manufacturing Technology for Loudspeakers and Driver Units
2. Project description: Production line for loudspeaker manufacturing with technical know-how transfer including training of engineers
3. Project products: general speakers, professional musical speakers, public address system speakers; hi-fi speakers; driver units
4. Planned capacity/output: To be further discussed
5. Total project cost ($)

    Equipment/machinery:
    Working capital:

6. Foreign cooperation sought: Sale of technology, equipment supply, expertise supply

*Profile of Project Sponsor*

1. Sammi Sound Technology Corp.

    # 231-4, 2ka, Sungsudong, Sungdongku Seoul, Republic of Korea
    Tel: 463-2121
    Fax: 465-0317
    Telex: K26225 SAMMIRO
    Person in charge: In Ho Yook

2. Present status of the sponsor

    Date of establishment: 1961
    Registered capital ($): 3,100,000
    Total assets ($): 12,000,000
    Latest sales ($): 20,000,000
    Number of employees: 800

3. Type of current business: Domestic and export

# Annex II

## PLAN FOR MAKING PVC PASTE RESIN*

Polyvinyl chloride (PVC) paste resin differs mainly in particle size and structure from PVC suspension resins which are used in extrusion, injection and blow moulding. The specific properties of paste resin can be described as follows:

- Particle diameters lie between 0.1 and 2.0 microns.
- Particle size distribution preferably follows the distribution of the spheres in the closest-packing arrangement.
- Particles are spherical and compact.

Those differences significantly alter the behaviour of the polymer when mixed with a plasticizer at room temperature. The PVC paste is mixed with PVC dispersion resin, plasticizer and other additives and can be formulated as a sol or a gel.

PVC paste resin is used widely because it can be processed in fluid form in less expensive equipment and at lower operating fusion pressure, and despite the fact that it is sold at a substantially higher price than general-purpose, or suspension-polymerized, resins owing to the greater difficulties encountered in its manufacture and the more extensive quality control required.

PVC resin is processed by a variety of techniques, including dipping, rotational casting and slush moulding. Various products, including toys, internal plastic parts for automobiles, mock leather, adhesives, coatings for metals, electric parts, hosing, wall coverings, flooring, can be made of this resin.

The plant introduced here adopts the emulsion polymerization process, in which polymerization is conducted either by seeding prepolymers or by adding emulsifiers during the polymerization. Although this polymerization method is known to be complicated and difficult with respect to the control of particle size, such disadvantages have been overcome. The initiator has cost advantages and is an important element of the process technology.

### Products and specifications

The plant can make various grades of high quality products. The general properties and characteristics of the paste resin can be summarized as follows: the resin shows low plastisol viscosity from low shear to high shear and its viscosity is stable when stored as the sol. Accordingly, when its sol is used for molded goods with a required hardness, it must be formulated with a similar amount of plasticizer.

Furthermore, the resin has excellent water repellancy and electrical insulation properties, and is transparent, making it especially suited for the top-coating of leathers and floorings according to its good rheological and mechanical properties. One grade has been available in the Republic of Korea for the top-coating of leathers and flooring, waterproof textiles, rigid materials with hard formation, sealing materials and interior parts of cars such as headrests and armrests. Another grade is excellent in air release and in foam cell formation, notwithstanding its high plastisol viscosity, and is used for plastic foam materials, pencil erasers and waterproof textiles. There are many other different grades.

### Contents of technology

*Process Description*

*Vinyl chloride monomer (VCM) receiving and storage.* VCM is received from a VCM tanker or tank lorry and transferred to a spherical monomer storage tank. The received VCM is measured by an oval flowmeter located in the pipeline and then pumped to the monomer weighing tank located in the polymerization section.

When VCM is stored, precautionary measures are necessary to prevent contamination by water or air. Such contaminants interfere with polymerization or lower the quality of the PVC paste resin product. Sometimes free water separated from the VCM causes spontaneous polymerization. Furthermore, VCM can form an explosive mixture with air.

*VCM recovery.* Unreacted VCM gas is recovered from the polymerizer to gas holder. The crude VCM gas is liquefied by dehydration and condensation and transferred to a rectifier.

*VCM purification.* The crude VCM is continuously fed to the rectification tower by a crude monomer feed pump, and the feed rate is kept at the specified value by means of FRC. At the bottom of tower the liquid VCM is vaporized in a reboiler by adding steam. The vapour rises toward the top of tower and is led to a VCM total condenser where it is condensed by cooling water. The condensed VCM is divided into two streams: one is returned to the tower as reflux and the other is led to a pure VCM storage tank.

*Based on UNIDO series *How to Start Manufacturing Industries: Technological and Investment Perspectives*, vol. III, file G-98.

*Dispersion process.* In this process, which is preliminary to polymerization, monomer is dispersed homogeneously to obtain monomer droplets of suitable sizes and distribution suitable for the dispersion resin. Emulsifier and other ingredients are dissolved in this process.

*Polymerization process.* In this process which is automatic, the VCM is polymerized and the unconverted monomer is recovered. The polymerization is carried out at some ranges of temperature and requires about 16 hours. When the conversion has reached the proper degree, monomer recovery begins. Once recovery is complete, the latex is transferred from the bottom of the reactor to the latex storage tank. Coarse particles are removed by screening.

*Drying process.* In this process, the latex is dried by a spray-drying system and powdered resin is collected in a bag filter. It is then crushed and finally sent to a storage bin.

*Equipment and machinery*

Raw material storage and reaction section: VCM storage tank, VCM disperser, reactor, latex storage tank, gas holder, VCM liquefaction compressor, VCM distillation tower.

Product drying and recovery section: vibrating screen, spray dryer, first air filter, air heater and bag filter; second air filter, air heater and bag filter; pulverizer, product storage bin; third air filter; root blower; packer.

*Raw materials and utilities*

The requirements for raw materials and utilities, per tonne of product, are as follows:

| *Raw materilas/utilities* | *Amount* |
|---|---|
| Process water | 9.5 tonnes* |
| Vinyl chloride monomer | 6.2 tonnes* |
| Initiator | 1.2 kg* |
| Other additives | 80-120 kg* |
| Demineralized water | 290 tonnes |
| Cooling water | 45 tonnes |
| Steam (8 kg/cm$^2$G) | 7 tonnes |
| Nitrogen | 1 nm$^3$ |
| Electric power | 840 kwh |

*Amount per batch (5.5 tonnes).

*Typical cost of equipment and requirements for spaces*

Plant capacity: 12,000 tonnes/year
Basis: 12 hours/day, 330 days/year

Estimated cost of equipment: Manufacturing machinery, $3,600,000 and utility facility, $15,000, for a total of $3,615,000

| *Space required* | *In square metres* |
|---|---|
| Site area: | 40,530 |
| Building area: | 4,625 |
| Other | 35,905 |
| Total | 40,530 |

Personnel Requirements: 1 manager, 4 engineers, 36 operators, 26 other personnel.

# *Annex III*

## SOME SERVICES AND NEWSLETTERS THAT PUBLICIZE OPPORTUNITIES FOR LICENSING

International Licensing News Letter
International Licensing Ltd.
92 Cannon Lane, Pinner, Middlesex, HA5 1HT, United Kingdom

Dr. Dvorkovitz and Associates
P.O. Box 1748, Ormond Beach, Florida 32075-1745, United States

Technology Transfer International
15 Selvage Lane, Mill Hill, London NW7 3SS, United Kingdom

Dahlbo Associates
P.O. Box 2905, Ormond Beach, Florida 32074, United States

Innowa Wiener Innovationsgesellschaft m.b.H.
Beatrixgasse 1, A-1030 Vienna, Austria

Reef Industries, Inc.
P.O. Drawer O, Galveston, Texas 77552, United States

Techniques et Industries Françaises
10, avenue d'Iéna, 75783 Paris, Cédex 16, France

Technolizenz
Austrasse 4, FL 9490, Vaduz, Liechtenstein

Tecprosa - Technology and Products S.A.
Post Box 407, Bilbao, Spain

Euro Action Inquiry Card Service
A McGraw-Hill Publication
McGraw-Hill House, Shoppenhangers Road, Maidenhead, Berkshire SL6 2QL, United Kingdom

Novex Newsletters
Novex Co. Ltd.,
P.O. Box 62, Budapest H-1364, Hungary

Numac International Chemicals, Inc.
2537 S. Gessner, Suite 122, Houston, Texas 77063, United States

Eurobrevets S.p.r.l
Rue Alphonse Hottat 42, 1050 Brussels, Belgium

The Leonard Process Co., Inc.
Chemical and Industrial Engineers, Consulting Engineers
Worldwide Directory of Chemical Technology Available for Licensing
37 W. 37th Street, New York, NY 10018, United States

## Annex IV

# ON-LINE INFORMATION SERVICES IN CANADA AND THE UNITED STATES

ADP Network Services
Automatic Data Processing, Inc.
175 Jackson Plaza
Ann Arbor, MI 48106
Tel: (800) 521-3166
Fax: (313) 769-6800

BRS/SEARCH, BRS/BRKTHRU and BRS/After Dark
BRS Information Technologies
1200 Route 7
Latham, NY 12110
Tel: (800) 227-5277
Fax: (518) 783-7251

Compuserve, Inc.
5000 Arlington Centre Boulevard
P.O. Box 20212
Columbus, OH 13220
Tel: (614) 457-8600
Fax: (614) 529-1610
Internet address: Compuserve.com

Data Resources
Data Resources, Inc.
24 Hartwell Ave.
Lexington, MA 02173
Tel: (617) 863-5100

DataTimes
Suite 450, Parkway Plaza
14000 Quail Springs Parkway
Oklahoma City, OK 73134
Tel: (800) 642-2525
Fac: (405) 751-6400

DIALOG, Knowledge Index and DIALMAIL
DIALOG Information Services
3460 Hillview Avenue
Palo Alto, CA 94304
Tel: (800) 334-2564
Fax: (415) 858-3719

Dow Jones News/Retrieval Service
P.O. Box 300
Princeton, NJ 08540
Tel: (800) 522-3567
Fax: (609) 452-2000

Dun and Bradstreet Information Services, Inc.
3 Sylvan Way
Parsippany, NJ 07054-3896
Tel: (201) 455-0900
Fax: (201) 605-6980

EasyNet
Telebase Systems, Inc.
763 W. Lancaster Ave.
Bryn Mawr, PA 19010
Tel: (215) 526-2800

Genie
General Electric Information Services
401 N. Washington St.
Rockville, MD 20850
Tel: (301) 340-4000

InfoService and InfoMagic
I.P. Sharp Associates, Inc.
Suite 1900
2 First Canadian Place
Toronto M5X 1E3
Canada
Tel: (800) 387-1588
Fax: (416) 364-5361

LEXIS, MEDIS and NEXIS
Mead Data Central
P.O. Box 933
Dayton, OH 45401
Tel: (800) 227-4908
Fax: (513) 865-6800

MCI Mail
1133 19th St., N.W.
Washington, DC 20036
Tel: (202) 872-1600

NewsNet
945 Haverford Road
Bryn Mawr, PA 19010
Tel: (215) 527-8030
Fax: (215) 527-0338

ORBIT Search Service and Pergamon Infoline
Pergamon ORBIT Infoline
1340 Old Chain Bridge Road
McLean, VA 22101
Tel: (800) 421-7229
Fax: (703) 442-0900

QL Search
QL Systems Ltd.
Suite 1018, Tower B
112 Kent Street
Ottawa, Ontario K1P 5P2
Canada
Tel: (613) 238-3499

The Source
Source Telecomputing Corp.
1616 Anderson Road
McLean, VA 22102
Tel: (800) 336-3330
Fax: (703) 821-8888

VU/TEXT
VU/TEXT Information Services, Inc.
1211 Chestnut St.
Philadelphia, PA 19107
Tel: (800) 258-8080
Fax: (215) 665-3300

WESTLAW
West Publishing Co.
50 W. Kellog Blvd.
St. Paul, MN 55165
Tel: (800) 328-9833
Fax: (612) 228-2692

Wilsonline
H. W. Wilson Co.
950 University Ave.
Bronx, NY 10452
Tel: (800) 367-6770
Fax: (212) 588-8400

## Annex V

# EXAMPLE OF INFORMATION CONTAINED IN THE DATABASES OF KEDS*

*Licensable technologies*

University inventions

Public health service inventions

Department of energy (DOE) inventions

National Aeronautics and Space Administration (NASA) inventions

Department of agriculture (USDA) inventions

Environmental Protection Agency inventions

National Institute of Standards and Technology inventions

DOE/NIST inventions

*Ongoing federally funded research*

NTIS federal research in progress

NTIS SBIR award winners

USDA TEKTRAN

NASA TechBriefs

*Research expertise*

NTIS federal research in progress

UC-ACCESS faculty profiles

TINS Texas faculty profiles

*Company profiles*

CorpTech

BioScan

NTIS SBIR Programs

TINS High Tech Texas

*Research centers*

NTIS federal services and facilities

TINS Texas research centers

UC-ACCESS research centers and institutes

UC-ACCESS facilities and equipment

*News*

Comtex Business News

Technology Access Report

*The databases listed here are for the most part located in the United States.

# Module 6

## EVALUATING AND SELECTING TECHNOLOGY

*For developing countries especially, the success of a technology transfer depends in large part on the selection of "appropriate" technology. This module examines the issue of appropriateness (that is, the suitability of technology to a host country environment) and provides methods for evaluating and selecting technologies appropriate for transfer. These methods will differ depending upon the type of technology – open-architecture or closed-system (process) – being considered. Methods for examining the feasibility of both types are discussed. The module also includes a discussion of the various risk factors involved in technology transfer, and provides quantitative methods for comparing and rating various competing technologies. The discussion concludes with an assessment of factors to consider about the host country (e.g., technological infrastructure) and about the technology (e.g., its "transportability") to ensure the selection of appropriate technology.*

# Contents

# EVALUATING AND SELECTING TECHNOLOGY

## Introduction

This module suggests methods for evaluating technologies. These methods will enable countries to select appropriate technology, considering the technical, commercial, and economic factors prevalent in the country where it will be employed. While the objective of technology transfer is to transmit advantages to its acquirer or licensee, transferring technology can involve serious risks. The terms "transport" and "transplantation" of technology appear often in this module to underscore the feasibility of successfully transferring the technical attributes of a technology which make it excellent and competitive — especially to developing countries. For example, it may or may not be feasible to transport automation, which may be viewed as a technical attribute, to a country where industry is characterized by a relatively low level of technological complexity.

The term "technology" has many connotations. In this module it connotes industrial technologies, i.e. the technical means employed for producing established commercial goods. Technology can be a package of various kinds of information (general, specialized or proprietary) coupled with the technical, managerial and craft skills* embodied in an individual team. Depending on the intended product's nature and capacity, the package can be simple or complex. Viewed differently, technology is a combination of invention, scientific discovery and principles, data cumulation and experience in constructing, using and servicing equipment and machinery. Good technology is configured to obtain a desired commercial result economically, conveniently and safely and to ensure its maintainability. It may be supported by patents, trade marks, copyrights or proprietary data and information (intellectual property rights), which enhance its commercial value. Acquiring technology bypasses the rigours of the trial-and-error process and yields immediate, significant rewards for the buyer.

By and large, industrial technologies belong to one, or a combination, of the following five categories:

*Craft skills may be characterized as a combination of manual dexterity, visual feedback, empirical planning (in the mind of the artisan) and the accumulation of experience through practice of the craft. Craft skills extend from traditional ones such as cloth weaving or carpentering to the modern equivalents of welding, precision assembly etc. They are acquired over a long period of time and are not readily transmitted from person to person or through information and formulations. The term show-how is often used in connection with craft skills when they form part of the technology package.

- Technologies for the production of goods, measured, or classes of goods, of near identical design or properties, whose output is in volumetric units. Technologies oriented to the manufacture/production of ores, implements and tools, glass sheets, cement, caustic soda, vegetable oils, pharmaceuticals, machinery (e.g. lathes), or components of machines and appliances typify this category. The production operation itself may involve mining, extraction, fabrication, assembly, formulation, physical transformation or chemical conversion (process).
- Technologies that enhance the properties, features or qualities of a product to create a commercially relevant advantage such as cost, convenience, performance or safety. Examples of product improvements include "free-flowing" salt, the twin-blade shaving razor, cocoa-butter substitutes for making chocolates and encapsulation of pharmaceuticals.
- Technologies that produce one or more special effects, e.g. hot and cold rolling steel; anodizing, galvanizing or electroplating metals; texturizing yarn; waterproofing, fireproofing and dyeing fabrics; fumigating and detoxifying grain, tubers or feeds; sterilizing and pasteurizing dairy or other processed food products. The product may be produced in-house, be a bought item, or it may be contracted out to a third-party with expertise in the specific conditioning process.
- Technologies that modify a production process or manufacturing system to bring about some advantage or leverage. Examples include: improving operating or public safety by eliminating pollutants in products and processes, removing phosphates in detergents and cleaning up automobile exhaust gases. Such technologies can also comprise the automation, computerization or robotization of processes and mechanical sequences to improve a particular feature. (These technologies do not always have a microeconomic significance but can enhance the image of the technology.)
- Technologies for the "production" of technical services, e.g. product/process design and engineering, computer software development and modelling and productivity enhancement techniques.

Since developing countries tend to be interested in technologies in the first three categories, which can stimulate entrepreneurship or economic development, this module focuses on the analysis and evaluation of those types.

## Why technologies can fail when they are transported

### *Product and technology life cycles*

For the following analysis, it would be helpful to consider the implications of product and technology life cycles for the exercise of technology evaluation. The curve of product life cycle is S-shaped and shows three phases: growth, ascent and maturity.* In figure 5, three S-curves for the same basic product, television sets, represent three cycles of innovation within the industry. Over a long time, these curves become a part of a single S-curve and can, in turn, be re-analysed into the growth, ascent and maturity phases. By then, however, they will reflect the growth of the industry rather than of the product.

Over time, some earlier forms of a product phase out (fade into oblivion) or shift from one industry to another. For example, the black and white television set became a computer monitor, which is now mature and being replaced. For significant innovations like the automobile, television and computers, for which the overall product life cycle is very long, the subcycles constituting it may be of different lengths.

Figure 6 shows the technology life cycle curve. It has four phases: latent development, ascent, maturity and decline. Returning to the example of television, it can be said that the technology for the black and white television is, in 1994, almost at its end, that colour television is in its maturity and that high-density television is in the early ascent phase. This is not to say that black and white television sets are extinct — millions are produced annually — but that their production technology is. In other words, very basic products have very long product lives, but particular technologies involved in making or servicing these products (typically) have shorter lives.

The technology life cycle can be regarded as having a rising potency after a point (*X*) on the ascent phase; it reaches a peak at some point (*T*) and declines until it ceases to have valid potency (beyond point *Y*). At points $P_1$ and $P_2$, the potencies can be equal from an acquisition standpoint. From a licensing and evaluating perspective, technology is most valuable during the time period between points *X* and *Y*. Earlier than *X*, the risk in acquiring the technology may be fairly high. (The technology life cycle is looked at from other perspectives in module 17, on valuation and methods of payment.)

### *The technology transfer framework*

By and large, most technology originates in industrialized countries, although the newly industrializing countries are becoming important contributors. A technology package develops to meet an existing or forecast market need in its country of origin and is consistent with accessible resources. It can be said to be "appropriate" to that environment. Although such a technology may later be modified to use different raw materials and simpler levels of automation, it will still be recognizable as mature technology.

A mature technology reflects the capabilities of mass production, the market preferences of an affluent population and the workability and efficiency of a well-developed industrial infrastructure. It also embodies a large number of major and minor improvements made over a long period of time. Furthermore, a mature technology reflects the strength imparted to it by the legal framework in which it is used.

A state-of-the-art technology, particularly one on the ascent portion of the technology life cycle, is unlikely to be available for licence, especially to a licensee in the relatively amorphous marketing and legal environments of a developing country. Even if it were available, it would most likely be inappropriate for a developing country, not only for the reason cited above but for others as well, such as a lack of technological complexity in the industrial structure of the host country.

In industrialized countries, technologies yield products or processes with specifications different from those of the innovative products. The differences result from the processes of competition and imitation and from the mechanisms of market segmentation, product positioning and niche markets, which both multiply technologies and broaden their range. Companies often consider exporting technologies to subsidiaries, joint ventures, or third parties for a number of reasons: to avoid home-market competition, to enlarge international market share, to gain access to more conducive markets and to offset development costs. The technologies may be offered for licence directly by the owner of the technology or through engineering companies and licence brokers.

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*In the initial phase a small number of firms using a variety of methods produce many versions of a product. In the second phase, the product rapidly gains acceptance, more firms enter the market, price competition begins and mass production becomes common. Finally, when markets reach maturity, a smaller number of firms survive by careful marketing or product differentiation, production facilities become capital-intensive and technology stabilizes. In this phase, it ceases to be a technology and degenerates into a "technique," a professional skill rather than a valuable proprietary entity. One does not need to obtain a know-how licence to manufacture a technology in this zone but merely needs to enter into a technical services agreement with a manufacturer.

**Figure 5. Product life cycle**

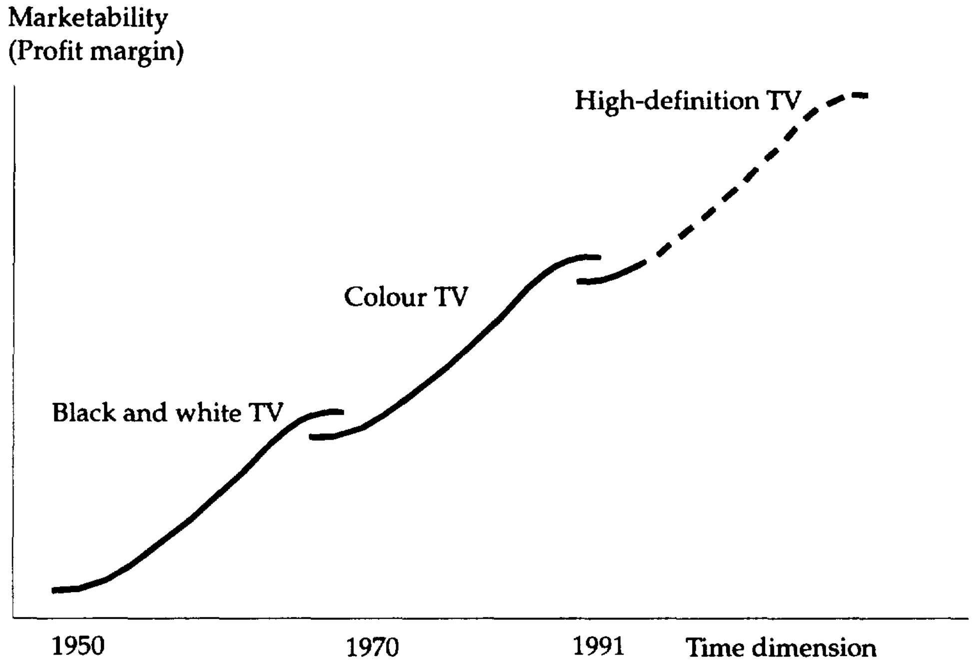
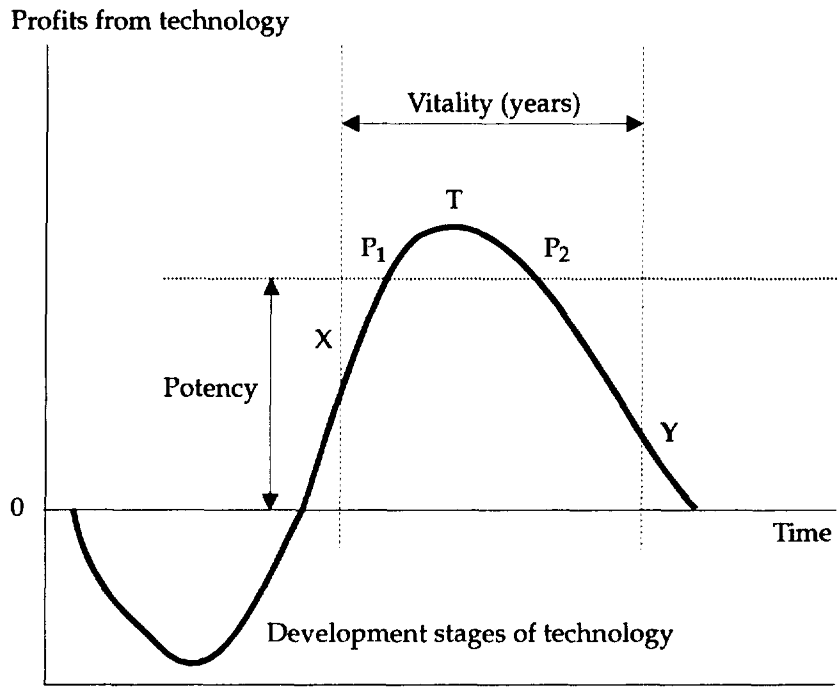



**Figure 6. Technology life cycle**




For almost the same reasons, the technologies applied in products and processes in the mature or declining phase of the technology life cycle may become offered for licence and sale.

### *The reconfiguration of technology*

It is generally difficult to transplant technology from one environment to another. In other words, products or processes developed in the context of one market environment are seldom wholly suitable in another. This sometimes holds true even for technologies transported between industrialized countries. For example, the composition and form of the leading detergent products are markedly different in the United States, western Europe and Japan even though the principles under which detergents are formulated remain the same. This happens because of differences in washing traditions, the fibre mix in the laundry basket, demographic factors etc. The same phenomenon occurs in the motor car industry: even though the manufacturer and trade marks are the same in different countries, the car models differ significantly in such features as, seating capacity, number of doors, thrust, acceleration, fuel consumption, suspension and comfort.

### *Technology appropriateness and risk factors*

The transportability of technology to developing countries is affected by other factors as well, including small markets, raw materials constraints, scarcity of skills and underdeveloped infrastructure. Thus, except for the simplest transfers, technologies by and large will either need to be modified and made appropriate for the new environment or they will have to be accepted even though inappropriate.

Transferring a particular technology to a developing country typically requires that it be modified in one or more of the following ways:

- Scaling down, so that it meets the requirements of the new marketplace, mainly reduced capacity and minimum penalties for lower levels of product quality and economic efficiency.
- Redesigning it to use scarce inputs in ratios that are economically rational in the new environment.
- Ensuring its maintainability and its ability to be absorbed at the skill levels available (or trainable) in the new environment.

It may be necessary to restyle the products or to re-engineer the production technology, or both. Modifications should be carried so as not to jeopardize the technology owner's intellectual property, trade marks, competitive standing or international image.

However, a technology owner has no means of knowing if, say, a scaled-down version of it (or a version that, uses another raw material, or that has been simplified will work effectively or efficiently in the new environment except, perhaps, by attempting process simulation, "pilot-planting" or market-testing. Unless the costs of this testing can be passed on to the technology recipient, in whole or in part, the owner will have to absorb them.

The transfer of technology to an environment different from that in which it was developed entails risk, so a methodology is needed to identify and appraise technology for its acceptability.

## The ideal technology selection process

An ideal approach to selecting technology appropriate to an environment — and to determining the appropriate form a project might take — is to follow the steps shown in figure 7. The entire acquisition and implementation process must be considered, not merely the financial and technical merits and risks.

Technology must be viewed as a product exhibiting a degree of "stickiness" to its owner. That is, it reflects the perspective of the owner: his attitudes to economic, technical and other factors, and his desire to control the technology through legal means. When selecting a technology, one must not only evaluate its technical excellence but must also reckon with the firm that developed it: the quality of legal protection the firm has acquired, its reputation for successfully operating technologies, and the extent of its international activities. The tendency to turn to transnational corporations as sources of good technologies, or to corporations known for excellence in certain fields, e.g. fibres or audio equipment, demonstrate this stickiness factor. Consequently, the technologies that emerge may be equivalent in terms of product types and outputs, but very different in their use of raw materials, energy and other inputs, in their manufacturing and product specifications; and in their patents, trade marks and other proprietary rights. To a substantial extent, the stickiness factor indicates the degree of support one can expect from the developer in making a technology viable in its new home.

The steps identified in figure 7 are not sacrosanct and do not apply in all circumstances; a parastatal agency may approach the selection process differently from a private sector agency. This module focuses on evaluating and selecting one technology from among several offers, although attention is also paid to considering options when accepting a single offer. In point of fact, at the first level of comparison, it would be wise to treat each technology as though it is the sole technology offered.

The step discussed in this module is step I in figure 7. It is taken for granted that step G, "select alternative technologies and technology sources," has been completed. Some of the criteria discussed here may also be used for the short-listing stage covered in steps C to F. Steps J to O are not covered in this module, but they must be considered part and parcel of the technology selection process none the less.

Although technology is one of the most important factors of production, its value to a society cannot be characterized in the same manner as other factors of production, i.e., "interest rates" for capital, "rentals" for land, and "wage rates" for labour. Units of measure, such as the running royalty rate for licensed technology, do not necessarily allow comparability: just because one technology is offered at a higher royalty rate than another equivalent technology does not mean there is an objective, qualitative difference that makes it superior.*

*However, one should correctly expect that a technology in the maturity phase of the technology life cycle would be offered at a higher royalty rate than the same technology in the declining phase.

**Figure 7. Idealized technology selection process**

THE NATIONAL MARKET ENVIRONMENT

Candidate products for manufacture
(Step A)

Market assessments
*Product identification*
Market size
(Step B)

*Potential modes of production investment estimates*
(Step C)

*Preferred modes of production*
*(raw materials, energy forms, skills, etc)*
(Step D)

*Suitable technological routes*
(Step E)

*Potential technology suppliers*
(Step F)

*Select alternate technologies and respective technology sources*
(Step G)

Evaluation of technology attributes
(trade marks, patents, etc)
(Step H)

| |
|---|
| *Analysis of appropriateness of technologies*<br>*Analysis of technology risks*<br>(Step I) |

Preferred form of technology transfer
(joint-venture, licence, etc)
(Step J)

Analysis of financial acceptability
(including technology costs)
(Step K)

Preferred technology and form of acquisition
(Step L)

*Preferred mode of technology implementation*
*(turnkey, unpackaged, etc)*
(Step M)

Preferred strategies of market entry and product establishment
(Step N)

Enterprise formation,* technology transfer and project implementation
(Step O)

*Enterprise structure, funding etc. are not detailed here although some may have a bearing on technological selection.
*Note.* Procedures in italics relate to technological selection.

Methodologies for evaluating technology are, therefore, empirical, and subjective factors may be considered in the evaluation exercise.

### Open and closed architecture technologies

In this module, appropriateness and economic-technical risks are used as two key parameters for evaluating if a technology will be suitable in the host country environment. This is based in large part on responses obtained from the technology owner, a situation not unlike discussions between doctor and patient. On-site inspection of the working technology by its intended recipient, which would be valuable before making a decision, will generally not be possible until a degree of contractual certainty is created.

Before proceeding to a discussion of evaluation tools, it may be useful to classify the technology differently than in the introduction (where five categories were given), that is into two broad categories: those with "open" and "closed" architectures. Doing so bears on the scope of analysis available in selecting technology.

Technologies that relate to assembling components to make a product such as a washing machine or lathe or that relate to making mature commodity products, such as cement, typify "open-architecture" technologies. In the case of an assembled product, a competent professional can actually disassemble the product to see how it has been put together. Such an examination permits determining which components are most critical to operating the appliance or machine and how effectively each performs relative to its counterparts in an equivalent appliance or machine. Likewise, a cement-making process offered as an "engineering package", which would disclose its salient features, can be conceptually disassembled into its component elements. Using the wealth of information available in technical literature, the probable sequence of physical/chemical operations by which cement is manufactured in the engineering package can be visualized. Technologies that have entered the public domain through the expiry of patents also belong to this category. Indeed, the first IBM personal computer was expressly, designed to have an open architecture so that industry would be able to manufacture peripherals (such as printers) and software, thereby expanding its usage.

Such analyses can help a technology evaluator appreciate the excellence of the technologies offered. An evaluator can then develop inquiry procedures seeking clarifications and assurances from the technology owner in areas of importance, doubt and uncertainty, and on issues affecting the "relocating" — that is, the transportability of a technology.

In "closed-architecture" or "closed-system" technologies — such as those for manufacturing novel alloys, drugs, polymers or integrated chips — examining the end product provides little information about the raw materials used, the manufacturing process, the conditions during manufacture, the processing sequences involved etc. The product or process cannot be conceptually disassembled, except in the vaguest terms. Practically all crucial aspects of the process must be disclosed to the technology recipient for him to assess its appropriateness and risk.

Thus, technologies with an open architecture are generally easier to assess because there is greater opportunity for examination prior to acquisition or licence than there is for closed-system technologies. Of course, many technologies are partially open architecture and partially closed-systems.

Nevertheless, testing for appropriateness of technologies depends on obtaining some level of process disclosure from the technology owner. The amount of material available for examination, and the knowledge as well as the experience of the technology owner in applying the technology, reveal themselves only as the collaborative arrangement between the owner and potential technology-recipient gains strength. Even so, much of the technology's nature will remain unrevealed.

It is not always possible for developing country entrepreneurs to go through the sequences in figure 7 to examine alternative technologies. In many cases, the choice is between accepting or not accepting a single offer of technology resulting. This can happen for several reasons including the following: (*a*) not knowing that other sources of technology exist, (*b*) lack of any other willing supplier of technology, or (*c*) the fact that the technology owner is assuring a market for the product.

### Assessing the appropriateness of a technology

Assessing technological appropriateness involves assessing the technical and economic features of a technology package in the context of production in a given national environment. The assessment process requires some level of information disclosure from the technology owners, from obtaining responses to queries, to visiting plants of the licensor, to obtaining confidential disclosures (drawings, designs, specifications) and so forth.

By and large, it will be difficult for technology evaluators in most developing countries to obtain the needed information without providing the technology owner with some assurances. In some legal environments, prior disclosures and "look-see" arrangements may be obtained by paying front-end fees and the technology need not be selected. Typically, developing country Governments discourage such payments, although they are widely practised in developed countries.

As a result, evaluations of appropriateness are carried out under less than ideal conditions. However, good homework by the potential acquirer of technology, striking a good relationship with the technology owner, demonstrating seriousness of purpose and sending strong signals that good technology will find a new and rewarding habitat, can stimulate responses useful enough to make good decisions.

Where there is a choice of several technologies, analysing appropriateness is much easier than analysing feasibility for a single technology. A plurality of choices inherently shows that there are several accessible and practised routes to achieve a given objective. It also shows that some technologies have facets that enable them to work in different habitats. Moreover, one route may have a configuration close to that required by the technology recipient.

However, as an initial exercise, it may help to analyse appropriateness by assuming only a single technology offer of a stand-alone technology not influenced by extraneous parameters such as financial credits, equity participation.

In the following hypothetical cases, two of them with relatively open architectures and one of the closed-system type, the first step is to develop checklists for evaluating the technologies.

## Two cases of open-architecture technology

### *Product of low complexity*

In this case the product is one that can be easily disassembled by an engineering professional. It can be put together by obtaining from its manufacturer semi-knocked-down (SKD) or completely knocked-down (CKD) product kits. However, even though little "technology" is apparently needed to assemble the product from its parts, many things would not be known even to a professional. Several questions arise. How is the assembly best sequenced? Which subassemblies are made first and which later? How fast can the assembly be done? Where are the hold-ups? What kind of a floor layout is best suited to assembly? What quality control measurements are made and what kinds of instruments are required? At what stages of product assembly are the subassemblies tested? Would local technicians need to be trained? Thus, although we are dealing with what might be called "screwdriver technology," many things that should be obvious from the open architecture of the technology are, in fact, not. None the less, the questions raised above can be answered. They will form part of the "technology package" — the know-how (or should it be called show-how?) to be acquired from the proprietor of the technology.

### *Product of greater complexity*

In this case, a technology whose features are largely available in the public domain is tested for appropriateness. Its features are fairly well described in technical literature (including in expired patents) and can be explored through the use of consultants who have investigated or practised similar technologies. It is assumed that there is an on-going national market for the product, that the entrepreneur can manage project finances and that he is capable of establishing the enterprise and organizing its operations.

The technology at hand involves the manufacture of copper-based welding rods, used as a filler metal for joining ferrous and non-ferrous metals through braze welding with a gas torch. A literature search and advice from consultants has disclosed that in a typical manufacturing scheme, virgin metals, e.g. copper, zinc and tin, plus hardeners, if needed, such as phosphor-bronze, are melted, under flux cover, in graphite crucibles, and the molten metal is cast into rods on green sand moulds. The rods are then hot-rolled to reduce their diameter and then cold-rolled and annealed before being sent to wire-drawing machines, from which the end-product emerges after pickling. Further annealing may be practised for certain grades. The national market that meet supports American Welding Society (AWS) — American Society of welding rods.

The professional consultant is of the opinion that *(a)* most of the information on the manufacturing process is in the public domain (open architecture), *(b)* all of the manufacturing equipment involved can be sourced locally at competitive prices and *(c)* the local environment can accept a product of this complexity. These factors, by themselves, are insufficient to warrant successful entry into the market place. A helping hand is needed perhaps from a firm active in a similar market in another country and having a diversified range of products and a good product mix. In this case, show-how is not as important as know-how pertaining to the manufacture of a wide range of products.

A prospective buyer needs a basic knowledge of the operating process and a preliminary idea of what technical support will be necessary before he or the licensee can elicit enough information from a technology supplier to begin an evaluation of a technology's appropriateness.

A check-list has been developed of the kinds of questions a technology supplier might be expected to answer for a serious-minded client. The responses help the technology seeker to determine the basic features of the manufacturing process, assess the technical factors critical to commercial success, identify areas of technical risk and highlight matters that should be incorporated into the final transfer contract. Checklist 1 proposes questions that will help to evaluate the appropriateness of an open-architecture technology.

**Check-list 1. Questions for analysing the appropriateness of an open-architecture technology**

- Is the potential transferor of the technology currently practising the technology? Where, and for what levels of market? Are there subsidiaries/licensees in other parts of the world? In other words, is the technology amenable to different environments?
- Can the technology supplier provide recipes for a wide product range? Are they covered by commercial experience in these grades? Would the recipes be state-of-the-art? Can they be modified to suit particular needs?
- Is the general flow of operations consistent with the flowsheet and layout prepared by the technology-seeker or are there other special features? Is automation relevant?
- What features/equipment can constrain production (which are the crucial pieces of equipment)?
- What key features determine plant capacity? Will cooperation be possible for phased upgradation of capacity?
- What features of the technology determine and limit product mix?
- Is quality control complex? How complex (does it require complex equipment and special skills)? What features/tests/inspections determine product quality?
- What features/equipment determine optimum production economics? Is the scrap rate an important determinant of production economics? Can scrap be recycled? Is scrap resalable?
- Which processing operations require a high level of skill in operations? Can the skill be developed on-site, or does it require observing/working experience at technology supplier's site?
- If needed, will the technology supplier himself be in a position to provide detailed ordering information for critical equipment? Will a third-party become involved?
- Is customer technical service important? If so, can the technology supplier train national personnel?
- Will the technology supplier provide assistance to solve problems at the manufacturing site? In the field?
- What special contributions can the technology supplier make towards the success of the national enterprise?
- Do products of the technology transferor meet the standards of the American Welding Society and the American Society of Mechanical Engineers?
- Are the specific components the most efficient in the use of energy, water and raw materials? Are there cleaner production processes (i.e. less resource-intensive) that could reduce the amount of waste generated for no or little additional cost?
- Is the combination of cleaner production processes and pollution control equipment the least expensive means of complying with the environmental standards of the country?
- Do some unit processes use input materials, such as lead or formaldehyde, that would create health and safety problems for the workforce? Are substitutes technically and financially feasible? If not, what additional investment mus be made to reduce health and safety risks to the workforce?

Many aspects of the technology and its appropriateness should become apparent from the responses to these questions. "Look-see" arrangements may come next, possibly at a cost, since a visual check is often vital for technology selection.

In neither case is there much need to probe risk elements, because no risk areas are evident. However, questions about whether local knowledge was appropriate to the needs of the technology or the market certainly had to be asked. Responses would point to training needs in the context of fruitful technology use and to improve management effectiveness.

### *Case of a closed-system (process) technology*

In this case, a process technology for producing a chemical illustrates the exercises necessary for evaluating the appropriateness of a closed-architecture technology. Because the process is based on know-how, most of its features will not be in the public domain. Indeed, they may be confidential and will generally only become accessible to the entrepreneur when he enters into a technology licence contract. Product literature or oral information from salespersons is, of course, available for promoting and marketing the technology's product and facilitating its application. It is assumed that the would-be entrepreneur in a developing country has been presented with a single offer of technology and that the offer is not associated with offers of equity or other forms of participation.

The example involves the manufacture of a branded, high tech protective coating for exterior surfaces of all kinds (wood, metal etc.). According to a technical brochure enclosed with the marketed product, the coating develops on polymerization of the constituents present in the coating solution. The polymerizing substances are said to be acrylic esters, with no further qualification. The brochure states that polymerization requires the addition of a mixture of catalysts and other materials packed in a separate container but sold with the ester product.

If the process is patented it will be fairly easy to get a good understanding of it because patents generally do four things: *(a)* disclose "prior art", i.e. how coatings belonging to the patented product group have in general been made; *(b)* present claims of novelty for the patented product/process; *(c)* outline the methods available of obtaining the product; and *(d)* state the preferred mode of making the product. A patent makes the technology more open-architectured.

However, even though all details of the process may be disclosed in the patent, they usually relate to production at the test-tube level or, only details of the critical segment are provided. A capable engineering firm might be able to scale up the process to commercial dimensions, but that would not yield crucial operating knowledge. The question of how to make the product most economically and with the best specifications would remain open.

Operating information, often referred to as know-how or show-how, is held in confidence. "Look-see" arrangements, feasible with open-architecture technologies, would in this case reveal very little. Understanding process technology requires a knowledge of operating conditions in all segments of the process, not just the patented segment. However, prior disclosure agreements can often be concluded to obtain such information, since the potential for misuse is minimized by the protection already available through the patent.

Contracts for the prior disclosure of process information for technologies that are wholly know-how based are often possible in industrialized countries for a fee. In developing countries, the legal framework may not sufficiently protect an information supplier in terms of ownership rights and wrongful use of process information.

To a great extent, in closed-system technologies, a technology analyst has to approach evaluation obliquely and indirectly. The check-list of queries for analysing closed-system technologies will be broader in scope but poorer in detail than the check-list for open-architecture technology because there is little information in the public domain to use in framing

### Check-list 2. Questions for analysing the appropriateness of a closed-system technology

*General*

- Where does the licensor believe the product and technology are positioned in relation to the product and technology life-cycles?
- Has the technology owner been long in the business of coatings? What ranges of coatings are offered?
- Does the candidate product belong to the latest generation of coatings for miscellaneous exteriors? Is the coating technology unique? If not, how competitive is it with other coatings of the same category in terms of price? What sales ranking does the product have? Is the technology owner a leader in the coatings field?
- Is/was the product covered by a patent in the licensor's home market? Are there established product standards for this category of products in the licensor's home market?

*Project features*

- Product types and range in the context of demand in the host country.
- Site suitability with regard to the application of the technology.
- Scope for project phasing.
- Volume sensitivity of the product to cost of production.

*Product specifications, product-mix and outputs*

- Suitability of product with respect to prevailing national and international standards for similar products and suitability of technology.
- Product specifications in relation to the entrepreneur's "positioning" and "segmentation" of the product in the market-place.
- Product mix capabilities of the technology; product adaptability.
- Suggested current mix; ease with which output can be varied and product specifications changed.
- Product packaging requirements and design features.
- Product quality determination standards.
- Customer convenience features.
- Consumer safety profile of the product.
- Patent-related advantages (if product is patented and/or if there are competing patented products).
- Product design that allows easier recycling or disposal as conventional solid waste rather than hazardous waste.

*Raw materials*

- Suitability of local raw materials; or identification of critical raw materials and minimum specifications.
- Variability possible in raw material specifications, i.e. quality trade-offs; possibilities of determining suitability by laboratory tests/ pilot-planting/process simulation.
- Assurances of availability and supply of ancillary raw materials and products such as catalysts, which are outside the control of the technology recipient.
- Features of transportability stability of raw and auxiliary materials, hazards, containers, transportation modes, loading/unloading requirements, warehousing.

*Energy forms and utilities*

- Intensity of energy usage in the production system.
- Preferred energy forms and combinations, i.e. steam, electric power, fuel oil, natural gas, liquified petroleum gas (LPG) etc.
- Other process/production utilities required, e.g., water and air.
- Desired features of utilities (pressures, temperatures) and means of obtaining them.*
- Interchangeability of energy forms, and plant design in relation thereto.
- Environmental consequences (air, water and soil) of alternative fuels and the extent to which the use of a particular fuel facilitates compliance with environmental standards.

*Information may not be available.

*Plant and equipment*

- Use of energy, water and raw materials.
- Availability of cleaner (less resource-intensive) production processes that would reduce the amount of waste generated for little or no additional cost.
- Use of high temperatures and pressures (operating safety factors).
- Listing of critical equipment (this type of information may not become available during early stages of technology exploration).
- Responsibilities of national/international procurement.
- Tentative value ratio of imported/indigenous equipment.
- Hazards profile of the plant operations and safety design.
- Degree of automation.
- Ease of operation.
- Equipment durability and life.
- Required inventories of spare equipment and parts.

*Plant design and construction*

- Single or multi-purpose facility.
- Modality of plant design and construction — turnkey or disaggregated construction attributes.
- Conformity of plant layout and machinery to national/international regulations.
- Role of the technology supplier in design and layout of plant and machinery.
- Familiarity of the technology supplier with plant design and its layout; experience with procurement of equipment and services for installation of plant.
- Need for third-party engineering, construction procurement firms.
- Technology supplier's assistance in the identification of acceptable engineering, construction and inspection firms.
- Acceptable divisions of responsibility among negotiating parties in the use of engineering, construction and inspection firms and supervision and integration of the their activities.

*Skill requirements*

- Levels of skill and number of personnel required for start-up of the plant, routine production, maintenance and quality control.
- Appropriateness of national skills; scope for supply of skilled personnel of licensor on licensee need basis.
- Modalities of upgrading national skill levels: on-site vs supplier-site training.

*Quality control/quality assurance features:**

- Quality controls exercised on raw materials.
- Identified in-process products subjected to quality control.*
- Quality control on final products.
- Scaling factors for upward and downward change in capacity (proportionate rise of investment and operating costs).
- Raw materials, auxiliary materials, utility and manpower requirements per unit of product produced.
- Inventory norms for critical raw materials and spare parts.
- Annual operating period, shut-down periods, turnarounds etc.
- Plant maintenance expense per unit of product.

*Environmental impact, hazard potential, and toxicology aspects*

- Potential environmental aspects involved in the disposal of gaseous, liquid and solid waste products (e.g. disposal of detergents into public sewerage systems or unsupervised receiving waters) and environmental/ecological impacts (thermal, noise and similar) of operating the technology.
- Prevention/treatment/management procedures for limiting or eliminating pollution potential; conformity to national/international standards and conventions.
- Environmental considerations and protection modes in the transportation and storage of raw materials and products.
- Hazard potentials (e.g. explosions, toxic leakages, oil spills), of process configuration, plant location and raw material and product transportation.
- Public safety features (e.g. toxic leakages; microbial toxins; public awareness and warning systems and precautions).
- Toxic materials in processes and products.

*Post-production technological assistance*

- Trouble shooting assistance on process and product application (customer services).
- Access to technology supplier's product/process design improvements.
- R and D support available from licensor.

*Information may not be available.

questions. In this case there is no patent in the host country.

Checklist 2 is a typical check-list for enquiry into a closed-system technology such as our example. It contains queries that a technology proprietor should be able to answer with little fear of violating proprietary information. A search of technical literature in the coatings field may also reveal answers to some of the questions. Some queries raised in the context of the second case, that are of a product of higher complexity may also be applicable here. A few kinds of information may not be available during the early stages of technology exploration; these have been marked with an asterisk.

## Risk in technology transport

The focus thus far has been on the suitability of a technology for use in a developing country environment. That assessment is generally separate from assessing the risks related to the technical performance of a technology that may otherwise be eminently suitable.

Technology-associated risks are always present, and their consequences vary in significance. Some risks may be small, that is, rectifiable at a low cost or with little effort. Other risks may be more difficult to correct (if, for instance, a plant is located near a mine for a raw material but the quality turns out to be poor and raw material must be bought from a distance) but still allow a reasonable profitability. Still others are large enough to cause a venture to be abandoned, e.g. risk of the emission of toxicants forced the closing of some plants in the United States after the Bhopal disaster.

Technology-associated risks arise in several areas. Some key areas have already been referred to: the workability of scaled-down versions of technology and the adaptability of technology to raw materials or utilities with which the technology owner is unfamiliar. These risks are present in all cases of technology transfer.

The ultimate user of a technology bears many other risks: incorrect choice of product, insufficient market size, misjudging the market segmentation or product positioning, poor location of production plant, underestimation of investment and so forth.

Appraising business risks, which may be greater than technology-associated risks, is peripheral to these analyses. Some risks cannot be covered at all, others may be covered by carefully written contractual provisions, and some may be shared or minimized by involving the technology supplier in the market-place (joint-ventures, product-sharing etc.) Some risks cannot be controlled, assessed or appraised by either the technology supplier or the recipient. These are accepted by both parties as being uncertainties outside the knowledge or control of the negotiating parties, an example would be an impurity in a raw material.

### *Risks in process industry technologies*

The technological risks of closed-system technologies are generally greater than those of open-architecture technologies, or widely used technologies. In the product assembly industries, for example, there are many or few sequential steps in the manufacture of a product, only some of which may result in serious economic risk if improperly assessed. Project-phasing, testing critical equipment prior to shipment and obtaining warranties of the replacement of defective equipment are all risk-reducing measures that may provide early assurances of workability.

In the process industries, however, output results from an intricate networking of the constituent elements, all of which must be present and working simultaneously to achieve project objectives. Thus, cement, sugar or paper plants cannot be phased in, nor can any reasonable test be made of an individual piece of equipment without feeding it material from another process unit. An unexplored deficiency in raw material, wrongful use of a construction material, or incorrect configuration in a reaction area can jeopardize an entire project. Another form of risk may lie in an ill-conceived mating of technology supplier and plant engineering/construction firms.

Another feature of process industries is that the risk-characteristics, and the points at which the risks are most significant, are often specific to the industry involved. Thus, in the manufacture of cold-rolled steel, the mechanical properties of the steel and the thickness tolerances obtained may be more critical, and thus a greater risk factor, than the steel's physical or chemical properties or even the output volumes. In the pharmaceuticals industry, a technology may be chosen because it presents the least risk with respect to product purity, shelf-life and clinical performance (e.g. low dosage, few contraindications) rather than for reasons such as yield on raw materials or output stability of the manufacturing process. In the chemical industries, risk exposure may lie in performance parameters such as product yield on raw materials or catalyst stability. Analysis of risk thus involves the identification and analysis of what may be called hidden factors in the industry or technology involved.

Some risks have direct financial implications while other risks, such as public safety aspects of the technology, cannot be measured in these terms. Financial risks may be minimized or shared through mechanisms such as simulating the process at the laboratory level, building a pilot plant, obtaining assurances through process guarantees and warranties, creating a joint venture or building a turnkey plant.

In general, risk is minimized when technologies are licensed-in at the mature phase in their life cycle and when the output volume is not too different from that in similar plants. A technology's maturity is indicated by the frequency with which it is being licensed (see also module 16, on valuation and methods of payment). Industry journals often provide this information about major technologies; alternatively, a licensor may be asked to provide a list of licensees and the dates on which plants constructed under the licences came on stream.

### *Potential for environmental damage*

In open-architecture technologies there is some opportunity for the would-be acquirer to assess its potential to cause environmental damage. In closed-system technologies, the opportunity for such assessment can be quite limited. Disclosure agreements may become mandatory if the technology is suspected of creating an adverse impact in any of these areas; alternatively, affidavits or warranties, at the technology selection stage, may be required. The forms of legal protection that may be available are outside the purview of this module. Check-list 2 listed some of the questions a technology acquirer must address.

At the same time, many open-architecture technologies in which developing countries are interested (e.g. cement, paper or metals) are the developed world's smokestack industries and they can pose great environmental and ecological risks, which must be abated by sophisticated technology. This, however, may turn a previously open-architectured technology into a package with a closed-system component that needs to be analysed as discussed above.*

### Quantitative approaches to assessing technology appropriateness and risk

The availability of more than one technological option has many advantages. A plurality of options, as noted earlier, avoids a Hobson's choice (take it or leave it). It provides alternative routes to manufacturing a product, one of which may be most appropriate for the host country. In many industries there are, at any given time, equivalent technologies competing with each other.

The most frequently used methods for selecting one technology from a set of options are those of financial analysis (economic reward). Many kinds of analysis are available, ranging from a simple return on investment analysis to a more complex analysis of internal rate of return. These methods take into account inputs and outputs in terms of costs and prices, the life of the project, time-related flows of funds, discount rates of money, inflation and several other factors. They do not, however, weigh technological factors directly.

Financial analysis may weigh some quantitative impacts of appropriateness and risk, but they do not weigh many important qualitative factors bearing on the acceptability of a technology in a particular physical environment and eco-system. Nevertheless, the economic reward is a fundamental criterion in any analysis of alternative technologies and constitutes a key test of acceptability. Objective methodology must attempt to achieve a better balance between measuring the positive aspects of economic benefit and the negative aspects of inappropriateness and risk.

In this module, a variation of the simple return-on-investment (ROI) method, the comparative costing method, is used to determine economic reward. The exercise is carried out not so much to demonstrate the methodology, which is well-established, but to compare its rating of alternative technologies to the ratings of two other methods: the parameter ranking method and the points system method. Because different aspects of a technology are evaluated using the different methods, it is desirable to use all three to determine the most appropriate technology of those on offer, using information from the suppliers. The recipient must choose a technology with a low-risk profile while trying to obtain maximum possible insurance against risks being accepted, including the risk of selecting an inappropriate technology. Process disclosure agreements, process guarantees and warranties, joint-venture arrangements, shared production and subcontracted manufacturing modes are among the alternatives that may be available.

Comparing technologies becomes a reasonable exercise only after step G in figure 7: select alternative technologies and technology suppliers. By that time, the potential technology recipient will have researched independently, or with the help of professional consultants, the technologies in use and, through this process, eliminated some alternatives on grounds such as raw materials availability or minimum required plant size. Reaching step G also indicates a technology evaluator has short-listed technologies taking into account the "stickiness" factor, which associates the perspectives of the technology developer with the manner in which a technology will be used.

#### *The comparative costing method*

Table 3 presents an analysis of costs that might apply when selecting a process-type technology. Primary data, which might have been provided in many kinds of units, have been reduced to currency units. While profit before tax (PBT) and PBT/fixed investment have been used as economic comparators, other comparators might also be applied. Technologies may, however, be compared without taking into account financial parameters such as overhead, which vary little with technology; this is known as comparative costing.

If in the comparative costing method the PBT/fixed investment ratio is the determinant of choice, technology C would be the most attractive, followed by technology A. Technology E would be the poorest choice. The lower operating cost factor might further favour technology C.

If aspects of a technology such as position in the life cycle, impacts on the ecosystem, public hazards and consumer safety are equally favourable for all the technologies being compared, the above method would be quite appropriate for industrialized countries, because accessibility to resources is not restrict-

*For example, hazardous nitrous oxide in the gases being emitted by a metal-smelting furnace can be abated by having the gases pass over a catalyst bed, which would be a closed-system segment of an otherwise open-architectured technology.

**Table 3. Illustration of the comparative costing method**[a]

*(Millions of United States dollars)*

| | Technology | | | | |
|---|---|---|---|---|---|
| | *A* | *B* | *C* | *D* | *E* |
| Annual sales value of product | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 |
| Fixed investment | | | | | |
| Foreign currency | *4.1* | *3.6* | *3.3* | *6.0* | *2.9* |
| National currency | *6.0* | *7.4* | *6.4* | *5.9* | *5.6* |
| Total | 10.1 | 11.0 | 9.7 | 11.9 | 8.5 |
| Raw and auxiliary materials | | | | | |
| Local | *0.6* | *0.6* | *0.4* | *0.9* | *0.7* |
| Imported | *1.4* | *1.8* | *1.8* | *1.3* | *1.7* |
| Total | 2.0 | 2.4 | 2.2 | 2.2 | 2.4 |
| Utilities | | | | | |
| Petroleum fuels | *0.6* | *0.7* | *0.5* | *1.4* | *2.4* |
| Electric power | *2.2* | *1.8* | *1.2* | *0.7* | *0.5* |
| Total | 2.8 | 2.5 | 1.7 | 2.1 | 2.9 |
| Labour | | | | | |
| Semi-skilled | *0.3* | *0.4* | *0.4* | *0.7* | *0.8* |
| Skilled | *0.4* | *0.4* | *0.5* | *0.2* | *0.2* |
| Total | 0.7 | 0.8 | 0.9 | 0.9 | 1.0 |
| Total operating costs | 5.5 | 5.7 | 4.8 | 5.2 | 6.3 |
| Training costs[a] | *0.9* | *0.7* | *0.6* | *0.7* | *0.7* |
| Maintenance costs | *0.4* | *0.5* | *0.4* | *0.6* | *0.5* |
| Plant and business overheads | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Cost of working capital | 0.27 | 0.28 | 0.25 | 0.26 | 0.29 |
| Depreciation (10 years) | 1.01 | 1.10 | 0.97 | 1.19 | 0.85 |
| Technology costs | | | | | |
| Flat fee | 0.90 | 0.15 | — | 1.20 | 0.10 |
| No. of installments | 1 | 1 | — | 3[b] | 1 |
| Sales royalty rate (%) | — | 3 | 7.5 | — | 6 |
| Royalty period (years) | — | 5 | 3 | — | 6 |
| Total technology cost[c] | 0.90 | 1.69 | 2.52 | 1.00 | 3.63 |
| Annual technology cost[d] | 0.18 | 0.34 | 0.50 | 0.20 | 0.73 |
| Annual production cost[e] | 11.25 | 11.62 | 10.52 | 11.15 | 12.37 |
| Profit before tax (PBT) | 2.25 | 1.88 | 2.98 | 2.35 | 1.13 |
| PBT/net fixed investment (%) | 22.4 | 17.1 | 30.7 | 19.7 | 13.4 |

[a]Assumptions: Analysis of parametric data supplied by technology sellers. Estimates are made at an operating capacity level considered commercially beneficial by competing firms.

*Note:* Italicized costs are those based on data supplied by the technology proprietor or developed with his cooperation.

[a]On-site plus overseas training costs.

[b]Payable at the beginning of the first, third and fifth years.

[c]See annex for basis of calculation.

[d]Total technology cost distributed over five years.

[e]Including depreciation and interest.

ed and market costs (factor prices) are the determining criteria.

In developing countries, however, other factors need to be considered. For example, a constraint on foreign exchange might encourage selecting a technology that uses a maximum of indigenous materials (e.g. capital goods or raw materials); likewise, constraints on natural resources might orient selections to those technologies in which, for example, (hydro)electric power could be substituted for petroleum-based fuels. In these circumstances, the selector may be willing to trade off higher cost and less economic efficiency for minimizing the use of scarce resources.

Again, the disadvantage of the comparative costing method is that it does not provide a mechanism to take into account qualitative factors. The ranking and point systems methods make attempts in this direction.

## *Ranking methods*

The following list shows how the technologies in table 3 might be compared taking into account the constraints in a particular country. Five criteria are established:

- Fixed investment in national currency to be optimized
- Fuel gas usage to be conserved
- Costs of imported raw materials to be conserved
- Electric power usage to be conserved
- Need for skilled labour to be minimized

### *Unweighted ranking*

In the first and simplest of these methods, technologies are awarded proficiency marks, that is, ranked, with the highest number assigned to the technology most proficient in the use of each parameter, e.g. maximizes national investment inputs, minimizes the use of natural gas. If the relevant data from table 3 are ranked using these criteria, we have the result seen in table 4.

Table 4 shows that technology C is most proficient in the use of fuel gas, i.e. uses the least amount, whereas it ranks poorly on the use of imported raw materials and currency. Likewise, technology E is

**Table 4. Ranking technology parameters (unweighted)**

| | Technology | | | | |
|---|---|---|---|---|---|
| *Parameter* | *A* | *B* | *C* | *D* | *E* |
| Investment in national currency | 3 | 1 | 2 | 4 | 5 |
| Imported raw materials | 3 | 1 | 1[a] | 4 | 2 |
| Fuel gas | 4 | 3 | 5 | 2 | 1 |
| Electric power | 1 | 2 | 3 | 4 | 5 |
| Skilled labour | 2 | 2[a] | 1 | 3[a] | 3 |
| | 13 | 9 | 12 | 17 | 16 |
| Unweighted rank | 3 | 1 | 2 | 5 | 4 |

[a]Correct computation requires that if two or more technologies have the same ranking (that is, the same ranking in a horizontal tally of the parameters), as in the asterisked cases, that ranking be "fractioned." For example, if two technologies rank = 3 in the horizontal tally, then the rank number to be used for totalizing is 2.5; similarly if three technologies rank = 3, then the rank number to be used is 2.33.

most proficient in the country's use of investment inputs and poor in the use of its raw materials and in conserving fuel gas.

While adding proficiency marks might be a useful exercise, it offers little support to realistic analysis because it assigns the same weight to all scarcity factors. It may, however, be a useful tool for comparing investment sites within a country for a particular technology rather than for selecting one of a set of competing technologies.

### *Weighted ranking*

A more rewarding exercise is to rank technologies after weighting scarce inputs or constraint factors. Table 5 shows the weight assigned by a technology selector in a developing country to each factor listed earlier. Clearly, the selector thinks the most important criterion is conserving foreign exchange, the use of fuel gas, imported raw materials cost, electric power use, and the need for skilled labour.

**Table 5. Weighting for technology parameters**

| *Parameter* | *Weight* |
|---|---|
| Fixed investment in national currency | 0.40 |
| Fuel gas | 0.25 |
| Imported raw material | 0.15 |
| Electric power | 0.10 |
| Skilled labour | 0.10 |

Table 6 recalculates the results of table 4 giving due attention to weighting. The weight of any parameter in table 6 is derived as follows:

$$\text{Weight} = \frac{\text{Rank of parameter in the particular technological process}}{\text{Highest rank number weightage of that parameter among compared technologies}} \times \text{Assigned parameter}$$

For example, the weighting for fuel gas usage for technology B is as follows:

$$\text{Weight} = \frac{3}{5} \times 0.25 = 0.15$$

**Table 6. Weighted ranking of technology parameters**

| *Parameter* | *Technology* A | B | C | D | E |
|---|---|---|---|---|---|
| Fixed investment in national currency | 0.240 | 0.080 | 0.160 | 0.320 | 0.400 |
| Imported raw materials | 0.113 | 0.038 | 0.038 | 0.150 | 0.075 |
| Fuel gas | 0.200 | 0.150 | 0.250 | 0.100 | 0.050 |
| Electric power | 0.020 | 0.040 | 0.060 | 0.080 | 0.100 |
| Skilled labour | 0.067 | 0.067 | 0.033 | 0.100 | 0.100 |
| Weighted cost | 0.640 | 0.370 | 0.540 | 0.750 | 0.730 |
| Ranking | 3 | 1 | 2 | 5 | 4 |

Three is the ranking for the fuel gas parameter and five is the highest rank received by any one technology when considering that parameter (table 4); 0.25 is the weight given to the fuel gas parameter (table 5).

The technology with the highest weighted cost, that is, the technology that uses scarce resources most efficiently, is, of course, to be preferred. In this example, technologies D and E are particularly proficient, and when overall cost parameters and the impact on scarce resources are considered, technology D would be preferred. However, selecting it would reduce the economic advantages obtainable by selecting technologies C and A. This, then, is the trade-off the selector must be able to accept if the priorities (weightings) are significant and are to prevail.

Ranking methods are useful when critical parameters can be quantified on a rational basis and weights can be assigned. However, they are relatively inefficient when there are a large number of qualitative factors.

### *The points system method*

The points systems method takes into account the qualitative factors cited in check-lists 1 and 2 (e.g. operational, public safety) that cannot be quantified or weighted. However it, like the ranking methods, involve problems of subjectivity. These problems will be dealt with after describing the points systems method.

Table 7 illustrates the method and shows the kind of qualitative factors that often need to be evaluated. The following steps are involved:

- Key evaluation parameters are listed and evaluation criteria are clearly defined.
- The parameter the selector considers most significant — the reference parameter — is assigned a weight of 100.
- The weights of the other parameters are assigned by the selector considering their importance compared to the reference parameter (they will, by definition, be less than 100). This gives rise to point system scale.
- One of the candidate technologies is taken as the reference technology. It can be any one of the technologies being considered.
- For this reference technology, and using the points system scale, the selector attempts to establish a point score by assigning the maximum number of points to a parameter if the technology is favourable with respect to it or a lower number of point if it is less favourable. This establishes a vertical scoring component.
- With the reference technology thus scored, all other candidate technologies are compared to it, parameter by parameter, and scored. Some technologies may get a higher score than the

**Table 7. The point system method**

| Parameter (in descending order of importance) | Point system scale | Technology[a] Reference technology I | II | III | IV |
|---|---|---|---|---|---|
| Product parameters | | | | | |
| Purity | 100 | 80 | 100 | 85 | 75 |
| Range | 40 | 45 | 35 | 55 | 40 |
| Input raw materials | | | | | |
| Raw material *A* | 30 | 35 | 25 | 20 | 40 |
| Raw material *B* | 50 | 60 | 50 | 40 | 70 |
| Consumption | | | | | |
| Catalyst | 60 | 10 | 75 | 50 | 20 |
| Safety | | | | | |
| Pressures | 30 | 30 | 30 | 10 | 10 |
| Toxic chemicals | 85 | 70 | 70 | 40 | [b] |
| Environment factors | | | | | |
| Refrigeration | 20 | 30 | 30 | 20 | 20 |
| Effluents | 50 | 70 | 60 | 10 | 40 |
| Implementation | | | | | |
| National construction firms | 70 | 40 | 60 | 30 | 40 |
| Technology absorption | | | | | |
| Time | 40 | 40 | 60 | 40 | 50 |
| | 575 | 510 | 595 | 400 | 405[c] |

[a]A higher score in the horizontal tally means the technology comes closer to meeting evaluatory criteria set for the parameter.

[b]Data not available at the time of analysis.

[c]Incomplete totals due to lack of data.

reference technology. This is the horizontal scoring component of the methodology.

Totaling the points obtained by each competing technology yields a ranked list.

In table 7, the technology selector has assigned the highest priority to product purity, probably with an objective of accessing export markets. This is the reference parameter. The remaining factors, in hierarchal order, are as follows:

- Product range should be as wide as possible.
- Too rigid a specification for raw material *A* is undesirable.
- Delivered cost of raw material *B* is important.
- Catalyst should be obtainable from a number of sources.
- Use of high-pressure process systems should be minimized.
- Use of declared toxic materials should be minimized.
- Fluorocarbon-based refrigeration systems should be as minimal as possible.
- Cost of waste treatment should not be an undue burden on the technology recipient.
- National construction firms should be used as much as possible.
- Factory decision-making must be within the control of the national enterprise within the shortest possible time, say, 24 months.

The method should be used with caution, as it is possible for a selector to assign too many points to a relatively unimportant parameter. Injudicious weighting on the points systems scale may seriously compromise the measurement of overall technology appropriateness.

### *Assessment in the dual-bid method*

Many developing country agencies use what may be termed the dual-bid, or double-envelope, method for selecting technology. In this method, a short-listed group of licensors makes two-part sealed bids. The first — the technical bid — details the offering in terms of technology proficiency factors, and the second — the cash or commercial bid — identifies the fixed investment and technology costs for the technology package. Bids are formulated using a questionnaire prepared by the potential buyer, using consultants if necessary.

Evaluators on the buyer side then further short-list the technologies from the economic and technical proficiency perspectives, taking available resources into account. The technologies are reviewed separately, by financial experts and decision makers, from the commercial and business points of view. When this type of bidding process is used, the ranking methods and the points system method are particularly relevant for analysing the technical bid, leaving the comparative costing methods until the last.

To carry out the assessments suggested in this module, a significant amount of data and information about technologies is required from the owners. Generally, this becomes possible after confidence is established that the analyst is serious and that one of a proffered set of technologies will finally be selected. These assessment methods use information technology owners are usually willing to divulge to technology evaluators. The technology owner must be satisfied that the evaluating firm has done its "homework" and that step H of figure 7 has been reached.

## Testing subjectivity

As pointed out earlier, and as evident from the ranking methods and the point system method, there is likely to be a substantial degree of subjectivity in an analysis, both in the selection of the parameters and in the scoring. Fortunately, several statistical methods are available to test the degree of subjectivity in analysis. They can be used to assess the selection of parameters, scoring or both. Two of the easiest methods are illustrated here.

It needs to be pointed out that, to be as objective as possible, those who evaluate the technologies and those who select the parameters and establish weights for them, and correspondingly for the points system scale, must be different people. The selection of parameters and their weighting should be done by senior managers or teams experienced in the technical and economic aspects of technology. This would remove one of the several subjective factors inherent in such exercises.

### *The Spearman rank correlation coefficient test*

The top segment of table 8 shows the ranking of five technologies, A-E, by two evaluators, *P* and *Q*. The convergence of the evaluation process can be tested by the Spearman rank correlation coefficient, *R*:

$$R = 1 - \frac{6(\Sigma D_i^2)}{N^3 - N}$$

where $D_i$ = rank difference and $N$ = number of technologies being ranked. The correlation coefficient is equal to 1 when the rankings are identical and −1 when they are opposed. The results are contained in the lower half of table 8:

While the rankings are certainly not diametrically

**Table 8. The Spearman rank correlation coefficient test: poor correlation**

| | Technology | | | | |
|---|---|---|---|---|---|
| | *A* | *B* | *C* | *D* | *E* |
| Ranking by *P* | 5 | 4 | 2 | 1 | 3 |
| Ranking by *Q* | 4 | 3 | 5 | 1 | 2 |
| Rank difference (*D*) | 1 | 1 | -3 | 0 | 1 |
| $D_i^2$ | 1 | 1 | 9 | 0 | 1 |
| Rank correlation coefficient $(R) = \Sigma D_i^2 \div 12 = 0.40$ | | | | | |

opposed to each other, the level of convergence is relatively poor for selecting a technology. If the rankings are as shown in table 9, a more acceptable pattern of convergence emerges.

Assuming that the individuals who selected the parameters have capable parameter selectors, low degrees of correlation show that the evaluation parameters need to be defined more precisely, although

**Table 9. The Spearman rank correlation coefficient test: better correlation**

| | Technology | | | | |
|---|---|---|---|---|---|
| | *A* | *B* | *C* | *D* | *E* |
| Ranking by *P* | 5 | 4 | 2 | 1 | 3 |
| Ranking by *Q* | 4 | 5 | 3 | 1 | 2 |
| Rank difference (*D*) | 1 | -1 | -1 | 0 | 1 |
| $D_i^2$ | 1 | 1 | 1 | 0 | 1 |
| Rank correlation coefficient $(R) = \Sigma D_i^2 \div 4 = 0.80$ | | | | | |

this may not always be possible. The Spearman coefficient is limited to testing the findings of only two parameters. Unless the correlation is very high, technologies may not be correctly ranked. One may, however, use a third evaluator and then compare the paired results (A-B, B-C, C-A etc.) to see if any two evaluators rank the technologies with a high degree of correlation. However, the following approach may be better.

### *The coefficient of concordance test*

Where more than two evaluators are available to select technology, the method that calculates the coefficient of concordance is more useful for testing a selection. The coefficient of concordance, *W*, is expressed by the following relationship:

$$W = \frac{12 \times S}{m^2(n^3 - n)}$$

Where $m$ = number of evaluators, $n$ = number of technologies evaluated and $S$ = the sum of squared differences between the observed rank total and the expected total of null hypothesis. *W* varies from 0 for random evaluation to 1.0 for perfect concordance.

In Table 10 technologies A-E are ranked by six evaluators. This evaluation shows high concordance (0.95). Therefore, the ranked score totals may be taken as giving a true ranking of the technologies on these parameters.

The results emerging from these two methodologies, seen separately, may merely reflect accidental agreement or disagreement among the evaluators without sustainable foundation. To determine if this is so, further tests of statistical significance are re-

**Table 10. The coefficient of concordance test for statistical coherence**

| | Technology | | | | |
|---|---|---|---|---|---|
| | *A* | *B* | *C* | *D* | *E* |
| Evaluator | | | | | |
| *P* | 4 | 5 | 2 | 1 | 3 |
| *Q* | 4 | 3 | 2 | 1 | 5 |
| *R* | 5 | 3 | 1 | 2 | 4 |
| *S* | 4 | 3 | 2 | 1 | 5 |
| *T* | 5 | 3 | 2 | 1 | 4 |
| *U* | 5 | 3 | 1 | 2 | 4 |
| Rank score total | 27 | 20 | 10 | 8 | 25 |
| Total of ranks 90 | | | | | |
| Bank score expected on null hypothesis 90/6 = 15 | | | | | |
| Square of difference between rank total and expected result of null hypothesis | 144 | 25 | 25 | 49 | 100 |
| Sum of the squared differences = 343 | | | | | |

quired. Some simpler tools for determining significance are available.*

## Technological complexity and technology transfer

### *Concept*

It has been assumed in the course of the above discussion that if a selected technology meets certain techno-economic criteria it is appropriate and can be transported from the country of its development (and use). Many of these criteria have been outlined: a technology's adaptability to smaller markets, its accommodation scarce resources, its adherence to certain qualitative criteria, its maintainability given the skill levels of the new habitat etc. These are important, but sometimes insufficient, conditions for successful transfer.

A key criterion that must also be assessed is the workability of transported technology in the context of the technological complexity** in both the sourcing and host countries. Technological complexity relates to the manner in which and the extent to which technology is used to yield output and diversity of modern goods and services, and to carry out the tasks of industrial management and organization, as well as on the means adopted for its development, propagation, permeation and protection. In its beneficial aspects technological complexity ultimately manifests itself in the form of products and services that reduce drudgery in carrying out everyday work, provide greater comfort and convenience, afford more time for the pursuit of leisure activities, and so forth. Hence, a high degree of technological complexity typically reflects a high quality of life.

Experience shows that unless certain externalities are similar in the two environments, many of the micro-economic benefits exhibited by an individual technology in the sourcing country or environment will not be realized in the host country environment. In other words, unlike water, technology does not flow well from a high level to a low level environment.

### *The technological infrastructure*

The technological complexity of an economy evolves gradually. At its high end, the substantive components of technological complexity are manifest in external facets such as replacing or supplementing natural products with synthetic substitutes, high manufacturing and processing speeds consistent with high levels of product quality, progressive integration and assembly of parts, miniaturization and the increasing substitution of machines and systems for human skills. With respect to the last item, one may cite the substitution of machines for muscle-embodied labour, of automation and robotization for skilled labour, of computers for clerical and many categories of supervisory personnel, and of artificial intelligence and neural systems for middle-level managers.

Technological complexity is further demonstrated by the use of technology to network goods and services. Goods are ordered, paid for, inventoried, and employed in efficient systems through the use of information technology, with a few people controlling the movement of large volumes of goods through a complex transport system. There are also many systems to deliver services: human hierarchies within an enterprise perform certain functions and specialized professional agencies outside the enterprise to perform others. The systems by which technology is produced, employed and licensed contribute to technological complexity. Legal instruments such as patents, trade marks and trade secrets legislation enable relatively easy access to technology. Technological complexity both reflects and is enhanced by the presence of a well-developed technological infrastructure.

A high-quality industrial infrastructure supports a large number of business transactions per unit of time over distances by a variety of means, such as computer, fax, telephone, video-conferencing, person-to-person interactions. Indeed, the relative levels of two industrial infrastructures can be measured by the number of transactions they can support per capita: [(number of two-party transactions per unit of time) $\times$ (the sum of the distances separating the transacting parties)]/[population].

### *The transportability of technology*

The transportability of a technology, that is, the ability to relocate it to another environment, depends on the technological complexity of the national (industrial-economic) environment and of the particular industry in which it will be imbedded. Of these, the complexity at the national level is perhaps secondary. Thus it is possible for particular groups of advanced technologies to work adequately and efficiently within an industry having a high technological complexity internally even though, the country lags well behind those countries from which the technologies have been sourced. The effective performance of computer-based technologies in Taiwan Province of China and the Republic of Korea is an example. Since

*See, M. J. Moroney, *Facts and Figures* (Penguin Books, 1956).

**UNIDO uses the term "technological complexity" in several ways and takes different approaches to its analysis. This module's bibliography refers to some UNIDO publications in this area. The approach in this module differs in some respects from those listed in the bibliography as it bears more heavily on the transfer of technology process.

computer technology is one focus development in these countries industries employing these particular technologies have thrived and been efficient despite their need for extreme levels of miniaturization and processing speeds (which are characteristic of many industries in the technologically advanced countries). The same is true for the incorporation of advanced textile industry technologies in India, which call for high levels of vertical and horizontal integration of industry systems, a multifibre processing capability, and large volumes of production. That having been said, it remains true that, technology flows most effectively from one point to another when the levels of technological complexity are nearly the same.

The degree to which human skills can be replaced by machines and systems, the extent to which goods and services are networked and the transaction capability of the technological infrastructure are three external features that determine the transportability of technology from one environment to another.

It might be asked. Does the reverse situation hold? Does a technology efficient in a place of lower technological complexity perform satisfactorily when transported to a place at a higher level? Specific examples to illustrate the point are difficult to find. One, however, is the superior performance (i.e., higher output per man-hour of work) of software people (a non-material form of technology transfer) when they move from a developing country to a developed one.

### *Comparative significance*

If we look at technological complexity in the United States and set it at an arbitrary level of 100, then transfers of technology, at any point on the technology life cycle, to western Europe and Japan may be expected to be as effective and rewarding as transfers within the United States. If, on the other hand, the same technologies were to be transferred to a newly industrializing country with a level of technological complexity of 50-60, then the effectiveness of transfer might prove poorer. Even so, it might be more effective than transfers to, for example, a developing country in Africa with a level of complexity in the 15-20 range, where the technical and economic conditions will be unacceptable and the technologies will fail to perform.

On the other hand, a technology transfer from one developing country to another, with a level of technological complexity, will have less possibility of distortion through reconfiguration than a transfer from a country with a markedly higher level of technological complexity. That is, if a technology is transferred from an environment with a technology complexity factor of 40 (relative to the United States) to one that has a technology complexity factor of 30 (relative to the United States) then it will travel well, particularly if adapted to national endowments.

However, technologies that have existed for a long time and are in the declining phase of their technology life cycle may be transportable to locations with a substantially lower level of technological complexity without significant potential of distortion through reconfiguration. This is true because, first, the technology in the declining phase was developed when the environment was at a lower level of complexity than at the time of its transfer and, secondly, the technology has by now become a technique (that is, a specialized skill) and thus carries little risk of inadequate performance. Much of the technology flowing between advanced and developing countries may be characterized as technique which is why it works well in new habitats. These transactions can be said to involve technical services rather than true technology.

One of the paradoxes of modern-day economic reality is that developing countries with a low level of technological complexity require certain high-level technologies, such as power and telecommunications systems, or systems to exploit natural resources for exports. Because such technologies need not be scaled-down or modified to suit the factor endowments of the recipient country, they transfer well, particularly when the transfers are made on a turnkey basis. At the same time, they are not readily absorbed by host country technicians and managers and will continue to require external maintenance support for optimum performance.

Thus, consciously acknowledging the importance of the relative technological complexities of both sourcing and receiving countries permits one to assess the transportability of a technology. In most cases, a qualitative determination suffices: the difference in technological complexities is too great to successfully transfer technology, or the complexities are of a comparable level, or the penalties of the difference can (or cannot) be absorbed at a moderate cost.

### *An assessment tool*

Sometimes, however, an objective method of assessing the relative levels of technological complexity between the technology-source and the technology-recipient countries is called for. One way of doing this is to take a poll of experts and analyse its findings using the Delphi Principle.

The method suggested here is analogous to, and derived from, the points system method. It is a simple way of looking at technological complexity to support decision making for technology transfer.

Such an analysis is easier, and the results are clearer, when evaluating a technology entering a particular industry. Here, however, it is the economic-industrial technological complexity of the two countries that are being compared.

The basic methodology comprises the following steps:

- List the external features needed to support the successful operation of the technology in the source country (country A).
- For the country that will receive the technology (country B), give a rating of 100 to each feature. If the feature is absent, give a score of zero.
- Rate each feature in country A. The score will generally, but not always, be higher than 100. For instance, if the quality of telecommunications was the feature being assessed and its score was 100 for country B, it could well be that the score for that feature in country A would be 400. Likewise, for transportation flexibility, the scores could be 100 (for country B) and 250 (for country A). On the other hand, in terms of accessibility to unskilled labour, the score for country A might be 20 compared to 100 for country B and perhaps zero for access to certain raw materials. Where the country B score is zero, pro-rate the country A score looking at the scores you have given to other features of country A.
- Total the points for each transacting country.
- Set the technology complexity factor 100 for the country acting as the technology source (country A).
- Obtain the proportional comparative factor of technology complexity for the country receiving the technology (it will generally be below 100).
- Assess the impact of this factor on the transportability of the technology between the two countries.

The important external features that can affect the performance of a technology may be listed as follows.

*Industrial System*

- Degree of industrialization, i.e. number of industries, by type, in the country.
- Degree of horizontal and vertical integration.
- Geographic dispersion/concentration of industries.
- Interdependence of products and services and the degree of networking of products and services.

*Technology system.*

- Intensity of replacement of labour of various skill levels by machines, automation and computerization.
- Complexity and depth of the technology information system.

*Status of intellectual property rights.*

- Know-how
- Patents
- Trade marks and designs
- Copyright protection (for software, etc.)

*Marketing system*

- Size of markets
- Complexity of product mix
- Degree of competitiveness within industries
- Competition from imported products and services
- Technology of the distribution system
- Technical servicing capabilities
- Manpower system
- Availability of unskilled and skilled labour
- Availability and cadres of supervisory and managerial personnel

*Institutional structures*

- Technical schools
- University and corporate R and D centres
- Design and engineering firms
- Construction and erection firms
- Product and technology consultancy organizations
- Role of national Government in institutional structures

*Infrastructure*

- Accessibility of raw materials and utilities
- Transport systems
- Telecommunications

# Annex

## BASIS OF CALCULATING EQUIVALENT TECHNOLOGY COST

Using the concept of present value, it is possible to reduce various expressions of time-related technology fees to a common, comparative basis. Each future payment is reduced to its present value by discounting it at a discounting rate, which may vary between countries. That is, at a 10 per cent discount rate, $1.00 received a year from now is equal to $0.9091 today (its present value).

Where a comparison is being made between technologies relative to their respective ascendancy, the application of a 10 per cent factor will not unduly distort results.

The UNIDO publication "Guidelines for the Evaluation of Transfer of Technology Agreements," DTT Series, No. 12 (1979), provides more background to this methodology, which may be used to reduce to comparative figures. The technology costs in table 1 (A, 0.90; B, 1.69; C, 2.52; D, 1.00; and E, 3.63).

**Technology cost**

| *Year* | *1* | *2* | *3* | *4* | *5* | *6* |
|---|---|---|---|---|---|---|
| Discounting factor (10%) | 0.91 | 0.83 | 0.75 | 0.68 | 0.62 | 0.56 |
| | *Present value of payments (Million US$)* | | | | | |
| *Running royalties* | | | | | | |
| Technology A | — | — | — | — | — | — |
| Technology B | 0.37 | 0.33 | 0.30 | 0.28 | 0.25 | — |
| Technology C | 0.92 | 0.84 | 0.76 | — | — | — |
| Technology D | — | — | — | — | — | — |
| Technology E | 0.74 | 0.67 | 0.61 | 0.55 | 0.50 | 0.46 |
| *Flat fees* | | | | | | |
| Technology A | 0.90 | — | — | — | — | — |
| Technology B | 0.15 | — | — | — | — | — |
| Technology C | — | — | — | — | — | — |
| Technology D | 0.40 | — | 0.33 | — | 0.27 | — |
| Technology E | 0.10 | — | — | — | — | — |

# Module 7

## PROCURING TECHNOLOGY

*Procurement is the selection and contracting of all goods and services required to implement a project. This module discusses standard international methods used for large and small procurements. As most procurements by public institutions are accomplished through a bidding system, this module focuses primarily on procurement by bidding. The international competitive bidding (ICB) system, the most widely used of the several established bidding systems, serves as the model for a detailed discussion of the stages, procedures and techniques involved in preparing for and executing procurement through bidding. The advantages and disadvantages of different methods of payment to contractors also receive attention, as do means for procurement without bidding.*

# Contents

# PROCURING TECHNOLOGY

## Introduction

Whenever an investor decides to produce a new product for whatever reason — to process available natural resources, to replace imports, to broaden the means of existing production, or to make profits exceeding the amount of interest collected from the banks — a new project is born. This new project depends on technology or know-how and equipment. If a technology is not owned by the investor, it has to be procured.

An investor owning no technology will be forced to purchase all elements of the project by one of two means:

- To purchase a complete package using one of the following methods: turnkey, semi-turnkey, product-in-hand, build-operate-transfer (BOT), complete plant or quasi-complete plant.
- To divide the package, i.e. to slice it into parts. This unpackaging can be achieved by acquiring a licence and know-how from an appropriate licensor and procuring all other elements from various sources, or procuring combined elements (composite engineering).

An investor must understand the project, the technology, the equipment and all other details to the extent possible at this stage and must then define the procurement and prepare a procurement document. Proper definition of the project concept, proper document preparation and sound planning and execution of a procurement are all crucial to project success. Lack of any one of these elements often results in the loss of quality, delays, cost increases, time- and cost-consuming litigation and overall poor performance with the prospect of serious losses or complete failure.

## The bidding system

Competitive bidding, or tendering, is a system in which an investor or purchaser requests bids (binding offers) from a number of suppliers. Prospective suppliers submit such bids by a date which is fixed by the purchaser and identical for all bidders. All bids must comply with technical, commercial and other formal requirements, including the period required for bid evaluation, as well as evaluation criteria, laid down by the purchaser in the bidding documentation, which is available to all interested bidders under identical conditions. Contents of submitted bids remain unknown to the purchaser until the public opening attended by all bidders. Bid contents are read out loud.

Bidders must acknowledge that costs incurred in preparation of the bid will not be reimbursed, whether they lose or win. The bidders specify that, should a contract be awarded to them, they will accept all obligations originating from it. Bidders are permitted to submit alternative, separate bids if they can prove that the technical and/or commercial conditions offered are more favourable for the purchaser.

Within the competitive bidding system, a purchaser awards a contract to the bidder responding most closely to the conditions set out in the tender or bidding documentation. Simple notification will be given to a bidder whose bid has been evaluated as being best. The purchaser also declares its right not to award any contract, without explanation.

Tendering or bidding is a very special means of concluding a contract. Legislation everywhere regulates bidding rules in order to safeguard the integrity of the bidding process. In a number of countries, bidding is mandatory for any substantial public procurement. Projects in developing countries are often financed through loans granted by international financial institutions such as the World Bank, the Asian Development Bank, the African Development Bank, the Inter-American Development Bank, the International Development Association (IDA) or other regional international development banks. These institutions prescribe open international competitive biddings for most procurement. They issue comprehensive and detailed procurement guidelines for their borrowers.

### *Bidding and international financial institutions*

Many international financial institutions finance project procurement (goods and related services) in developing countries. These institutions usually sign a loan agreement with a leading bank of a developing country; then approved projects are financed on the basis of separate contracts. Projects may be jointly financed by more than one international or regional financial institution.

The rights and obligations of both the investors (the borrower) and the suppliers of goods and services are laid down in the bidding documents and the contracts signed by these parties. The responsibility for executing a project and for the awarding and administrating a contract rests with the investor (borrower).

The international financial institution checks up on the economy and efficiency of a project to ensure that the loan is being used only for agreed purposes. Bidding documents are approved by the lending institution and must be prepared on the basis of the procurement guidelines. Typically, only suppliers from member States of the international financial institutions and from other countries specified by these institutions may bid. Manufacturers and contractors in the investor's country are encouraged to participate in the bidding.

A project may be one single package or may be broken up into smaller, possibly homogenous packages. For each package, a separate bid or tender is required. In the event of unpackaging, coordination of the tenders and the entire package is required. Should an investor lack sufficient capacity and experience, an engineering contractor or a consulting company must be contracted. For a major procurement, the institution may need to employ a consultant or consulting engineer.

### *Preparations for bidding*

Effective preparation is vital to successful procurement. For large scale projects particularly, preparing for effective bidding requires timely and careful attention to planning and scheduling issues. Planning involves, first and foremost, selecting an appropriate bidding process. This step is often completed with the help of a consulting engineer. Next, planning must consider whether the tender will involve a single package or whether unpackaged components will be acquired through separate tenders. Planners must also list the various services needed (design engineering, training) and goods (equipment) needed or complete works to be constructed. Interrelationships between the items and services to be procured must be clearly identified. And, finally, a financial chart must be prepared to monitor costs for the series of receivables to be procured.

Careful preparation includes scheduling. A project timetable is developed to coordinate the bidding and procurement package, i.e. the dates by which various services, equipment or works should be received and integrated into the procurement programme. Careful scheduling allows adequate lead-time to deliver each component and permits integrating and monitoring the stages of a procurement programme. Time is money. Careful planning and scheduling will ensure its efficient use.

In more complex projects a two-stage bidding process may be applied. For example, procurement in the chemical, metallurgical or micro-electronics industries, which rely upon technologies especially sensitive to process, often employs two-stage bidding.

## Methods of procurement

### *International competitive bidding*

International competitive bidding (ICB) is the method most commonly used by public institutions, government agencies, municipalities and private investors for procuring goods and entire projects, from constructing public works such as roads and railways to erecting industrial plants.

### *Local open competitive bidding*

Local open competition bidding is preferred in countries where the indigenous industry is strong enough to provide all goods and services required for the project in question.

### *Selective bidding (limited tendering)*

Bids for limited tender projects (LIB) are invited directly from a preselected list of suppliers or contractors without open advertisement. This method may be used internationally or locally. It is applied in cases where the number and names of potential suppliers is limited and known. Where the size of a project and the extent of a contract is relatively small, this method may be used to raise interest internationally or when exceptional reasons justify and require its application.

### *International or local shopping*

Procurement by this method is usually based on comparing price quotations from at least three foreign or local suppliers, without formal bidding documents. This method may be appropriate for the procuring of off-the-shelf goods or goods of standard specification, small in value. It is also applied in some cases for small and simple works.

### *Single-source procurement (direct contracting or negotiated tendering)*

This method is based on a selective invitation to bid, addressed usually to a small number of selected suppliers or, sometimes, to a single supplier selected on the basis of technological criteria. Single-source procurement, that is procurement without competition, is justified and appropriate under the following circumstances:

- If the goods to be procured are proprietary in nature and can be obtained from one source only.
- When a contractor responsible for a process plant purchases one or more pieces of critical equipment from a specialized supplier as a condition of its guaranty for plant performance.
- Using standard equipment and spare parts may justify that additional items be procured from the same supplier to supplement an existing part or to increase spare parts stock delivered from this same supplier.
- In exceptional cases requiring early or immediate delivery, where more expensive supplies would prevent considerably more expensive losses resulting from an imminent plant stoppage.
- When a contractor is already in the course of executing a major work, usually some public works construction, and is invited to negotiate a contract for additional work in the same area.

In a single-source procurement, the investor or purchaser the right to negotiate with the sole bidder or with a selected bidder until all terms of the contract are agreed upon. The purchaser also reserves the right to stop negotiations at any point and start negotiating with another invited bidder.

Since broader bidding or tendering is usually possible, this procedure rarely meets the requirements set by international financing institutions, which demand equal opportunity to all bidders in the member countries.

### *Negotiated procurement*

Negotiated procurement may occur when a project is financed through the funds of an investor, by a local bank or local development funds, or through foreign loans other than international development funds not requiring a formal tendering procedure. While there is no bidding in negotiated procurement, the normal procedures of market research, soliciting offers, conducting talks, screening and evaluating of offers, negotiation and conclusion of the contract remain standard. More comments on this method of procurement are found towards the end of this module.

## A model of the bidding process

As noted, the ICB system is the most common method of procurement for large-scale projects. Thus, this section provides a detailed account of the steps and elements involved in its execution.

### *Concluding a financing agreement*

Credit must be established to finance any sizeable project. Thus, an investor has to conclude a loan or credit contract. Such a contract may be entered into either with an international financing institution or, more frequently, with a national bank that handles loans granted by the international institution to finance development projects.

### *Selecting a consulting engineer*

In the case of a major and/or more complex project, a consulting engineering firm is usually commissioned to prepare the final plant and equipment designs and to prepare the bidding documents. Using a consultant is also recommended for projects that involve new and/or unfamiliar technology.

Lending institutions financing a project may impose specific contract requirements such as prior approval of the short list of consulting engineers under consideration and of the terms of reference and evaluation of the final selection.

### *Preparing a final design*

An investor procuring technology, goods, services and/or works must develop a final design for each item. In cases where a project depends on relatively simple technology or when the technology is already in the investor's possession, the investor can usually produce the final design independently, provided the necessary expertise is available in-house. When lacking this capability, especially in the case of large or complex projects, an investor may consult with an engineering firm. In some cases, an investor may include final design engineering in the project procurement package and initiate bidding for a complete plant as a single package. Alternatively the design engineering can be bid out separately before soliciting bids for the rest of the project. Such cases present an investor with two options:

- The first option is to conduct a prefeasibility study and/or a feasibility study to select appropriate technology. The selected technology would then be prescribed as mandatory in the bidding documents.

- The second option is to give bidders the freedom to offer their own technologies, demonstrating their respective advantages. In such a case, an investor would specify the quality and quantity required and bids would be for the supply of a complete plant, subject to the prior approval of the lending institution.

Bidders may be entitled to submit alternative technologies prescribed by the investor. When new technologies are found in this way, the lending institution usually calls for a new tender based on the technology, in order to permit all bidders to prepare a new offer. This call for new tender applies only in cases where a technology has been prescribed and not to cases where no technology has been prescribed.

When tenders call for supplying a complete plant or a turnkey project, the investor should avoid releasing too detailed a specification. Instead, the two-stage bidding procedure should be applied. During the first stage, an investor evaluates the technical offer. After comparing the technical contents with the unpriced commercial conditions, the price envelope is opened. Should technical contents be modified, an opportunity must be given to all bidders to modify their price offers accordingly.

To save time, it is advisable to prepare the bidding documents during the preparation of the final design or the evaluation of the feasibility study.

### *Notifying potential bidders*

Once a project has been designed and the bidding documents prepared, prospective bidders must be notified that bids will be solicited. This notification usually takes the form of an advertisement. Three factors are considered when placing advertisements: timeliness, the forum and the contents.

Timely advertising is essential to the success of the bidding process. Notification is considered to be timely if it occurs about 60 days prior to making the bidding documents available to the public. The objective of the advertisement is to provide an equal opportunity for all qualified bidders.

Bidders may be notified in the following forums:

- The country's official gazette.
- Local or national newspapers (in local and foreign languages).
- Foreign newspapers in leading languages (in particular, international newspapers).
- Technical journals.
- Trade publications.
- Embassies and trade representations in the investor's country.
- Direct notification to suppliers or contractors.
- Official notice board at the headquarters of the investor and in the embassies of its country.

A combination of any of the above forums usually provides sufficient notification. Certain international lending institutions may have their own notification requirements. For example, the World Bank requires, as a minimum, that a General Procurement Notice be published in the *Development Forum*, a circulated United Nations publication, with a text approved by the Bank.

Direct notification of potential suppliers is very effective but also risks complaints about omissions and favouritism. Newspaper and periodical advertising, meanwhile, may be very costly and involve foreign exchange expenditure. Contracting a specialized advertising agency to handle a bid notification is often worth the expense for the inexperienced.

As to the contents of notices, experience shows that the more information given, the better the response. The advertisement or notification should be concise yet informative and should include:

- The name of the organization issuing the invitation.
- The objective of the invitation: Is it an invitation for prequalification, or an invitation to bid?
- Brief description of the requirements, e.g. goods, works.
- Time for delivery or completion.
- Address and time at which documents can be obtained.
- Price of the documents and mode of payment.
- Date, time and place for submitting offers.
- The amount and form of bid bond (bid security), if required.
- Criteria for eligibility, if any.
- Source of financing.

For larger projects, it is useful to combine advertisements for various procurement packages, even if their closing dates are different.

### *Qualifying of bidders*

The purpose of the bidding procedure is to select the technology, goods, services and/or works most appropriate for the investor. Awarding a contract to a bidder that lacks the necessary experience, ability and/or financial standing to perform as promised exposes an investor to great risk. Thus, investors must ensure the competence of bidders, especially on large-scale or costly projects. Such precautions may be exercised prior to bidding (prequalification) or after bidding (postqualification).

Prequalification is a process by which the number of bidders is limited to those who meet certain criteria. It is usually appropriate for larger or more complex projects. Most often, the lending institution prescribes whether prequalification is required. Prequalification is also useful for determining a contractors's eligibility for domestic preference, where this is allowed. Because preparing a bid is usually expensive, prequalification saves unqualified bidders such expenses. As soon as prequalification is completed, the bidding documents should be issued to the qualified bidders.

Postqualification, on the other hand, permits all interested parties to bid. The two or three lowest bidders for the project are then selected, their qualifications are scrutinized to ensure their ability to complete the project competently, and an award is made based on a combination of price and qualification.

Prequalification is a desirable option because it tends to attract experienced firms while discouraging less competent ones. The advantages of postqualification include a wider range of bids to choose from and, hence, more intense competition for a project.

### *Bidding documents*

The bidding documents should provide all information necessary to prepare a bid to supply the specified goods, services and works. While the document's detail and complexity vary with the size and nature of a package, they usually include:

- Invitation for bids
- Instructions to bidders
- Bid form
- Schedule of requirements
- Technical summary sheet
- Commercial summary sheet with price schedule
- Contract form
- General conditions of the contract
- Special conditions of the contract
- Technical specifications
- List of goods or bill of quantities
- Drawings
- Forms of the necessary securities
- Bidder's acknowledgement form.

The World Bank, together with the Asian Development Bank and the Inter-American Development Bank have prepared guidelines and sample documents for procuring goods and works by international competitive bidding. These institutions expect investors to study, consider and follow these documents.

Drafters of bidding documents must exercise caution when using sample documents that are intended only as models and should not be copied directly. Every project is unique, with its own particular purpose. Thus, language from sample documents must be examined to ensure that it meets the particular conditions of a project, including the laws of the governing country and the requirements imposed by lending institutions. None the less, the wise and competent application of models can greatly assist the developer of bidding documents. That is especially true when project financing is being sought from international lending institutions, such as the World Bank.

In preparing the bidding documents, all available details of the project should be thoroughly studied. The cooperation of a competent and experienced consultant is strongly recommended in this delicate work. Available models should be used as appropriate. A draft should be sent to the participating lending institution for its comment and approval. Comments requiring further clarification or discussion should be acted upon to the satisfaction of both sides. The process of developing and refining bidding documents takes time.

#### *Invitation for bids*

The invitation for bids (IFB) is a letter addressed to prequalified bidders, if there was a prequalification procedure, or addressed to all eligible applicants, accompanied by a full set of the bidding documents.

The IFB may include and, depending upon the case, should include, the following:

- Name of and brief details of the investor (purchaser).
- Brief description and location of the project.
- Bid reference and title.
- List of the bid documents.
- Receipt/acknowledgement form, to be returned by the recipient, acknowledging receipt of the complete set of bid documents and indicating the intention of the recipient to participate or not participate at the tender.
- Reference to any important requirements, e.g. bid security, without which a bid would be considered invalid.
- Date, time, place and manner for submitting of the bids.
- A statement to the effect that the purchaser/investor is not bound to accept the lowest or any bid.
- Any other detail considered important, such as whether it will be a one-stage or a two-stage procedure.

The investor may demand payment of a modest and reasonable fee for the documents.

#### *Instructions to bidders*

The instructions to bidders (ITB) set the rules of the competitive bidding contest. Investors intending benefits from competitive bidding should seek a wide response from appropriate bidders. To accomplish this, the instructions should be very clear, comprehensive but concise, and fair to all participants. They should explain the procedure for submitting the bid and requirements for its contents.

The language of bidding documents and bids should be a widely used language, i.e. English, French or Spanish. While nationalistic impulses sometimes tempt investors to use their native language, experience shows that this reduces the number of potential bidders. If domestic offers occur and are sought, nothing prohibits writing documents in the country's own language. But, in such cases, the foreign language text should be declared to be decisive should discrepancies occur.

Not more than three copies should be submitted. Too many copies would cause bidders unnecessary expense and would make it difficult to maintain confidentiality.

If there is no prequalification, the qualification criteria should be clearly stated in the ITB, including the nationality of the bidder, country of origin of the goods and services, business status of the bidder (manufacturer or export agent), experience, financial status and specific information concerning the bidder's competency to perform the contract.

Criteria for bid evaluation should be clearly specified in the ITB. Delivery time is one factor. Technical performance features, performance values in operation (especially the guaranteed ones, such as specific consumption figures and quality parameters) and environmental protection requirements should all be included in the ITB. The instructions should also clearly specify the basis on which prices should be quoted; if they do not, comparison will be difficult, if not impossible. Simple goods or commodities, otherwise identical, may be compared on a price basis only, but with capital goods, and particularly with complete plants, price should be only one of the many factors. An investor should remember that a difference in price is paid only once, but consumption rates, product quality or environmental factors involve costs payable over the life of a project if inferior goods are procured for the sake of project economy in the short run. How these various factors will be evaluated should be explained to the bidders. If a merit point system is used, this should be noted. Attention is called in this respect to the contents of the section below on evaluation.

Three other points should be covered:

- Bidders should be encouraged to visit the plant site.
- A joint venture with a local engineering or contracting firm may be permitted (with the approval of the lending agency).
- The ITB should set a realistic but not overlong period of validity for the offer.

*Prices.*

Since evaluation has to take place on an identical basis, the ITB should instruct bidders to submit all bids in a way that facilitates such evaluation and comparison. This requires that the bidder itemize on the price schedule included in the bidding documents the unit prices and the subtotal and total prices of all goods and services offered. Their contents and exclusions, as well as the terms of delivery, should be described as exactly as possible. All prices should be indicated in accordance with the selected delivery terms specified in the ITB. The prices quoted should be firm prices without any claim for adjustment for inflation or any other reason. All prices should be expressed in the currency specified in the ITB. Should the bidder want any portion paid in another currency, it should state so in its bid.

### *Contracting conditions*

A contract consists of two parts: the general conditions and the special conditions. In competitive bidding, all participants must bid on an identical basis, including the contractual terms. Thus, the conditions form part of the bidding documents. Lending institutions prefer to follow a structure in which standard clauses and conditions are in the general conditions.

#### *General conditions of contract*

The general conditions of contract spell out, in detail, all enforceable contractual obligations of the parties, the law governing the contract, the forum for settling disputes, the procedures for inspection of the goods, shipment, insurance, the method of payment, the financial securities, etc. When general conditions are being written, the sample documents prepared by lending institutions should not be copied without close scrutiny and deliberation.

#### *Warranties*

In cases where investors seek to procure complete plants, composite engineering or key equipment from a supplier, warranty clauses are among the most important contract clauses. While a sample document may speak only of "mechanical guaranty," procurements of more complex technologies require more complex warranties in the contract. When procuring capital goods, technical features and specific rates of consumption or production, quality values and environmental factors are at least as important as the price when determining value.

Warranties cannot ensure the success of an investment. They do, however, guarantee technical parameter values and other performance features that will affect the competitiveness and profitability of a project. Thus, an investor should clearly spell out a supplier's obligations for ensuring performance. This should be done in a general way in the general conditions of the contract, while specific values and other details of required performance should be spelled out in the special conditions. The reader should consult module 4, on success factors in technology transfer and module 17, on warranties.

Warranty clauses should state that performance values will be proved through a performance guarantee test (PGT). They should specify the conditions of the test, the supplier's obligations to rectify performance problems (if specified values are not met in the first PGT) and the consequences of lagging performance. Details for measurements, minimum and maximum performance parameters, times and sites for measurement, registration and evaluation of the results shall all be set forth in the special conditions. When PGT results demonstrate the specified performance values, a provisional acceptance protocol will be issued to the supplier as proof that performance guarantees have been met.

### *Transportation and insurance.*

The obligations of purchasers and suppliers for transporting and insuring goods are matters of generally established practice. The International Chamber of Commerce (ICC) in Paris has published these obligations in *International Rules for the Interpretation of Trade Terms*, generally known as INCOTERMS.* The rules precisely describe the obligations and responsibilities of the parties, the bearing of expenses and charges, the exact points at which risks are transferred from one party to the other in the various conditions. They give significant guidance to contracting parties because, instead of describing all these obligations and responsibilities in contracts, one can refer to specific conditions as set forth in the most recent issue of INCOTERMS (at present, 1990). These rules should be thoroughly studied and the most appropriate conditions selected to maximize safety within the most reasonable spending limits.

The same applies to insurance, which has to be selected in accordance with the nature of the project, the equipment purchased, the mode and route of shipment and the conditions established.

### *Conditions of payment*

Trade in capital goods usually involves documentary letters of credit, providing safety to both parties and facilitating immediate payments on presentation of the documents prescribed in the contract. The appropriate documents for payment, including those specifying equipment quality control and shipping, as well as any other document originating from the nature of the goods and of the project, should be prescribed.

Reasonable advance payment to cover the initial expenses of the supplier should be expected. Depending on the nature and value of the equipment, an advance payment may run from 5 per cent to 20 per cent of the total contract price and be paid against the presentation of an advance repayment bank guaranty covering the investor's interests against a failure to deliver.

It is also customary to pay up to 80 per cent of the total value (minus the amount of the advance already paid) *pro rata*, against presentation of the shipping documents. Usually, 10 per cent is paid on the successful completion of the PGT, while the last 10 per cent falls due upon the mechanical guaranty's expiration.

It is advisable to thoroughly study the Uniform Customs and Practice for Documentary Credits (1962 Revision) of the ICC.* This document represents the practice of banks in about 100 countries.

It is also customary to set a value limit under which cash payment is effected.

### *Governing law*

The above-mentioned sample documents assume that the laws of the purchaser's country apply. Consideration should, however, be given to experience showing that foreign companies, unfamiliar with such laws, often fear an unknown risk, causing them to increase their bid price. Experience also suggests that applying a neutral, internationally accepted, well-known and applied law would eliminate or reduce this risk, and could be more advantageous to an investor.

### *Forum for disputes*

The approach to be taken in settling disputes between an investor/purchaser and a supplier should be specified in the contract. Several forms exist to resolve contract disputes. Typically, sample documents suggest using a third-party mediator, adjudication in an agreed-to national or international forum, or international arbitration, with the mechanism specified in the special conditions of the contract. The guidelines prepared by the lending institutions strongly recommend international commercial arbitration for its practical advantages over other methods of settlement. This module concurs with that recommendation and suggests the following prescription for international commercial arbitration by a

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*Contained in *Register of Texts of Conventions and Other Instruments concerning International Trade Law: Volume I* (United Nations publication, Sales No. E.71.V.3).

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board of three members from a commercial organization such as the ICC that has institutional rules of procedure for settling such disputes. Reputable national chambers of commerce may also be an acceptable forum for arbitration.

*Special conditions of the contract*

While general conditions apply to any project, special conditions apply to the particulars of a project at hand. The structure of the special conditions follows that of the general conditions: specific condition clauses are either identical to general conditions clauses, in which case a reference to the corresponding clause therein is sufficient, or they amplify or modify the content of the corresponding clause.

The two sets of conditions complement each other, but in a hierarchy, with the special conditions ranking higher. Whenever there is a discrepancy or contradiction, stipulations in the special conditions prevail. Therefore, any change in the special conditions should be formulated to state how it changes the contents of the corresponding clause in the general conditions.

*Contracting form*

The contracting form is a brief review of essential contract features that identifies the contracting parties, the place and date of execution and the signature of the parties.

*Contacts between investor and bidders*

Bidders noticing any discrepancy or vagueness in or about the bidding documents or requiring clarification may contact the person responsible for the tendering or the engineer (consulting engineer) whose name and address is indicated in the IFB.

All participants should be given equal opportunity for such contacts. Any bidder's question that might be of interest to others must be replied to in writing and sent, together with the question, to all participants. The same applies to a request for an extension of the proposal deadline.

Any effort to influence the investor by any bidder shall cause the bidder to be excluded from the competition. Such efforts should also be reported to the lending agency, which will strike the bidder from the list of eligible suppliers.

*Securities in the bidding procedure*

*Bid security (bid bond)*

The bid security (bid bond) demonstrates the seriousness of a bidder. It assures an investor that a bidder will maintain the offer and that the bidder will sign a contract if it is awarded. Should the bidder fail to do so, the security would be forfeited. The securities of all other bidders are released after a contract is signed with the winner.

The amount of the bid bond should be about 5 per cent of the value of the goods offered. This security should be in the currency of the bid or in another freely exchangeable currency, and it should take the form of a bank guaranty letter or a letter of credit. It should be valid for the evaluation period, the award period and the contract conclusion. The winner's bid security is returned when the performance security is submitted.

*Performance security (performance bond)*

The purpose of a performance security is to prove that a supplier will meet its contractual obligations. Typically, it is written for 10 per cent of the contract value and is in the form of a first demand letter of guaranty on the bank specified. It should be valid until the date of provisional acceptance, following the successful PGT, plus the period of the mechanical guaranty, plus 30-45 days.

*Bid opening procedure*

The opening of bids should occur in accordance with the country's legislation on bidding, the requirements of the lending agency and the stipulations of the bidding documents (IFB and ITB), in public, in the presence of the representatives of any bidders who desire to participate. Non-bidders are not generally allowed to attend. The presence of bidders is officially registered by their representatives.

The tender is brought in and the sealed envelopes are checked one after the other against the list of invitation numbers. Bids are then opened by an official, who reads out loud the name of the bidder, the price and the delivery or completion time, initialling the bid against the price.

An immediate formal checking establishes whether the bids are responsive to the prescribed criteria, whether the securities are in order and whether they are on time. Late bids are rejected without opening. This is the last opportunity for withdrawing a bid without forfeiting the security.

The purchaser investor prepares minutes of the opening session. The bidder's representatives need not sign the minutes.

In simple cases involving simple goods or commodities, where price is the only decisive factor — with all other conditions being otherwise essentially identical — the award may be made immediately. In all other cases, the bids are turned over to the technical committee for examination and evaluation.

The opening procedure differs when a two-stage system is used. This system is used to acquire technically more complex items, where technical-commercial clarifications may result in price changes prior to the opening of the price bid envelope. This is the case when the equipment or plant in question has to be manufactured according to the requirements of the purchaser or its consulting engineer and involves new designing work from the bidder. After such work, the bidders may submit, again in sealed envelopes, new technical-commercial and price bids.

In the opening session only the technical bids are opened and checked formally for substantial responsiveness, after which they are turned over to the technical committee for examination and evaluation. In the course of the examination, the purchaser may ask the bidders for clarifications and more details in writing. No changes in substance or in price are permissible, however. Aspects of the examination and the evaluation will be discussed below. The price bids are opened in a second opening session, following the examination and evaluation procedure.

## *Examination and evaluation of bids*

Examination includes two main stages and is performed by a committee composed of a representative of the purchasing and contracting department, one or more representative(s) of the technical department and occasionally, a representative of the legal department.

As noted above, technical evaluators often need more information for evaluation than is contained in the bid. To reject a bid for lack of sufficient information would not be in the interest of the purchaser. The committee, therefore, should have discretionary power to seek clarifications or other details from any bidder. The bidder, however, should not be permitted to modify its price or any of the substance of the bid.

### *Preliminary examination and first screening*

The committee should examine the bids to determine that they are properly signed and complete; that the bidder meets the eligibility requirements, if any; that the securities are as required; that they are substantially responsive to the bidding documents; that they do not contain computational or typing errors; and that they are generally in good order.

### *Computational errors.*

If there is an arithmetical error, the unit price should be taken as correct and the totals should be corrected. Should the unit price be absurdly high or low and obviously the result of a typing or decimal placement error, the unit price should be rectified. The bidder should be notified of errors found and corrections made and be asked to confirm its agreement. Refusal to do so may entitle the purchaser to reject the bid.

### *Minor or substantial deviations*

Substantial deviations from requirements should result in rejection of the bid, while minor deviations may be tolerated, so long as performance, operation and other requirements are fully met. A bid with minor deviations, but otherwise substantially responsive, should not be rejected out of hand. Instead, the deviations should be evaluated and adjusted to ensure a fair comparison of the bids.

In deciding whether a bid is technically and commercially responsive, the following basic principles should be considered by the committee:

- Any tolerable deviation from a bid condition or specification should be one that would be acceptable if the contract were awarded to that bidder.
- If the deviation enabled the bidder to offer a lower price, it must be possible to evaluate the deviation in monetary terms to have a fair basis for comparison.
- Even though it can be evaluated in monetary terms for comparison purposes the deviation should not be so major that it would be unfair to other bidders not to be given an opportunity to bid on the alternative specification.

Consider the following hypothetical scenario. Instead of offering the galvanized steel pipes specified for a water pipe system, a bidder offers plastic pipes at much lower prices. These might adequately serve the purpose but would have a shorter life. If the purchaser decides to accept plastic pipes, bids should be retendered to give every bidder the opportunity to compete under these modified specifications.*

The committee will discontinue evaluating bids that are found to be essentially non-responsive to the conditions and specifications of the bidding documents. A substantially responsive bid is one that conforms to all terms and conditions of the bidding documents, without material deviation affecting in any substantial way the quantity, technical characteristics, performance, operation or delivery time of the goods and services offered and without limiting the purchaser's rights or the bidders's obligations under the contract.

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*Taken from International Law Institute, *International Contracting and Procurement for Development Projects,* Washington, D.C., Georgetown University Law Center.

*Evaluating responsive bids*

Evaluation must be performed on a basis that permits identical comparison and, as far as possible, on a quantified monetary basis. Criteria for evaluation differ depending on the subject of the tender, whether it is a complete package with or without prescribing a given technology, or whether it is unpackaged partly or completely.

Establishing selection criteria for a package tender involves integrating a wide variety of considerations. Selection criteria should, of course, be directed toward securing a competitive and lucrative product or production process, but national interests must also be borne in mind. Selection criteria should consider the impact of the package on national resources (available currency reserves, raw materials, electric power etc.) as well as the costs of transportation, insurance, construction, licensing fees etc. The technology must also be considered in terms of the impact it will have on the rest of the nation's economy, its place on the life-cycle curve and its reliability. Other factors include the selling power of the product and its effect on the nation's export or import replacement potential (quality or quantity); the maintenance costs of the package and the future availability of spare parts; the impact on the surrounding environment; and the rate of return the project should generate versus projected operating costs for 10-15 years, to ensure that financing obligations can be met.

To the extent possible, all of these factors should be quantified in terms of cost and potential returns. Comparisons of projects should be made using one currency as standard (United States dollars, say, or deutsche mark), and the prices of all projects should be converted into that standard. Not all factors can be quantified in monetary terms, however. For judging these, another, more subjective method must be employed. Often a merit point system is used to evaluate and compare the merits of the competing bids. Under this system, all decisive evaluation criteria are listed and a weighted percentage assigned to them, with their total being 100. Merit points are awarded for all technical features and other evaluation criteria for each bid. Evaluations then arrive at a merit points total for each bid. At this stage, the qualitatively best offer will be the one with the highest total. The point total may then be correlated with the bid price by dividing the evaluated price (with corrections, if necessary) by the merit points total to arrive at the price per point. The bid with the lowest score is the winner.

A more common method factors the price into the table of criteria, with a percentage weight given to it. When awarding the merit points, the number of points given to the price factor is inversely proportional to the actual bid price, i.e. the lowest price gets the most points. The winner in this case is the one bid that scores the highest point total.

The same merit point system may be employed to evaluate bids for individual equipment, since performance features may provide differences that can be weighted. For example, the follow-on expenses of a piece of equipment might exceed the purchase price.

When bidding documents are being prepared, evaluation factors or criteria have to be formulated for the instructions to bidders. Preparations continue until just before the bids are opened, when committee members and the consulting engineer prepare the final evaluation criteria and their relative weights to form an evaluation grid.

For all of its advantages, the merit point system does involve a great amount of subjectivity and risks certain errors. Errors may be committed in weighting the list of criteria. Some of the weights may assign too great or too little influence to a particular criterion of the project. Errors may also be committed by awarding points to every criterion in each bid, which risks awarding points for some things that are not particularly important to a given project. Errors may be committed as well by omitting to enlist features that might turn out later to be important. On the other hand, the greater the number of evaluation criteria, the smaller will be the impact of a particular criterion on the final result. Similarly, the greater the number of bids, the smaller will be the differences in the points awarded to each criterion. All these errors may none the less distort the picture.

There is, lastly, the matter of individual judgement. If three people are asked to weight the same list of criteria, the weights may be very different depending on individual experience, background and professional interests. To counteract and reduce subjectivity and error, the "grid dressing group" that prepares the criteria and the weighting scale should include at least five members. Their discussions should proceed in a stepwise manner. Each member should prepare a list of criteria without weighting, which should be agreed on by the group. This list is then tested against a number of practical or hypothetical examples to evaluate possible distortions introduced by taking up or omitting or duplicating certain criteria. Now each criterion is weighted, with the total weight of all criteria equalling 100 points. (Certain criteria may be grouped for the calculation of the final score.) The grid is again tested against the examples, this time quantitatively.

After the grid dressing group has completed its work, a bid evaluation group should be composed. This group may be identical in composition to the grid dressing group or completely different, or it may be modified by enlarging the original dressing group. The grid dressing and bid evaluation groups jointly discuss, test and improve the grid and finalize it. The joint group formulates its requirements concerning the contents of the bids and, consequently, the contents of the instructions to bidders and other parts of the bidding documents. The evaluation grid must also be included in the ITB with explanations about how it will be used.

The person responsible for the project sees to it that all requirements are spelled out in the bidding documents to permit comparative and fair evaluation. Some bidders may, with justification, point out the inappropriateness of a particular weighting. This may encourage the purchaser to review and modify the weights, if necessary. In such a case, all bidders must be duly notified in writing.

The weighted ranking, the comparative costing, and the point system methods are described in module 6, on evaluating and selecting technology.

### *Awarding the contract*

The purchaser notifies the successful bidder through a notice of award sent by cable, telex or telefax within the period of bid validity. It either invites the winner to a contract signing or informs the winner that the contract will be airmailed for signature. The winner must confirm receipt of the notification of award by telex, cable or telefax within five working days.

If so invited, the winner must sign the contract within 15 days of receiving of the notice. If the contract is airmailed, the winner must return the signed contract form together with the documents specified, within 10 calendar days of its receipt. In both cases, the winner shall promptly inform the purchaser by telex, cable or telefax.

The effective date of the contract will be the date the purchaser receives the two copies signed by the winner. Should the winner fail to return the signed contract within the prescribed periods, the purchaser will be entitled to the winner's bid security and award the contract to the second placed bidder or to call for new bids.

### *The contract package*

All documents of the bidding procedure, from the IFB through the bidding documents, the notice of award and the signed contract, constitute the contract.

## Changing conditions of bids

Experience shows that, mostly in tenders for large projects, large companies of good reputation worldwide do not always follow certain ITB requirements. Bidders often submit bids with conditions different from those specified but that conform to their own established commercial practices. Other bidders attempt to impose their own conditions when submitting bids. Such attempts present the investor with a difficult dilemma. The investor may declare all such bids non-responsive and reject them, but this might cause them to lose the best technology. On the other hand, accepting new conditions would be unfair to the rest of the bidders.

The investor may declare the bidding unsuccessful and negotiate with the lending institution to obtain approval for changing certain conditions to make them more acceptable to such bidders. Should the investor receive such approval, new documents are prepared and the entire procedure is repeated. Such changes entail expenses and take considerable time. However, since the investor has no other means of financing the procurement of a desirable technology, it has no other choice.

Experience also shows that when it is a question of procuring smaller plants and less intricate technologies, the sources of such technology (often smaller companies in both developed and developing countries) do not even think of participating in a tender as suppliers. To attract such suppliers, the investor could try first, with the approval of the lending institution, to reach a preliminary agreement with such suppliers unpackage the technology, with the help of an engineering agency or, in simpler cases and if sufficiently experienced, without such assistance. The investor may contract with the licensor for that technology and call for bids to supply equipment and services the licensor is unwilling to take up.

## Methods of payment

A number of factors determine the price of a contractor's bid on a project. The contractor will estimate the actual expenses involved in the manufacture, delivery and/or construction of a technology or plant. It will also factor a reasonable profit into its calculations of the bid price, of course. But the contractor must also take into account risks such as inflation, longer-than-expected construction times as a result of unexpected technical or logistical problems etc. This uncertainty often drives bid prices upwards.

The investor's interests, on the other hand, lie in getting the work done well and on schedule (if possible, ahead of schedule) at the lowest price possible. Early project completion may not be in the contractor's interest, however. It is incumbent on the investor, therefore, to try to extend incentives to the contractor to bring sometimes conflicting interests into closer conformity.

A number of payment methods have been developed to introduce incentives for contractors. Three basis system or methods of payment are generally employed:

- Lump-sum payment or pricing
- Unit pricing
- Cost-reimbursable pricing

The first two of these three are considered systems of pricing according to performance, while the third is seen as pricing according to cost. All three systems can be employed in contracts resulting from bidding or negotiations.

Let us briefly consider the basics of these systems and their advantages and limitations.

### *Lump-sum system*

In the lump-sum system, the contractor assumes all risks. Consequently, it increases its prices to allow for a margin of error in its calculations, resulting in a higher price to complete the project. Such contracts are sometimes also called fixed-price contracts.

To reduce the rigidity of this system, a price reduction formula is introduced to cover the effects of inflation, thereby reducing such risks. The revision or adjustment formula may be based on a single index, i.e. the parity of the currency of the contract with respect to a reference currency, or it may be based on the inflation index of another currency associated with the contractual one or it may be based on a more complex formula joining several factors weighted according to their impact on the contract performance.

Sometimes two currencies are specified in the contract: a foreign currency and a local one to cover local supplies or works. An evaluation formula is usually established for expenditures in the local currency. This dual currency system offers a measure of simplicity but could also mean lower quality if supplies are purchased locally. Strict quality controls on locally purchased goods must be established and enforced.

Another variant of the lump-sum method is the "redeterminable fixed-price contract." This system establishes an initial cost and a lump-sum price estimate at the time the order is placed. It may be revised when the actual price of the supplies can be better defined. This system is helpful in minimizing price increases due to uncertainty. But since it tends to reduce the profits of the contractor when costs are reduced to real value, contractors tend to resist it.

### *Unit pricing*

Establishing unit prices is a practical way to reduce the risks of the contractor. In this system, prices are agreed upon for certain measurable units of performance (cubic metres of poured concrete, man-hours of engineering or erection, teaching hours in training etc.). This method is practical when it is not possible to exactly define the work to be done.

It may, however, also tempt the contractor to prolong the work, since profits increase for each unit billed. A measure employed to reduce this effect is to set a reasonable estimate of the expected units with intermediate limits. The contract should provide a reliable control on the number of units to be billed.

The entire system of unit price and, by extension, time rate criteria requires careful follow-up. It has the advantage, however, of being easily applied in local deliveries and services.

### *Cost-plus*

In cost-reimbursable, or cost-plus, contracts, the contractor is entitled to be reimbursed during a project for all expenses paid to execute the contract by means of invoices, including also a reasonable, predetermined profit. The intention here is to reduce the uncertainty and risk present in lump-sum contracts, thereby permitting the contractor to reduce its safety margin, resulting in lower prices. Several variants of this system are in use.

#### *Cost-plus-fixed-fee contracts*

In cost-plus-fixed-fee contracts, the contractor bills the investor for all expenses paid in the course of executing of the contract plus a fixed overall amount foreseen for the entire project as the contractor's profit. This variant is used most often for projects of an urgent nature, where a complete schedule cannot be established prior to starting the work. Because the profit is a fixed amount, the contractor is uninterested in the final costs. It is therefore used only for certain R and D projects and for small projects.

#### *Cost-plus-margin contracts*

Cost-plus-fee is perhaps the most commonly used variant. In its pure form the contractor bills the investor for expenses incurred in executing the contract, adding to the bills its profit, which is specified as a percentage.

The drawback of this method is that the higher the costs of the project, the greater the profit of the contractor. Because the contractor has no incentive to control costs, it is customary to set a ceiling for the overall cost of the project. While it is common to include a "termination clause" in the contract should the costs exceed a reasonably set limit, replacement of a faulty contractor by a new one is a delicate situation for the investor.

Should this system be employed, the contract should clarify what costs may be compensated and how to deal with costs resulting from modifications or repairs etc. that may fall under the contractor's responsibility and are normally excluded from the fee calculation. Usually, discounts, commissions etc. collected by the contractor should be turned over to the investor.

Experience shows that an investor, especially from a developing country, should avoid using the cost-plus system. If it must be applied, its use should be limited to situations in which a final cost assessment is uncertain. Even in such cases, provisions should be made to shift to a lump-sum system by introducing incentive clauses, making it a hybrid system.

*Hybrid contracts*

One kind of hybrid system could be cost-plus associated to lump-sum contracts. In this scenario a large and complex project starts under cost-plus pricing up to a reasonably accurate cost estimate covering the preliminary studies, basic engineering, training, technical assistance etc. After determining a final cost estimate sharp enough to make the investment decision, the project progresses under a lump-sum contract.

In another variant, a ceiling-price is foreseen in the cost-plus contract that must not be exceeded. Practically, this contract is shifted into a lump-sum contract. After the ceiling is reached, all expenses will accrue to the contractor, whose fee is maximized at the ceiling, whereafter it decreases with no share of the additional costs.

Allowing the contractor to increase the ceiling cost would defeat the purpose of the cost-plus system, because it would from the very beginning be a disguised lump-sum.

### *Incentive pricing*

Efforts have been made to introduce incentives relating the contractor's reward and the caliber of its performance to contractually fixed goals. Any success in the contractor's job (i.e. faster completion, lower costs) is assumed to produce a project benefit, while a failure will have a negative impact on project returns. Consequently, giving the contractor a stake in both reward and penalization would improve the situation.

Four concepts have been developed in connection with the incentive pricing contracts.

*Fixed targets*

One or more goals are defined in the contract, with a price evaluation method agreed between the parties or set by an independent auditor. The target cost ($PC_0$) plus the target fee ($F_0$) equals the overall target disbursement, $T_0 ( = PC_0 + F_0)$. This system can be used for several targets simultaneously.

*Share coefficients*

For each goal, a share coefficient is established. One of the contract variables could be the project cost. It could be stipulated that, if the attained objective cost ($PC$) is different from the target cost ($PC_0$), the share coefficient $X$ ($0 < X < 1$) will define the part of the difference $C_0 - C$ that will be added to the target fee ($F_0$) to determine the actual fee, $F$: $(C_0 - C) X = F - F_0$. Quite often, instead of a share coefficient, a share ratio (e.g. 75:25 or 90:10) related to $C$ is employed.

In a variant of this method, two different share coefficients are defined: one for cost overruns, intended to penalize the contractor, and another for costs under the target cost, to reward the contractor.

The incentive system can be complemented by setting upper and/or bottom limits beyond which the sharing principle would not apply. More methods developed for this type of pricing are described elsewhere.* This article provides more details about the methods mentioned above, such as the partition function, the fixed-price-incentive fee, and the cost-plus-incentive fee system; it also describes incentive systems with multiple target variables, such as the cost-plus award fee. For selecting the most suitable pricing system, Burt also suggests a criteria system that depends on a number of project characteristics, such as the total value of the project, the uncertainty in the available cost appraisal and the management capacity of the investor.

## Negotiated procurement

The formal bidding system is not the only means available to leverage competition in order to obtain the most favourable conditions of procurements. Investors may instead seek to procure goods and services through direct negotiations with suppliers.

This negotiated bidding or tendering method requires no formal bidding procedure and none of the formal bidding documents. It may produce real competition, directed toward the most critical points or aspects of a project or technology. Would-be suppliers may be engaged in direct negotiations, which is strictly forbidden in the formal bidding system.

In preparing for a negotiated procurement, it is always advisable to invite as many offers as possible. Nothing should prevent an investor from maintaining relations with potential suppliers whose technologies have been evaluated as appropriate. The investor may conduct negotiations with more than one or even all of such appropriate offerors in order to find out the extent to which they may improve the weak

*See, for example, D. N. Burt, "Getting the right price with the right contract", *The Management Review*, vol. 65, No.5 (May 1978).

points in their technologies (e.g. performance guaranty values) or in their commercial conditions to satisfy the investor's needs. The supplier who can do this best is awarded a contract.

Competition can be overdone in a negotiated procurement, however. Pressing too hard, beyond reasonable limits, risks leading some competitors to accept conditions they are unable to fulfil, a situation from which no one benefits.

Another, not unimportant advantage of this method is simplicity. The negotiated contract is one single document with annexes, not a series of documents with a hierarchy among them to rule over the interpretation and validity of the inevitable discrepancies.

### Special transactions

Procurements are sometimes made under special arrangements. Such special arrangement could be a barter arrangement, in which the purchaser pays not with money but with some prearranged commodity the supplier needs or can sell. Such barter transactions are, however, always a combination of two agreements, i.e. of a sales agreement and of a purchase agreement. They are to be treated as such. Care must be taken that both agreements should be fair in every respect.

In another special form of procurement, the technology supplier agrees to purchase the product of the technology produced by the licensee over a period of years. For the licensee, this transaction has the advantage that the licensor has a real interest in the quality of the product. It is, in effect, another warranty for the technology. Here again, this transaction should be considered as two separate agreements, both of which must be fair. It requires an appropriate treatment of the price of the product, with sound provisions for periodical (e.g. annual) revisions of the price on an agreed reference basis and with appropriate safety provisions protecting the interests of both parties.

Space precludes discussing the details involved in these special transactions. Whatever special features such transactions may have, they all are forms of contractual procurement. Since the bidding system is a very special form of creating a contractual relationship, there is, at least in principle, no prohibition on conducting such special transactions through the bidding system.

# Module 8

## NEGOTIATING

*Arriving at a satisfactory business relationship requires two things: the preparation of a balanced and comprehensive agreement between parties, and civil negotiations that aim to achieve mutually beneficial results for all of the parties involved. Being well-informed, building an effective negotiating team and communicating well with members of the other team will affect the success of the negotiations. Various steps to be taken at given stages of the negotiation process are recommended. Effective, cooperative negotiations make for mutually beneficial relations and the long-term satisfaction of the parties to the agreement.*

# Contents

# NEGOTIATING

## Introduction

A technology transfer agreement that results in a satisfactory long-term relationship between two or more parties is one in which the parties recognize that the agreement must provide benefits for each. Once this principle is accepted by negotiators, the process moves more smoothly. It can be enhanced in two ways: *(a)* by preparing a proposed agreement between the parties to serve as the basis of negotiation that is balanced with respect to their mutual and conflicting interests as well as comprehensive and *(b)* by conducting negotiations to arrive at a mutually acceptable final text that gives each party the appropriate rights and obligations.

The manner in which negotiations are conducted will also help ensure a successful end result. Negotiators should *(a)* obtain and master all the relevant information needed to correctly present their interests and options, *(b)* develop the internal communications that will mould each party into an effective team and *(c)* utilize approaches and techniques that facilitate communication between the parties and develop mutual confidence and trust.

This module will discuss the various steps that need to be taken at each stage of the negotiating process. It will elucidate the elements that maximize the chances of success, not necessarily in terms of what provisions are incorporated into the contract but by how successfully the project ultimately evolves, and by how the relationship between the parties becomes cooperative rather than adversarial. The cumulative effect of those elements constitutes what is generally referred to as the dynamics of the negotiation process.

Certain points stressed here should be kept in mind throughout the planning and execution stages of negotiations:

- When making international agreements, it is essential that the culture of the other party's country be studied carefully to assure that your own party's understanding of the other's arguments and interests are clear and that yours are clear to them. It is just as important to learn their customs to avoid embarrassments or insults.
- For any kind of agreement, national or international, learn all you can about the other party(s): its style, preferences, performance, financial condition, ethics, expectations from the deal etc. Separate assumptions from facts. This will help in formulating your own objectives and negotiating strategy.

## Planning stage

If negotiations are to culminate in a successful agreement, certain prerequisites must be met before negotiations get under way.

### *Objectives*

Well before an agreement is drafted, each party needs to determine its objectives for concluding a deal. This is an elementary but necessary rule of successful negotiation. Parties often do begin negotiations without being clear about the nature and scope of the contractual relationship they wish to establish. This may lead to ambiguity, misunderstanding and, even, distrust and bad faith between the parties as the negotiations proceed. Each party should enter a negotiation with well-conceived and adequately supported goals so the process moves ahead in an orderly manner.

A technology transfer relationship often begins when one party submits an outline or preliminary proposal to another, offering rights to intellectual property or expressing interest in purchasing such rights. It may take a meeting or two to help define the market value of the technology or to decide how to structure the future relationship, especially if the technology is being transferred for the first time. Once these details have been worked out, one of the parties, usually the initiator of the proposed relationship, submits a written proposal to the other as the starting point for subsequent negotiations.

It is assumed that before writing such a proposal, the submitting party will have defined its goals and interests. The party receiving the proposal then needs to study it thoroughly.

### *Proposal analysis*

The first step to be taken after receipt of a proposal is to appoint a technical group to analyse it, list all of the questions it raises and identify and request any additional information that is required from the party submitting the proposal. There should be no reluctance to do this; in fact, most parties who have submitted a proposal welcome questions and requests for information, for it indicates to them that the proposal is being taken seriously. It gives them a better idea of what is of particular interest to the other party, as well as any shortcomings of their proposal.

Information on the subject-matter of the proposal should also be sought from independent sources. Such information might relate, for example, to the nature and effectiveness of the technology being proposed, the market for the proposed product, the quality and production cost of the product, the potential sources of financing.

All the information received from the party submitting the proposal and from independent sources should then be reviewed thoroughly by the technical group. To the extent that the new information raises additional questions, these should again be posed to the proposing party or to the independent sources, until the technical group is satisfied that it has all the information it needs to formulate the preliminary structure of the relationship.

### *Preliminary structure for the relationship*

Once the required information has been collected and analysed and it is determined that the proposal should be pursued, a preliminary structure (and, perhaps, alternative structures) for the relationship should be formulated and evaluated in terms of how it will meet needs and objectives. If a patent licence is being offered, the technical team should determine if pertinent know-how, trade marks, and/or copyrights should be included and should have some idea of the amount of training and on-going technical assistance required. In other situations, the agreement structure may require a technical services, engineering services or management services agreement At times, a joint venture may be the preferred or required relationship.

### *Planning stage suggestions*

These are some suggestions for the planning stage:

- Determine alternatives to completing the agreement. Even one alternative improves your negotiating strategy. The authors of *Getting to Yes*, from the Harvard Negotiating Project, call this BATNA, Best Alternative to a Negotiated Agreement.*
- Consider the long-term benefits of the agreement. Don't be overly concerned with the short-term implications.
- Look for areas of agreement between the parties, not areas of conflict.
- Plan the major issues as independent units, not in sequence. This will avoid confusion if the issues are brought up out of your sequence.
- Set ranges for your objectives, not specific points.

## The negotiating team

Once a preliminary agreement structure has been agreed upon, a negotiating team should be selected.

### *Composition*

Two teams need to be assembled, the planning team and the negotiating team. The team that does the planning for the negotiation should consist of, at a minimum, the chief negotiator, a technical expert, a financial expert and a legal expert. If it is a complex deal, engineering, manufacturing and marketing personnel might also need to be involved. At times an outside consultant will be beneficial. It is the planning team's responsibility to set all of the parameters for the proposed agreement so that the negotiating team has the information it needs to properly present its side to the other party.

The actual negotiating team for technology transfer agreements should be kept as small as possible. A simple patent or patent and know-how licence may only require one person from each party, the licensing executive for each. As the complexity of the type of agreement being sought increases, the team is expanded. Many complex technology transfer agreements are handled by the licensing executive and an intellectual property attorney. This, of course, does not preclude discussions between negotiating sessions with technical, financial, manufacturing or marketing experts. In situations where, for example, a large production line, a turnkey plant or a joint venture is being considered, the negotiations may require the presence of technical, financial and other experts. As the negotiations proceed and once they are completed, the drafts of the agreement are nearly always prepared by an attorney skilled in technology transfer agreements.

All too often, a negotiating team is appointed just as formal negotiations are about to begin, so the team goes to the table without adequate opportunity to study the proposed transaction and back-up information in depth or to have an input into the positions that the chief negotiator will present during the negotiations. Obviously, last-minute appointment of the negotiating team is an unwise practice that should be avoided.

*Roger Fisher and William Urey, *Gettin to Yes*.

### *The team leader*

The chief negotiator's role is a special one. He or she should command the respect of the other players and be articulate and patient. A Government makes a mistake when it assigns this role as a matter of course to the senior official involved in the project. Instead, the person best able to deal with the particular negotiation should be named the chief negotiator. An understanding of the culture of the other party's country, the language in which the negotiations are to be held and the culture of the company itself are decided advantages for a chief negotiator.

The chief negotiator must have the character and strength to be able to control a meeting and win the respect of his own and the other party's representatives. He must have self-confidence, be able to lead and have the support of superiors. He must also be a person who thoroughly understands the subject, who is broad-minded enough to listen to opinions different from his own and who appreciates arguments and is not offended when someone contradicts him. He must not be vain, but, rather, sure of himself and not easily influenced by flattery. As well, he must have experience in the business being negotiated and, above all, must be able to make decisions when they are needed.

### *Team members*

The technical expert should know the technology and must understand the technical advantages and disadvantages of what is being offered. He must have a knowledge of alternative technologies to those in the proposal and their cost. If at all possible, he should be drawn from the technical group in the planning team that analysed the original proposal.

The financial expert should be familiar with various types of financial arrangements, including potential sources and terms of both domestic and international financing. He should also be able to calculate the long-term impact of changes in interest rates, repayment periods and principal amounts of the financing being discussed, as well as the long-term financial returns and cash flows from the transaction as it is modified during the course of negotiation.

The legal expert should have experience in drafting contracts and should be knowledgeable about the terms and conditions of technology transfer agreements. If the subject matter is a project for a developing country, a knowledge of technical, engineering or management service agreements may also be needed.

The legal expert's role needs to be delineated. Some companies feel such experts should take a back seat in the actual negotiating sessions as they are often thought to be too dogmatic in their approach. Others feel the opposite way, reasoning that agreements are legal documents and should be attended to by legal staff. However, whether the legal expert plays a primary or secondary role, his main duty is to structure the agreement and its specific provisions so that they reflect what the parties have agreed to orally. He must also watch for terms and conditions unfavourable to his side and must be able to detect subtle provisions that might escape the eye of the business licensing executive.

Should no suitably qualified experts be available locally, it would be worthwhile recruiting them from outside the company as consultants. The cost of a knowledgeable expert can be recognized many times over by his impact on the cost of a transaction to the acquiring party. If such an expert is retained, he should participate in both the preparation for the negotiations and the negotiations themselves.

### *Team discipline*

A negotiating team should speak with one voice. Usually the lead negotiator is the main person. Other members should speak only when the principal spokesperson invites them to do so, which should be frequently as possible to maintain team alertness and spirit. The leader should try to engage all the members of the team while maintaining his authority over the team as a whole. Experienced negotiators make a point of looking for any disagreement between the members of an opposing negotiating team and exploiting it to their advantage. Obviously, open disagreements between team members must be avoided, as should disagreements conveyed by facial expressions and body language.

It becomes crucial, therefore, that team members maintain a calm demeanour in the negotiating room. They should avoid revealing any difference of opinion with what the chief negotiator is saying. If the issue being discussed is of sufficient importance and the disagreement is substantial, the chief negotiator should be asked to call a recess so the issue can be discussed and an acceptable position agreed before returning to the negotiating room.

In fact, team meetings should be held before each day's negotiating session to go over the points to be discussed that day and to agree on their handling. Similar meetings at the end of each day's session to review the points agreed upon and their general impact on the overall progress of the negotiations will go a long way towards limiting the chance of disagreement during the actual negotiations. In these meetings, team members should advise and assist the lead negotiator by analyzing the arguments presented by the other side, finding their weak points, studying their implications and generally providing the chief negotiator with appropriate counter-arguments.

## Preparing for negotiations

Once the negotiating team has been appointed, it should start preparing for formal negotiations with the other party. This requires focusing on its own and the other party's key information, objectives and issues. Doing this before the start of formal negotiations compels the team to reflect in-depth on each issue and prevents it from later being caught by surprise or being forced to improvise positions.

- *Develop key information.* Key information on a range of issues needs to be gathered and assessed before the negotiations. These issues includes the technical aspects of the proposed transaction, such as the nature of the technological product or process being proposed and alternatives thereto, the type of equipment required, the raw materials and utilities needed, the material flow and production specifications and technical assistance requirements. They also include financial aspects such as estimated production and capital cost, potential profitability and return on investment. With respect to a technology licence, the team needs to determine proper royalties, territory, exclusivity, field of use and the many other important aspects of a technology transfer agreement discussed in module 14.
- *Defining key objectives.* Adequate preparation requires the negotiating team to determine how its technical and economic objectives can be optimized without making the agreement unduly one-sided. Once the objectives have been identified and agreed to, the negotiating team should list the key issues to be negotiated and should try to avoid establishing fixed positions on these issues. A better approach would be to set acceptable ranges that would accommodate the side's interests. The ranges, however, do need to be firmly fixed to ensure that positions later agreed to prove satisfactory.
- *Information about the other party.* The importance of learning all you can about the other party cannot be overstated. Information on financial position may initially be obtained from the party itself. It can then be verified and supplemented with information from many other sources. If the other party is a publicly traded company, extensive financial information can be obtained from annual and quarterly filings with national regulatory agencies. If the other party is privately owned, information can also be obtained from large banks and credit agencies. Information on the experience and prior performance of the other party in similar technology transfer projects is more difficult to obtain. Again, the negotiating team should request such information from the other party and then check it out through other sources.
- *Objectives of the other party.* Acquiring background information about the other party may give the negotiating team a good idea of the other party's objectives, priorities and concerns. This information will enable it to formulate better negotiating strategies. Addressing the other party's concerns early in the negotiations with proposals designed to satisfy interests on both sides would greatly facilitate a mutually satisfactory agreement.

## Contract drafts

### *The point at which they enter the process*

If a licensor already has one or more licensees for a given technology, the earlier licence agreement is presented when the licensor is seeking another licensee. Usually, such a licensor has a proven technology, and existing contracts, and there will seldom be any major changes to the terms and conditions of another licence for the same technology.

If the subject of the negotiation is a technology for which there are no existing licensees, the process is different. In such cases, the first step is generally a meeting in which the offering party presents the technology to a prospective licensee. During the final part of the presentation, the offering party outlines general terms, such as the licence grant (patent licence only, patent and know-how, technical assistance or not etc.), field of use, territory and, perhaps, payments/royalties. Following this meeting, there may be others for further clarification of general terms. But if there is to be an eventual licence agreement between the parties, the offering party prepares a draft agreement that contains all of the terms and conditions it expects for the licence and sends it to the potential licensee. This draft becomes the basis for the ensuing negotiations; it becomes, in effect, the object for study by the negotiating teams.

Following each negotiating session, the draft is updated and the new version becomes the basis for the next negotiation. This process continues until the parties agree and execute the agreement or finally disagree and go their separate ways.

### *Preparing the first draft*

The party that prepares the first draft of a contract is commonly thought to have an advantage. That is probably true, as the first draft sets the agenda for the negotiations and places the onus on the opposing party for arguing for and justifying any substantive changes. However, the advantage is generally short-lived, because in the end both parties must be satisfied with the provisions of the agreement for a deal to be struck.

The negotiating team sets the parameters of the agreement in the planning sessions, sometimes even before any preliminary meetings. The parameters can then be refined as inputs from such meetings are received. When the required and desirable provisions have been selected and the draft has been reviewed and internally approved, it should be sent to the prospect in sufficient time for that party to review it before a first negotiation date is set.

## Organizational aspects of negotiations

In arranging negotiating sessions, a number of organizational aspects need to be considered. While these at first seem of secondary importance they none the less have significant impact. Some of the more important organizational aspects of negotiations are discussed below.

### *Physical arrangements*

The physical and psychological state of the negotiators during negotiating sessions frequently affects the dynamics of the negotiation process and can in turn be affected by the physical arrangements outside and inside the negotiating room.

Physical arrangements generally fall into two categories: arrangements outside the negotiating room and arrangements inside the negotiating room. The first category includes such elements as satisfactory hotel accommodations, familiar and high-quality food and logistical facilities such as secretarial services and long-distance telephone and fax services. The second involves the relative size of the negotiating teams, the size of the negotiating room and the seating pattern around the negotiating table.

If the outside physical arrangements are inadequate, or even unfamiliar, negotiators become uncomfortable and uneasy, which may lead to impatience and irritability. Such a state of mind makes the search for compromise solutions and eventual agreement more difficult.

Similarly, being substantially outnumbered by the opposing negotiators or being forced to negotiate in too small a room for long hours (particularly if there are chain-smokers among the team members) also makes negotiators uncomfortable and irritable and detracts from the dynamics of the negotiation process.

Some negotiators like to use physical arrangements as part of their tactics, believing that discomfort, impatience and irritation will induce negotiators to concede on issues where they might otherwise have staunchly resisted. This is not, however, a common practice. Look for it, and if the arrangements are troublesome, the host party will usually improve them once tactful comments or suggestions are made.

### *Meeting length and frequency*

It is not unusual for daily negotiating sessions to last 10 hours at a time. Sometimes they go longer, but that is not advisable. Fatigue is bound to set in and affect judgment. As in the case of physical arrangements, the length and frequency of meetings can affect the state of mind of the negotiators and either speed up or delay arriving at agreement. As a general rule, 8-hour sessions are recommended, with several breaks for review to release the tension negotiation usually creates.

The first-stage negotiation of a given agreement should go through the entire agreement completely so that all of the issues can be surfaced, even if this takes several days. It is not useful to become bogged down by a few major issues and not resume until they are resolved. First, surface all issues. What is stipulated in one paragraph of an agreement can affect other provisions. Once all the issues are known, it is easier for each party to determine how much time they will need to study them and when a new meeting date can be set for their resolution.

### *Informal meetings*

Informal meetings, such as lunch or dinner with members of the opposing negotiating teams, are highly recommended. In such settings members of the respective teams get to know one another better and have the chance to develop personal relationships that will facilitate communication and understanding between them. Business should not be discussed at such meetings: they should be kept informal. Team discipline must preclude "side discussions" of issues by team members other than the chief negotiator in informal meetings.

Conversely, if an issue(s) has reached an impasse, it can be helpful if the chief negotiators of each party get together by themselves for lunch or dinner to try to resolve the impasse without the tension-filled atmosphere of the formal negotiation, where face-saving may be important.

### *Language differences*

Negotiations are often carried on in English. Although the proceedings are sometimes translated into the negotiating teams' native languages by interpreters, ordinarily members of the two negotiating teams are sufficiently fluent in English to communicate adequately for purposes of carrying on negotiations.

On the other hand, one must remain aware of the fact that, however fluently the negotiators or interpreters use the language of the discussions, their understanding of what is said may not be exactly what is intended to be conveyed. There are expressions in every language that are the product of a particular country's culture and business practices that have nuances and special meanings that can only be fully understood within those contexts.

It is important, therefore, to use the simplest possible phraseology in presenting proposals or making arguments. In fact, many experienced negotiators have developed the habit of restating points in different words to avoid ambiguity and to minimize their chances of being misunderstood.

### *Premature publicity*

A project can founder because premature disclosure has either raised expectations or created opposition before it has been structured sufficiently to appear economically feasible and desirable. Sometimes the disclosure appears in the form of a press release by one of the parties or a newspaper article based on an interview with an official or executive charged with responsibility for implementing the project.

In either case, the information contained in the release or article can be very limited, if not inaccurate, since the project is presumably still being structured. To the extent that the information is valid, it may publicly announce positions on key issues that have not yet been resolved, which could make them more difficult to change during subsequent negotiations.

The parties should, therefore, maintain confidentially about the project and about the progress of negotiations until an agreement has been firmly structured and its key terms and conditions have been agreed upon.

## Role and objectives of negotiations

While specific objectives may differ from project to project, the role of negotiations is to provide a forum and a process that will accomplish three results.

- *A mutually satisfactory structure.* In the course of preparing for detailed negotiations, the negotiating team presumably formulated a preliminary structure for the proposed transaction. The role of negotiations is to convert this preliminary structure into a structure that satisfies the interests of both parties.
- *An executed agreement.* The negotiating team will have prepared a draft of the contract documents that contains terms and conditions that it believes are required or desirable to govern the implementation of the transaction. The role of negotiations is to reach agreement with the other party on both the text and scope of the terms and conditions that should be contained in the final contractual documents.
- *A long-term relationship.* The role of negotiations is to provide a process by which agreement can be reached on terms and conditions that are the basis for a lasting, mutually beneficial relationship. Negotiations should create an agreement free of the seeds of future conflict. They should not leave a wake of anger, mistrust or bitterness as that would undermine the future relationship.

## Conduct during negotiations

Negotiators have different views on how negotiations should be conducted: whether as an adversarial process, with each side defending its interests until a mutually acceptable position is forged, or as a process in which the mutuality of interests is the paramount focus. Each view is discussed below.

### *Adversarial approach*

The adversarial process has become part of the judicial system in common law countries principally because it was felt to be the most effective way to arrive at the truth in cases of alleged penal violation. But it is an inappropriate process in the undertaking of a business agreement, where cooperation and accommodation are sought. The adversarial approach leads to positional bargaining in which each side fiercely defends its position. Such a contest of will causes anger and resentment, which jeopardize the ongoing relationship. Bargaining over positions tends to force each party to extremes for the sake of winning small concessions. This drags the process out significantly, increasing the time and cost of arriving at an agreement and reduces the chances of one being reached at all.

### *Principled negotiation*

Principled negotiation, or negotiation on the merits, is a widely accepted method of negotiation. This is the method advanced by the Harvard Negotiating Project, developed by Roger Fisher and William Urey and related in their best selling book, *Getting to Yes.* In essence, their method calls for negotiators to be problem-solvers with a goal of reaching a wise agreement efficiently and amicably. It has four basic points:

- People: separate the people from the problem.
- Interests: focus on interests not positions.
- Options: generate a variety of possibilities before deciding what to do.
- Criteria: insist that the result be based on some objective standard.

The first point recognizes that positions become identified with egos. Agreement is delayed because it is difficult to get people to back down. The negotiators need to work side-by-side and to resolve issues together, attacking the problem rather than each other.

The second point is meant to avoid focusing on stated positions when the object of a negotiation is to satisfy the underlying interests of each party. Looking at the interests of the parties—that is, to their overall objectives—rather than at a series of positions makes it easier to reach compromises on the particulars.

The third point is aimed at avoiding decisions made under pressure or in the presence of an adversarial negotiator. Such conditions tend to narrow vision. The same can be said for coming up with the one right decision. Instead, negotiators from both sides should take time together to think up a wide range of solutions that advance shared interests and/ or reconcile differing interests and then, later, jointly choose one. The parties, in effect, should invent options for mutual gain.

The fourth point has to do with situations in which the interests are directly opposed. In such situations, the parties should try to reach results based on standards independent of the will of each party. Some fair standard such as market value, custom, law or expert opinion will serve the purpose. Negotiators should reason and be open to reason, yield to principle but not to pressure, and insist on using objective criteria.

The Harvard Negotiation Project teaches that these four principles are relevant to all the stages of negotiation: analysis, planning and the actual negotiation. During analysis you are diagnosing the situation, gathering and studying information about it, considering possible problems with personal interactions, reviewing options already on the table and identifying the interests of the parties. During planning the same four points are considered again while ideas are generated and actions decided. How will the personality be handled? Which are your most important interests? During negotiation the four points come to the forefront. Differences in perception, feelings of anger etc., should be acknowledged and dealt with. Each side should recognize the interests of the other so both can generate options to achieve agreement.

In summary, principled negotiation, as contrasted to positional bargaining, focuses on the interests of the parties, mutually satisfactory options and fair standards to reach agreement. It enables the parties to reach agreement efficiently without all of the anger and resentment that occurs when they try to dig each other out of entrenched positions, improving the chances for a wise agreement, amicably achieved, that can lead to a rewarding long-term relationship.

### *Cultural differences*

During negotiations it is important to be aware of cultural differences between the groups of negotiators and to recognize that cultural differences can affect the way one side hears and absorbs what is being said by the other. Cultural differences can either highlight and clarify or distort and confuse what is said. Special effort is needed to counter their impact. Care must be taken to be sure that arguments are phrased in a manner that will be fully comprehended. Certainly, speaking slowly and stopping to get feedback from the other party on their understanding of your statement will be very helpful.

### *General rules*

The following self-explanatory statements augment the principles of the Harvard Negotiation Project and provide a supplementary check-list of behaviour principles to follow during negotiations:

- Set the tone early, offset any bad rumours, be candid.
- Utilize "human factors" and be open about feelings and motives: this will enhance trust.
- Avoid presenting too many issues, highlight the strongest ones.
- Avoid deadlines, lessening the chance for needless concessions.
- Summarize frequently: this enhances understanding.
- Present arguments calmly, without personalization, and make sure they are logically supported.
- Avoid the use of personal opinions in arguments.
- Avoid ultimatums and other forms of non-negotiable demands.
- Admit, when appropriate, the validity of the other party's arguments.

## Typical negotiating techniques and tactics

It is often difficult to distinguish between negotiating techniques and negotiating tactics. One way is to think of negotiating techniques as positive methods designed to resolve issues fairly and negotiating tactics as clever negative manoeuvres to create false impressions and obtain agreement through deceit.

### *Techniques*

- *Defer difficult issues/create a momentum of agreement.* Probably the most useful technique for advancing the process of reaching agreement is to defer those issues that appear most difficult to resolve and tackle those that can be settled quickly. Experience has shown that a series of agreements on lesser issues creates a momentum that induces negotiators to reach agreement on the difficult issues. The agenda for the negotiations should therefore be set so that less difficult issues are discussed first.
- *Take up general propositions before specific ones agree on the principle before the specific language.* The rationale for this technique is in the same as for the preceding technique. It is frequently far easier to agree on a general proposition than on a specific one whose impact is more transparent. Similarly, agreement on a principle is often more easily obtainable than agreement on the specific language that applies to a principle facet of the transaction, postponing the more difficult phase of the negotiation.
- *Use committees to resolve difficult issues.* Initial discussions on certain issues may reveal that they will be difficult to resolve and might require alternative means of resolution. Formal negotiating sessions may not be the best setting for exploring possible solutions. It may be more effective to set up a special committee in which members familiar with the problem explore the different solutions and report back to the negotiating teams.
- *Keep score of concessions/quid pro quo's/propose package deals.* Keep a summary record of all concessions made. They prove your willingness to compromise and may help obtain concessions from the other party later in the negotiations. They may also be useful for obtaining a package deal at some point in the discussions. Another simple and frequently used technique is to offer a quid pro quo, one concession for another, or a package deal, one set of concessions for another set. Each technique is designed to break impasses by balancing the concessions of each side.
- *Use the two-way street argument.* Proposals are often advanced which may be difficult to oppose because they appear reasonable on their face, although they may have objectionable long-term implications. One technique to counter or accommodate such proposals is to agree to the proposal provided the proposing party agrees to accept the equivalent conditions. If the proposal does in fact have objectionable long-term implications, the proposing party will very likely withdraw it. Occasions for use of the two-way street technique come up often. Keep it in mind as its reciprocal logic makes it very compelling.
- *Apply the "most favoured nations" solution.* If there is more than one licensee for the same technology, the "favoured nations" argument is frequently raised. The new licensee wants this in the licence to assure the terms and conditions of its agreement will be comparable to that of other licensees. It is raised mostly in connection with royalties, but may come up elsewhere in the agreement. The best way to handle the argument is to offer to include the favoured nation provision but have it apply to all terms and conditions of the agreement. This is fair and precludes giving a concession to the new licensee on just monetary provisions, without including other provisions that may be unfavourable for the new licensee.
- *Spread the concessions out.* Negotiators occasionally face issues whose resolution requires a concession by the other party that is so large there is little chance of obtaining it. A technique that experienced negotiators often use in such cases is to break the issue down into its various components and then to spread concessions on the relatively minor components throughout the various negotiating sessions. This is known colloquially as "slicing the salami" so that it becomes easier to swallow. In contrast to negotiating tactics or gambits, there is nothing underhanded about this technique. In many instances, its use is announced by a phrase such as "let me try to break this issue down and see if we can agree." Such phases may signal the need for countering the technique.
- *Structure the negotiations.* Quite often, usually in the first session, when the initial draft of the agreement is to be reviewed paragraph-by-paragraph, one party will want to negotiate and settle issues as they arise. This procedure is strongly discouraged. It is far better to have list all concerns and issues before negotiating any one of them. This would preclude conceding a point early in the session and then regretting it later, when a fresh issue is raised. While this precaution is most important for the initial session, it should be followed throughout the negotiations.

### *Tactics*

Some of the most common tactics are discussed below:

- *Bad guy/good guy.* If a team decides to use this technique, its members will create a "bad guy," who does not want to yield on any issue and who makes unacceptable demands, and a "good guy," who makes reasonable proposals and acts in a moderate way. In fact, the "reasonable" proposals of the "good guy" may also be unreasonable. The other party may accept them not because of their merit but because of their proponent's tone, which made it seem he was "good" and his proposals more acceptable. It is an old trick that plays on emotions and should be guarded against.
- *Divide and conquer.* This ploy selects one opposing negotiator whose views are more acceptable than those of the other opposing negotiators or, better, the opposing leader. The selected negotiator is then played up to and treated as a reasonable man. The aim of this ploy is, of course, to provoke a division in the opposing ranks that isolates the team leader and eventually pressures him to make the desired concession.
- *Trial balloon, red herring/straw man.* All of these are variations of the same tactic, arguments presented not because they are believed, but simply to obtain information, to mislead, or to instil a false sense of confidence with respect to the other party. A trial balloon is essentially an argument or proposal that the presenting party does not intend seriously to pursue or does not really expect to be accepted by the other party. Its purpose is to obtain useful information about the other party by observing their reaction to it. A red herring is an argument or proposal that is really not relevant to the issue being argued. Its purpose is to divert attention. A "straw man" is an argument or proposal so weak on its face that it can be easily destroyed. Its purpose is to give the other party's negotiators a false sense of confidence making them less wary of what may be coming up next.
- *Threatening a walk-out.* Threatening to terminate the negotiations is a tactic often used to gain an important concession. It can be successful if it appears the other party is under pressure to obtain the agreement being negotiated, but it can only be used once, or at most, twice, in any negotiation, however extended it may be. Like the boy who cries wolf too often, a repeated threat to walk out if a given point is not conceded loses its impact. The tactic needs to be used very judiciously and only when the issue is sufficiently crucial that the party making the threat will not hesitate, if the point is not conceded, to carry it out.
- *Last-minute demands.* Last-minute demands are generally made by the home team after negotiations have been completed and the visiting negotiators, under the impression that they now have completed their work, are about to return to their home office. The tactic is used in the belief that the pressure to accede to such a demand may be irresistible.

### *Standard terms, national practice/ setting a precedent*

A tactic commonly used by large multinational companies is to resist otherwise reasonable requests for changes by conceding their reasonableness but asserting they cannot be granted because the terms being offered are standard terms; or because they are in line with, and possibly even required by, national law or practice or because they would set a precedent that could force them to modify many of their existing agreements. Usually, these assertions do not have much validity. So-called standard terms are constantly revised by the companies themselves. Quite often there are no conditions imposed by national practice, and the argument usually disappears if steps are initiated to check local regulations. Certain requests may indeed set a precedent, but this is almost always irrelevant since no two sets of negotiations and agreements are identical. The tactic may have merit, though, when a licensor already has existing licensees for the same technology.

## Conclusion

The goal of enlightened negotiation should be to achieve an agreement that is equitable. The process should recognize the interests of the parties and provide for optimizing the benefits as measured by objective standards. Enlightened negotiating leads to a long-term relationship in which both parties focus on maximizing their mutual return, not one in which each party tries to maximize its own return at the expense of that of the other party.

Adherents of positional bargaining — while they enjoy some obvious advantages in dominating a negotiation — tend to put excessive demands, restrictions, provisions and royalties into the agreement. Even though the terms and conditions may be accepted by the other party because it urgently needs the particular technology, experience has shown that agreements under such conditions can also lead to discouragement and underperformance. In the long run, fairness will result in the best return for each party.

# Module 9

## THE LEGAL ENVIRONMENT IN DEVELOPING COUNTRIES

*Over the last 20 years, and in the last decade especially, Governments in developing countries have taken steps to liberalize the conditions under which technology transfer occurs. This module focuses on the growing trend toward liberalization and its results in developing countries. It discusses those regulatory areas directly impacting technology transfer flows to developing countries, with particular emphasis on the technology transfer legislation adopted in many countries over the last 10-20 years. It also reviews two areas of particular relevance to technology transfer in developing countries – foreign direct investment and intellectual property rights – and the regulatory changes that have taken place in those areas.*

# Contents

# THE LEGAL ENVIRONMENT IN DEVELOPING COUNTRIES

## Introduction

Substantial changes in the world economy in the last decade, particularly in developing countries, have affected both the supply of and the demand for technology at the international level. Structural reforms, including substantial tariff reductions, and liberalization programmes have been implemented in many countries. At the same time, other measures have been adopted to satisfy existing international requirements or requirements emerging from negotiations with large, industrialized countries.

The new economic and legal environment has influenced regulations relating to technology transfer transactions. Although these transactions may be directly or indirectly affected by a great number of rules (for example, industrial licensing, customs legislation, immigration laws and antitrust regimes), this module focuses on regulatory areas having a direct impact on technology transfer flows, with emphasis on the technology transfer legislation that has been adopted in a number of countries, but also including two other regulatory areas that generally influence technology transfer transactions: regulations on foreign direct investments and intellectual property laws.

The close relationship between technology transfer and foreign direct investment (FDI) is well known. In fact, foreign direct investments are one of the main channels for transferring technology, particularly when the aim is to transfer production capabilities to receiving countries in the early stages of industrialization or to preserve an owner's control over its most advanced technology. The content and impact of the technology transferred in the context of FDI may differ substantially depending on the industrial sector, the maturity of the processes or products and the degree of participation of local partners and personnel.

In any case, regulations on FDI are likely to influence the type and rate of technology transfer and may therefore be an important component of the legal framework affecting such a transfer.

The impact of intellectual property protection on technology transfer has been addressed by several studies and reports since the 1960s. According to a recent survey, "there is evidence that many technology exporters consider inadequate protection of intellectual property to be a strong disincentive to technology transfer to developing countries. A survey conducted by the OECD listed intellectual property problems among the most significant barriers to licensing in developing countries. However, as the case of the Republic of Korea suggests, [a] weak intellectual property system can coexist with intense licensing activity . . ." [1]. In a global competitive environment, where the access of developing countries to technology is problematic, the level and scope of intellectual property protection have been changing significantly.

The analysis in this module is not exhaustive. It highlights trends and describes in more detail some experiences that indicate the content, characteristics and evolution of technology transfer regulations. The first section examines the typical legal regulations used by a number of developing countries to control technology transfers.* The next section deals with the changes in those regulations as they (in some cases) evolved from registration and strict controls to more liberalized modalities. This section also considers the impact of technology transfer regulations. Section three gives a brief account of some developments in the area of regulations on foreign direct investments. The fourth section presents the main changes in the field of intellectual property rights in developing countries.

## Review of regulations on technology transfer

Several developing countries in Africa, Asia and Latin America adopted regulations during the 1960s and the 1970s aimed at controlling different aspects of technology transfer contracts. The post-war Japanese experience in the matter, the regulations adopted in Andean Group countries and, later on, the work undertaken by UNCTAD on a draft code of conduct on technology transfer served as models that were followed to a different extent in different countries. In a number of countries, among them Brazil and Colombia, technology transfer regulations were first introduced to control growing royalty remittances abroad and to reduce balance of payments deficits. In other countries (for example, Mexico), the regulatory schemes were concerned mainly to deal with fiscal fraud. These regulations, as well as those im-

*The analysis is based on past and present regulations enacted in countries such as Argentina, Bolivia, Brazil, Colombia, Ecuador, India, Mexico, Nigeria, Peru, Philippines, Republic of Korea and Venezuela.

plemented in other countries, rapidly evolved as instruments for technological and industrial development and to improve the negotiating power of local recipients in characteristically imperfect markets.

Although the scope and content of technology transfer regulations differ significantly from one country to the next, a number of common patterns may be found, as described below.

### *Scope*

In general, technology transfer regimes have been applied to different modalities of technology transfer, including licensing agreements, know-how contracts and supply of technical services. In some cases, they have also been extended to turnkey agreements, franchising contracts and other contractual modalities. Trade-mark licences have in general been covered, often including special provisions and requirements.

In most cases, regulations have dealt only with technology transfer contracts with foreign parties (i.e., with international contracts), although internal transactions have also been regulated in some countries (e.g. Brazil).

### *Registration and prior approval*

In general, technology transfer regulations have been based on a system of prior approval and registration of contracts. Approval has been made conditional upon an evaluation of the transaction, commonly on technical, economic and legal grounds. In most cases, authorities in charge of the regulations ask for amendments to the contracts before they allow registration. The items that need to be revised generally include restrictive practices and the amount of payments [2].

In some countries such as Argentina, government intervention is limited to the registration of the contract, which is a formality necessary for tax deductions or remittances abroad. In the majority of cases, however, the administrative process also involves either a contract or project-focused evaluation. In the latter case, which has been seldom applied despite its relative advantages, the evaluation goes beyond the contract itself and concentrates on the implementation of the investment project a contract is linked to [3].

### *Selection of technology*

Some technology transfer regulations (for example, Argentine law, 1974 and Nigerian Decree 70, 1979) aim not only to screen the terms and conditions under which a particular contract was established but also to review the choice of the technology itself. Its appropriateness to local conditions, as well as its age and complexity, has been generally taken into account in this regard [4].

However, in the majority of countries, the selection of technology has not been systematically evaluated. In others, such evaluation has had little impact. For instance, after having reviewed all foreign licensing signed in 1977-1979 in the Republic of Korea, Kim found that, "most bureaucrats involved in evaluation have technical backgrounds but lack specific expertise to evaluate [the] particulars of a wide range of industrial technologies under evaluation. As a result, the government could not turn down any of [the] foreign licensing applications" [5].

### *Remuneration*

A key point in technology transfer regulations has been control over royalties and other payments to foreign licensors. The regulations have affected technology prices in a wide variety of ways, including those referred to below.

#### *Payment ceilings*

Many countries establish a 5 per cent general ceiling, while others set royalty rates by sector or contractual component. Thus, the Philippines Rules of Procedure of the Technology Transfer Registry (1988) set ceilings of 2.5 per cent, 3 per cent, 4 per cent and 5 per cent for various economic sectors. Only contracts for the motors/machinery industry were allowed rates of 1-5 per cent "unless it can be proven that the technology is more complex and sophisticated than that already existing in the country" [6].*

Provisions relating to trade-mark licences exemplify the setting of royalty rate ceilings in accordance with contract components. Argentina, Brazil and Mexico used to admit only 1 per cent royalty in these cases.**

Ceilings have also been enforced for lump sum payments for consultancy and off-shore services. In Nigeria, for instance, the total lump sum was not generally allowed to exceed 8 per cent of total expected sales or 10 per cent of the project cost [8].

#### *Forms of payment*

Some regulations (e.g. Brazil's Normative Act 15/75)*** specified whether a particular payment modality would be acceptable for a particular type of trans-

*In March 1993 the rules applicable to payments in technology transfer transactions were liberalized in the Philippines. Agreements in which royalty fees do not exceed 5 per cent of net sales will be automatically approved [7].

**These restrictions have since been eliminated, in the framework of the drastic changes in Latin American regulations referred to in the next section.

***This Act was replaced in 1991 by Resolution 22/91.

action. Thus, royalty payments for technical services were not allowed, while those for patent and trade-mark licences were.

Regulations have often defined the basis on which royalties are to be calculated, generally net sale prices.

*Parent-subsidiary remittances*

Some countries (e.g. Andean Group countries and Argentina) restricted royalty and other technology-related payments between a parent and its subsidiary in order to prevent foreign companies from benefiting from the different tax rates applicable to royalties and to profits remitted abroad.

*Evaluation*

Within each national legal framework, the price of technology has generally been evaluated taking into account a multiplicity of factors on a case-by-case basis (age and complexity of the technology, economic and employment impact, prices of comparable technologies etc.). In most cases, the authorities have enjoyed considerable discretion to appraise and suggest changes in the prices agreed upon by the parties. Some national registries (e.g. that of the Philippines) have applied more sophisticated methods of evaluation, such as the licensor's share of licensee's profit suggested by UNIDO [9], and the determination of a local value added-coefficient [10].

*Duration*

Regulatory regimes commonly determine a maximum duration for technology transfer agreements, particularly for licences, often between 5 and 10 years. This limitation has been justified "both in the interest of limiting technology payments to a reasonable period of time, and in order to ensure that effective absorption takes place in the licensee enterprise during such period" [11].

*Restrictive clauses*

Most technology transfer regulations specify clauses that are considered restrictive and do not allow

***Restrictive practices under Nigerian law***

Decree 70 defines the restrictive provisions that have to be eliminated from the text of an agreement prior to registration. According to paragraph 6(2) of the Decree, these are cases where:

- Provisions are included therein that permit the supplier to regulate or intervene directly or indirectly in the administration of any undertaking belonging to the transferee of the technology and are, in his opinion, unnecessary for the due implementation or execution of such a contract or agreement.
- There is an onerous or gratuitous obligation on the part of the transferee of the technology to assign to the transferor, or any other person designated by the transferor, patents, trade marks, technical information, innovations or improvements obtained by such transferee with no assistance from the transferor or other person.
- Limitations are imposed on technological research and development by the transferee.
- There is an obligation therein to acquire equipment, tools, parts or raw materials exclusively from the transferor or any other person or given source.
- It is provided that the export of the transferee's products or services is prohibited or unreasonably restricted or where there is an obligation on the transferee to sell the products it manufactures exclusively to the supplier of the technology concerned or any other person or source designated by the transferor.
- The transferee is required to use permanently, or for any unspecified period, personnel designated by the supplier of the technology.
- The use by the transferee of complementary technologies is prohibited.
- The volume of production is limited for sale and where re-sale prices are, in contravention of the Price Control Decree of 1977 or any other enactment relating to prices, imposed for domestic consumption or for export.
- The transferee is required to appoint the supplier of technology as the exclusive sales agent or representative in Nigeria or elsewhere.
- The contract or agreement is expressed to exceed a period of 10 years or other unreasonable term where this is less than 10 years.
- The consent of the transferor is required before any modification to products, processes or plant can be effected by the transferee.
- An obligation is imposed on the transferee to introduce unnecessary design changes.
- The transferor, by means of quality controls or prescription of standards, seeks to impose unnecessary and onerous obligations on the transferee.
- There is provision for payment in full by the transferee for transferred technology that remains unexploited by him.
- There is a requirement for the acceptance by the transferee of additional technology or other matter, such as consultancy services, international subcontracting, turnkey projects and similar package arrangements not required by the transferee for or in connection with the principal purpose for which the technology is to be or has been acquired.

them in technology transfer contracts. The clauses were considered to be restrictive not because they stifled competition but because they inhibited economic and technological development.

The types of clause considered to be restrictive varied significantly among countries, but in general they include clauses such as the following:

- Grant-back provisions
- Export restrictions
- Post-agreement use of technology
- Price and volume fixation by the licensor
- Tie-in clauses.

Different regulations in different countries contain longer or shorter lists of restrictive practices. Decision 24 of the Andean Group of countries and Decision 291 (today in force) list only seven restrictive clauses but include a catch-all provision embracing other clauses "with similar effect." The (abrogated) Brazilian Normative Act 15/75 outlawed at least 15 restrictive practices, as many as the Philippines Rules of Procedure (1988) [12]. Nigerian Decree 70 defines 16 types of provisions that may be deemed restrictive (see box).

Among the various restrictive practices, certainly some have a significant economic impact. This is true of export restrictions, which affect the exploitation of the technology in foreign markets. Most countries, however, look for pragmatic solutions to approve contracts even if they contain some kind of restrictive clause. For instance, the Malaysian guidelines (1979) forbade all restrictions in principle but allowed special exceptions where the supplier was the manufacturer or had given exclusive rights to others, or where he was not legally empowered to allow sales based on his technology. A flexible approach was attempted by the Indian guidelines (1982), which stated only that there should be no export restrictions to the "fullest extent possible."

### *Guarantees*

Legislation adopted (or amended) in many countries during the late 1970s and the 1980s required guarantees to be included in technology transfer contracts. The inclusion of a specific chapter on the matter by the United Nations Conference on an International Code of Conduct on the Transfer of Technology, the last session of which took place in 1985, had a significant influence on these developments. In some cases, such clauses were introduced as a result of administrative practices, even if not explicitly provided for in the law [13]. Illustrative of required guarantees are those provided by the Philippines' regulations, which was modelled on the draft international code of conduct, in connection with the suitability of the technology, if properly used, the validity of licensed rights and the access to improvements in transferred techniques and processes.

### *Assimilation*

Some legislation went even further, asking not only for certain guarantees but also for activities that would ensure an effective transfer and assimilation of the technology. Thus, training provisions were required by many countries (e.g. Nigeria and Malaysia), while other countries (e.g. Argentina, Brazil, Mexico) required licensees were requested to undertake R and D or other innovative activities.*

### *Applicable law and jurisdiction*

A typical point in the technology transfer regulations of many countries has been to require that regulated contracts be subject to national law. Alternatively (or, in some cases, additionally), it has also been common to provide that any disputes that arise should be litigated before the courts of the country of the recipient party.

## Changes in and impact of technology transfer regulations

Many researchers and international organizations, such as UNIDO, have analysed the scope and content of the regulations discussed in the previous section.** In the 1980s, however, important changes were made in these regulations, mostly in the direction of a more flexible and liberal regime. This section considers, in general terms, some of the changes. No doubt the macroeconomic reforms introduced in many developing countries have meant less interventionist national policies and have allowed more room for market forces. These regulatory changes may also be seen as the result of an evolutionary process consisting of at least three stages, which will also be discussed in this section.

Evidence on the impact of technology transfer regulations, on the selection of different modalities for them,*** and on the behaviour of recipient firms is scarce. Some studies and reports on the matter are summarized below.

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*The extent to which these requirements were implemented, however, is uncertain.

**See UNIDO Development and Transfer and Technology Series, particularly No. 2 ("UNIDO abstracts on technology transfer", 1979) and No. 12 ("Guidelines for evaluation of technology transfer agreements", 1979) and the *TIES Newsletter*.

***For an early assessment, see Correa [2].

*Trends in technology transfer regulations*

### *Towards a more flexible framework*

The liberalization of technology transfer regulations has reached most developing countries, in varying degrees. Three groups of countries may be distinguished with respect to the degree to which they have maintained or changed their respective technology transfer regulations.

The first group of countries has preserved the main content of their regulations. Countries such as Nigeria and the Philippines continue to apply substantially the same rules that they adopted in 1979 and 1988, respectively. A number of adjustments, however, have been made in the regulations themselves and in practice. In Nigeria, for instance, royalty ceilings in respect to know-how, patents and other industrial property were fixed in 1988 at 1-5 per cent, as opposed to 1 per cent earlier. In the Philippines, as noted above, changes have also been introduced in connection with royalty rates. More importantly, the practices and policies of the competent authorities have shifted their emphasis from control to a more promotional approach, under which local and foreign companies are advised and encouraged to conclude mutually satisfactory agreements.

In a second group of countries, regulatory changes have been more drastic. These include most Latin American countries, where the authorities were showing more flexibility even before regulations were formally revised. Brazil (1991) and the Andean Group of countries (since the mid-1980s) relaxed the requirements for contract registration and approval: they eliminated royalty ceilings and restrictions on parent-subsidiary payments, were more flexible in their assessment of restrictive practices and guarantees, and accepted foreign law and/or jurisdiction in connection with technology transfer contracts. Under the new approach, the selection of technology is deemed to be the responsibility of the recipient party, which is viewed as better prepared than the Government to choose the most suitable technological alternative. Technology transfer regulations were also made more flexible in Asian countries. A good example is the Republic of Korea, where the approval system was replaced by a reporting system in 1984, under which consultation was waived for agreements which met certain conditions, such as royalties of 10 per cent or less and a licensing period of 10 years or less.

A third group includes countries that have taken even more radical steps. Argentina eliminated the evaluation of contracts between independent parties in 1981.* Mexico completely abrogated the technology transfer law while enacting a new industrial property regime in 1991.*

*Only contracts between parent and subsidiary firms remained subject to some type of prior evaluation and approval.

### *An evolutionary process*

The history of technology transfer regulations, at least in a number of countries both developed (Japan, Spain and Portugal) and developing (Argentina, Brazil, Mexico, Republic of Korea), seems to suggest an evolutionary process determined by changing local and international conditions. Three basic stages are generally found, differentiated by the degree of government intervention in technology transfer transactions as industrialization progresses.**

In the first stage, once a country has reached a certain scientific and technological level and the demand for foreign technology increases, regulations attempt to improve contractual conditions, mainly with respect to terms of payments and other clauses that may have a negative impact (e.g. on exports). Often, foreign exchange crises provoke new regulations.

In the second stage, Governments introduce more explicit technology policy objectives. Screening becomes more selective and focused on the assimilation of the technology and the strengthening of local technological capabilities. At this stage, provisions requiring training programmes, R and D commitments and similar obligations are established. The cases of Brazil and the Republic of Korea may be recalled here in this regard.

In the third stage, when a learning process has taken place and the country has reached a higher level of technological development and firms acquire experience in the negotiation of technology, the control over technology transfer transactions is liberalized or maintained only to prevent major abuses or to deal with specific sectors. Technology transfer regulations may be replaced at this stage by legislation on anticompetitive practices.***

In sum, the type and extent of governmental intervention in technology transfer seem to correlate with the degree of technological and entrepreneurial development of the recipient country [15]. When a great asymmetry exists between local and foreign parties, regulations attempt to avoid abuses and strike a reasonable balance between unequal parties; as a country advances in the process of industrialization and technological learning, government control becomes

*Chile also eliminated all kinds of control in 1976, when it left the Andean Group.

**This three-stage evolution is partially based on [14].

***Restrictive practices in licensing and know-how contracts are subject to scrutiny and eventually condemned in industrialized countries under antimonopoly regulations. See module 11, on the legal environment in industrialized countries.

more selective and focused. When local enterprises have developed bargaining and technical capabilities to enter into mutually advantageous agreements, stringent regulations tend to be liberalized or abandoned.

On the other hand, the evolution of technology transfer regimes may also be linked to changes in the international supply of technology and in industrialization patterns. In the 1960s and 1970s, developing countries had access to many mature technologies that could be applied in the framework of import substitution policies. The technology supply was relatively diversified, and Governments in developing countries tried to improve the bargaining position of local enterprises so they could get the best technologies at the lowest possible prices. In the 1980s, however, the opening of many developing countries' economies to foreign competition and the growing value of technology as a key competitive asset reduced the number of workable options available to developing countries. In other words, there is now a more limited supply of technology, and recipient parties can no longer produce in a sheltered market with whatever mature technology they can find. The premises for many technology transfer regulations have changed substantially since they were adopted.

### *Impact*

Technology transfer regulations assumed that the supply of technology is relatively inelastic to price reductions. The price, it was thought, would not affect supply, and government intervention was expected to strengthen the recipient party by eliminating undesirable restrictive practices and improving guarantees and other contractual conditions, such as applicable law and jurisdiction. Although some studies indicated that that had indeed happened to a certain extent [16], others pointed out the limitations of regulatory mechanisms.

A study on technology transfer in the Andean Group countries, including a survey of 73 firms in Ecuador, Colombia and Peru, found that while a majority of firms favoured strict government intervention, others (around 30 per cent) preferred a flexible approach [17]. A survey of 46 Brazilian firms also indicated support for government intervention but at the same time showed extensive use of gentlemen's agreements to bypass government action [18]. When he reviewed the process of prior approval of technology contracts in the Republic of Korea, Kim found that technology suppliers complied with all revisions requested by the Government (such as royalty ratios and duration of agreements), but "since suppliers had alternative ways to charge proposed royalties and to renew agreements, government criteria did not serve their purpose" [19].

Research conducted in India revealed that government intervention, mainly aimed at restricting payments, did not make it easier for the recipient to obtain specific knowledge that the supplier was reluctant to transfer. Another study suggested that the majority of Indian recipient firms remained largely unaffected by government policy and that export restrictions, one of the main restrictive clauses, were often irrelevant for the surveyed firms, which did not export or expect to. In the light of this type of evidence, Chudnovsky concluded that

> recipient firms were not particularly disappointed when several of the governments that implemented the technology transfer regulations in the 1970s liberalized them in the 1980s, though this is a subject that needs to be investigated. In any case the apparent lack of complaints by the supposed beneficiaries of the government regulations is certainly a strong indication that the convergence between private and social interests on which the regulations were based was not as strong as originally assumed [20].

An explanation of the lack of convergence between government and recipient interests is offered by Pérez:

> In fact, the legislation and the institutions in charge of overseeing a proper technology transfer were set up as if local firms were really technologically active and trying to learn, whereas the foreign suppliers were unwilling to teach and liberate them. In practice the exceptional local firms that did want to learn possibly benefited from the legislation, but the majority took it as another bureaucratic hurdle, lived with it through patience or corruption but, in the end, related with the suppliers as they saw fit, on the basis of "private" agreements [21].

Evidence on the impact that the liberalization trends may have had on technology flows is, at best, scant. Isolating the effects of such changes from other economic or legal changes presents a complex methodological problem. Figures for Argentina, for instance, show a substantial increase in royalty payments in the post-liberalization era [22]. Between 1987 and 1990 royalty payments in the Republic of Korea increased by about 30 per cent a year and reached around $1.1 billion [23]. Although in the case of Argentina, the increase in payments was parallel to a dramatic reduction in industrial output, in the Republic of Korea it accompanied sustained growth and industrial modernization.

## An evolving framework for foreign direct investments

### *Characteristics of regimes for foreign direct investments*

As mentioned above, FDI constitutes an important channel for technology transfer, particularly where local absorptive capabilities are low or where advanced technologies are involved. Many developing countries have established (in some cases since the 1950s but mostly since the 1970s) regulations on FDI. In some cases (for example, in many Latin American countries and in India and the Republic of Korea), regulations aimed at controlling foreign investment inflows in various respects;* in others (mainly in African countries), regulations have had a more promotional objective, that is, they have sought to provide the incentives needed to attract FDI.

Regulations aimed at controlling FDI have typically been based on the prior assessment and approval of FDI operations. They have generally pertained to the following:

- The type of capital contributions allowed.
- Exclusion of FDI from certain sectors that are either reserved for the State or for local companies.
- Requirements for minimum local participation in certain areas.
- Restrictions on the acquisition of existing local undertakings.
- Fade-out obligations that would gradually transfer ownership to local partners.
- Limitations, including ceilings, on profit remittances and capital repatriation.
- Export and other performance requirements.
- Limitations on obtaining local financing.
- National jurisdiction in case of disputes.

The content and effective application of FDI regulations have varied significantly from country to country, and even within a single country over time. Those countries that adopted a promotional rather than a control-oriented approach have provided a number of incentives to encourage FDI, including tax benefits and guarantees for profit and capital remittances and against expropriation.

### *Liberalization trends*

FDI regulations have also been relaxed over the last decade in many developing countries. While in the 1970s, easy access by such countries to bank financing reduced the advantages of transnational corporations as capital suppliers, but in the 1980s the picture changed dramatically. With big foreign debts, economic slowdown and a drastic decline in investment rates, developing countries again started to welcome FDI. Many of them also initiated drastic privatization programmes that opened new and important opportunities for FDI. By that time, however, ideas had already changed as to which developing countries would make the best investment partners, along with the globalization of the economy. The liberalization occurring in many developing countries lowered or eliminated entry barriers for finished products and, consequently, lessened the use of FDI as a means to jump over high tariff barriers. As a result, the relative bargaining position of potential recipient countries and foreign investors changed substantially.

In many cases legislative changes have been profound. Argentina, for instance, abrogated its foreign investment law and completely liberalized FDI inflows in 1990. The Andean Group countries, which still formally preserve an FDI regime, substantially reduced their already limited scrutiny functions. Asia, China, India and the Republic of Korea, among others, have adopted more flexible FDI regimes in the last decade. In the case of India, once a paradigm of tight controls over FDI, a foreign investment promotion board was established. Automatic approvals are granted now for investments up to 51 per cent foreign equity in priority industries, in trading companies and in existing companies where there is already some foreign holding.

Despite the relaxation of policies and laws on FDI, the changes have not yet been fully reflected in government practices in many countries that still face bureaucratic resistance to change. The implementation of these changes may, in fact, take time. But the trend towards promoting rather than restricting FDI seems to be well-established in developing countries seeking to recover or increase their rate of productive investment.

In addition to relaxing technology transfer and FDI regulations, some developing countries (e.g. Argentina, Brazil, India, Mexico, Venezuela) have adopted or proposed measures to strengthen laws for the control of monopolistic, restrictive and unfair trade practices. This indicates the desire for a more indirect, market-oriented monitoring of foreign technology suppliers and investors as well as a counterbalance to pressure for the reinforcement of intellectual property rights. This is an important development, consistent with prevailing macroeconomic approaches, in an area where developing countries' legislation has been generally weak and rarely effective.

## Changes in intellectual property systems

The emergence of new technologies, a drastic reformulation of national economic approaches and direct action by the Government of the United States to ensure intellectual property protection for United States technologies and trade marks has led to significant changes in intellectual property law in a large number of developing countries since the second half

*Some of these regulations (e.g. in the Andean Group countries) were established in conjunction with regulations on technology transfer.

of the 1980s. In many cases (e.g. the Republic of Korea) those changes have been comprehensive. In others (e.g. Chile and the Andean Group countries) they have been more selective and have centred on issues of interest to groups of transnational corporations (TNCs), such as the pharmaceutical companies.

### *Patents*

Patents are an area where legislative changes have been significant and widespread. For the purposes of this module, three aspects — patentability; compulsory licensing and other remedies; and the duration of protection — are of particular relevance.

#### *Patentability*

Pharmaceutical TNCs and the Government of the United States, acting under Section 301 of the Trade and Tariffs Act of 1984 (as amended in 1988),* developed a far-reaching strategy to alter a situation regarded as hampering the industry's profitability and the long-term sustainability of R and D efforts. At the beginning of last decade, roughly 50 countries did not recognize patent protection for pharmaceutical products.** The pharmaceuticals industry was, according to estimates by the United States International Trade Commission, one of the industries with the highest revenue losses, a result of intellectual property inadequacies [24].

Since 1986, the patentability of pharmaceutical products has been accepted by Bolivia, Chile, China, Colombia, Ecuador, Indonesia, Mexico, Peru, the Republic of Korea, Saudi Arabia and Venezuela and is about to be accepted, according to draft legislation, by Argentina and Brazil.

A second source of changes in patentability is related to the protection of biotechnological products and processes. Several legislatures have addressed the complex issues involved in some measure of detail. Thus, Mexican patent law, as revised in 1991, distinguishes micro-organisms (including cells and subcellular components) and plant varieties, which are patentable, from animals, plant species, biological materials pertaining to the human body and genetic materials, which are not. Patent law in Taiwan Province of China, as revised in 1986, excludes the patentability of biotechnological inventions (new species of animals, plants and microorganisms), and the Andean Group countries, though leaving most of the issues for a later decision, established the non-patentability of biological materials that exist in nature and their clones as well as of materials and genes that belong to the human body.*

One important practical point relating to these developments is the date from which the extended protection is granted. The United States pharmaceutical industry has prompted the adoption of a "pipeline" solution under which protection should be retroactively conferred to patentable products that have not been previously commercialized.

The Republic of Korea admitted, under an agreement on intellectual property issues with the United States, the retroactive recognition of United States pharmaceutical patents.** Mexico, for its part, adopted the "pipeline" solution for patentees of any nationality and without time limits, while China extended retroactivity only to 1986. The "pipeline" solution was not adopted by Chile or the Andean Group countries.

These changes in patentability may substantially affect trade and FDI patterns in the countries concerned, since a situation of virtual competition by any imitator is replaced by one of limited monopoly. However, the impact of those changes depends not only on various contextual economic factors, such as market size and prospects, but also on the degree of monopoly accorded in, for instance, the granting of compulsory licences or the establishment of other limits to the patentee's rights (e.g. the exhaustion of rights in respect of the importation of legitimate products). If, for instance, parallel imports are admitted, the title holder may prefer to set up a facility in the importing country to closely monitor the market and adjust pricing and other sales conditions to changing circumstances. The impact of extended patentability, particularly on FDI, may thus vary considerably among countries that adopt it, depending upon the conditions under which the extension occurs.

#### *Compulsory licences and other remedies*

The obligation to exploit a patented invention has been present for a long time, with different degrees of strictness or flexibility, in the legislation of many developed and developing countries. During the 1970s, developed countries gradually limited or eliminated that requirement, which was seen as increasingly incompatible with TNC operations and the globalization of the economy.*** A strict obligation to produce the patented invention locally may have,

*The application of this section to a targeted country (which may be subject thereunder to commercial retaliations) is activated by private sector claims, such as by the Pharmaceuticals Manufacturers Association (PMA) in the case of pharmaceutical products.

**Some countries, like Brazil, excluded protection of pharmaceutical products and processes.

*See Decision 313 establishing a common regime on industrial property, February 1992.

**In a retaliation for discrimination against European patent-holders, in 1988 the European Community suspended the Republic of Korea's trade benefits under its Generalized System of Preferences, which meant an estimated annual cost (in additional duties) of 50 million ECU for Korean exporters.

***The successive revisions of the Convention of Paris for the Protection of Industrial Property (1883) clearly reflect this process.

under certain circumstances, direct effects on FDI decisions if failure to do so leads to patent revocation or to the granting of compulsory licences. In order to retain rights or to exercise control over the use of the invention, the patentee may be induced to invest and produce locally or to grant a licence to a third (local) party.

Recent or proposed changes to legislation in several developing countries have responded to the concerns of TNCs over strict working obligations but have generally maintained compulsory licences in accordance with the terms of the Paris Convention. For instance, the Republic of Korea established an arbitration system for compulsory licences and the granting of such licences in cases of patent dependency. The patent law of Taiwan Province of China (1986) introduced compulsory licensing of a product patent in favour of a process patentee if it was, among other things, in the public interest. The Andean Group countries adopted a range of different types of compulsory licensing, for reasons including insufficient or failure to work, national emergency, public interest and abuse of a dominant position (Decision 313).*

It should be noted here that industrialized countries have a number of antitrust policies and instruments that are widely applied to counterbalance the exclusive rights granted to holders of intellectual property in order to avoid abuses and anticompetitive practices. Developing countries generally have weak legislation of this type. Compulsory licences — for instance, to remedy market abuses — may be an important instrument to strike the necessary balance between the public interest and the rights of the intellectual property holder.

### *Duration*

Until recently the duration of patent rights has not been subject to any international standard.** Legislation in developing countries has historically tended to confer shorter terms of protection than that in developed countries. But this is also changing in the present wave of reform. Thus, patents are granted for 15 years in the Republic of Korea (12 years before the 1986 reform) and Taiwan Province of China. In the Andean Group countries patents are now conferred for 15 years now (compared to the previous term, 5 plus 5 years if the inventions were industrially exploited), counted from the application date; patent duration can be extended for an additional 5 years if the invention is industrially produced in the country of registration. Mexico now ensures 20 years from application, extendable for 3 additional years in the case of pharmaceutical patents that have been licensed to Mexican firms.

*Similar non-voluntary licences have been proposed under the Argentine and Brazilian draft patent laws.

**This situation is now changed with the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) concluded within the General Agreement on Tariffs and Trade (GATT).

### *Trade marks*

Inadequate protection of trade marks and, in particular, the commercialization of counterfeit products, is probably, in economic terms, the most important hindrance in the area of intellectual property protection.* Claims by industrialized countries mainly relate to difficulties renewing or maintaining trade mark registration due to non-use, weak protection or no protection at all of well-known marks, obligations to use one trade mark linked to another trade mark, unreasonable licensing requirements and narrow spectrum of class protection [25].

Although TNCs and industrialized countries have been much less concerned with trade marks than with patents or copyrights, many developing countries have recently improved their methods of trade mark protection. In 1986, the Republic of Korea abrogated the requirement that trade mark licences be accompanied by an actual technology transfer, and ensured the protection of trademarks well-known overseas even if they are not also known in the Republic of Korea. Taiwan Province of China revised its trade mark law in 1985, to give foreign nationals the legal standing to pursue trade mark infringement in local courts and to establish stricter penalties for violators. Brazil is considering changes in its trade mark laws that, among other things, are likely to strengthen the protection of well-known trade marks.

### *Copyright*

Significant legislation in the area of copyright has also been adopted in many developing countries. Such legislation relates mainly to the protection of computer software and audio and video works, where large-scale violation of intellectual property has been reported.

The worldwide protection of software was a target set in the 1980s by industry and the Government of the United States, reflecting the dominant position of that country in the software market. Although the ability of copyright to protect functional works is still far from clear [26], under pressure from the United States, many developing economies adopted it as the main or sole framework for protection, including Brazil, Indonesia, Malaysia, the Republic of Korea, which enacted a separate law based on copyright

*In accordance with their degree of importance, trade marks ranked first among the intellectual property rights for the 245 enterprises surveyed by the United States International Trade Commission (1988, pp. 2-4).

principles in 1987, Singapore and Taiwan Province of China. Unlike other countries, Brazil recognized copyrights for software but only for 25 years (following the French legislation in this respect).

## Conclusion

Technology transfer transactions, as indicated above, have been regulated in many developing countries by means of special legislation. Foreign direct investment and intellectual property regimes also influence technology transfer, albeit in different ways. Therefore, regulations in at least those three areas need to be taken into account when considering the regulatory framework of technology transfer. There are, of course, many other policies and regulations, such as industrial and competition policies, tax laws, foreign exchange rules, and dispute settlement principles, that may in one way or another affect the negotiation of a technology transfer contract, the choice of the technology and of the parties, as well as the terms and conditions of the agreement.

Some developing countries maintain technology transfer regimes with differing degrees of restrictions on the parties' freedom to determine the form, subject matter and terms of their agreements. There is a clear trend, however, towards liberalizing such regimes, and in some cases the regulations have been abrogated. The reasons for these changes are many. In some cases, the changes are probably a response to an evolutionary process as countries strengthen their technological capabilities and industrial development. In others, they may be viewed as one component of a broader macroeconomic and institutional change aimed at giving more room to market forces, including foreign competition, and reducing government intervention.

Another important dimension has to do with changes in the functions of national registries and other authorities in technology transfer issues. Although not specifically referred to in this document, it is worth noting that some registries (e.g., those in Brazil and Nigeria) have been increasingly emphasizing the provision of information and other services to actual or potential licensors and licensees, in order to facilitate the technology transfer and improve the technology's assimilation.

It should be noted, finally, that the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) negotiated with GATT includes some rules (see box) that would be applicable to licensing agreements, mainly with regard to the regulation of restrictive practices. Those rules imply, on the one hand, that the evaluation and eventual prohibition of restrictive clauses should be based on the application

### DRAFT TRIPS AGREEMENT: CONTROL OF ANTICOMPETITIVE PRACTICES IN CONTRACTUAL LICENCES

#### Article 40

- Members agree that some licensing practices or conditions pertaining to intellectual property rights which restrain competition may have adverse effects on trade and may impede the transfer and dissemination of technology.
- Nothing in this Agreement shall prevent members from specifying in their national legislation licensing practices or conditions that may in particular cases constitute an abuse of intellectual property rights having an adverse effect on competition in the relevant market. As provided above, a member may adopt, consistently with the other provisions of this Agreement, appropriate measures to prevent or control such practices, which may include for example exclusive grantback conditions, conditions preventing challenges to validity and coercive package licensing, in light of the relevant laws and regulations of that member.
- Each member shall enter, upon request, into consultations with any other member which has cause to believe that an intellectual property right owner that is a national or domiciliary of the member to which the request for consultations has been addressed is undertaking practices in violation of the requesting member's laws and regulations on the subject matter of this Section, and which wishes to secure compliance with such legislation, without prejudice to any action under the law and to the full freedom of an ultimate decision of either member. The member addressed shall accord full and sympathetic consideration to, and shall afford adequate opportunity for, consultations with the requesting member, and shall cooperate by supplying publicly available non-confidential information relevant to the matter in question and other information available to the member, subject to domestic law and to the conclusion of mutually satisfactory agreements concerning the safeguarding of its confidentiality by the requesting member.
- A member whose nationals or domiciliaries are subject to proceedings with another member concerning alleged violation of that other member's laws and regulations on the subject matter of this Section shall, upon request, be granted an opportunity for consultations by the other member under the same conditions as those foreseen in the preceding paragraph.

of a rule of reason and a competition test. In other words, such clauses can not be condemned *per se* or on the basis of their impact on development or other general criteria, but only to the extent that they negatively affect competition in an individual case. On the other hand, TRIPs establishes a system of bilateral consultations in case of alleged violations that would provide the basis for cooperative resolution of the conflict between the governments of the countries where the parties are domiciled.*

*For an analysis of these provision, see Correa, [27].

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# Module 10

## THE LEGAL ENVIRONMENT IN INDUSTRIALIZED COUNTRIES

*This module examines the legal environment for technology transfer in developed countries, with particular regard to antitrust and other competition laws. It focuses specifically on legal environments for technology transfer in the United States, the European Union (EU) and Japan, tracing the evolution, theory and practice of the relevant laws in each. The laws in these jurisdictions relating to technology transfer have many substantive features in common. But their application and procedural requirements differ significantly, especially in respect of interpretation and enforcement. Although it outlines the applicable laws in each jurisdiction in terms of broad principles rather than specific cases, the module none the less provides specific references to the practices allowed and forbidden in each jurisdiction and makes a useful primer for those interested in conducting technology transfer agreements with companies in the developed world.*

# Contents

# THE LEGAL ENVIRONMENT IN INDUSTRIALIZED COUNTRIES

## Introduction

The legal environment for technology transfer in industrialized countries encompasses several different interrelated bodies of law. One body of law concerns the legal protection afforded technology, often called intellectual property law. This includes patent law, copyright law, trade mark law and trade secret law. Another body of law affecting technology transfer is contract and commercial law, which regulates and permits the enforcement of contractual and other business relationships. Finally, technology transfer activities are subject to competition laws generally designed to restrict business arrangements that unreasonably restrain free trade.

Intellectual property laws and contract and commercial laws are the subject of other modules in this *Manual*. This module will focus on the competition laws of the United States, the European Union and Japan, as those laws relate to technology transfer. Other industrialized countries have competition laws, as do many of the member countries of the European Union. But, in principle, most such competition laws are similar to those in the United States, the European Union and Japan. Understanding the effect their competition laws have on technology transfer will therefore assist in dealing with competition issues arising in agreements with companies in most industrialized countries.

While the competition laws of the United States, the European Union and Japan, as they relate to technology transfer, have many substantive features in common, their application and procedural requirements differ in certain significant aspects. Each of the competition laws is founded upon broad statutory authority. Interpretation and enforcement of the statutes in the United States are left almost exclusively to judicial courts. In the European Union and Japan, administrative agencies interpret and enforce the laws in the first instance, with the judiciary being the reviewing authority. In addition, in the United States the scope and application of the competition law must be determined by analysing court decisions; there are few, if any, binding regulations that provide guidance on application of the competition law. In the European Union and Japan, the cognizant administrative agencies have issued regulations which, if followed, provide some assurance of compliance with the law.

This module will provide an outline of the competition laws of the United States, the European Union and Japan as they relate to technology transfer. These outlines will highlight those provisions in a technology transfer agreement that may violate the competition laws in each jurisdiction. Competition laws in all three jurisdictions will focus on the practical effect of the provisions, not merely on the words involved. This will require considering the effect all of the provisions in an agreement, when considered together, will have on the rights and obligations of the parties and on competition in a defined market. It is impractical to consider in context all of the factors that enter into determining a violation of the competition laws. Accordingly, this module will, of necessity, focus on the broad principles of each jurisdiction's competition laws and on individual technology transfer restrictions. The effect of the entire context of any particular agreement on competition is beyond its scope.

A final warning concerns the scope of application of the competition laws in the jurisdictions under consideration. In each jurisdiction, the laws primarily concern technology transfer arrangements that will have an effect on trade within the jurisdiction or on foreign trade with the jurisdiction. A technology transfer agreement that in practice would have no effect on such trade in or with a jurisdiction will not be subject to the competition laws of that jurisdiction. None the less, a company from one of the jurisdictions under consideration may find persuasive negotiations based upon the principles of its competition laws even though the agreement under negotiation would not be subject to such laws. Thus, an understanding of the competition laws of the jurisdictions under consideration may assist in negotiating technology transfer agreements regardless of the jurisdictions involved. The purpose of this module is to provide that understanding.

## The United States antitrust laws

United States antitrust laws began with enactment of the Sherman Act in 1890. That Act, and subsequent supplemental statutes, are designed to reflect that country's commitment to a free market economy. The theory behind the antitrust laws holds that market competition ensures the most efficient allocation of resources and provides maximum benefit to the consumer. This theory has been applied by United States courts in interpreting and enforcing antitrust laws over the more than 100 years since their inception.

There are no binding regulations or guidelines in the United States antitrust laws. Their scope and application must be determined by analysis of court decisions applying the antitrust laws to particular situations. While the United States Government, through its Department of Justice, has issued guidelines reflecting its theory of enforcement, these guidelines are not the law. The Department position has historically had a decisive impact on court decisions applying the antitrust laws, but there is no guarantee that the courts will agree with the Department. The antitrust laws change over time through evolution in court decisions and, on occasion, through enactment by the United States Congress of modifying laws.

Any discussion of the effect of the antitrust laws on any particular transaction is merely opinion based upon analysis of the relevant statutes and court decisions applying the statutes. To properly evaluate a transaction for potential antitrust consequences, consideration must be given to the practical competitive effect of the transaction on an economically defined relevant market in the United States. Although definite rules and regulations applying the antitrust laws are not available, it is possible to provide an outline of the relevant factors historically considered by the courts in evaluating transactions for antitrust violations and to provide a guide for an antitrust analysis of those factors.

### *Principal statutes relevant to technology transfer*

Section 1 of the Sherman Act (15 U.S.C. S1) renders illegal every contract, combination or conspiracy in restraint of trade or commerce among the states or with foreign nations. Section 2 of the Sherman Act (15 U.S.C. S2) holds any person or company who monopolizes or attempts to monopolize any part of the trade or commerce among the states or with foreign nations to be guilty of a crime.

Section 3 of the Clayton Act (15 U.S.C. S14) renders illegal any transaction for the sale of goods, merchandise or other commodities which is conditioned upon the purchaser agreeing not to deal in a competitor's goods, merchandise or other commodities if the transaction substantially lessens competition or tends to create a monopoly. Section 7 of the Clayton Act (15 U.S.C. S18) renders illegal the acquisition of any asset of a corporation or company, including intellectual property rights, if such acquisition would substantially lessen competition or tend to create a monopoly.

Section 5*(a)* of the Federal Trade Commission Act (15 U.S.C. S45*(a)*(1)) declares unfair methods of competition or deceptive acts or practices in commerce unlawful.

Section 271*(d)* (5) of the Patent Statute (35 U.S.C. S271*(d)*(5)) declares that no patent owner otherwise entitled to relief for infringement or contributory infringement of a patent shall be guilty of misuse or illegal extension of the patent right by reason of his having done one or more of the following:

> . . . (5) conditioned the licence of any rights to the patent or the sale of the patented product on the acquisition of a licence to rights in another patent or purchase of a separate product, unless in view of the circumstances, the patent owner has market power in the relevant market for the patent or patented product on which the licence or sale is conditioned.

The miscellaneous statutes should also be mentioned:

- The National Cooperative Research Act (15 U.S.C. S4301) provides certain exemption to antitrust laws for joint research and development activities meet certain requirements including notification of the Department of Justice and the Federal Trade Commission.
- The Webb-Pomerene Act (15 U.S.C. S61) provides a limited antitrust exemption for competing businesses engaging in collective export sales of merchandise, provided the collective activity does not competitively injure domestic competitors.
- The Export Trading Company Act (15 U.S.C. S4001) provides limited immunity under antitrust laws to United States exporters of goods and services whose activities do not lessen competition in the United States and are consistent with a certificate issued by the Department of Commerce.

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*Procedural enforcement*

United States antitrust laws provide for both civil and criminal violations. Criminal actions may be brought by the Department of Justice, and the courts may impose fines and prison sentences on violators. Civil actions may be brought by the Department, by the Governments of the individual states and by private persons or companies who have suffered injury from antitrust violations. In civil cases, the courts may remedy the violation by injunctions compelling the violator to take specified action to eliminate the effect of the violation and may award damages to injured parties including up to three times actual damages, the increased damages being a penalty to the violator. The Federal Trade Commission also may institute administrative investigations of the Federal Trade Commission Act and may bring court actions for violations of the Act.

Except for special statutory exemptions to or immunity from antitrust laws in joint research and export sales, there is no requirement that agreements be registered or notified to any government agency for clearance under the antitrust laws. (This differs completely from the situation in the European Union, as will be seen below.)

The antitrust laws apply to activities that effect trade or commerce within the United States, or United States import trade, or commerce between the United States and foreign countries. As to United States export trade or commerce with foreign countries, antitrust laws apply to activities that have a direct, substantial and reasonably foreseeable effect on *(a)* trade or commerce within the United States, *(b)* United States import trade or commerce with foreign countries or *(c)* export trade or commerce with foreign countries of a person or business located in the United States.

*Principles of application of the antitrust laws*

*The Rule of Reason*

Section 1 of the Sherman Act, by its literal language, is so broad as to render illegal all business contracts. Business agreements, by their very nature, restrain trade in some fashion. In applying the antitrust laws, the United States courts realized that the statute could not have been intended to make illegal all business agreements. Thus the courts formulated the Rule of Reason, which holds illegal under the Sherman Act only contracts which unreasonably restrain trade.

In the technology transfer area, the Rule of Reason includes three principal elements of analysis:

- First, a restriction or limitation in a technology transfer agreement must be ancillary to a lawful main purpose. Licensing the manufacture and sale of a patented product is a lawful purpose. Requiring payment of royalties based on sales of that product is ancillary to that purpose. On the other hand, compelling the licensee to pay royalties on all of its sales, including unpatented products, would not be ancillary to the lawful purpose.
- Secondly, the scope and duration of the restriction must not be substantially greater than necessary to achieve the lawful purpose. For example, a restriction requiring payment of royalties by the licensee on sales of a patented product for a period greater than the life of the patent would have an unreasonable duration. A restriction requiring a licensee under a United States patent to pay royalties on products made and sold in Canada would have an unreasonable scope.
- Thirdly, the purpose and effect of the restriction in a relevant market must be reasonable under the circumstances. This third principle of the Rule of Reason requires an analysis of the restriction's competitive effect in a defined market and a determination of whether the purpose of the restriction is anticompetitive.

A relevant market is defined as all products for which there is cross-elasticity of demand. If, for example, the licensed product was a battery-powered digital watch, the relevant market would include other products to which purchasers would turn if the price of the digital watch was raised too high. It probably would include all analog watches, both electrically and mechanically powered. The relevant market probably would not include all devices that keep time, since customers would not consider purchasing a clock or clock radio as a substitute for a high-priced digital watch.

The purpose and effect analysis may be illustrated by comparing the following hypothetical examples:

- Company A owns a patent on a digital watch but does not sell watches. It proposes to license all companies that manufacture and sell watches at royalties of 20 per cent for the first million sold each year, 10 per cent for the second million and 1 per cent for all sales over 2 million each year. Such a royalty structure is entirely consistent with the patent rights and even though it would place small licensees who never sell more than a million watches per year at a price disadvantage against large licensees who can easily sell over 2 million per year, the restriction would not be considered anticompetitive.
- Company A owns a patent on a digital watch and also has 50 per cent of the watch market. Company B has 30 per cent of the watch market and the remaining 20 per cent of the market is

held by 15 small companies that sell watches at price discounts. Company A uses the same royalty structure as in the previous example. Because only company B would have sufficient volume to obtain the 1 per cent royalty rate, the small price-cutting companies would be placed at a competitive disadvantage. This would have the effect of eliminating low price competitors of company A. With some additional evidence showing that company A understood and intended the effect, it might be an antitrust violation.

The relevant market analysis is not limited to product markets. The United States Department of Justice, in April 1995, issued guidelines applying the antitrust laws to technology transfer agreement. In these guidelines, the Department defined product, technology and innovation markets in which competition could be affected by technology transfer agreements. While the Department of Justice guidelines are not the law, they may cause increased scrutiny of agreements involving technology that has not been commercially proven or exploited.

The Rule of Reason analysis requires a careful analysis of the technology agreement, of its effect on the parties to the agreement, of the economically defined relevant market affected by the agreement, of the parties' competitive positions in that market and the effect of the agreement on competition within that market.

### *The* per se *rule*

After a period of evaluating various situations under the antitrust laws, United States courts determined that certain agreements or practices always have adverse effects on competition and could be conclusively presumed to be unreasonable and therefore illegal. Such agreements and practices were deemed to be *per se* illegal under the antitrust laws. The mere presence of such agreements or practices were sufficient to find a violation of the antitrust laws without conducting an analysis of the relevant market or the competitive effect of the agreements or practices on that market. Among *per se* illegal practices are price-fixing, group boycotts, division of markets among competitors and tying arrangements.

In the early 1980s, the United States Department of Justice changed its position on the application of the antitrust laws to technology transfer. Previously, it had considered the transfer of rights to technology, particularly patents and copyrights, to be agreements exploiting statutory monopolies which were exceptions to the antitrust laws. The Department actively solicited decisions from the courts holding many common provisions in technology transfer agreements to be *per se* illegal under the antitrust laws. After changing its view in the light of new economic evidence that technology rights were pro-competitive, the Department of Justice asserted that no technology transfer agreement should be subject to *per se* treatment under the antitrust laws.

The 1995 guidelines on technology transfer did not change the principles espoused in the early 1980s but they reflected antitrust law against technology transfer agreements that unreasonably restrain competition, whether among competitive products, technology or sources of innovation.

While its changing position is not the law, in time the Department may cause a change in court decisions or the enactment of laws modifying the antitrust laws as they relate to technology transfer. (This module, of course, addresses antitrust laws as they exist today, not as they may exist in the future.)

### *Patent and copyright misuse*

As the enforcement of United States antitrust laws evolved, the courts also developed the patent and copyright misuse doctrine. Patents and copyrights were considered statutory monopolies and exceptions to the laws prohibiting of monopolies. When an owner exploited his patent or copyright in a manner that was outside the specific rights granted under statute, the courts held this to be a misuse rendering the patent or copyright unenforceable. All antitrust violations involving a patent or copyright were also held to be a misuse. Yet not all misuses were antitrust violations. A patent owner could be guilty of a patent misuse rendering his patent unenforceable even though there was no appreciable effect on commerce or no restraint of trade.

The United States Congress, reflecting the changed view of the Justice Department in the 1980s, has legislatively modified the misuse doctrine relating to patents through amendment of the patent law. The effect of the amendment is discussed in the section on tying arrangements below.

### *Trade secret and know-how agreements*

Application of United States antitrust laws to technology transfer agreements involving trade secrets and know-how is essentially the same as their application to agreements involving statutory rights such as patents and copyrights. Any difference lies in the nature of the rights. Patents and copyrights give to their owners statutory monopolies to exclude others, a right that is enforceable against infringers regardless of how the infringer acquired the technology. Patents and copyrights have a defined life which, except for a court's declaration of invalidity, cannot be extinguished prematurely. Rights to trade secrets and know-how, however, are based solely on relative secrecy, competitive value and contractual obligations. Thus, a restriction based solely on a trade secret or know-how may become unreasonable when the technology becomes freely available to the public. On the other hand, it is not unreasonable to restrict the licensee's use of licensed trade secrets or know-how after expiration of the licence agreement so long as the trade secrets and know-how remain relatively secret.

### *Technology transfer provisions presenting potential antitrust consequences*

#### *Tying arrangements*

A tying arrangement involves two products—a tying product and a tied product. If the party (such as a licensor) possessing the tying product has sufficient economic power in a relevant market to compel another party (such as a licensee) to buy the tied product, and such tie-in is coerced and has an appreciable effect on commerce in the tied product market, it would be considered by United States courts as a *per se* antitrust violation.

This situation often arises in technology transfer agreements where a patent licensor wishes to compel the licensee, as a condition for receiving the licence, to buy an unpatented product from the licensor or his designated agent. Under antitrust law as it currently is taught by the Supreme Court of the United States, a patent or copyright is presumed to give to its owner sufficient economic power to compel a tie-in. Thus, to establish an antitrust violation in the context of a patent or copyright licence, the licensee or other injured party need only prove that it was coerced into buying an unpatented tied product and that the tie-in has an appreciable effect on the market for tied products.

There are certain exceptions. Where the licensor can establish that successful performance of the licensee under the agreement requires purchase of the tied product or service, the courts may grant a limited exception. This exception is strictly applied only to those situations where there exists no reasonable alternative to the tied product. For example, if the licensor could have given the licensee the manufacturing specifications of the tied product in lieu of imposing the tie-in, the exception will not be granted.

Other exceptions relate to the nature of a patented invention. Where the patent covers a process using a known, unpatented product that has no other known use except in the patented process, the patent owner can condition the grant of a licence under the process patent on purchase of the unpatented product from the patent owner. This is true only where the sole known use of the unpatented product is in the patented process.

A tie-in has also been considered to be a patent misuse. Conditioning the grant of a patent licence upon an agreement to purchase an unpatented product was considered outside the scope of the patent grant, rendering the patent unenforceable. The amendment to the patent law discussed above, however, now requires a determination of whether the patent owner has actual market power in the relevant market for the patented product before the tie-in can be considered a patent misuse. This amendment requires a realistic appraisal of the market position of the patented product; the mere existence of the patent is insufficient. The amendment to the patent law does not change the antitrust laws. While United States courts are likely to consider the intent of Congress as reflected in the patent law amendment, they are not required to do so and may rely on court precedent to find an antitrust violation based on the presumption of market power arising from the mere existence of the patent.

Both the antitrust laws and the patent law require coercion of the tie-in or conditioning of a licence grant on accepting a tie-in. Coercion may be direct by refusing to grant rights without the tie-in or indirect by pricing the licence rights in a manner which makes accepting the tie-in economically necessary. Where there is no direct or indirect coercion, there would be no antitrust violation or patent misuse. If the licensee willingly agreed to the tie-in there would be no violation. A statement to that effect in the technology transfer agreement might insulate the agreement from a tie-in charge.

#### *Tie-outs*

This is the reverse of a tie-in where the grant of a technology licence is conditional upon agreement by the licensee not to deal in products competing with the licensed product. United States courts have considered such provisions to be a *per se* violation of antitrust laws and a patent misuse.

A tie-out may be legitimate where it is a reasonable component of a best efforts provision. Particularly in exclusive licences, the licensor's royalties from use of the licensed technology may depend entirely upon the success of the licensee in marketing manufacturing, and selling the licensed product. Best efforts obligations are acceptable so long as they are reasonably related to ensuring adequate compensation to the licensor and their purpose is not solely to restrict competition. If an exclusive licensor's sole compensation comes from sales of the licensed product, restricting the licensee from dealing in competing products as a best efforts condition may not be an antitrust violation.

#### *Mandatory package licensing*

Frequently, technology owners have a package of technology rights, such as patents, copyrights, trade marks and know-how. These rights may be related to the same product, and the owner may wish to license all of the technology in one package. If the owner conditions grant of the licence upon the licensee's acceptance of the entire package of technology, United States courts have considered the restriction to be a *per se* antitrust violation.

Here too, there are exceptions. A patent owner may legitimately package multiple patents and know-how together as a condition for a licence under the know-how if rights under the patents are necessary to use the know-how. The converse may not be true, since a patent licensee may not need the know-how to practise under licensed patents.

Mandatory licensing of a package of patents has been considered a patent misuse where the licensee is required to accept a licence under unwanted patents in order to obtain a licence under a desired patent. However, the amendment to the patent law discussed above now requires proof that the owner of the desired patent has actual market power in the market for such patents before a patent misuse may be found.

The key to antitrust violations or patent misuse in this area is coercion. If the licensee willingly accepts the licence under the entire package of technology rights, there would be no violation.

### *Mandatory total sales royalties*

If a technology licensor requires the licensee to pay royalties on sales of all the licensee's products, including products not covered by or related to the licensed technology, United States courts consider the arrangement to be a *per se* antitrust violation. Where a patent owner conditions grant of a licence under the patent on the payment of royalties on products not covered by the patent, United States courts consider that to be a patent misuse.

For such an arrangement to be an antitrust violation or a patent misuse, the total sales royalties requirement must have been coerced. In some instances, it may be easier for accounting purposes to apply the royalty to all sales. If the licensee agrees to such an arrangement, there would be no violation.

### *Post-expiration royalties*

Where compensation for a patent licence is based upon use of the patented invention and the requirement to pay compensation extends beyond the legal life of the licensed patent, United States courts consider the arrangement to be a *per se* patent misuse.

For there to be a violation, royalty or other compensation must be based upon use of the patent and must continue after the patent expires. It is not a violation for a stated amount, such as a single lump sum amount, to be payable over a time period that extends beyond the life of the licensed patent. Such time payments are not based upon use of the patent.

A problem in analysis arises where the technology transfer agreement grants rights under a package of patents or patents and know-how and the royalty remains the same throughout the term of the agreement even though some of the licensed rights may expire earlier than others. Conceptually, if the royalties remain the same after expiration of one of the licensed patents, a portion of the continuing royalty is for use of the expired patent. Some United States courts have held it is not an antitrust violation or patent misuse for the royalty to remain constant until the last of the patents in the package expires.

On the other hand, where the agreement conveys rights under patents and know-how, United States courts have held that royalties that remain constant after all of the patents have expired include post-expiration royalties, rendering the agreement thereafter unenforceable as to the know-how. To avoid the latter problem, the agreement must contain some provision that indicates how much of the royalty is attributed to the know-how so that the licensee can begin paying the lower royalty for the know-how after the licensed patents expire.

### *Exclusive or assignment grantbacks*

Prior to the 1980s, the Department of Justice argued that an agreement requiring the licensee to assign, or exclusively license, all improvements to the licensed technology to the licensor may be a *per se* violation. Although the Department has since changed its view, an antitrust violation under the Rule of Reason may arise where the effect of such a provision would be to concentrate all technical improvements related to a particular relevant market in the hands of a single party, the licensor. If all the competitors in a particular product market who would be likely to conduct research on improved products were subject to an assignment or exclusive licensee grant-back provision, competition would be inhibited since the licensor would come to own all potentially competitive improvements. A court might also find that such an arrangement restricts competition in research and development since a licensee who has to assign all developments to the licensor would have no incentive to do research.

An assignment or exclusive licence grant-back provision may not violate the antitrust laws where it does not affect a substantial portion of the market. Where there are multiple significant competitors doing research, imposing an assignment grant-back on one of them would not appreciably restrain trade. A non-exclusive licence grant-back provision is always acceptable.

### *Veto power over future licensees*

An agreement between competitors to restrict or control the existence or market entry of other competitors would be a violation of the antitrust laws. Where a technology transfer agreement between two competitors includes a provision requiring the two parties to agree before any other party can be given rights under the technology, it is in effect an agreement to control the market entry of other competitors.

If a licensee has the power by agreement to veto the grant of rights by the licensor to third parties, it may be an antitrust violation. This is particularly true where the licensor and licensee are competitors.

### *Price-fixing*

Competitors agreeing to fix prices in most instances would *per se* violate the antitrust laws. Under United States law, this may not always be true in the context of patent licences. If the patent owner would effectively enjoy a real monopoly in a market because of the patent, any licence, however restricted, may provide more competition than would exist without the licence. This was the rationale used by the United States Supreme Court in 1926, when it held that General Electric's licence under the light-bulb patents to Westinghouse was not an antitrust violation despite a provision requiring Westinghouse not to sell light-bulbs at prices lower than General Electric. The court felt that General Electric would not have licensed if its licensee could have priced the light bulbs below General Electric price.

That decision has never been overturned. But it has been limited to its unique facts. A licensor may require a single competing licensee to adhere to the licensor's price policy, but if more than one licensee exists, this would be a violation. Any provision in a technology transfer agreement that would effectively restrict price competition among licensees in a relevant market would be found to violate the antitrust laws.

### *Quantity or volume restrictions*

A licensor may restrict the quantity or volume of licensed products sold by a licensee, unless the purpose and effect of the restriction would unreasonably restrain competition. A careful analysis of the effect of such a restriction in the relevant market should be made before imposing such a restriction.

### *Field of use restrictions*

A technology licensor may grant licences restricted to particular applications for the technology. For example, technology related to a small engine may be licensed to a first licensee for automobiles, a second licensee for aircraft and a third licensee for motorcycles. Under the Rule of Reason, such field of use restrictions would be an antitrust violation only if their effect would be to unreasonably restrain competition. For example, if the first and third licensees were active competitors in both the automobile and motorcycle markets, the field of use restriction might have the effect of preventing or restraining competition that existed prior to the licences.

### *Territorial restrictions*

A technology licensor may divide rights to the technology by geographic territory. One licensee may be given rights only east of the Mississippi River and another licensee may be granted the same rights only west of it. As in field of use restrictions, such territorial restrictions would be antitrust violations only where their purpose and effect was to restrain competition among otherwise competing parties.

Where a technology owner has patent rights in many countries throughout the world, he may effectively divide the world among licensees by selectively licensing the patents instead of imposing territorial restrictions. Granting a licensee rights under a Japanese patent but not under the corresponding United States patent effectively prevents the licensee from actively competing in the United States. Such selective licensing would not be an antitrust violation since the national patent laws allow such restrictions and their use to divide world markets does not violate antitrust laws.

### *Cross-licences and patent pools*

An agreement under which two technology owners agree to licence each other under their respective technologies is a cross-licence. Where three or more technology owners agree to pool their technology to benefit all of them, it is a patent pool. Both types of arrangements are permitted under United States antitrust laws unless the parties agree to restrict competitor access to the cross-licensed or pooled technology. Under the Rule of Reason, such a restriction may amount to an agreement among competitors to prevent the entry of third parties into the market as competitors. This would be particularly true when the cross-licensed or pooled technology dominated a relevant market.

### *Resale restrictions*

As a general rule, once a manufacturer sells a product he may no longer control its use or disposition. Similarly, once a patent owner receives consideration for use of the patent, he has exhausted his patent right as to the product to which the consideration applies. But a manufacturer or a manufacturing patent owner may, by contract, impose on the purchasing distributor a restriction as to resale location or territory if the purpose and effect of such restriction is to enhance competition between the manufacturer's product and competing products. Even though such a restriction may inhibit competition between the manufacturer's distributors with respect to the manufacturer's product, under the Rule of Reason it may not be an antitrust violation.

Also, the seller of a potential product may impose a post-sale use restriction on the purchaser if proper notice is given to the purchase before the sale.

Resale restrictions must be distinguished from territorial or field of use restrictions imposed upon a manufacturing licensee. Such a licensee is making the product not buying it.

### *Royalty provisions*

As a general rule, a technology owner may charge whatever a licensee is willing to pay. Extremely high royalties do not constitute an antitrust violation unless the purpose and effect is to inhibit competition. This may happen where one licensee is charged higher royalties than another, competing licensee. If the licensor has no legitimate purpose for such discriminatory royalties and only seeks to restrain competition between licensees, the royalty provisions may be found to be an antitrust violation under the Rule of Reason.

Royalty provisions that have the effect of economically forcing the licensee to accept a restriction or a licence which he otherwise would not want might be an antitrust violation as discussed above in connection with mandatory package licences.

### *Monopolization of a market*

The mere accumulation of industrial property rights either by development or acquisition will not *per se* violate the prohibition against monopolies even though such accumulated rights may result in a monopoly in a particular market. Acquisition of industrial property rights may, on the other hand, lead to violation of section 7 of the Clayton Act if the result would lessen competition or tend to create a monopoly in a particular market.

### *Restrictions on contesting patent validity*

While not strictly a part of the antitrust laws, United States law makes unenforceable any agreement provision that has the effect of inhibiting a licensee from attacking the validity of a licensed patent. United States courts have held that public policy requires eliminating invalid patents and that patent licensees have the most incentive for attacking the validity of licensed patents.

Accordingly, provisions that prevent a licensee from challenging the validity of licensed patents, or that frustrate him in such efforts, are unenforceable, although the agreement may continue to be enforced as to other provisions. At present, this law does not apply to agreements selling patent rights and does not apply to copyright, trade mark or know-how licences. This law also does not apply to patent licence agreements in settlement of patent infringement registration.

## The European union competition laws

### *Background*

The main power block in Western Europe is the European Union, also known as the Common Market. It was established by the Treaty of Rome in 1957 and in 1995 the member States are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden and the United Kingdom. Apart from the European Union there used to be a less important group of countries in Western Europe known as the European Free Trade Association (EFTA). Five members of EFTA have become members of the European Union in 1995. A treaty known as the European Economic Area, which links the two power blocks, has been agreed upon and ratified, but only Switzerland and Iceland are now not members of the European Union, so that the significance of this treaty has been seriously diminished.

Technology transfer to the European Union involves both the laws of the individual member States and certain provisions of the Treaty of Rome. Overall, the guiding principle of that Treaty is the breaking down of internal trade barriers between the member States. The free flow of goods is extremely important, but this is directed to free flow within the European Union. In relation to the outside world, import/export barriers are looked upon very differently.

### *Important articles of the Treaty of Rome*

In studying the legal aspects of technology transfer, a conceptual distinction must be made between contractual licensing and exhaustion of rights. The latter has importance in European Union law, but has no parallel in the technology transfer laws of any single country. In contractual licensing, the important provisions of the Treaty of Rome are articles 85 and 86. These are generally comparable to sections 1 and 2 of the United States Sherman Act, although their method of enforcement is very different (see the section below on procedural aspects).

### *Article 85*

Article 85 (1) of the Treaty of Rome provides that agreements between undertakings, decisions by associations of undertakings, and concerted practices that have as their object or effect the prevention, restriction or distortion of competition within the European Union are automatically void. However, article 85 (3) states that such agreements may be permissible if they contribute to improving the production or distribution of goods or promote technical or economic progress. Consumers must receive a fair share of the resulting benefit, and the restrictions imposed cannot be excessive. This provision is meant to state a rule of reason. There are not meant to be any *per se* violations of European Union antitrust law.

### *Article 86*

Article 86 of the Treaty of Rome is primarily concerned with abuse of a "dominant position". This article has been widely referred to in cases before the European Court of Justice. Article 86 *(d)* refers specifically to the conclusion of contracts that force upon other parties supplementary obligations which, by their nature or according to commercial uses, have no connection with the subject of such contracts. This leads fairly directly to tie-in clauses, which may be found in licence agreements.

Exhaustion of rights within the framework of the European Union is of great importance because of the unique nature of the Union. A prime purpose of the Treaty of Rome was to lay a framework for the formation of a United Europe and to break down trade barriers between the member States. A study of the development of the United States of America has parallels with the development of the European Union, but the Union has not yet advanced to the stage of economic integration reached by the United States. Conflict between national rights and laws and the case-law developing under the Treaty of Rome will exist for many years to come.

Permissible restrictions on import and export are dealt with more specifically in articles 30 and 34 of the Treaty of Rome. Thus, article 30 states as follows:

> Quantitative restrictions on imports and all measures having equivalent effect shall, without prejudice to the following provisions, be prohibited between member States.

Article 34 deals with exports:

> Quantitative restrictions on exports, and all measures having equivalent effect, shall be prohibited between member States.

It is important to observe that imports and exports here refer to those between member States of the European Union. Nothing in the quoted wording has any bearing on trading relations between the European Union and the rest of the world.

Specific reference to intellectual property is found in article 36, which reads:

> The provisions of articles 30 to 34 shall not preclude prohibitions or restrictions on imports, exports or goods in transit justified on grounds of public morality, public policy or public security; the protection of health and life of humans, animals or plants; the protection of national treasures possessing artistic, historic or archaeological value; or the protection of industrial and commercial property. Such prohibitions or restrictions shall not, however, constitute a means of arbitrary discrimination or a disguised restriction on trade between member States.

It is the rights arising from article 36 that must primarily be considered in the development of the principles of exhaustion of rights in the European Union context.

The doctrine of exhaustion of rights concerns the point at which a marketed product protected by a patent right ceases to be subject to the patent right, so that it may be traded and used free of any restriction enforceable by the proprietor of the patent. This is particularly significant where a product covered by a patent is marketed in one member State and subsequently transferred to another member State where another patent exists that covers the product. If the patent in the second member State is owned by the same person, it cannot be used to prevent resale and use of the product. Where exhaustion of rights does not apply, an owner of rights for part of the territory of a patent can prevent trade within that part in a product that has been manufactured and sold to a third party in another part of the territory of the patent by someone else.

## *Procedural enforcement*

The European Union's method of enforcing its antitrust laws differs considerably from those of the United States or Japan. In the United States, as discussed earlier, the laws may be enforced by the courts if there is any complaint of a violation either by a third party in a dispute with another party or by the Department of Justice. A court will then decide whether the complaint is justified.

In certain circumstances a violation of United States antitrust laws is a criminal offence. In most cases a finding of a violation of the antitrust laws results in a fine and cancellation of any associated contractual conditions. There is no need to register any contract with a government department when a technology transfer agreement is concluded, and this includes all patent and know-how licence agreements. Parties make a contract and that is all.

In Japan, technology transfer contracts or agreements between Japanese parties and foreign companies have to be approved by the Ministry of International Trade and Industry (MITI) or by the Fair Trade Commission (as discussed below).

In the European Union, the Commission of the Union should be notified of all technology transfer agreements if these fall within the scope of article 85 (1), subject to very significant exceptions (discussed later). Failure to notify may mean that the parties are liable to be fined and/or that all or part of the agreement concerned may be void.

*Agreements that do not have to be notified*

Agreements between two small companies may not have to be notified as their effect on inter-State trade may be minimal. The appropriate limits are discussed in the Notice on Agreements of Minor Importance, the latest text of which was published in 1994. To summarize, it grants an automatic exemption where the goods or services of the agreement do not represent more that 5 per cent of the total market for such goods or services in the area of the European Union affected by the agreement and the aggregate annual turnover of the participating undertakings does not exceed 300,000,000 ECU (1 ECU approximately equals 1 United States dollar). Agreements that fall under the scope of block exemption regulations, explained at length in the next section are exempt from notification. This manual is primarily concerned with technology transfer agreements in which one of the parties is a company from a developing country. European Union law is concerned only with agreements that affect the trade of the European Union. Obviously many agreements between a company in a developing country and a company inside the European Union will have no affect on trade within the European Union. Thus, notification need only be considered when imports into or exports from the European Union are affected. Restrictions on exports from the European Union are generally outside the scope of European Union Law.

### *Block exemption regulations*

As noted, any agreement that may be a violation of European Union antitrust law under article 85 should be notified to the Commission of the European Union in Brussels. To avoid overburdening the Commission with work, a number of block exemption regulations (BER) have been adopted. An agreement falling within the scope of a BER is automatically exempt from notification.

With respect to technology transfer, the important regulations used to be the BER dealing with patent licensing agreements (2349/84 issued on 22 July 1984) and the BER dealing with know-how licensing agreements (No 556/89 issued on 30 November 1988).

The regulations provide examples of effects that may be objectionable. For example, refusal by one or both parties to the agreement, without sufficient justification, to sell to customers known to resell in other areas of the European Union may be objectionable. Action by one or both parties which makes it difficult for customers to resell in other areas of the Union, such as by using national intellectual property rights to restrict such sales, may also be objectionable.

The BER will be replaced by one Technology Transfer Regulation, which is expected to come into force in the second half of 1995. With one important exception, the new regulation will broadly combine the two old regulations. It will begin with certain recitals that define the scope of the regulation and explain certain of the provisions in the regulation. There will be three lists of licence agreement provisions: a permissive list of provisions that would violate article 85 (1) but are exempt under article 85 (3); a white list of provisions that normally do not violate article 85 (1); and a black list of restrictions which, if present in an agreement, would prevent an automatic exemption under the regulation.

*Scope of regulations*

The regulation applies to agreements between two parties by which one party transfers rights in respect of know-how and/or one or more patents to the other party. The regulation does not apply to agreements involving more than two parties. It does not apply to sales agreements, franchise agreements, joint venture agreements or cross licences, i.e. agreements in which each party licenses the other under its respective technology rights.

Two broad categories of mixed agreements can be distinguished. One category relates to licences under patents that are "necessary" for exploitation of the technology, together with know-how, and the other category of mixed agreements relates to the transfer of know-how, together with a licence in respect of patents that are not "necessary" for such exploitation. In practice, the latter type of mixed agreements may rarely be met as it is difficult to say that the patent or patents involved are not "necessary" for exploitation of the licensed technology. Straightforward patent licences (without any know-how) are only a small part of all technology transfer agreements and far greater number are agreements involving both patents and know-how.

"Know-how" is defined as a body of technical information that is secret, substantial and identified in any appropriate form. The term "identified" means that the know-how is described or recorded so as to make it possible to verify that it fulfils the criteria of secrecy and substantially and to ensure that the licensee is not unduly restricted in his exploitation of his own technology. The know-how can be identified in the licence agreement or in a separate document or recorded in any other appropriate form at the latest when the know-how is transferred or shortly thereafter, provided that the separate document or other record can be made available if the need arises.

"Necessary patents" are patents whose licensing is necessary for the putting into effect of the licensed technology insofar as, in their absence, the licensed technology could not be realized or could be realized only to a lesser extent or under more difficult or costly conditions. These patents must therefore be of technical, legal or economic interest to the licensee. The term "licensed technology" means the initial know-how or the necessary patents, or both, existing at the time the first licensing agreement is concluded, and improvements subsequently made to the know-how or patents, irrespective of whether and to what extent they are exploited by the parties or by other licensees.

The regulation applies to patent and/or know-how licence agreements that also transfer rights under trade marks, copyright and designs, but only to the extent that these are ancillary rights. It only applies to agreements that have an effect within the European Union, which may include agreements with parties outside the Union if such agreements will have an effect within it.

Set out below are the six sections or paragraphs of article 1, part I.

(1) An obligation on the licensor not to license other undertakings to exploit the licensed technology in the licensed territory.

(2) An obligation on the licensor not to exploit the licensed technology in the licensed territory himself.

(3) An obligation on the licensee not to exploit the licensed technology in territories within the common market that are reserved for the licensor.

(4) An obligation on the licensee not to manufacture or use the licensed product, or use the licensed process, in territories within which are licensed to other licensees.

(5) An obligation on the licensee not to pursue an active policy of putting the licensed product on the market in the territories within the common market which are licensed to other licensees, and in particular not to engage in advertising specifically aimed at those territories or to establish any branch or maintain any distribution depot there.

(6) An obligation on the licensee not to put the licensed product on the market in the territories licensed to other licensees within the common market in response to unsolicited orders.

### *Permissive list: exempt provisions*

A major issue dealt with in the regulation is of little concern to companies outside the European Union. Article 1 deal with permissible and non-permissible restrictions on imports and exports between different European Union countries. If a non-European company simply wants to sell to the European Union without trying to divide it up, this major issue is not relevant.

### *White list: normally legal provisions*

The white list concerns licence provisions of two types: those that normally do not violate article 85 (1) and those that may represent a violation but are granted an automatic exemption.

They are set out in article 2, part 1, in 15 subparagraphs, and are quoted below, although some provisions are not set out in full:

1. Article 1 shall apply notwithstanding the presence in particular of any of the following clauses, which are generally not restrictive of competition:

(1) An obligation on the licensee not to divulge know-how communicated by the licensor; the licensee may be held to this obligation after the agreement has expired.

(2) An obligation on the licensee not to grant sublicences or assign the licence.

(3) An obligation on the licensee not to exploit the licensed know-how or patents after termination of the agreement in so far and as long as the know-how is still secret or the patents are still in force.

(4) An obligation on the licensee to grant to the licensor a licence in respect of his own improvements to or his new applications of the licensed technology, provided.

- That such a licence is not exclusive, so that the licensee is free to use his own improvements or to license them to third parties, insofar as that does not disclose the know-how communicated by the licensor that is still secret.
- And that the licensor undertakes to grant an exclusive or non-exclusive licence of his own improvements to the licensee, and accepts an obligation to pay appropriate royalties to the licensee when his right to use the licensee's right to use the licensed technology.

(5) An obligation on the licensee to observe minimum quality specifications for the licensed product or to procure goods or services from the licensor or from an undertaking designated by the licensor, in so far as these quality specifications, products or services contribute to:

(i) A technically satisfactory exploitation of the licensed technology, or

(ii) ensuring that the product of the licensee conforms to the quality standards that are respected by the licensor and other licensees

and allow the licensor to carry out related checks.

(6) Obligations:

*(a)* To inform the licensor of misappropriation of the know-how or of infringements of the licensed patents, or

*(b)* To take or to assist the licensor in taking legal action against such misappropriation or infringements.

(7) An obligation on the licensee, in the event of the know-how becoming publicly known or the patents prematurely losing their validity other than by action of the licensor, to continue paying the royalties until the end of the agreement or the regular expiry of the patents, in the amounts, for the periods and according to the methods freely determined by the parties.

(8) An obligation on the licensee to restrict his exploitation of the licensed technology to one or more technical fields of application covered by the licensed technology or to one or more product markets.

(9) An obligation on the licensee to pay a minimum royalty or to produce a minimum quantity of the licensed product or to carry out a minimum number of operations exploiting the licensed technology.

(10) An obligation on the licensor to grant the licensee any more favourable terms that the licensor may grant to another undertaking after the agreement is entered into.

(11) An obligation on the licensee to mark the licensed product with an indication of the licensor's name of the licensed patent.

(12) An obligation on the licensee not to use the licensor's know-how to construct facilities for third parties; this is without prejudice to the right of the licensee to increase the capacity of his facilities or to set up additional facilities for his own use on normal commercial terms, including the payment of additional royalties.

(13) An obligation on the licensee to supply only a limited quantity of the licensed product to a particular customer, where the licence was granted so that the licensee might have a second supplier inside the licensed territory.

(14) A reservation by the licensor of the right to exercise the rights covered by the patent to oppose the exploitation of the technology by the licensee outside the licensed territory.

(15) A reservation by the licensor of the right to terminate the agreement if the licensee contests the secrecy of the licensed know-how or challenges the validity of licensed patents within the common market belonging to the licensor or undertakings connected with him.

For reasons that are not clear, certain permissible restrictions on the activities of the licensee are set out in article 1, part 1, paragraphs 7 and 8.

(7) An obligation on the licensee to use only the licensor's trade mark or get up to distinguish the licensed product during the term of the agreement, provided that the licensee is not prevented from identifying himself as the manufacturer of the licensed products.

(8) An obligation on the licensee to limit his production of the licensed product to the quantities he requires in manufacturing his own products and to sell the licensed product only as an integral part of or a replacement part for his own products or otherwise in connection with the sale of his own products, provided that such quantities are freely determined by the licensee.

### *Black list: provisions not exempted*

The regulation includes a black list of provisions which, if incorporated in a licence agreement, will preclude application of the automatic exemption under article 85 (3). They are set out (not all in full) below. An agreement containing a provision in the black list must be notified to the Commission of the European Union and an exemption under article 85 (3) specifically requested. However, it is clear that many provisions on the blacklist will never be exempted:

(1) One party is restricted in the determination of prices, components of prices or discounts for the licensed product.

(2) One party is restricted from competing within the common market with the other party, with undertakings connected with the other party or with other undertakings in respect of research and development, production, use or distribution of competing products without prejudice to an obligation on the licensee to use his best endeavours to exploit the licensed technology and without prejudice to an obligation on the licensee to use his best endeavours to exploit the licensed technology and without prejudice to the right of the licensor to terminate the exclusivity granted to the licensee and to stop communicating improvements to him when the licensee enters into such competition.

(3) One or both of the parties are required without any objectively justified reason:

*(a)* To refuse to meet demand from users or resellers in their respective territories who would market products in other territories within the common market.

*(b)* To make it difficult for users or resellers to obtain the products from other resellers within the common market.

(4) The parties were already competing manufacturers before the grant of the licence and one of them is restricted within the same technological field of use or within the same product market as to the customers he may serve.

(5) The quantity of the licensed products one party may manufacture or sell or the number of operations exploiting the licensed technology he may carry out are subject to limitations, save as provided in article 1 and article 2.

(6) The licensee is obliged to assign in whole or in part to the licensor rights to improvements to or new applications of the licensed technology.

(7) The licensor is required, albeit in separate agreements, for a period exceeding that permitted under article 1 not to license other undertakings to exploit the same technology to the licensed territory, or a party is required for periods exceeding those permitted under article 1 not to exploit the same technology in the territory of the other party or of other licensees.

### *European Union competition law generally*

The above analyses of the block exemption regulations on technology transfer deal with only one facet of European Union restrictive trade practice or competition law. Permissible restrictions in agreements that deal primarily with trade mark licensing are not dealt with at all. The discussion on permissible and non-permissible restrictions on import/export bans deals only with those within the Union. Imposition of an export ban on a party exporting from the European Union is generally of no concern to the antitrust authorities of the Union. When one party outside the Union makes agreements with another party, and as a result of that agreement imports into the European Union are divided up in such a way that the free flow of goods between different member countries may be affected, the Commission will be very interested. This applies whether the second party is located inside or outside the Union.

There are many agreements between companies that violate article 85 (1), where the free flow of goods within the European Union is controlled, that have no real connection with a patent or know-how licence agreement. Companies have been very heavily fined for engaging in practices that violate article 85 (1). Thus the analysis given above may not be completely sufficient for assessing the validity of provisions in a technology transfer agreement, and in any event, it has dealt primarily with article 85, which relates to agreements between two or more parties. A licence may be granted under a patent and with no clauses in the licence agreement violating article 85 (1). When the patentee attempts to enforce his patent rights against an alleged infringer, however, he may meet difficulties based on the doctrine of exhaustion of rights arising from the provisions of article 36. Indeed it may be true to say that exhaustion of rights problems within the European Union are more significant in practice than agreements that may be in violation of article 85.

Most of the early cases where intellectual property was considered by the European Court of Justice involved exhaustion of rights rather than anti competitive practice arising out of article 85. Exhaustion of rights is of peculiar importance in a European Union context, and there is no real parallel with the situation in the United States or Japan. The uniqueness arises from the fact that the European Union was formed from a number of independent member States with well-developed legal systems of their own. The extent to which national intellectual property rights can be used to restrict the free flow of goods involves balancing the rights of the owner of the intellectual property under his national law against the general principle that free flow of goods within the European Union should be restricted.

## The antitrust laws of Japan

### *Background*

Japanese antitrust laws were first enacted at the behest of the Allied occupation forces after the Second World War. The Act concerning Prohibition of Private Monopoly and Maintenance of Fair Trade (known as the Antimonopoly Act), was enacted in 1947. It was originally quite similar to the Sherman Act in the United States, although it was more detailed. While it has been liberalized by amendment in subsequent years, it still retains basic similarities to United States antitrust law.

The Antimonopoly Act contains a broad prohibition against unfair trade practises similar to section 5 of the United States Federal Trade Commission Act. The Japanese Fair Trade Commission (JFTC) administers the Antimonopoly Act through its investigative powers, and administrative complaints are heard before administrative judges.

In the area of technology transfer, section 6 of the Antimonopoly Act applies to international licensing agreements and requires most such agreements to be submitted to JFTC for review. Until 1968, international technology transfer agreements required prior government approval under the Foreign Investment Act. When that law was changed, JFTC issued its first guidelines, which included a list of five provisions in patent licence agreements that were not considered unfair trade practices. The guidelines were stated to apply also to know-how agreements.

In 1989, JFTC issued new guidelines for technology transfer agreements. Unlike the earlier guidelines, the new guidelines are stated to apply equally to solely domestic agreements as well as international agreements. Since only agreements where one party is not Japanese must be submitted to JFTC for post-execution review, in practice the guidelines apply only to international agreements. The new guidelines also include a complete section devoted to know-how agreement provisions. There are no guidelines for trade mark or copyright agreements.

### *Antimonopoly Act provisions relevant to technology transfer*

Unreasonable restraint of trade is desired in sections 1, 2(6) and 3: any contract, agreement or concerted action that fixes, maintains or increases price or limits production, technology, products, facilities, customers or suppliers, thereby restraining substantially, contrary to the public interest, competition in any particular field of trade.

Section 6(1) provides that no entrepreneur shall enter into an international agreement or contract that contains such matters as constitute unreasonable restraint of trade or unfair business practices.

### *Procedural enforcement*

All international technology licence agreements having a term greater than one year must be filed with JFTC for review. This may be done by either party, although the Japanese party usually files the agreement.

JFTC reviews the agreements for provisions constituting unreasonable restraints of trade or unfair trade practices. It may issue cease and desist orders, may nullify mergers and acquisitions, may impose fines on parties to international agreements that unreasonably restrain trade and may apply other measures when considered necessary to eliminate a violation of the Act.

The Act provides for criminal prosecution although it has been used only once. It provides for private actions for damages, but only two or three such actions have been filed, and none successfully concluded. JFTC actions may be appealed to the Tokyo High Court, but this is rarely done; virtually all JFTC cases are resolved by consent.

In conjunction with issuance of the new guidelines for international technology transfer agreements, JFTC established a prior clearance procedure permitting foreign parties to request advance review and approval of an agreement. JFTC will provide a written clearance to the requesting party on which the parties can rely, although it reserves the right to withdraw the clearance by written notice if circumstances change.

### *Substantive applications*

While the law provides for judicial review of JFTC decisions, this rarely happens. JFTC, in effect, is the only authority for interpretation and enforcement of the Antimonopoly Act against technology transfer agreements. JFTC guidelines, therefore, represent current application of the act to international licence agreements.

The English translation of the new guidelines on which this paper is based is described as "tentative." JFTC refers to the Japanese text for resolution of interpretive questions.

The guidelines are similar in format to the European Union regulations. The patent and know-how guidelines each include three lists of provisions, a white list, a grey list, and a black list. The provisions in the white list are considered not to be unfair trade practices either because they are within the scope of patent rights or have a negligible effect on competition. These provisions are comparable to the white list in the European Union regulations.

The grey list provisions may be unfair trade practices depending upon the circumstances, such as the relevant market position of the licensor and licensee, the conditions in the relevant market and the durations of the restrictions imposed by the provisions. Each provision in the grey list includes comments setting forth considerations that may determine whether the provision would be an unfair trade practice. In substance, the grey list is not comparable to the permissive list in the European Union regulations; it is more closely analogous to restrictions evaluated by the rule of reason under United States antitrust laws. Thus, while the grey list provides some guidance, analysis of the economic situation and effect in a relevant market may be necessary to determine whether a provision constitutes an unfair trade practice.

The black list in the JFTC guidelines is comparable to the blacklist in the European Union guidelines. JFTC considers the black list provisions to be unfair trade practises unless there are justifiable reasons for exception.

### *Scope of the guidelines*

The guidelines are standards by which JFTC will examine patent and know-how licences between Japanese entities and between Japanese and foreign entities. Since only agreements involving a foreign party must be submitted to JFTC, the guidelines will particularly apply to agreements involving a foreign party.

In such foreign-party agreements, examination is stated to focus on restrictive conditions that may have an effect on competition in the domestic Japanese market. Many of the provisions in the grey and black list focus on fairness between the parties to the agreement, apparently on the assumption that where each party is fairly treated competition in the domestic market will not be restrained.

The patent licence guidelines apply to licences for patents and utility model. The know-how guidelines apply to agreements transferring secret technological know-how related to industrial use. Unlike the European Union know-how regulation, there is no definition of secrecy. Technological know-how related to industrial use apparently excludes non-industrial know-how of the type frequently transferred in service industries and franchise agreements.

The guidelines will be used by JFTC to examine reciprocal licence agreements or licence agreements involving multiple parties. These agreements may also be examined for unreasonable restraints of trade, section 3 of the Antimonopoly Act, which is not addressed in the guidelines.

#### *White lists: are not unfair trade practices*

These provisions in patent and know-how licences are considered by JFTC to be within the intellectual property rights or not to appreciably restrain competition.

- Licensing separately the rights to make, use and sell under a patent. This does not apply to know-how agreements.
- Licensing for a limited time period that is less than the life of the licensed patent or less than the period during which know-how remains a secret.
- Licensing for a limited geographic area less than the area covered by the licensed patent. This

provision is not addressed in the know-how guidelines, presumably since secret know-how has no geographic limit of protection.

- Restricting exploitation of the licensed patent or licensed know-how to a specified field of technology.
- Requiring a minimum production or sales volume of products covered by the licensed patent or made using the licensed know-how, or requiring a minimum use of a licensed patented method or the licensed know-how.
- Obligating the licensee to disclose to the licensor the licensee's experience with or improvements to the licensed technology (patent and know-how) or requiring the licensee to grant the licensor a non-exclusive licence to the licensee's improvements, provided the obligation is reciprocal and roughly balanced in substance.
- Obligating the licensee to use the licensor's trade mark with patented products, provided the licensee may also use his own trade mark as well. The know-how guidelines do not contain a comparable provision in the white list.
- Requiring the licensee to maintain certain quality standards for licensed products or raw materials or components used if such standards are necessary to maintain the goodwill of the licensor's trade mark or to ensure the effectiveness of the licensed technology (patent or know-how). The know-how guidelines permit quality standards for ensuring effectiveness of the licensed know-how only where the licensor has guaranteed effectiveness.
- Requiring the licensee to obtain raw materials or components from the licensor or his designee, provided restrictions on quality of raw materials or components or other restrictions are incapable of maintaining trade mark goodwill or ensuring effectiveness of the licensed technology (patent or know-how) and provided the obligation is confined solely to the extent necessary to protect the trade mark or ensure technology effectiveness. The know-how guidelines also permit such an obligation where it is necessary to protect the secrecy of the licensed know-how.
- Preventing the licensee from exporting licensed products to geographical areas where *(a)* the licensor has a patent covering the licensed product, *(b)* the licensor has been continuously marketing the licensed products or *(c)* the licensor has granted exclusive sales rights for the licensed products to a third party.
- Restricting the licensee's export prices or export quantities of licensed products or requiring the licensee to sell licensed products through the licensor in geographical areas where *(a)* the licensor has a patent covering the licensed product, *(b)* the licensor has been continuously marketing the licensed products or *(c)* the licensor has granted exclusive sales rights for the licensed products to a third party, provided the restrictions are reasonable.
- Obligating the licensee to pay royalties on finished products to simplify royalty calculation, provided the finished products cannot be made without incorporating or using the patented product or process or the know-how. The know-how guidelines also permit basing the royalty on the licensee's use of raw materials or components that are necessary to produce the licensed product.
- Providing that the licensor may terminate the licence if the licensee challenges the validity of the licensed patent or the secrecy of the licensed know-how.
- Obligating the licensee to use his best efforts to exploit the licensed patent or licensed know-how.
- The know-how guidelines also permit obligating the licensee not to deal in goods that compete with the licensed product or not to use technologies that compete with the licensed know-how for a short period after expiration or termination of the agreement where it would otherwise be difficult to prevent the licensee's use of know-how after termination or expiration of the agreement, provided the restriction is limited to preventing unauthorized use of the know-how. This provision only applies to know-how agreements, not to patent agreements.
- Compelling the licensee to accept licences under two or more items of know-how as a package where such restriction is necessary to guarantee effectiveness of the licensed know-how. There is no comparable provision in the patent guidelines white list.
- Requiring payment of royalties after the licensed know-how has become publicly known through no fault of the licensee, where such payments constitute instalment or extended payments of a determined amount or where the requirement for payment based on use extends only a short time after the know-how becomes public.
- Obligating the licensee to keep the licensed know-how secret, as long as it does not become public through no fault of the licensee.

### *Grey list: may be unfair trade practices*

The grey list includes provisions that may constitute unfair trade practices under some circumstances:

- Compelling the licensee not to deal in goods competing with the licensed product or not to use technology competing with the licensed technology during the term of the agreement. This may be an unfair trade practice if it deprives competitors of important customers or an opportunity to do business, or if it deprives the licensee of freedom to select products or technologies.
- Compelling the licensee to sell licensed products through the licensor or his designee or not to sell to persons designated by the licensor. This may be an unfair trade practice if it reduces competition in the market for licensed products.
- Compelling the licensee to disclose to the licensor or to non-exclusively licence the licensor under the licensee's experience or improvements in the licensed technology (patent or know-how) without a reciprocal obligation on the licensor having roughly equivalent substance. This may be an unfair trade practice where it results in unduly disadvantageous terms to the licensee.
- Requiring the licensee to use the licensor's trade mark without permitting the licensee also to use his own trade mark as well. This may be an unfair trade practice *(a)* where it unjustly prevents the licensee from using his own trade mark, thereby reducing competition, and *(b)* where the requirement continues after the licensed patent expires or the know-how becomes public, thereby resulting in unduly disadvantageous terms to the licensee.
- Restricting the quality of licensed products, raw materials or components where such restrictions are unnecessary to protect the goodwill of a trade mark or to ensure the effectiveness of the licensed technology (patent or know-how). This may be an unfair trade practice where it would restrict competition in the markets for the licensed products, raw materials or components.
- Obligating the licensee to obtain raw materials or components from the licensor or his designee where quality restrictions or other restrictions would be sufficient to protect the goodwill of a trade mark or to ensure effectiveness of the licensed technology, or in know-how agreements, to protect the secrecy of the know-how. This may be an unfair trade practices where it restricts the licensee's freedom to select his sources of supply, thereby placing the licensee at a competitive disadvantage, or where it reduces competition in the markets for raw materials or components.
- Preventing the licensee from exporting licensed products to geographic areas where the licensor *(a)* does not have a patent covering the licensed product, *(b)* has not been continuously marketing the licensed products or *(c)* has not exclusively licensed a third party to sell licensed products. This may be an unfair trade practice where it restricts the licensee's freedom to export, thereby reducing competition in the export market.
- Controlling the licensee's export price or export volume of licensed products or requiring the licensee to export through the licensor to geographic areas where the licensor *(a)* does not have a patent covering the licensed product, *(b)* has not been continuously marketing the licensed products or *(c)* has not exclusively licensed a third party to sell licensed products. This may be an unfair trade practice where it restricts the licensee's freedom to export, thereby reducing competition in the export market.
- Compelling the licensee to pay royalties on products that do not use or incorporate the licensed technology (patent or know-how). This would be a white list provision if, for ease in calculating royalties, payments were made on finished products part of which use or incorporate the licensed technology. Otherwise it may be an unfair trade practice as a term unduly disadvantageous to the licensee.
- In the patent guidelines, charging royalties after expiration of the licensed patents would be an unfair trade practice as a term unduly disadvantageous to the licensee.
- In the know-how guidelines, obligating the licensee to accept licences under two or more items of know-how. This may be an unfair trade practice if it deprives the licensee of freedom to select his technology, thereby placing him at a competitive disadvantage, if it resulted in reduced competition in the technology market, or if it caused the licensee to pay extra royalties or extended royalty payments, terms that are unduly disadvantageous to the licensee.
- Imposing unjustly disadvantageous terms regarding termination of the agreement such as unilateral termination without cause or termination without notice. In the know-how guideline unilateral termination without notice is acceptable for insolvency, otherwise such provisions may be unfair trade practices as duly disadvantageous to the licensee.
- Obligating the licensee not to contest the validity of the licensed patent or the secrecy of the licensed know-how. This provision may be an unfair trade practice where it restricts competition by precluding use of technology not subject to patent protection or where it causes the licensee to continue to pay royalties for the use of technology that otherwise should be publicly

available, thus being unduly disadvantageous to the licensee.

JFTC will examine the grey list provisions in light of the market position of the parties to the agreement, the economic conditions in the relevant market, the length of time the grey-list provision is in effect and other considerations with respect to individual provisions. By applying such a rule-of-reason approach, JFTC reduces the ability of potential licensing parties to predict how a provision will be evaluated, thus reducing the certainty that an agreement with such a provision will be acceptable. JFTC instituted a pre-agreement clearance procedure to alleviate the uncertainty.

*Black list: are unfair trade practices*

The black list provisions are considered to be unfair trade practices absent specific justifiable reasons presented to JFTC.

- Restricting resale prices of licensed products sold by the licensee in Japan.
- Restricting the licensee's sale price in Japan of licensed products.
- Obligating the licensee not to deal in competing products or to use competing technology after termination of the licence agreement, except in know-how agreements where such restrictions are acceptable for a short period if necessary to prevent the licensee's unauthorized use of the know-how after termination of the agreement.
- Restricting use of the patented technology after termination of the agreement and after expiration of the patent or restricting use of the licensed know-how after it becomes publicly known through no fault of the licensee, or requiring the licensee to pay royalties for use of know-how after it has become publicly known.
- Restricting the licensee's research and development activities with the licensed technology or competing technologies alone or with third parties. Such a provision is deemed to interfere with the licensee's long term business activities and to restrain competition.
- Obligating the licensee to assign to or exclusively licence the licensor under improvements developed by the licensee. This is deemed an unfair trade practice because it leads to a dominant position of the licensor in the market and lessens the licensee's incentive to conduct research and development, thereby restricting competition in a product or technology market. The guidelines suggest that this provision might be acceptable if the licensor was obligated to the same extent.

## Conclusion

The competition laws of the United States, the European Union and Japan have as a common theme limiting technology transfer arrangements to those perceived to promote competition. Generally, if the licence restrictions fall within the scope of the intellectual property rights they are perceived to promote competition. Each jurisdiction, however, has a slightly different definition of what is within the scope of intellectual property rights; the different definitions reflect each jurisdiction's unique priorities.

Application of the competition laws to license agreements, even in the European Union and Japan, where regulations and guidelines exist, requires careful consideration of all the surrounding circumstances that may affect the competitive impact of the agreement. For a developing country negotiator to use the competition laws effectively in negotiation will require careful consideration of all factors relevant to a competition analysis. The negotiator's position would be severely weakened by an incorrect application of the competition laws. The negotiator must therefore perform a thorough analysis before attempting to use the competition laws as a negotiation tool. Unless a breach of the competition laws is clear, an effort to argue their violation of the competition laws is not recommended. This module may assist in identifying potential violations of the competition laws, but once identified all such potential violations should be fully analysed under the laws of the jurisdictions involved before the issue is used in negotiations.

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# Module 11

## BASIC LEGAL NOTIONS IN TECHNOLOGY TRANSFER

*This module clarifies the basic principles and notions of legal systems, insofar as they are relevant to the context of the* Manual, *to show how a contract is formed and to create a better understanding of contractual terms, rights and obligations, irrespective of the type of contract involved. It serves as the foundation for the entire* Manual *in the area of contractual law.*

# Contents

# BASIC LEGAL NOTIONS IN TECHNOLOGY TRANSFER

## Introduction

Parties interested in establishing contacts to negotiate and conclude a contract often do not understand the legal implications of the various responsibilities they undertake or of the terms to which they may finally agree. This module explains the legal principles and notions that underlie the initial stages of negotiations and contracting and that may affect contractual terms, rights and obligations. Since it aims to show how a contract is formed and to create a better understanding of contractual terms, rights and obligations, irrespective of contract type, specific contract types are not addressed. Basic notions of the law of torts and property and other matters ancillary to technology transfer contracts are discussed.

## World legal system

### *Major legal systems*

When negotiating, drafting and concluding a contract, the parties must constantly be aware that none of this occurs in a legal limbo. The pre-contractual and contractual relations of the parties are rooted in the laws of at least one country and possibly of several countries.

This section cannot, of course, survey the relevant laws of even a few countries, because they differ from one legal system to another and from one country to another. It is, however, possible to divide legal systems into a few large groups (legal families). While different views exist as to their proper classification, one classification might be as follows:

- Romanistic
- Germanic
- Nordic (Scandinavian)
- Common law
- Socialist
- Far Eastern
- Hindu
- Islamic

Occasionally the laws of certain countries or a particular legal system will be referred to in the following sections to illustrate some point. For the reasons set forth below, references will draw attention mainly to differences between civil law and common law countries.

### *Civil law and common law systems*

For the purpose of this module, two basic legal systems are discussed: the civil law and the common law systems. The difference between these two legal systems is particularly evident in the laws governing contracts and trade. In contract law, most national legal systems originate in either the civil law or the common law system; some national legal systems show elements of both.

The common law system originated in Great Britain and is characterized by the importance of decisional law and, therefore, the authority of precedents. Nearly a third of the world's population lives in regions where the law has been strongly influenced by common law, which is often associated with English-speaking countries. This is a legacy of Great Britain's position as a colonial power.

The civil law system, not to be confused with civil law as private law, is rooted in Roman law. It developed in countries comprising continental Europe and spread to many other countries, e.g. South America and parts of the Far East, such as Japan. It is characterized by comprehensive codifications of the law.

Thus, countries frequently shaped their own legal systems, particularly in the areas of contract, trade and commercial law, on the principles and notions of either the civil or the common law system. However, the different systems may be moving closer together, because decisional law is becoming more important in civil law jurisdictions, while in common law countries there is a growing use of legislation and recognition of its importance.

## Civil law, private law, public law and criminal law

Each legal system is made up of many separate areas of law, which are often quite different in structure and style. A widely accepted division results from the way legal subject-matters are allocated to different codes, courts and other authorities.

### *Civil law*

Civil law is that part of the law primarily concerned with the rights and duties of persons toward each other. It is to be distinguished from public law and criminal law (see the next two sections) and has nothing to do with the notion of the civil law system as opposed to the common law system.

Civil law includes, but is not limited to, the following:

- Law of contract deals with that branch of the law that determines whether a promise is legally enforceable and what its legal consequences are.
- Law of tort and the law of contract entitle people to claim compensation in a rather limited way, when a plaintiff has been disappointed in justifiable expectation that the defendant would honour a promise. The law of tort also deals with cases of infringement: when a plaintiff's health has been impaired (e.g. if he has been run over by a car), his reputation besmirched, goods damaged or some other economic loss. There is an enormous range of harmful occurrences, and it is the function of the law of tort to determine when the victim ought to be able to shift the harm to which he has been exposed to the shoulders of another.
- Law of property determines the nature and extent of the rights that people may enjoy over movable and immovable (or real) property.

### *Civil law (private law) as distinct from public law*

Civil law is sometimes referred to as private law, as distinct from public law, which consists of those fields of law primarily concerned with State organization, relations between the State and the people composing it, and the responsibilities of public officers to the State, each other and private persons.

Thus, public law comprises, *inter alia*:

- Constitutional law: the rules regulating the structure of a government's principal organs, their relationship to each other and their principal functions and powers.
- Administrative law: rules concerning the rights and duties arising from the impact on an individual of implementing the executive instruments of government.
- Criminal law: described below.

### *Civil law as distinct from criminal law*

In civil law, a legal action is initiated by a private person to establish individual rights against another person. Criminal law, in contrast, is enforced on behalf of the State, because criminal acts are offenses against the State.

### *Substantive law as distinct from procedural law*

Substantive law includes the rules of law, civil or public, governing substantive matters of law. It is that part of the law that creates, defines and regulates the rights and duties of persons.

Procedural law lays down the rules governing the manner in which rights arising under substantive rules are enforced and how the violation of such rules is prosecuted. Different rules are applied by different authorities, i.e. the rules depend on whether the proceedings are civil, criminal or administrative.

## The formation of contracts

### *Juristic acts and contracts*

The notion of a juristic act is a subcategory of the concept of a legal act in the wider sense. While the latter signifies any act of a person that has effects in private law, the former has effects precisely because the actor so intended. All legal systems must recognize juristic acts as events that occur in life and so require some kind of regulation, but they can do this without grasping the concept of juristic acts in its pure form. Thus, many legal systems have rules, whether statutory (derived from the case law of the courts) or judicial (enacted by the legislature), that regulate only the most common type of juristic act, namely the contract.

A contract is a legally binding agreement between two or more parties creating both an obligation to do or refrain from doing something, and a corresponding right.

### *Relative nature of contractual relationships*

The relationship created by a contract may be described as "relative", as only the parties to it are affected by the rights and duties it engenders: there is a bond of obligation only between the parties. In contrast to this are "absolute" rights, usually rights of dominion over property, which enjoy protection against any other person (see section on the "absolute" nature of property rights).

### *Freedom of contract*

Freedom of contract means the freedom to select and enter contracts or not, and the freedom of each contractor to fix the terms of his own promise, subject to the agreement of the other party. It therefore involves the free choice whether to conclude a contract and how, or on what terms. Thus it means that, within the frame of mandatory rules of law, the parties are free to shape their contracts at their discretion.

However, even where the law allows freedom of contract, true freedom of contract cannot exist unless the parties to the contract are economically and socially equal. Often, therefore, there is no such thing as freedom of contract.

## *Applicable law, choice of law and private international law*

### *Applicable Law*

Like all legal relationships, including international ones, contractual relationships are rooted in the law of a country. It is not always easy to determine which country's law is applicable to an international (contractual) relationship. Throughout the centuries, based on the notion of freedom on contract, the laws of many countries have allowed the parties to a transaction (in particular a commercial one) not only (within the frame of the law) to determine their respective rights and obligations but also to choose and agree on the legal system they wish to be applicable to a particular transaction.

### *Choice of law*

In international contracts one therefore usually finds a choice of law clause in the closing provisions. Agreement on the applicable law should, however, be reached as soon as possible, as the substantive provisions of the contract will have to fit into and reflect the framework of that law.

### *Private international law*

Private international law (sometimes called conflict of laws) refers to that law which is applied in determining which country's laws should be applied by a court in cases containing a "foreign" element and in cases of contracts where the parties have not agreed on a law governing the contract. For example, if *A*, a company incorporated in Taiwan Province of China, makes a contract in London with *B*, a French company, for the supply of certain machinery to its plant in the Philippines and *A* now takes action against *B* in a court of law for alleged breach of contract, this court will have to determine which law is to be applied: Taiwanese, English, French or Philippine. The rules of private international law in force in the country where the court is located will have to be consulted. The complications and problems involved show the benefit of a choice of law clause in a contract.

## *Contractual capacity*

Generally speaking, any "person," natural or legal, may be a party to a contract, but there are exceptions to this rule. Thus, only if a person has reached a certain minimum level of understanding and ability and is regarded by the law as having "contractual capacity," i.e., only when it has reached a certain age, can it bind itself by contract. All legal systems have rules protecting minors, lunatics and incompetents, denying them contractual capacity under certain conditions and making a contract with them void or voidable.

Certain legal systems, in particular those based on English law, follow to a certain extent the doctrine of *ultra vires*. Its basic rule is that a contract made by a company acting in breach of the objects and powers laid down in its memorandum and articles of association is void, thus restricting the capacity or legal ability of such a company to make a binding contract.

## *Precontractual arrangements: can negotiations create obligations?*

### *Precontractual liability*

Negotiations are oral or written exchanges of views and contacts between parties related to a specific offer before the conclusion of an agreement. During negotiations parties often exchange letters, telexes or other oral or written communications in which they express their intentions regarding an offer to conclude a contract. Once an offer is accepted, a contract is concluded (see section on offer and acceptance).

In principle, negotiations that precede the formation of a contract do not create obligations and the parties are free to discontinue negotiations at any time before they have finally committed themselves, i.e. before they have entered into a contract. However, there are jurisdictions in which even negotiations may create obligations and where a party who has carried on negotiations without an intention to conclude a contract may be liable to the other party for damages caused by such behaviour. Jurisdictions where such obligations may be created based on *culpa in contrahendo*, i.e. negligent behaviour in negotiations, are usually based on civil law tradition and not on common law. Courts in the United States have, however, recently applied the principle of promissory estoppel in such situations and awarded the injured party frustrated expenses, i.e. expenses incurred by a party in connection with negotiations believed to have been conducted by the other party in good faith.

### *Letter of intent and other precontractual documents*

Parties sometimes sign documents that they do not wish to call contracts because they have not yet agreed on all the points they consider necessary. In such documents, parties may commit themselves to continue negotiations, or even to conclude a specific contract in simple letters, cables, telexes or telefax messages. Sometimes parties during negotiations sign documents called "minutes of the meeting", "letter of understanding", "head of agreement", "letter of intent" etc. All these documents may be later interpreted as being either true contracts or less-binding declarations of the parties, depending on the intent of the parties to bind themselves. If a document contains all the elements necessary for a contract, the courts usually interpret such documents as expressing the will of the parties to conclude a contract, regardless of the title or the name the parties have given to the document itself.

Although there are no rules and every document should be judged on its own merit, in many cases a letter of intent only expresses an intention to conclude a contract at some future time. Heads of agreement are sometimes true contracts but at other times they may be only an indication of the intent to conclude a contract in the future. The same is true for letters or memoranda of understanding.

### *Agreements "to negotiate" or "to agree"*

Sometimes parties enter into arrangements that amount to only a commitment to continue with negotiations. In common law, a contract to negotiate is considered too vague to be enforced, although there are authors who claim that there is neither authority nor satisfactory reason in principle for refusing to recognize a separate, enforceable contract to agree or to negotiate.

Parties sometimes make a commitment to enter into a binding contract at a later time. Similarly, in most cases, such "agreements to agree" or "contracts to make a contract" are not considered binding. In civil law jurisdictions, the approach is sometimes different. There are jurisdictions where an "agreement to agree" may be considered binding if it contains all the elements necessary for the second agreement.

### *Agreements "subject to contract"*

Sometimes parties make an agreement "subject to formal contract". In common law jurisdictions, such arrangements are often considered as not binding. However, the courts may judge whether the parties have really intended the conclusion of a formal agreement to be the condition for the contract, or whether they have merely expressed a desire to make such a formal agreement without it being essential for the existence of the contract. If the parties have made an arrangement but stated that the arrangement is valid "subject to contract", it is considered that they did not intend to be legally bound by that arrangement.

### *Caution*

The above examples show that if the parties did not express themselves clearly during negotiations, the courts may interpret their behaviour. Such an interpretation of behaviour shall be made in these cases in accordance with the laws applicable to that relationship, and such laws may bring entirely different results from what the parties really wished to achieve and what they expected.

## *Offer and acceptance*

As a rule, a contract is concluded when parties express their agreement by corresponding declarations, a prior offer and a subsequent acceptance. An agreement merely to negotiate, however, does not constitute a contract, for "agreement" denotes a meeting of the minds of two or more persons upon the same matter. For legal purposes this consensus must receive some outward form of expression that can be proved. Further, the question whether or not an agreement has been reached must, in practice, be judged not according to what the parties assert about their own states of mind but according to what may reasonably and objectively be inferred from their words or actions.

The formation of a contract depends on the agreement of the parties, expressed in the offer and acceptance, either or both of which may be indicated by words or by conduct. However, not all offers or all acceptances will be permitted to lead to legal agreements, and there are legal rules governing the validity of offers and acceptances. Thus, a contract can only be complete if all essential terms have been agreed on, for there can be no agreement if any of these terms remain to be settled.

An offer may be described as a proposal addressed to one or more specific persons to enter into a contract, provided the proposal contains all the essential elements and, if it is accepted, results in a contract. To become legally binding, an offer must be sufficiently precise, i.e. clear and unequivocal, to be capable of acceptance. A statement made in the course of negotiation will thus not necessarily amount to an offer. For example, an offer to enter into a contract for the sale of goods must indicate the goods and expressly or implicitly state or provide for determining the quantity and the price.

### *Binding force of offer*

If both parties are in the same place or, although separated, are in immediate communication by telephone or otherwise, the invariable rule is that the offer lapses if the offeree does not accept it promptly. Problems arise when a contract is to be concluded at a distance, by the exchange of letters or other embodiments of the parties' declarations. Since the two declarations, offer and acceptance, must be given in succession, the offer has to remain in force for some period of time. The question therefore is what legal effects attach to the offer as an individual declaration of will directed towards the making of a contract.

In jurisdictions that are part of the civil law system, the binding force of offers is stronger than in common law jurisdictions. In principle, an offer can be withdrawn at any time until it has been accepted. However, if the offeror has set a given period for acceptance, either he cannot withdraw it for the period of time he specifies or the withdrawal makes him liable for damages.

An offeror is less bound in jurisdictions adhering to the common law. The offer remains capable of acceptance from the time it arrives until such time as it lapses through the expiry of a period fixed by the offeror or determined in accordance with the circumstances. Until the offer has been accepted, however, the offeror remains free to withdraw it at any time and even if he has declared his readiness to be bound by his offer for a stated period he is legally free to withdraw it before that period elapses, even for capricious reasons.

The reason why the common law imposes no obligation on the offeror is to be found in the doctrine of consideration, that is, the principle of Anglo-American contract law whereby a promise, unless contained in a document "under seal", generates a binding obligation only if the promisee has rendered or promised a counter-performance ("consideration"). The basic idea of the doctrine of consideration is that something of value must be given or done or undertaken by the promisee or he must suffer some loss in return for the other's promise. In effect, it is the price he agrees to pay for the other's promise. Thus, "reciprocity" or "mutuality" is required. Offers are normally made without any counter performance by the addressee and they are hardly ever clothed in solemn form, so normally the offeror is not bound by his offer.

### *Requirements as to form*

Generally speaking, no special formalities are required for the formation of a contract. But in all legal systems there are exceptions to the rules that specify formal requirements either to facilitate proof or to confirm seriousness of intention. The required form facilitates proof not only of the conclusion of the contract but also of its contents, whether the document is simply presumed to be accurate and complete or whether proof of a divergent oral agreement is excluded. The most common requirement as to the form of a contract is that it be in writing. Only rarely are there more specific requirements as to form.

A formal requirement clearly serves to ensure seriousness of intention if it lays down that the contract must be attested by an independent official with legal training, such as a notary. Officials of this type exist in almost all European continental systems, albeit with considerably differing legal positions. In the common law jurisdictions there is no official with functions comparable to those of the notary of certain European countries in connection with the attestation/recording of certain legal transactions, although similar formal requirements may apply.

#### *Legal requirements*

Rules that impose formal requirements are often concerned with the seriousness of intention. In prescribing the conditions a transaction must satisfy if it is to be enforced as being presumptively serious, it is intended to give persons unfamiliar with business an opportunity for thoughtful consideration and protect them from unpleasant surprise.

The laws of civil law countries usually make a basic distinction between cases where certain formalities must be observed as a precondition of the validity of the legal transaction and other cases in which an informal transaction, though valid, cannot be proved in court or can only be proven by limited means of proof. The precise formal requirements and the types of transactions affected vary from country to country.

In Anglo-American law, a promise unsupported by consideration is binding only if it is contained in the form of a document under seal, a requirement springing directly from the doctrine of consideration. There are very few other cases in common law where the observance of a particular form is a precondition of validity. The normal result of failing to observe the forms legally required is to render the transaction not invalid but, rather, unenforceable, that is, incapable of forming the basis of a claim in court.

The above suggests that while no legal system can entirely dispense with formal requirements, the trend is towards informality, in any case in the area of classical civil (private) law.

#### *Contractual requirements*

Frequently the parties agree that a contract (or any amendment) shall be subject to a specific form, in particular that it be in writing and signed by the parties or their duly authorized representatives. The form thus agreed on will usually have to be taken as a condition for the validity of the contract. However, the effect of any deficiency in the agreed form will have to be determined on a case-by-case basis depending on the circumstances and the applicable law.

### *Interpretation of contracts*

The essence of a contract is a meeting of minds. However, words used in a contract can never fully express what was intended. Furthermore, the parties to a contract may not have thought of certain matters that later prove to be relevant. Judges or arbitrators are therefore constantly faced with deciding the rights and obligations of parties who have expressed themselves unclearly or incompletely. This process of determining the meaning of ambiguous or incomplete contractual expressions is called "interpretation" or "construction".

Interpretation is needed when it is known what the parties said, wrote or otherwise expressed but not obvious what they meant by it. It may start from either of two opposing premises, neither of which is found in its pure form in practice today:

- In one view, it is the intention of the promisor that counts; this is justified by the "principle of private autonomy", which treats the free will of legal persons as the source and measure of legal consequences.
- The other view gives priority to the external expression on the grounds that the legal order is concerned with protecting commercial intercourse: the internal will, i.e. the intention of the promisor, is treated as significant only in so far as it coincides with the normal objective meaning that a reasonable man would attribute to its expression.

No matter which view is followed, by the rules of construction of the various civil laws the purpose of construing ambiguous or incomplete contracts is to achieve an objectively fair and functional solution appropriate to the facts of the concrete case. In particular, one must ask whether one of the parties should not have realized that the other might reasonably attribute a special meaning to the contractual term in question. If so, the meaning honestly attributed to the declaration must be treated as conclusive and the subjective intention of the person making the declaration must be ignored.

In common law the conflict between the theories of intention and expression has been less important than in civil law jurisdictions. This basic attitude of the common law explains why the courts of countries adhering to the common law, when required to draw up a contract, spend as long as possible on its actual words and only revert to the attendant circumstances if there is no other way of arriving at a solution. If an unequivocal clause in the contract fits the circumstances under dispute, the court will often apply that clause even if there is good reason to suppose that the parties probably did not intend the point at issue to fall under the clause, clear as it is.

Some general principles governing the interpretation of contracts that can be found in many jurisdictions are the following:

- Words are to be understood in their plain and literal meaning. This rule may sometimes lead to consequences which the parties did not contemplate. It is followed subject always to admissible evidence being adduced of a usage adding to or varying the usual meaning of the words, e.g. where for the purposes of a contract a term has a certain defined meaning.
- The interpretation of a contract shall be such that it will best give effect to the intention of the parties to be gleaned from the whole of the contract. The clear intention of the parties is of more importance than any particular words that they may have used in expressing their intent.

Subsidiary to these main rules are various others, all serving the same purpose, i.e. to give effect to the intention of the parties so far as it can be discerned from the contractual expressions. For example,

- Obvious mistakes in writing and grammar will be corrected by the court.
- The meaning of general words may be narrowed and restricted by specific and particular descriptions of the subject matter to which they apply.
- Words with two meanings will be given that meaning which will make the contract valid.
- Unclear and ambiguous words and phrases will be interpreted against the party using them. This rule is based on the principle that a party is responsible for ambiguities in its own expression.

A problem concerning written contracts allied to the problem of interpreting contracts is how far to admit evidence of prior or contemporaneous collateral oral agreements that alter or extend the meaning of the contract as written. The civil law approach is that the party asserting an oral collateral agreement is entitled to prove it, whereas under common law proof of the contrary is in principle inadmissible.

### *Void, voidable and illegal contracts*

One of the essential elements in a valid contract is that there must be a genuine consent between the parties. This consent may be vitiated in particular by the following factors:

- Mistakes.
- Misrepresentations.
- Illegality.

Where one of these factors exists in relation to a contract, there can be no true consent and the contract may be rendered void or voidable.

### *Void and illegal contracts*

Void contracts have no legal effect, i.e. they are not contracts, and agreements of this kind do not confer legal rights to the parties. Despite the prevalence of the principle of freedom of contract, every legal system must reserve the right to declare a contract void if it is legally offensive. In all systems illegality is seen as a fact which invalidates contracts, i.e. the courts will not enforce it. The question of what makes a contract illegal is answered differently in the various systems. In civil law countries one usually finds general rules making a contract void if it contravenes a statutory prohibition and if it was the intention behind the prohibition to invalidate the contract. In common law jurisdictions one must usually resort to case law to discover which contracts are illegal.

Illegality may exist in particular in regard to the making, performance or purpose. Sometimes a contract is illegal in part only. In these circumstances, the applicable law may divide the contract, enforcing the valid portion and refusing assistance in regard to the illegal part.

### *Voidable contracts*

A voidable contract is good in substance, but by reason of some technical defect one or both parties cannot sue upon it, i.e. it may be void at the insistance of one of the parties. For example, a contract that is induced by fraud can be avoided by the party deceived.

When a contract is shown to be void, it cannot create legal rights. It is a nullity. But a voidable contract is a contract with a flaw, of which one of the parties may take advantage.

### *Mistakes*

#### *Classification of Mistakes.*

The law of mistakes is one of the most difficult and controversial branches of the law of contracts. As a general rule, a mistake must be one of fact; a mistake about some rule of law would in most jurisdictions, if not all, be immaterial, everybody being presumed to know the law. Mistakes may be classified as follows:

- *Mistakes as to the identity of the subject-matter.* Where two parties intend to contract and the first party intends to contract with regard to one thing while the second intends with regard to another, there is no true agreement and hence no contract.
- *Mistakes as to the existence of the subject-matter.* Where both parties contract in the mistaken belief that a particular thing is in existence when in fact it is not. Such a fundamental mistake may render the contract void.
- *Mistakes as to the quality of the subject-matter.* A mistake as to the quality of the thing contracted for usually does not invalidate the contract but renders it voidable.
- *Mistakes as to the identity of the other party.* This type of mistake arises where, for example, *A* intends to contract with *B*, but by mistake contracts with *C*. Depending on whether the identity of the party (in the example, party *B*) is material to the contract in the sense that *A* intended to contract with *B* and no other person, the contract may be valid or voidable.
- *Mistakes as to the nature of a document.* The general rule of law is that a person is bound by the terms of any instrument that it signs, even if, although it had the opportunity to do so, it did not read the document or did not understand its content. There may be exceptions to that rule, i.e. if a person signs a document in the mistaken belief that it is a totally different document.

#### *Effects of mistakes*

Where the dividing line is to drawn between mistakes of which the law will take account and those which it will disregard is a controversial question with different answers in the different legal systems. Also, the effect of a mistake (whether it makes a contract void or only voidable) varies from country to country. As noted above, however, the mistake, has to be one of fact and not of law. If a party has made a mistake about some general rule of law, it cannot plead in court that it did not know the legal rule existed.

#### *Misrepresentation*

As noted above, the doctrine of mistakes is rather complex. A separate category exists of those cases where the mistake is caused by an inaccurate statement or misrepresentation by the other party. A misrepresentation is a false statement made before or at the time of conclusion of the contract that caused the other party to enter into the contract or contributed to it doing so. Innocent misreprentations are those statements of fact that the maker believes to be true but that are, in fact, false. A misrepresentation that the maker knows to be false is fraudulent. Such a misrepresentation constitutes the tort of deceit.

A party that has been deceived by an innocent misrepresentation can usually resort to the following remedies:

- It may claim damages.
- It may cancel the contract.
- It may repudiate the contract and refuse further performance.
- It may affirm the contract.

A party that has been fraudulently deceived may do any of the above and may furthermore prosecute the deceiving party.

### Terms of a contract

The terms of a contract are the promises of the parties. In the simplest form, the term "I will grant you a licence under my patent *ABC*" could be answered by "then I will pay a lump sum licence fee of *XYZ*." Although the implementation of a contract term must relate to the future, it may often take the form of a statement of fact; for example, in a patent licence agreement the licensor may affirm "the patent is valid" and this statement will become a term of the contract and be treated as a promise.

#### Express and implied terms

Although contracts may arise solely by implication from conduct, most of them rest on statements made by the parties and therefore contain express terms. Terms may, however, also be implied. All agreements are made in the light of circumstances known to the parties, and these circumstances may bear on the agreement and be a tacitly accepted part of it, i.e. they may be understood but not declared.

Terms may be implied for any number of reasons, the basis of the implication being that the parties may be taken to have tacitly agreed to them. There are, however, certain common sources of implication. One such source is usage. Where a contract is made between people of the same trade it may usually be assumed that it is to be conducted against the accepted background of that trade, or where a contract is made in a particular locality it may be assumed that it is made in the light of the customs of that locality. Hence, the usage may be treated as being incorporated into the contract.

Terms may be implied by law, either by general rules or by specific statuary provisions, the role of the law being generally to provide obligatory minimum standards for all transactions or relationships of a particular kind.

#### Conditions and warranties

##### Conditions under civil law

In civil law countries, condition signifies a future uncertain event whose occurrence or non-occurrence may trigger or suppress certain legal consequences. The word is used in this sense in common law as well, as in the phrases "conditions precedent" and "conditions subsequent". The effect of a condition precedent is suspensive, i.e. it suspends the implementation of a contract, whereas a condition subsequent resolves a contract after it has come into force.

In addition, the concept of condition is used in common law in the law of contract to denote the principle that if one party to a contract is bound to perform first or if the performance of the two parties is to take place simultaneously, the duty of one contractor to perform is subject to the condition that the other party has already performed or is ready and willing to perform at the agreed time.

Finally, in common (and in particular in English) law, the word condition has also been used to denote an essential term of the contract whose non-performance gives the innocent party the right both to refuse to perform its own obligations and to claim damages for non-performance of the whole contract.

##### Terms, conditions, and warranties under common law

By tradition, terms used to be of two kinds in common law jurisdictions: either conditions or warranties. Conditions are terms of major importance that form the main basis of the contract, and the breach of a condition gives the aggrieved party a right to damages and, subject to certain conditions, to repudiate the contract. Warranties are terms of minor importance and a breach of warranty gives a right only to damages. Common law thus treats all contracts as guarantees, leading to a claim for damages for breach of contract if the guaranteed result is not produced by the debtor. Therefore, common law in particular does not have any special way of dealing with defects in goods, work or service since the breach of guarantees in contracts of sale, service, lease etc. are just like all other breaches of contract, which themselves arise from broken guarantees.

##### Warranties under civil law

Civil law jurisdictions usually distinguish between the provisions regarding the guarantee of title and quality in things and the general provisions relating to non-performance of contracts. Defective performance does not necessarily constitute a case of non-performance, and the creditor can only exercise the claims based on the statutory guarantee provided for in the law for the type of contract concerned, usually a curing of the defect or defective performance or an adequate reduction in price or a rescission of the contract.

### Representation

#### General

People unable or unwilling to act for themselves may use the assistance of persons who transact with third parties "for them": "on their account", "as agents", "in their name", etc. The word "representation" denotes a situation where a principal (or the law itself, see below) has authorized another, his representative or agent, to enter into legal transactions with third parties or to make statements (declarations) on his behalf, with binding force for himself.

The civil law countries make a basic distinction depending on whether the transaction with the third party is conducted in the middleman's own name or in the name of his principal. Only when the third party knows, either from the middleman or from the circumstances, that the transaction is a transaction of another does the middleman's activity have any direct effect on his principal, and it is only in such cases that the laws of civil law countries speak of representation. If the middleman transacts in his own name, he alone acquires rights and duties under the contract even if, just as in the case of true representation, he was acting on the principal's business and account without having any personal interest in the transaction at all.

Such a distinction is unknown to the common law. If a middleman (agent) acting within the scope of his authority concludes a contract with a third party on his principal's account, the principal acquires rights and duties under this contract even if the middleman acted as an undisclosed agent, that is, made the transaction in his own name and did not reveal the fact that he was acting for a principal.

### *Statutory representation*

#### *Statutory representation of natural persons*

The laws of civil law countries have the legal institution of statutory representation, allowing incapable persons such as minors and the mentally unsound to take part in legal matters with the help of statutory representatives. For example, the parents may be the statutory general representatives of minors in legal matters. The concept of statutory representations is unknown in common law.

#### *Statutory representation of legal persons*

Legal persons can act only through natural persons. Persons appointed to represent a legal person (such as a company) in accordance with its charter, articles of association etc. are its organs. What organs a legal person may (or must) have is provided for in various laws, in particular in company laws.

### *Contractual representation*

The principal's authority for his contractual representation may, as a rule, be given in writing, words or conduct, unless there is a requirement that it should be given in a special form. A written authority is usually referred to as power of attorney. In principle, a representative (agent) may (and can) bind his principal only within the limits of the authority granted to him, i.e., acquire rights or assume obligations directly for the principal.

## The performance of contracts

### *Claims to performance and their enforcement*

A person who enters into a contract expects the other party to do as it promised, i.e. to perform the contract. He may be disappointed. For example, the goods may not be delivered. The question then arises, What forms of legal relief will the legal system offer the contractor who has been deceived in his expectation that the contract will be performed? The principle in all modern legal systems is as follows: the creditor must not simply help himself, by, for example, taking the goods from the seller or using other private and forcible methods to compel the other party to perform its promise. The innocent party must go to court and establish its claim for non-performance of the contract before it takes any further steps against the debtor, and those steps, too, must proceed under the supervision of the State.

The party that suffered a loss because it has not got what it was promised may be content with monetary compensation. This will normally be the case if something as good as what was promised can be procured elsewhere, even at a higher price, for the innocent party will be content to sue the defaulter for damages for the extra it has to pay. But what shall be done when it is difficult or impossible to calculate the damage or when no calculation can reflect any special interest the creditor may have in having the contract performed? This question leads to another question: Under what circumstances may a court, at the insistence of the plaintiff, order specific performance (see below) by the defendant?

Even if the court grants the creditor's claim for performance, he still does not have what he really wants, for many debtors do not satisfy a claim even if it has been established in court, either because they cannot or because they do not want to. The State helps the creditor by enforcing procedures for his claim against the debtor's will.

No further attention will be part to the execution of claim, which is beyond the scope of this module. Suffice it to say that money claims, or the payment of licence fees, are enforced in all countries by having State execution officials seize and sell the property of the debtor and then hand the proceeds of the sale to the creditor and that claims are often enforced by other means, depending on the relevant law in the country where enforcement/execution is sought.

### *Specific performance*

Unlike in common law (see below), in civil law a claim for performance of a contract is generally recognized: the creditor has the right to bring a claim for performance of a contract in court and to obtain judgement ordering the debtor to fulfil it. For this purpose it is immaterial whether the debtor's obligation is, for example, to deliver goods pursuant to a sale, to vacate a house or to refrain from illegal competition.

A judgement ordering the debtor to perform the contract in kind can be issued only if performance is still possible and is only useful if the legal system provides the means to make it effective. Accordingly, the question arises whether and how such a judgement can be enforced. Usually the law provides for set procedures pursuant to which the debtor can be compelled by using the State's coercive powers to satisfy the creditor's claim. These procedures for enforcing judgments for specific performance differ quite considerably in the various legal systems.

Whereas in civil law countries a party to a contract is in principle entitled to demand that the contract be performed in kind (specific performance), the standpoint of common law is quite different: if a party to a contract does not perform the contract as promised, the innocent party's only right, in general, is to bring a claim for breach of contract, which leads to monetary compensation or damages. The idea that the conclusion of a contract engenders an enforceable duty to perform it is foreign to common law, according to which the only universal consequence of not keeping a legally binding promise is that the law makes the promisor pay damages.

In exceptional cases, however, even in common law countries, specific performance may be claimed, it being understood that an order of specific performance remains in the complete discretion of the judge.

The most important requirement a party must satisfy if it seeks an order of specific performance is that the normal sanction of damages is inadequate and that it has an interest in the performance of the contract that cannot easily be translated into monetary terms. Where the contract is for the transfer of technology, the creditor's (recipient's) interest is that technology that cannot be adequately estimated in money if it is impossible to obtain an identical or similar technology from a third party.

The inadequacy of a claim for damages is not the only factor when an order of specific performance is sought. The courts often ask whether the execution of a judgement for performance would involve great inconvenience.

Specific performance will not be granted if the contract calls for personal services from the defendant.

While a claim for performance is the normal sanction in civil law countries and specific performance is regarded as exceptional in common law, the actual contrast is not quite so sharp. Where the claim to performance is regarded as the primary legal remedy, it does not in practice have the significance originally attached to it: whenever non-performance can be made good by the payment of money, businessmen often prefer to claim damages rather than risk wasting time and money on a claim for performance whose execution may not produce satisfactory results. On the other hand, the traditional common law view, explicable only on historical grounds, that specific performance is an exceptional remedy is apparently losing some of its force.

### *Penalties and liquidated damages*

To avoid the expense and uncertainty of litigation, many commercial contracts include clauses specifying in advance the amount of damages payable in the event of breach, i.e. the parties assess the damages that would be owing were there a breach of the contract by one or both of them and introduce this assessment into the terms of the contract. This does, however, not exclude the application of the rule that damages for a breach are to be compensatory and not penal. It is therefore a question of the proper construction of the contract to decide whether a sum fixed in this way, however the parties may have described it, is a penalty, in which case it may not be recovered in common law jurisdictions, or a genuine attempt to liquidate, that is to say, to reduce to certainty the prospective damages. In any event, the fixed sum may be calculated either as a lump sum or on a scale varying with the length of the default.

Clauses to that effect sanction a wide variety of behaviours: performance delays, non-respect of quality or production guarantees, failure to supply, non-performance of a purchase obligation.

A damages clause makes it unnecessary for the parties to determine or even prove damages or have damages fixed by the court and offers advantages not only to the buyer or licensee but also to the supplier or licensor, in so far as it might limit his liability. The treatment of such clauses varies from one legal system to another.

#### *Common law countries*

The law of common law countries distinguishes between liquidated damages and penalties. A penalty clause is only valid and effective if it seeks to impose a pre-estimate of damages likely to result from the breach in question. It is not regarded as valid *per se*. However, the law will recognize the validity of the parties' own assessment of the damages at which they rate a breach by one or both of them. Thus, it is a question whether a sum fixed in that way is a penalty (and therefore irrecoverable) or liquidated damages (and therefore recoverable) as judged at the time of drawing up the contract, not as at the time of the breach.

The genuine intention of the parties has to be ascertained; the use of the terms liquidated damages or penalties in the clause may indicate the parties' intention but is not conclusive. If the sum fixed in the contract qualifies as liquidated damages, the court will award that sum. It is no obstacle to its recovery that the consequences of the breach are such as to make the pre-estimate of damages almost an impossibility; it is equally irrelevant that the loss actually suffered is lower or higher.

Whether or not the stipulated sum is construed by the courts as a penalty or as liquidated damages, the clear advantage of fixing such a figure remains in either case to facilitate the recovery of damages without the difficulty and expense of proving actual damage. The differences between these two types of clauses are also important in the law of procedure; if the clause stipulates liquidated damages, the party that claims damages need not prove the amount of damages, but if it is a penalty clause (which, as has been seen, is ignored), the party has to prove the amount of damages which it wants to recover.

### *Civil law countries*

In contrast, in civil law countries, the law on the subject of penalty or liquidated clauses can be extremely complex. Starting from the principle that such clauses are not subject to modification, each system provides a whole series of exceptions to the general rule, which in practice gives rise to considerable uncertainty. The rule of thumb is that such clauses are used for two purposes: to guarantee contractual performance and to provide an estimate of the damages in the event of default. Such clauses are generally acceptable, although the courts in different countries tend to emphasize either the guarantee or the damage aspect. Their enforceability, however, is not without judicial interference or adjustment in many civil law countries.

On the whole, there is some justification for saying that in international commercial transactions these clauses, which appear so attractive at first sight, may, owing to the confusion and uncertainty they engender in commercial relations, cause significant problems. It is therefore doubtful whether their procedural advantage is a sufficient counterbalance to their uncertainty from the point of view of substantive law. However, as most countries recognize the parties' right to stipulate an applicable law and this law governs the validity of such clauses, the parties can make sure what the effects of a penalty or liquidated damages clause are by looking carefully at the applicable law and then carefully drafting the clause to reflect their intention in view of the applicable law. Very often, however, they fail to do that, assuming (especially if the words for it sound alike in their respective languages) that a penalty is treated under the applicable foreign law just as under their domestic law, which quite often is a fallacy.

In legal systems that recognize the validity of penalty clauses it is clear that the stipulation of a liquidated sum payable immediately on failure to perform can act as a salutary stimulant to induce the promisor to fulfil his obligations. Moreover, its use avoids the delay, expense and difficulties of proof inherent in an assessment by a count of the damage arising out of a breach of contract.

## *The effect of supervening events*

### *General*

A party to a contract not performing it properly is generally liable for breach of contract. If, however, it is prevented, albeit temporarily, from performance by circumstances unforeseeable and beyond its control, then an exception is made. Thus impossibility of a factual or legal nature may often act as an "exculpatory obstacle to performance". But what shall be done if the unforeseen change of circumstances does not exactly render it impossible for the debtor to perform the contract but makes it much more difficult or much more expensive, so that the two sides of the contract are now quite out of proportion? What shall be done in cases of frustration of purpose, when one party to the contract is to pay a sum of money and can easily do so but finds that the other party's performance has now been rendered valueless for it by subsequent events?

A distinction is drawn here between circumstances that render the performance of the contract (temporarily or definitively), impossible, those that render it much more difficult and those that frustrate the purpose of the transaction only to help classify and clarify the cases, which in fact are closely interconnected.

#### Force majeure

The question whether a person may be released from his contractual obligations has been familiar to lawyers in civil law countries for centuries. It appeared in the doctrine making the validity for a contract dependent on the continuation of the circumstances prevailing at the time of its formation. Thus, in many civil law countries the concept of *force majeure* is used to render certain changes of circumstances relevant one way or another. Cases of *force majeure*, that is, external events unforeseeable and unavoidable (by reasonable means) in their consequences, may release a party from liability for late or non-performance of a contract, with the result that either its obligations are suspended for the duration of the event or, if appropriate, the contract is terminated.

The concept of *force majeure* is thus not really one of common law, and parties should not incorporate the term into common law contracts without any formal contract definition. Few common law cases have interpreted the phrase, but the conclusion to be drawn from them is that *force majeure* is a term can only be construed in the light of the facts of each particular case and the general drift of the contract containing it. In general, for an event to be one of *force majeure*, it must be outside the control of the parties to the contract and must cause some physical or material constraint.

With regard to the various jurisdictions that do use the term *force majeure*, this can have a very different meaning, depending on the system of law applied. One should therefore be very careful to understand exactly what is meant by the term in the law that governs the contract in question.

In all jurisdictions the consequences of *force majeure* are roughly the same. The contract may be terminated or its performance suspended, and there is an equitable right to readjust the past to prevent one party taking advantage of the termination to benefit from either work done and not paid for, or from payments made in advance. One can see that although the principles on which the concept of *force majeure* is based are rather different from those underlying the common law doctrine of frustration (see below), the result is roughly the same, except that the law of *force majeure* is normally more flexible in dealing with the consequences to the parties of the termination of the contract.

### *Frustration*

Common law countries normally consider the matters discussed here under the heading of discharge by frustration. The two principles are different ways of looking at the same problem, but while they overlap to some extent, they are by no means identical.

The common law doctrine of frustration may be termed a very narrow type of *force majeure*, with no recognition of the doctrine of hardship (see below), while *force majeure* clauses relate to circumstances that cause a degree of hardship that makes the performance of the contract temporarily or definitely out of the question. The two clauses have two things in common. First, they are both linked to disturbances during the period of the performance of the contract; secondly, neither of the parties is legally responsible (in contrast to a breach of contract such as defective quality or lack of performance).

### *Hardship*

By hardship are usually understood events that arise subsequent to the entry into force of the contract and that, although they do not make it impossible to perform the contract, force a party to accept a much greater risk than it had contemplated when it entered into the contract. There is, however, a great difference in the way various jurisdictions deal with the doctrine of hardship.

These events may in some jurisdictions allow the application of the principle of *force majeure*, but normally they are treated under the principle of hardship, which indicates a situation where an alteration of political, economic, financial, legal or technological factors results in a fundamental and material alteration to the nature of the obligations assumed by the parties under the contract. They will rarely, if ever, allow the application of the common law doctrine of frustration.

In general, hardship clauses aim at the renegotiation of the terms of the contract with a view to creating conditions that will lead to the contract being performed despite the new situation.

### *Acts of God*

Finally, it will be useful to consider the definition of the term "act of God", which often appears in clauses purporting to be *force majeure* clauses, as in some people's minds the term seems to be equivalent to the term *force majeure*. Certainly, the occurrence of an act of God may give rise to frustration of the contract or the operation of the doctrine of *force majeure*. It is also often stated as one of the reasons in exemption clauses excluding liability for failure to perform or justifying an extension of time. However, it has a much narrower meaning than *force majeure* and should not be confused with it.

An act of God is an event that is solely due to natural causes of such an extraordinary nature that it could neither have been foreseen nor reasonably guarded against. In general, act of God, when it is not expressly mentioned in a contract clause, has little application in the field of contract. It is, however, used in common law jurisdictions as a defence against certain torts.

### *Conclusion*

From the above it appears that the general law on *force majeure*, frustration and hardship should be made and the extent be stated to which foreseeability, fault and lack of control are relevant. The parties should enumerate all the circumstances they wish to call *force majeure* or hardship, either because they are true cases under the applicable contract law or because the parties wish them to be so treated, even if the law does not so provide. The most common situations are war, strikes, labour disputes, acts of State, acts of God and adverse legislation or government decrees. The effect of the events so defined should be specified.

## The law of property

### *Absolute nature of property rights*

By its nature, a contractual agreement creates a legal relationship only between the contracting parties, each of whom is given rights that are enforceable at law. The general rule, therefore, is that only a person who is a party to a contract can sue on it: only the parties to a contract are affected by the rights and duties resulting from it, the contractual bond being relative. This rule is known in common law as the doctrine of privity of contract.

By contrast, the owner of an object has no direct relationship with any other person, but has a right to the object, a right of dominion, a right protected against everyone and therefore (in particular in civil law countries) sometimes called an absolute right; as such, it is protected by the law of tort (see below) and by special rules in the law of property.

### *Ownership*

#### *The concept of ownership*

Ownership may be described as the entirety of the powers allowed by law to use and dispose of an object. The owner of an object thus has an aggregate of rights, namely those of enjoyment, destruction and disposition.

#### *Freedom of ownership*

The owner of an object may, in principle, do whatever he chooses with it and exclude others from all effect on it. This freedom of the owner is, however, not absolute: it must be exercised within the limits prescribed by law and subject to the rights of third parties. The legal constraints on the owner's freedom to deal with his property as he thinks fit vary from country to country and very often reflect a country's political and economic system.

#### *Acquisition of ownership*

Ownership may be acquired in the following ways:

- Originally, that is, by creating something, e.g. a picture, or by occupation, whereby a person claims something not owned by anyone, e.g. a wild bird.
- Derivatively, through sale, gift or compulsorily by law, for example, where goods or land are compulsorily acquired by statute or taken by duress in execution of a judgement.
- By succession, on the death of the previous owner, e.g. the beneficiary under a will.

#### *Protection of ownership*

Ownership is usually very well protected by the law of tort, which gives a claim against a third party who adversely affects it. Thus, an owner can demand the return of his property from the person in possession of it without some right to possess it derived from the owner himself. In case of unjustified invasions of ownership other than dispossession, the owner can demand that they cease and request an injunction.

Ownership is usually also protected against the State. This is especially important with regard to expropriations. Thus, the rules on expropriation, which are often contained in public law enactments, usually provide for fair compensation and due process.

### *Possession*

Possession is usually not regarded as a right in itself but as a physical relation to an object, namely the physical control over it combined with the intent to exercise (exclusive) possession of the object itself and thus to prevent others from using it.

Possession is largely a question of fact. Thus, if *A* lends a fountain-pen to *B* for his examinations, *B* is in temporary possession of the pen, while *A* remains the owner.

Possession may be obtained lawfully and unlawfully. Lawful possession needs no explanation, as the above example demonstrates. A thief acquires unlawful possession of a stolen object but no rights to it against the lawful owner.

Although possession is largely a question of fact, it also has considerable legal significance, as there are legal rights attaching to it and to the protection given to it by law. Thus, it is usually protected against invasion and infringement by third parties, regardless of the possessor's title. If a person's possession is groundlessly challenged or if he is dispossessed without justification, he may sometimes retain or retake the property by force, if need be, or else by legal process.

With regard to movables, possession also has a publicity function: it may be an outward manifestation of ownership to the extent that a third party can rely on it. If the owner of an object sells it and says he is the owner when he is not, the buyer may still become the owner by acquisition in good faith according to the laws of many countries.

### *Property*

The word property has several meanings. It may mean ownership. Thus, one may say that *A* has property of a watch, meaning *A* owns the watch. Or it may mean the object or objects capable of ownership.

In this sense the word includes any object that a person may own or possess. Property may be tangible or intangible. Tangible property may be divided into movables and immovables. Movables can actually be possessed and transferred physically, such as books, cars or furniture. Like other forms of property, they may be the subject of a contract. The owner's rights to property are protected by the law of torts and by criminal law.

The laws of most countries usually contain more or less detailed rules on the ownership of land (and other rights, such as liens, related to it) and other tangible property, its protection and acquisition.

There are many forms of property that are not tangible physical objects. Debts, for instance, and shares in a company, are property, but they cannot be touched or seen. The owner's right to this kind of property cannot be asserted by taking possession, but only by means of an action. Important in the context of this *Manual on Technology Transfer Negotiations* is intellectual property as a form of intangible property (see below).

## Intellectual and industrial property

### *General*

The legal systems of most countries provide for means whereby inventors, innovators, entrepreneurs and authors can protect their inventions, ideas, information, reputations etc. against exploitation by others, if not indefinitely, then at least for specified terms. The rights that may subsist in these are generally termed intellectual property rights, with the term intellectual property covering copyright and industrial property. Industrial property may include in particular the forms listed below. The scope and specific nature of the protection or right or remedies available may differ among countries and legal systems, and some countries or systems may include additional special forms of protection such as petty patents or utility models or semiconductor chip topography rights.

Thus it is of paramount importance to consider the differences in the various forms of industrial property rights that are the subject-matter of a licence agreement in their national context in order to ensure that the licensor grants and the licensee obtains the rights contemplated by the parties.

### *Forms of industrial property*

#### *Patents*

A patent is a statutory privilege granted by a Government to an inventor and to other persons deriving their rights from the inventor, for a fixed period of years, to exclude other persons form manufacturing, using or selling a patented product or from utilizing a patented method or process.

#### *Industrial designs*

An industrial design is the ornamental or aesthetic aspect of a useful article. The ornamental aspect may consist of the shape, pattern or colour of an article, and it must be reproducible by industrial means. Industrial designs are protected by registration.

#### *Know-how*

Many definitions of know-how have been suggested. Suffice it to say here that it may include any industrial information or techniques likely to assist in the manufacturing or processing of goods or materials. Unlike patents or trademarks, it is not really a proprietary right directly protected by statutory provisions but (depending on the jurisdiction and provided it is secret) by criminal law, unfair competition law, trade secret law or similar civil law. Appropriate secrecy or confidentiality provisions in contracts are therefore of paramount importance.

#### *Trade and service marks*

A trade or service mark ("mark") is a visible sign that serves to distinguish the products or services of one enterprise from the products or services of other enterprises. While a mark is protected by statutory enactment, it differs from a patent in two important aspects: Although initially issued for a term of years, it is usually renewable for subsequent periods to time without limitation. In many countries, marks can be obtained through registration and without use, although subsequent non-use may result in their loss. In some countries, trade mark licensing is not permitted.

#### *Rights relating to semiconductor chips*

In certain countries, in particular the United States and the member States of the European Union and the European Economic Area, legislation exists creating a special exclusive right in the topography/mark work of semiconductor chips.

#### *Biotechnology rights*

Biology has presented the patent system with a challenge. If something must be novel and inventive in order to be patentable, does the discovery of some organism/product/process already existing in nature constitute a patentable invention or an unpatentable discovery? The recent advances in genetic engineering have made the boundaries between discovery and invention harder to define. In view of the uncertainty of whether patent protection may be obtained, many believe that secrecy and aggressive marketing to achieve rapid market dominance is the best strategy for protection.

In the European Union, plans exist at the Union level to provide more certainty by way of a directive, a draft of which has been published.

## The law of torts

### *Tort in general*

The word "tort" is derived from the French tort, meaning wrong. Torts must be distinguished from crimes, on the one hand, and from breaches of contract, on the other. A crime is a wrong which, by means of punishment or otherwise, the State inhibits. The same facts may constitute both a crime and a tort.

A tort is a civil wrong that entitles the person injured to claim damages for his loss, whether purely by way of reparation or to show the defendant the anti-social nature of his act. An injunction may also be a proper remedy in some circumstances. A breach of contract is, like a tort, a civil wrong, but it is different from a tort. Whereas contractual duties are imposed by the parties to the contract themselves, the duty to refrain from committing torts is imposed by the general law. Here, too, the same circumstances may give rise to a breach of contract and a tort.

In civil law jurisdictions, the law of tort is based on a general principle of delictual liability. Even where the cases that fall under the general principles are divided into categories, the imposition of liability in damages ultimately depends on the same statutory text and on the fulfilment of its requirements.

The common law countries, on the other hand, adhere to a system that as a matter of principle, distinguishes separate types of torts, such as defamation, deceit and negligence. Each of these is regarded as independent and each has its own constituent elements and defenses. The most important tort in practice is the tort of negligence, the word here meaning that in order to support an action for damages for negligence, the plaintiff has to show he has been injured by the breach of a duty owed to him in the circumstances by the defendant to take reasonable care to avoid such injury.

Irrespective of the legal system, a claim based on tort presupposes the following:

A tort may be committed intentionally or negligently, i.e. by breaching a legal duty to take care. Even where there is proof of such a fault, a further requirement to be met before the plaintiff's case is fully established, apart from proving actual damage, is proof of causation, i.e. the damage must result from, or be caused by, the defendant's breach of duty.

Normally, then, when claiming damages the plaintiff must prove the following:

- That he suffered a damage.
- That the defendant is at fault.
- That the damage is in some way the result of that fault.

Damage includes physical injury, damage to property etc. Subject to exceptions, in many jurisdictions a purely economic loss, such as a loss of profit, is not recoverable under the law of torts.

### *Liability for others*

As a general rule, people are not liable for the torts of others. This general rule may, however, be subject to a number of exceptions, depending on the jurisdiction involved. Thus an employer can be liable for a tort committed by an employee in the course of his employment, but as a general rule he is not liable for the torts of an independent contractor.

### *Strict liability*

As a matter of principle, tortious liability is based on the principle of no liability without fault. Many factors have led, particularly in industrialized states, to the limitation, restriction or evasion of the pure principle of fault in tort law, or even its abandonment for certain types of accident. These factors include the growing use of machines and technical devices of all kinds in industry, manufacture and transport, the increased risk they present of causing damage to persons or property that is severe, that is, that exceeds the victim's capacity to bear it, his consequent need for protection, the possibility of spreading the risk of loss through the community as a whole by means of insurance and the great change in people's view of the degree of social security which a legal system should guarantee to its members.

The type of strict regime of liability of most interest in the context of the subject-matter of this *Manual* is the case where a person suffers personal injury or damage to property as a consequence of a defective product. What is of special importance is whether the victim has any claim against the manufacturer. In many countries the courts have developed special rules for the liability of the manufacturer of products, irrespective of his fault, and more recently, product liability laws providing for his strict liability have been enacted in a number of countries, particularly in Europe.

In the context of this *Manual* it will be relevant, whether, under the applicable laws, the licensor having licensed the technology used by the licensee in the manufacture of a defective product may be sued as a quasi-manufacturer for damages by a person injured as a result of the defect, or, if the licensee is sued as the actual manufacturer, whether he has a recourse against the licensor on the grounds that the licensed technology has caused the defect.

# Module 12

## AN APPROACH TO CONTRACT DRAFTING

*This module focuses on approaches to contract drafting, provides an overview of the drafting process and suggests useful strategies for producing a draft. It deals more with the roles and attitudes of the contract drafter than with the operational principles of certain contract clauses which are discussed elsewhere in the* Manual. *Factors to be considered before producing a draft contract include the unique features of the agreement, the details of the technology, the economic aims and purposes of the contract the implementation process, the structure of the contract, and the language selected. Recommendations are given for incorporating these factors into the contract, and their importance is discussed.*

# Contents

# AN APPROACH TO CONTACT DRAFTING

## Introduction

This module deals with approaches to contract drafting. Its focus is on philosophy and attitude. Rather than reviewing the principles of certain clauses of a contract, which will be done elsewhere in the *Manual*, it discusses the state of mind the drafter should bring to the task of drafting a contract.

Contracts provide a vehicle for transactions in an economy. The role of a contract is twofold; it not only records the transaction undertaken by the parties, but also guides its implementation. In this respect the contract is an important tool for success.

When project implementation goes well, few people ever read the contract. The document rests in a drawer, used only for checking addresses and the numbers of copies of documents to be sent to which individuals and parties. But not all agreements proceed so smoothly. In these cases, a contract assumes considerable importance.

When a transaction becomes subject to litigation in court or goes before an arbitration board, the first thing a judge considers is the contract text. It represents the intent or will of the parties. To be considered valid, a contract usually needs to take written form.

It is vitally important that a contract spells out as clearly and precisely as possible the identity of the parties, the character or nature of the contract, its subject(s), the grant of rights and their limitations, the scope and limits of supplies and other obligations, the consequences of possible defects and the termination or expiration of rights and obligations. The less room left for alternative interpretations, the better.

Clarity and precision have a further advantage in the case of a long-term agreement. The persons dealing with it on both sides may change, but clear, well-phrased text will prevent newcomers from interpreting the contract differently than initially intended. Conciseness generally has the same effect.

The drafter should remember that a contract is a legal document. In the case of technology transfer a contract is technical and its purpose economic. The contract is a complex document with technical, economic and commercial—in short, business—aspects assembled and explained in legal (that is, contractual) language.

## Contract characteristics

### *Correctness, fairness and balance*

A contract should correctly present the basic interests and expectations of the parties and exhibit fairness and balance in the rights and obligations asserted. Licensees are most concerned with making a success of their enterprise, that is, making it productive and profitable. Licensors are concerned with proper protection of their technology from misuse and timely realization of payments. Contracts must endeavour to show that there is a balance in such expectations.

The best way to judge if a contract meets these criteria is to step back and take an impartial, objective look at it. The licensor's expectations must be comparable to those articulated in his other negotiated licences or to provisions seen in seminar arrangements elsewhere.

It must be clear that the licensor is not overbearing in the demand being made and that they will not comprise the productivity, profitability, growth and market status of the licensee.

Correspondingly, the licensee must respect the licensor's wish to maximize returns through his ownership and development of technology and must understand the risk exposure of the licensor. The impartial point of view should draw attention to alternative arrangements available to the licensee from other sources.

### *Homogeneity*

A contract is a homogeneous document and not simply a loose collection of clauses. Ideally, the clauses (and conditions) of the contract are interrelated and consistent with each other. They form a closed-loop control system, where any controlling action taken to modify one element of the system will also have an effect on other elements. For example, a change in the date set for providing basic starting data will also affect the date for supplying the design. This may, in turn, affect clauses dealing with payments and penalties, as well as clauses dealing with plant erection and commissioning, and those concerning acceptance. Thus, there are considerable similarities between designing a closed-loop process control system, drafting a set of patent claims and drafting a contract.

### *Purpose of a contract*

The purpose of a contract is to set out the understanding, arrived at after negotiations, of parties to an undertaking or venture, and to provide for the enforceability of this understanding in a court of law. A contract usually addresses itself to three main issues: *(a)* the subject-matter of the agreement, *(b)* the business interests of the parties and *(c)* legal-administrative provisions that govern undertakings under the contract and its enforceability. A contract is typically a complete and self-contained document, but sometimes it can refer to another agreement.

The final contract generally emerges after several intervening activities have been completed: *(a)* the completion of face-to-face negotiations (see module 8, on negotiating), *(b)* the preparation and submission of a draft contract by the party specifically identified during negotiations, *(c)* a review by the receiving party from the point of view of its self-interest, *(d)* counter-proposals, if any, of the necessary party and *(e)* an indication of their acceptability to the party preparing the primary draft, with face-to-face renegotiation sometimes required.

Thus, before gaining its final shape and substance, a contract may go through a series of drafting exercises to resolve conflicting points of view. This is not merely a matter of redrafting but also of proposing/accepting trade-offs and options. Where complex issues are involved, the first draft may be preceded by a memorandum of understanding drafted by both the parties together after they have had their major and defining face-to-face meeting. This facilitates the preparation of the final contract.

### *Unity of concept and completeness*

In a well-thought-out contract, there will be an inherent logic of development, a close interrelationship among the various elements and a state of completeness. Thus, the recital clauses give the background for the undertaking, particularly the intentions of the parties; the definitions clause set will pay specific attention to the terms of the contract so as to reduce ambiguity; the grants section (in, say, an agreement concerning intellectual property rights) will state what is the specific right given by the licensor to the licensee, the obligations of the licensor in connection with that grant and the reciprocal obligations of the licensee (see modules 13 and 14).

The clauses not only need to be complete in themselves, but they must also exhibit a relationship to those clauses with which they are allied or interlocked. For instance, a payments clause needs to be interlocked with clauses dealing with payment terms (the currency in which payments are to be made, due dates, the place of payment etc.) A good contract will also be a complete contract in the sense that should the parties discharge their respective obligations as set forth in the contract, the undertaking to which the contract applies will prove successful and will meet the original expectations of the parties.

### *Reversal of roles*

At the macro-level, technology transfer puts the transferor in the role of the "obligor" and the transferee or recipient in the role of the "obligee." In the various clauses of a contract, however, these roles are reversed continuously.

By definition, all clauses reflect an obligation on one side and a right to demand such an obligation on the other. In one instance it is the transferor who is obliged to do something (obligor), and in another case it is he who demands fulfilment of the obligation. The transferee, for this obligation under this clause, is the obligor. For example, suppose the transferor is obliged to provide a drawing, but he can only deliver the drawing on time if he has received the initial data necessary for the drawing on schedule. The drawing could well be incorrect or defective if the initial data were incorrect.

It is important to remember this principle when drafting, because the actions of one party not only influence those of the other party but may also release the first party from consequences stated in the contract.

### *Establishing minimum requirements and conditions*

Once the main objective of the contract is clear and the process of implementation has been considered, the drafter has to clarify the minimum requirements and conditions of the contract. That is, he must set the limits for all essential rights and obligations that must be achieved in order to ensure its success. The drafter must also consider the possible limits beyond which his counterpart cannot go. He must consider the "price" of any advantage expected, as well as possible concessions and/or unwillingness to compromise.

### *Anticipating problems*

One of the most useful habits the drafter should acquire is to continuously ask and seek to answer the question, What could go wrong? Competent colleagues can help. Partners should be sought within the organization with expertise in particular subjects and a team assembled when the first contract draft is ready. The team's mission is to project scenarios, from mere annoyances to worst cases. The exercise will considerably improve the draft.

The drafter's responsibility includes recording the agreement and considering the process of implementation. The drafter and the team must also look ahead, try to identify potential problems, and provide contingency plans for what can go wrong. Such contingencies can be developed by answering questions such as the following:

- What happens if the market changes?
- What happens if the licensor or licensee were to find new applications?
- What if the patents are declared invalid?
- What if competitors come up with a newer technology?
- What if the licensor decides to grant the licence to someone else who intends to break into the same market (i.e., a competitor)?
- What if someone infringes the licence rights?
- What if the licensee wishes to get out of the agreement?

The contract should be drafted in language that explicitly covers adverse turns of events and other possible changes. The questions help to answer the general question, What could go wrong? They should be answered bearing in mind events that could happen 5-15 years following project implementation.

### *Originality*

Each contract is unique and irreproducible. It should be tailored to fit only the project in question. There are those who suggest using a contract concluded on a similar subject as a model, with slight modifications. While such contracts could and should be studied, as they may be useful, an old contract should not be copied. Care should be taken when using model contracts. Keep in mind the following:

- Conditions are never identical, not even if the technology and the plant capacity are the same. An analysis of particular conditions, through the application of principles above, should never be omitted.
- A contract already concluded is the result of compromises based on positions or conditions different from those prevailing for the project in question and on the negotiating capabilities of the two parties to that particular contract. Starting from the position in a model contract, there will most likely be other contract negotiations, new compromises will have to be made.

Such documents should be studied to learn more about the subject of contracting, but they should never be considered as anything other than a check-list of what should not be left out, or as a suggestion for the wording of certain clauses. They must never be copied without studying every word and the entire context and without asking the questions, Is it good for us? Does it cover our case? Each case is unique, and success or failure strongly depends on specific conditions, not on model conditions or assumptions.

Check-lists, model contracts, model forms, form books and similar agreements can be safely used by expert drafters only, who know what changes or modifications are needed both in the structure of the agreement and in the wording of the clauses to describe the specific features and individual requirements of the project and contract at hand. A contract needs to correctly reflect the agreement both parties have in mind to correctly serve its economic aim and purpose. Those who are not yet expert drafters should use such models with great care and should ask a lawyer to revise the draft. This is absolutely necessary to prevent later trouble.

### *Taking enough time*

Contract drafting is a time-consuming job. Enough time needs to be taken to produce a useful draft. While many people admit this is true they claim there is not enough time to do everything that has been suggested here. Experience shows, however, that taking the time required to produce a superior draft will pay off in the long run, saving money by anticipating problems and damage and by applying sound, tested principles. The more contracts one drafts, the less time it will take, but it will never become a matter of simple copying. A good contract will always take time, but it will endure.

## Points to clarify before drafting

### *Law of contract and drafting procedure*

Either the licensor or the licensee may draft the contract with the consent of the other party, it being noted that the contract will generally tilt in favour of the drafting party. Drafting generally calls for a multidisciplinary effort that brings together the business, financial and legal interests of the party drafting the agreement. It is best carried out by a team of personnel with professional experience in these areas, headed by a leader who can come from any of the disciplines mentioned. In small businesses, a capable entrepreneur or a principal manager is often able to put together a draft agreement and have an attorney (with experience in the field) or a small law firm flesh it out and make it a legally valid document.

Drafting has two main dimensions to it: *(a)* the techno-economic content of the intended licence and *(b)* the legal framework of the contract, both of which raise key issues.

The techno-economic content of a contract is determined by the nature of the intended undertaking and its purpose. It may dominate a contract whose objective is, for example, to have the supplier/licensor erect a manufacturing plant for the client/licensee. It may, by contrast, be a rather insignificant part of a trade mark licence where statutory provisions and legal issues relating to, for instance, the ownership, registration and use of the trade mark will tend to dominate.

If the techno-economic content is significant, it is prudent for the licensee to draft the contract so that the inputs available and the outputs to be achieved are properly itemized and sequenced. However, it may not be feasible for the licensee to fully define these parameters in a know-how-intensive contract, when some technical aspects of the process are revealed to the licensee only after execution of the licence. For instance, a licensee may not be able to place a constraint on a pollutant unless he knows that the pollutant will be produced in the licensed process. For technical know-how contracts, it would not be usual for the licensor to claim the privilege of drafting the contract, in which case, the licensee would need to protect his interests by additional legal provisions. For the instance just cited, a good environmental protection clause can be inserted to ward against unknown pollutants.

The legal framework of the contract refers to the statutes and general laws that will govern the performance of a contract and that can be applied in the event of a dispute. Two components need to be addressed: *(a)* legislation that specifically covers the working of patents (national patent law), the application of trade marks (national trade mark legislation) or copyrights (copyright legislation) and *(b)* the general legal code applicable to the contract, that is, the law that applies to other provisions of the contract.

Unless national legislation provides for the protection of the proprietory rights of a licensor by means of patents, trade marks and copyrights* a licensor will not grant rights-of-use to them and a licensee will not be able to gain competitive advantage.

### *Contract structure*

Two basic systems of national law apply to the provisions of technology contracts: *(a)* those whose origin is in civil law and *(b)* those whose origin is in common law (see module 11, on basic legal notions).

The civil law system (followed by most countries of Europe and applied by others such as Japan and several countries in Latin America) is characterized by a comprehensive codification of the laws that come under the system. Thus, the law of contracts will apply to the provisions of a contract and will apply even though a particular provision is not specifically made in the contract (e.g. warranties of delivery or performance).

The common law system is followed by most English-speaking countries and is characterized by its evolutionary process. The body of law has grown, and continues to grow, based on decisions taken by courts in prior litigation. Familiarity with precedent law is mandatory for good drafting.

Because contracts under civil law are based on legal codes, they tend to be terser and less verbose than contracts under the common law, where it is possible (and safer) to explicitly define all unusual terms or casually used terms (usually nouns) to reduce anomalous interpretation. None the less, there will be terms that are not further expanded on in the contract and for them, resort must be made to decisional law (precedents set). Often, courts make decisions using precedents set in another (common law) country.

It is evident from this discussion that legal counselling is essential for the development of most contracts. However, the party drafting the agreement must carefully specify its techno-economic expectations so that legal support can be given to them. A lawyer would be poorly equipped to accomplish this single-handedly, without input from technical people.

The general law governing the contract should be the mutual choice of the licensor and licensee. A contract written with the neutral law of a third country as the governing law becomes interpretable and enforceable by the provisions of that law.

However, national legislation, particularly that of developing countries, often allow its citizens to enter into only those agreements that are enforceable under national law (with exemptions for export contracts etc.). While this would seem to imply that the drafter of the agreement should be the party that comes under the national law (taken here to be that of a developing country), it is more often the case that the expatriate licensor drafts the agreement. This happens because in many cases there is not enough litigation in developing countries to allow interpreting the important terms and legal phrases that are used in agreements (e.g. "sole and exclusive agreement"). If there is litigation, it would not be unusual for developing country courts to rely on interpretation by the courts of industrialized countries rather than creating its own precedents.

*Know-how is another intellectual property right of licensors but in most countries there is no specific statute covering it. It is typically protected by general law through covenants applying to the breach of secrecy or confidentiality.

### *Language of the contract*

If the countries of both parties have the same official languages, the contract should be made in this language, if the parties so agree with due consideration to the law governing the contract and the forum for settling possible legal disputes. If their countries do not have the same official language, the parties should explicitly agree on the language of the contract, which is usually the one used in the negotiations preceding the contract stage and probably in which the one the offer was made. Usually the language is and should be one of the world languages used in international business transactions and found acceptable by both parties (generally either English or French, but sometimes German, Spanish or Portuguese).

### *Preparation of a check-list*

There are actually two lists: one lists the problems to be dealt with in the contract and the second lists the sections and main clauses (an example of the latter appears as an annex in module 13, on types of agreement). The items on the two lists will obviously not be identical. It would be helpful, of course, to study check-lists recommended by other authors writing on this subject. Such check-lists should not, however, be grafted into contract clauses or sections in the final version of the draft. They are meant only to ensure that important matters have not been overlooked.

### *Use of the decimal system for numbering subdivisions*

To facilitate checking and reference, a decimal system of numbering, with subdecimals for subparagraphs or subclauses, should be used. Carefully thought-out titles for major subdivisions also contribute to easy reference.

### *Clear and consistent language*

A contract is a complex business document put into legal or contractual language. The words "legal or contractual language" need explanation. The drafter should not use legal terms understandable only to other lawyers. He or she should write in everyday language using terminology accepted and understood in the branch of business involved. All aspects and issues must be covered and all implications of the words used must be examined.

The choice of words is very important. The drafter must choose words that are clear, concise and explicit. They should express a notion in as few words as possible. The chosen word or word should have a connotation covering all of the meanings intended but nothing more than intended. The choice of words may be vital when it comes to interpretation. Here there is a great similarity with patent claim drafting.

Another aspect of language is that in a contract there is no room for "brightening the style". Once a term has been used and a meaning assigned to it, the drafter should not use a synonym of it, because it might be interpreted as being another term with a different meaning. Wherever the drafter intends to mean the same thing, the same term should be used. This is one of the main advantages of the Anglo-American type of structure and its system of definitions. Once a term has been defined, it is used throughout the entire contract with the same meaning. There is no room for an interpretation different from that given in the definition.

## Definitions

Modern-day drafting practice calls for incorporating a definitions clause set as early as possible in the text of a contract. If, however, there are only a few definitions, they may be defined in the main text of the contract after their first appearance.

The number of definitions and their nature vary from contract to contract. They will be few in, say, franchise agreements but several score in know-how or engineering services contracts. Definitions are generally listed in the order in which they appear in a contract, but sometimes they may be listed alphabetically. Most of them are nouns.

Definitions explain and limit what is meant by a particular term. Typically they have the format "ABC shall mean . . .", where ABC is the term being defined.

The definition given applies only to the contract in question. Separating out the definitions into a set facilitates the understanding of the contract since a focused meaning is given to terms not otherwise set down in legal codes or well-known in commercial practice.

In good drafting practice, a definition should not refer to another definition in the contract, but in many cases this is unavoidable. Sometimes a definition may refer to material appended to the contract. For instance, where many trade marks and branch names are being licensed, it facilitates the reading of the contract to have all of them listed in an appendix, with the term "trade marks" defined in the body of the agreement as the trade marks and branch names listed in that appendix. An appendix also has the advantage of being updatable (both parties agreeing) during the contract period without having to alter text in the sensitive body of the contract. The appendix must be read as a part of a contract document, and many agreements explicitly state this.

The definitions are not a mere glossary of terms in the contract but are part and parcel of it and, indeed of the contractual process. Thus, besides avoiding defining a term every time it occurs, the definition also helps in official correspondence that will take place after the agreement becomes effective. For example, a reference to know-how in such correspondence is anchored to the definition provided in the agreement and not how it is used in the letter.

The practice of placing definitions in a definitions clause set has another advantage: the text under the operative clauses of the agreement (such as grant of know-how or secrecy of know-how) can focus on the conditionalities and ambience of the subject rather than its content.

### *Recital or whereas clauses*

It is always a good practice to have a set of recital clauses at the beginning of a contract. They inform a third party looking into the contract (such as a court or an arbitrator or a firm that inherits the contract) about the intentions or economic aims of the parties, the background or the premises to the agreement and its scope. Such clauses can play a critical role in judging issues that are not addressed in the contract but that come into the picture unexpectedly during implementation. However, they create no contractual obligation; they state facts in everyday language.

Some important areas covered by the recital clauses are the following:

- Business background. For example "ABC Company is the owner of certain [successfully practised]* know-how and has [valid and significant] patents [of interest to the licensee and needed to practise the know-how] and has control over their disposition" or "XYZ Company (the Licensee) owns plant and machinery which ABC Company has been asked to modify to attain full operating capacity and it is an area in which the Licensor has [commercial] experience [or has rendered such services worldwide].
- Desire and willingness of parties to enter into the agreement; what the licensee wishes to obtain and what the licensor is willing to grant.
- Expression of mutual interest or "mutual convenant" in the success of the enterprise.
- Other statements, such as a statement of the licensor regarding its familiarity with the business and technical environment of the licensee's country (of particular interest to developing countries).
- Statements about the future intentions of the parties.

*Words and phrases in brackets show the degree of specificity that can be brought to the recital clauses. Their inclusion shows the extent to which the party making the statement becomes liable under the contract for the representation made.

The recital clauses are followed by a constructional clause, such as "Now, therefore, in consideration of the premises and of the mutual convenants and conditions herein contained, the parties to the agreement have agreed and do by these presents agree as follows:"

## Steps in the drafting process

Drafting is as individual as a writing style or a learning method. It is a process that has been developed over time and through continued use. The actual drafting of a contract should be undertaken only after having clarified all preliminary facts and features in discussions with both the transferor and the other team members. Details of the technology and the economic aims and purposes of both the project and the contract must be spelled out clearly in the draft. The process of implementation and its sequence must also be put on paper, and the structure of the contract and its language selected.

### *Choosing the law*

A useful first step is to choose the law governing the contract, because we must know what this law says about the subject. What, for example, does the law, a supplier of equipment oblige, or not oblige, a transferor of technology, a grantor of licence, a supplier of design, or a contractor to do? What does it say about warranties and guarantees? What rights does it give a purchaser, a licensee or a lessee?

Everything that the law says is valid by implication. This means that if the contract does not specify or stipulate a certain obligation, right or consequence in an express way, the stipulations of the law concerning such obligations, rights, consequences etc. will be valid. For instance, equipment has been supplied and a defect is discovered in it, the main interest of the purchaser is usually to have it repaired quickly. If it cannot be repaired or cannot be repaired relatively quickly, it should be replaced. If it can be repaired not to its full value but to a level acceptable to the purchaser, then the price should be reduced to conform to the reduced value. If it is unfit for the purpose intended, the purchaser should be entitled to repudiate the contract and to claim recompense for damage suffered.

However, not all national contract (civil) laws stipulate in the same way and in the order of interest indicated. Some of them, for example, do not mention repair.

As has been mentioned already, there is contractual freedom, and most of the stipulations of national contract (civil) laws are not binding. Rights and obligations may be freely foreseen in the contract. Consequently, they may be extended or restricted compared to those implied in the law of the contract. In any event, the first law in any court process on the interpretation of a contract will be the text of the contract, as it states the intentions and declared will of the parties.

### *Identifying the parties*

The official names and addresses of both parties should be clear and exact. They should be followed, literally, to the letter. Companies not taking sufficient care in this have paid high prices for their negligence.

### *Formulating the aims of the project*

The basic questions any contract has to answer are who, what, when, where and for how much? In effect, the question must be asked, Why do we need this project and this contract? The answer will reveal the economic aims of the contract.

### *Declaring the subject-matter*

The next step would be to declare the subject-matter of the contract, which could be one or more of the following:

- A licence on the patent(s), if any, the know-how, the trade mark, the model or the software.
- A transfer of the technology in its various forms: written technical documentation with a specified contents; consultations; training; and assistance in the procurement of equipment.
- Supply of equipment and supervision of erection and commissioning.
- Other services, such as management.

To ensure consistency throughout the contract, it is advisable to describe the above subject-matters as to their contents, limits and implications for the other party. Attention should be paid to the list of obligations of both parties, to the check-list of problems to be dealt with and to the process of implementation.

The clause on the licence should be written first. This means, for example, identifying all patents licensed and declaring the patent validity in the intended market. The contents of the licence and its limitations should be described. The warranty against legal defects and the problem of infringement should also be dealt with.

The licence clause should be followed by the clause on the technology transfer, e.g. material dealing with the technical documentation, the engineering, and training and supervision. The clauses should address performance guarantees, i.e. how the tests should be performed, conditions for them, how the results should be registered, evaluated and calculated, and what the consequences of the results should be.

This should be followed by clauses dealing with equipment supplies. Areas covered by such clauses include specifications, delivery times, packaging, markings, transportation, delays, erections, commissioning, testing, quality control, mechanical guarantees and their content.

The clause on financial conditions should contain prices, conditions for payments, documents for payments and financial securities, and insurance should be dealt with. Conditions dealing with coming into force, term, possibilities for termination, rights surviving the term, and settling of possible disputes should also be drafted.

Cooperation between the parties after implementation should be clearly detailed, e.g. exchange of development results, consultations, joint research and development, rights and obligations originating from such cooperation, their terms and the expenses involved.

It is suggested to first make a list of the fundamental terms and then to define them. Complete this list as drafting proceeds.

### *Checking the draft*

Revision is an important part of drafting. Depending on who has been involved, it may be divided into two steps:

- Drafter's checking or revision.
- Checking or revision by other team members.

It is important that the drafter revise the draft one aspect at a time. In different readings, look for different things:

- Vagueness, or ambiguity of terms or notions. This process should be repeated until the drafter is satisfied that uncertainty has been reduced to the minimum tolerable and that the text is clear, concise and readable.
- The sequence of definitions from the standpoint of dependence and of fundamental or less fundamental character.
- Consistency of terms.
- Service and counter-service, mutual obligations.
- Chronology of the implementation.
- Terms and dates, factuality and consistency.
- Repetition of the what-could-go-wrong? exercises.

- The placement of annexes and their content.
- The system of references in the text.
- The structure of the agreement (titles of subdivisions, the logic of divisions and subdivisions, the numbering system, indentations etc.).
- Important aspects that may have been overlooked.

Checking or revision by other team members should be done in two steps. First, each team member should be asked to revise and comment on the draft from his or her own perspective. Having made the necessary corrections, the drafter should then pass the draft to the legal expert. The lawyer will have a much easier job if the draft has been prepared as indicated. His or her main concern will be to revise for consistency of terms, to further reduce uncertainty and to look ahead.

If the draft was initially prepared by the lawyer, the other team members will have to revise the text from different standpoints.

### Negotiations and the draft

The revised draft is now ready to be handed over to the partner, that is, to the transferor of the technology, for negotiation. Since the draft has been prepared in full knowledge of the transferor's offer and based on a series of talks, it may be reasonably expected that it will not be rejected in full. Nevertheless, it will still be the recipients draft and not the transferor's; so differences in opinion are likely to arise. These must be negotiated.

If the draft has been prepared as suggested, the recipient's negotiating team (not identical with its drafting-team, although certain persons may be the same) will be well prepared, will know the answers to likely questions, will be able to anticipate arguments, will know all the limiting conditions and values, and will have a negotiating strategy (and possibly tactics) worked out.

As a result of the negotiations, certain changes will have to be made in the draft. The drafter should remember all of the principles discussed here, especially the interrelationship of the clauses, when carrying out these changes.

### Conclusion

A transfer of technology should be based on truthful, long-term cooperation between the parties and on mutual goodwill, with an intent to meet obligations together in order to share the fruits of joint success. Nevertheless, a contract is still required to record the agreement. It will direct the parties as to what should be done if certain events occur or should a dispute arise.

The principles discussed above may be summarized as follows:

- The contract's first purpose is the success of the project or innovation. It can only achieve this if it is fair and correct and keeps both parties interested in success. This means that it should be balanced.
- The contract should be written in readable, concise language; it should be easily understood and its content should be clear. This means that it should be aptly divided and subdivided, with descriptive and indicative subtitles and carefully enumerated, possibly using a decimal system.
- The contract should be precise and leave as little room as possible for alternative interpretations. This requires unambiguous and consistent terms and definitions, with as little uncertainty as humanly possible.
- The contract should consider, and be based on, the process of implementation and should try to take in its account what might go wrong and what might happen in the future.
- The drafter should be aided by a team comprising all the experts who have a role in preparing and implementing the project.

# Module 13

## TYPES OF AGREEMENTS

*Technology transfer agreements serve different needs for different parties, so there are many different types of agreements. This module provides an overview of 11 types of agreements, emphasizing the main characteristics of each and their distinctions. The module treats the following types of agreements: hybrid (patent/know-how); patent; know-how; trade mark; franchise; distribution; copyright; computer software; technical services and assistance; engineering services; and management services. A check-list of the elements found in a hybrid agreement, which is common in business dealings and includes many of the elements common to nearly all technology transfer agreements, is found in the annex.*

# Contents

# TYPES OF AGREEMENTS

## Introduction

This module presents an overview of different types of technology transfer agreements. It emphasises the main characteristics for each type of agreement and the distinctions between those types. The module should be read in parallel with module 14, on the general structure of technology transfer agreements, which details the structure of a hybrid agreement, i.e. an agreement pertaining to patents and know-how.* Hybrid agreements are widely used throughout the world. Indeed, some estimate that as many as 25 per cent of all licence agreements are of this type. A hybrid licence is complex and contains essentially all of the provisions found in the various types of pure or simple agreements. A check-list of the major paragraphs and subparagraphs of a hybrid agreement can be found in the annex of this module.

## Hybrid agreement

The hybrid technology transfer agreement grants rights to more than one intellectual property in the same agreement. The most common form of the hybrid agreement covers both a patent or patents and know-how. It is not uncommon for such a licence to also include trade mark rights. In some instances, it will be appropriate to cover rights to patents and know-how in the same document. But the treatment of hybrid licences varies considerably from one jurisdiction to another, namely, in what concerns the consequences of expiration or invalidity of licensed patents. Prudence dictates that the licensee and licensor should be acutely aware of the relevant differences in the treatment of hybrid licences in different jurisdictions.

Neither party should be satisfied with a licence that contains questionable royalty provisions. Any issues of royalty in a hybrid licence should be resolved at the drafting stage, for instance:

- Differentiating between patent and know-how rights.
- Allocating royalties between patents and know-how.
- Providing for a diminished royalty rate or abolition of royalty if the licensed patents terminate or are declared invalid.
- Providing for a diminished royalty rate or abolition of royalty if pending or contemplated patents do not issue.
- Possibly changing the exclusivity provisions of the licence when the patents expire or are declared invalid.

The above concerns may also affect the duration of a hybrid licence. When only one duration must be shown for patents and know-how, the duration for running royalties will, in principle, not exceed the duration of any licensed patent.

A safe way to avoid the royalty and duration complications of a hybrid licence may be to have separate agreements for patent and know-how rights. This is especially recommended when the know-how aspects of a technology transfer are important.

## Patent licence agreement

The pure patent licence agreement grants rights to a patent(s) only. No technical assistance, know-how, trade marks, machine sale or other technology or intellectual property rights are included. The patent owner may wish to restrict the patent rights in a variety of ways. For example, he may wish to limit them to a specific territory or to a field of use (when more than one application of the patent exists), by the quantities that may be produced or by means of use (make, have made, use, sell).

This kind of agreement is most likely to be found in transactions in the market economy context in cases where the licensee has a solid technological and innovative capacity of its own and only needs the legal right to use a patent owned by the licensor. In transactions involving licensees in developing countries, there is usually a need to accompany the licensing of a patent with the provision of other inputs like technical assistance and know-how. Also, some of the above-mentioned restrictions could conflict with the host country's policies or the licensee's interests.

A distinctive element of a pure patent licence agreement involves the handling of royalty rates. The parties can freely negotiate royalty rates that apply in an agreement, but the payment obligation ceases

*In this module, the term know-how includes know-how and trade secrets.

when the patent(s) expires, becomes invalid or terminates for any reason. (This is unlike the hybrid licence where payments can continue for the use of know-how even after the expiration of the licensed patents.)

The twofold rationale for patent systems in many countries provides the basis for the fixed life of a patent. That is, the protection afforded: *(a)* stimulates innovation by giving the patent holder the right to exclude others for a specified period of time and; *(b)* promotes the use and growth of technology by permitting free use of the invention when the patent expires or terminates for any reason.

All of the generally used elements of a patent licence are shown and explained in the hybrid licence agreement of module 14. Essentially, that example can be changed from a hybrid to a pure patent agreement simply by removing the paragraphs that pertain solely to know-how, such as the grants of rights to the know-how and unpatentable improvements; the provisions for technical assistance, payments for know-how related items as machines and test equipment; and the duration of the know-how licence.

## Know-how agreement

### *Introduction*

A fundamental characteristic of know-how is that it is unpatented. Its property value depends on it being kept secret. Therefore, when the owner of know-how tries to license it, he will wish to be assured it is kept confidential by the licensee.

It may be necessary for the potential licensee to obtain a certain amount of information relating to the subject of the licence, in order to enable him to evaluate its technical and commercial worth. In those cases, a preliminary confidentiality or secrecy agreement may be consummated, because if there is an outright disclosure of know-how without a confidential relationship the recipient could destroy the property value of the know-how. The disclosure of know-how without clear evidence of what was being disclosed can lead to controversies if no licence agreement is ever entered into and a similar know-how is eventually used by the recipient.

Licensing is often international. Although in many countries similar rules may apply, the great importance of secrecy in the licensing of know-how dictates that negotiators, from the start, must satisfy themselves as to the strength of the protection granted locally to know-how. There is general absence of special legislation in national laws concerning the transfer or communication, use and disclosure of know-how. Where such legislation exists, its diversity and the absence of specific provisions in international treaties for the protection of know-how compounds the problems faced by a licensor of one country in his dealings with prospective or existing licensees in other countries.

Nevertheless, the risks inherent in the supply of know-how can be minimized by measures specified in the terms and conditions of a know-how licence or technology transfer agreement or adopted in the course of the preliminary negotiations.

### *Secrecy agreement*

In view of the above, the parties, and in particular, the prospective licensor, will usually prefer to take advantage of the greater certainty of a contractual relationship by concluding an agreement providing for some sort of secrecy or confidentiality requirement. This requires, of course, something definable, to the satisfaction of a court, as confidential information. When confidential information is transmitted, it must therefore be made clear that the prospective licensee is responsible for its confidentiality. When this is done prior to the existence of a know-how agreement, a disclosure fee may be required.

Normally, a secrecy agreement includes two undertakings by the recipient:

- To keep the information secret.
- To use it only for a specified purpose.

The recipient, will not, however, wish to accept unnecessary and inappropriate obligations and must be careful to avoid implied obligations. An express and precise definition of what is confidential may be therefore necessary to protect against burdensome obligations.

The agreements the prospective licensor will use to protect secret know-how disclosed before the conclusion of a know-how licence agreement may take the form of preliminary, option or secrecy (confidentiality) agreements; the licence agreement proper, will also of course, contain secrecy provisions. Such agreements are discussed in the last section of this module.

### *Continuing royalty payments*

Unlike a patent licence, in many countries no specific term applies to royalty payments for know-how other than the term agreed to by the parties to the agreement. In some countries, (the United States, for example) an agreement can be drafted that stipulates continuing payments even if a public disclosure destroys the confidentiality of the know-how. But a current view among practitioners is that the agreement should stipulate a duration beyond which the continuing payment of royalties would be unreasonable or unjustified.

### *Technical assistance*

Very often know-how agreements include training in the use of the information by means of visits to the licensor's plant(s), direct assistance at its own location(s) and ongoing consultation rights. This assistance assures that the licensee will be able to successfully implement the licensed know-how in its operations.

The exchange of information will almost always include both confidential and non-confidential information. Accurate records must therefore be kept to ensure that both parties agree on what portion of this information represents the secret know-how.

### *Improvements*

Rights to ongoing improvements are not automatically included. Their inclusion should be negotiated before finalizing the agreement. Generally, when the licensee secures the rights to improvements, the licensor also obtains the grantback of the licensee's improvements. Module 14, on the general structure of agreements, elaborates further on this subject.

### *Machinery*

The elements of a know-how agreement are at times embodied in a piece of manufacturing equipment. Although all of the terms and specifications for the machine can be made part of the agreement, they are best handled in a separate purchase contract that is kept subject to all of the know-how agreement's provisions. The know-how aspects of the machinery itself should be shown in the know-how agreement.

As was the case for the pure patent licence, all of the generally used elements of a know-how licence are shown and explained in the hybrid licence agreement in module 14. To adapt the hybrid to a pure know-how agreement, the paragraphs that pertain solely to patents should be removed.

## Trade mark agreement

Unlike patents and, to some extent, know-how, which have relatively short lives, a trade mark can remain in effect forever if it is continuously renewed. Thus when a trade mark can be licensed along with a related technology, the combination can produce longer rewards than a technology agreement alone. The licensee should, however, take care to assess the value of the trade mark to his business activity, e.g. in terms of facilitating entry or strengthening presence in a certain market. However, it is often advisable to have a separate trade mark licence, as complications sometimes occur when a trade mark is included in a technology agreement.

Control of the quality of the goods or services marketed under the mark is an essential part of any trade mark licence. In the agreement, the licensor stipulates that the licensee's use of the trade mark is subject to the licensor's supervision or approval of product quality. Samples of product produced and marketed by the licensee are routinely collected and examined by the licensor for the purposes of a quality check.

The trade mark licence itself has virtually all of the provisions of a pure patent licence, including the boiler-plate terms and conditions. In many countries, however, there can be only one user of a trade mark, whereas patents can be licensed to more than one party. In addition, a trade mark agreement should include provisions whereby the licensor does the following:

- Represents and demonstrates ownership of the mark for the class or classes of goods that are the subject of the licence.
- Grants permission to the licensee to use the trade mark for the pertinent class of goods.
- Assures the trade mark will be kept in force.
- Where applicable, undertakes to have the licensee registered (in the appropriate territory) as a (registered) user of the trade mark for the licensed goods.

Provisions are also be made, as mentioned above, requiring the licensee to maintain the quality standards of the trade-marked product and to cooperate with the licensor on means to ensure that those standards are being met. If, however, the licensor wishes to avoid liability for wrongful acts of the licensee, the degree of control should not exceed a minimum requirement.

The issue of minimum vs. significant control mandates special care in the drafting of trade mark (and franchise) agreements. Often, but not always, a trade mark licence requires a payment from the licensee for the right to sell goods or services under the licensor's mark. The question may arise as to whether a trade mark licence creates a franchise agreement. Usually, this is determined by whether the control over the licensee (or franchisee) is deemed significant. If the trade mark licence provides for a royalty and minimal quality control standards, as shown above, control would most likely not be considered significant and subject to franchising law. Conversely, if the licensor (or franchisor) actively controls or assists the licensee in its operations, the licence could be deemed a franchise that provides for significant control.

The legal difference between a trade mark and a franchise agreement can be very important in cases where liability includes responsibility for personal damage that may arise from defective products or services. For instance, in the United States, a principal is vicariously liable for a wrongful act of an agent who is sufficiently controlled by the principal. However, a principal is not liable for the wrongful act of an independent contractor. The distinction usually depends on the degree of control exerted by the franchisor or licensor. In such cases, the wording of the written agreement and the interaction of the parties is examined to determine if the control went beyond the minimum requirement of trade mark licensing law. As the law seldom sets clear definitions for "minimum" and "significant", a careful study of the law in the applicable area must be made before finalizing the agreement to reduce the risk of liability due to exercise of significant control.

Because a trade mark licence is such an important part of a franchise agreement, franchising is discussed in the next section.

## Franchise agreement

Franchising is a method of distributing goods and services based upon trade mark licensing. A franchise agreement combines a trade mark licence with a number of other, familiar types of licences, such as a know-how and trade secret licence, a copyright licence and a distribution agreement.

Franchise agreements allow a franchisor to obtain a large number of sales outlets with much less investment than would be involved in operating the same number of outlets as company-owned locations. In fact, some very large marketing organizations have been created through franchising with relatively small financial investment. The franchisee, on the other hand, gains access to operate under a well-known and respected trade mark. Franchising enables the smaller, independent merchant the means to become an effective competitor of larger firms, and for these reasons it has experienced substantial growth for well over the last 20 years.

Each party to a franchise has several interests to protect. The franchisor's interests include receiving agreed-on payments; protecting the goodwill, image and integrity of the franchise; promoting opportunity to the fullest extent in the designated territory; and retaining complete ownership of the trade marks, service marks, logos, trade names, copyrights, technical and operating know-how, and trade secrets used in the franchise. All of the terms just mentioned are included when the terms "trade mark" or "mark" are used in this section.

Beside the right to operate under the valued trade mark, the other primary interests of the franchisee include management assistance and support in operating the franchise optimally, the right to acquire the needed raw products or materials and/or services used in the franchise at lower cost and the right to continue the franchised operation within a territory by complying with the reasonable requirements of the franchisor.

Some common types of franchise are the following:

- Business format or package and product.
- Distribution.
- Manufacturing.
- Service.

Business format or package and product permits the franchisor to develop a valuable mark by licensing its use to franchisees who operate retail outlets under detailed instructions. Typical businesses are involved in this type of franchise: hamburger, pizza and yogurt restaurants, auto leasing establishments and dancing schools.

Distribution franchising gives the franchisor a system for licensing franchisees to distribute its product line, such as petrol, shoes, clothing, branded automobiles and bicycles.

In manufacturing, the franchisor utilizes a secret formula or a manufacturing process in the trade-marked product and licenses the franchisee to use the secret formula or process to make the trade-marked product, which it then sells. It is prominently used by soft drink producers.

Other franchisees offer a service under the franchisor's business name or trade mark in accordance with his instructions. Examples are oil changes for motor cars, temporary help agencies and rug and carpet cleaners.

The principal elements of a franchise agreement include provisions for the following:

- Licence to use the franchisor's mark.
- Territory of the licence. This can be the most troublesome area of a franchise agreement. A franchisor may be able to constrain the manufacture of the trade-marked product but may not always be able to regulate the area of sale. Assurance of territorial protection requires careful study.
- Protection of the mark.
- Quality control.
- The timing and amount of payments.
- Capital, suitability of the premises and insurance.
- Settlement of disputes.
- Expiration and termination.
- Renewal of the licence.
- Assignability.
- Indemnification.
- Protection of trade secrets, know-how or any other intellectual property.

The provisions for all of these elements must conform with the laws of the relevant governments. Franchising is considered by many to be a subdivision of licensing in general. Some of the differences between them are shown in table 11:

**Table 11. Differences between franchising and licensing**

| *Licensing* | *Franchising* |
|---|---|
| The term "royalties is normally used. | "Management fees" is considered more appropriate. |
| Product(s) is the common element. | Covers the total business. |
| Usually taken by established businesses. | Tends to be start-up situation. |
| Often a specific product(s) with improvements subject to negotiation. | Franchisor is expected to make and pass on improvements as inherent part of the agreement. |
| No goodwill attached to the licence unless it pertains to a trade mark. | Franchisee benefits from local goodwill. |
| Substantial leeway for fee negotiation. | Usually a standard ongoing fee structure. Initial lump sum can vary by sales potential of the territory. |

Aside from the agreement itself, a prospective franchisee should carefully read and study the franchise offering document. Many do not. Key considerations include the following:

- Determine the franchise fee. This usually is a front-end lump sum payment plus a percentage of the franchisee's sales.
- Determine what is included in the fee (for example, training, site selection support, advertising and accounting assistance).
- Amount of start-up costs.
- Amount of working capital required.
- Franchise stability, typical results at other locations.
- Assurance that additional licensees of the same franchisor will not proliferate in the territory.

The trade mark section above discussed the legal complications for franchises. Before entering into any franchise agreement, the advice of counsel specializing in this area of the law should be sought. Many of the provisions of the agreement within a common franchise offering will be essentially equal for each franchisee. But each case will be different and legal counsel well worthwhile.

## Distribution agreement

A distributor is an independent merchant who, under the terms and conditions set forth in a distribution agreement, purchases products from a manufacturer or other supplier and resells them, both in his own name and for his own account.

Where the products involve special installation procedures or knowledge of how to operate, maintain or replace them, the distributor will frequently have to rely on the principal for technical assistance, services or training for a period of time or even during the life of the agreement. Appropriate provisions in the agreement are not essentially different from those in know-how and technical assistance agreements. They involve the transfer of technology with all the terms and considerations involved in such arrangements.

A distribution agreement may be the first step to a licensing or even a joint venture agreement. Local manufacturing may sometimes be a stated goal of the parties at the outset. In such cases, a licensing agreement may already have been negotiated in its essential terms by the effective date of the distribution agreement, with the understanding that the licensing agreement will be executed on the occurrence of certain events, such as the attainment of a certain sales volume. The wording of the agreement may even give the distributor an option. In such cases, there is a continuum between the distribution agreement and a licence, with the licensing/technology transfer content varying depending on the circumstances.

## Copyright agreement

Copyright protection begins as soon as a work is created and fixed in a tangible form of expression from which the copyright may be perceived, reproduced or otherwise communicated. For practical and business purposes, however, and depending on applicable law, a copyright should be registered if it is to be licensed. A licensee of any of the rights to a copyright would require protection from infringement, and registration may be required for filing an infringement action. In the United States, if a copyright is not registered within three months of a first publication, there can be no recovery of statutory damages or attorneys' fees for infringements occurring before the effective date of the registration.

The exclusive rights of the copyright owner may be licensed and owned separately. Thus, the licensor may assign to another any one or more of these exclusive rights, which include the right to reproduce, to prepare derivative works, to publicly distribute by sale, rental, lease or lending, to publicly perform or to publicly display.

The legal purchase of a copyrighted work, for example, a physical object such as a computer software product, does not of itself convey rights of copyright, even though the purchaser becomes a licensee by virtue of the purchase. A licence agreement must accompany the sale of the physical object if the purchaser/licensee is to legally reproduce, prepare derivative works or distribute copies of the copyrighted work.

Anyone contemplating licensing copyrighted material should have legal counsel study the latest cases and laws. Copyright law is complicated and continually changing. Awareness of its intricacies can substantially modify the risks and obligations of the parties to a copyright licence. Improper drafting can result in substantial liability.

### Technical services and assistance agreement

When technical services in technology transfer embody proprietary know-how, the description of the technical assistance to be provided is usually included in the know-how agreement. This case was shown in the know-how section. There are situations, however, especially in developing countries, where a technical assistance agreement does not contain proprietary know-how. That situation will be dealt with here.

An operating company may simply require technical assistance in a mature industry, such as the manufacture of cement, metal cans, glass bottles or timber products. The supplier's input of services could include plant layouts, lists and specifications of equipment, product literature and sales aids. Managerial inputs may include expert services in training the recipient's personnel in production management, coordinating supplies with plant erection, quality control and the like. This type of assistance is often aptly referred to as show-how.

Show-how is a teaching or technical support service, such as that offered by consulting engineers when they use the common knowledge of the art to advise a client. This contrasts with engineering design work that includes proprietary know-how. The value of show-how can be great. The assistance can enable a manufacturing company to establish efficient, economical production and effective, profitable market penetration much sooner than it could do on its own.

Where a technical assistance agreement is associated with other technology transfer agreements, such as a know-how licence or an engineering design contract, it is best to link the agreements by referring to them in the technical assistance agreement, even if there are different contracting parties. Such cross-referencing can minimize later conflict.

The provisions of a technical assistance agreement must be tailored to fit the specific needs of each agreement, they generally include the following:

- Definitions of product: product design, specifications, quality, as applicable.
- Plant capacity (for chemical plants, operating range).
- List and description of all of the supplier's services, for example:
  - Supply of technical personnel
  - Training
  - Quality control procedures
  - Testing services
  - Ongoing consultation
  - Literature preparation
  - Productivity/costs standards
  - Sales/Marketing Information
- Product/process improvements when included in the agreement.
- Costs for use of supplier's personnel.
- Performance warranties.
- Supplier's liability with respect to plant performance (if any).
- Payment by client for the services.
- Linkage to other agreements, when applicable.
- Governing law of the agreement.

### Engineering services agreement

The engineering contract discussed here is based on the complex situation that often occurs in a developing country. That is, the engineering firm executes a design and construction agreement in which the client:

- Legally discloses to the engineering firm know-how acquired from a process licensor.
- Performs and assumes full responsibility for all non-specialized work either directly or by using local agencies.
- Independently transacts with the process licensor and the engineering firm for performance guarantees relative to their areas of work.

In this context, the objective of the client, is to establish a manufacturing plant at its estimated cost that will make a product at a certain volume and cost and meet a prescribed standard of operation by a given date. To achieve this objective, the client has to contract with both the process licensor and the engineering firm for ranges of services and responsibilities that reinforce each other and do not conflict.

An engineering company, based on know-how revealed under secrecy, defines in a proposal the overall project, its principal services (design, procurement, construction, plant commissioning etc.), major equipment required, the time to completion and the approximate cost. The proposal specifically states the services to be performed by the engineering company and what services the client will perform, directly or by subcontracting. Once the parties concur, the formal, detailed agreement is drafted.

Module 18, on contracting complex industrial projects, provides a more detailed elaboration of issues in such agreements.

### Management services agreement

Management services are often obtained in connection with the setting up of new facilities. Whenever possible, management services should be accompanied by training schemes in order to enable the buyer to operate the "ready" facility efficiently with its own staff as soon as possible, making further management assistance unnecessary.

Some developing countries have used management services agreements in industries such as mining, steel and heavy engineering. These agreements may be relevant to the management of public utilities that are responsible for power supply, medical care, telecommunications, forestry, transport and port management. They are also common in the tourism sector, especially for hotels and similar facilities.

"Corporate skills" and "management know-how" are two of the expressions used to describe what the buyer is seeking. The management agreement is often concluded when a company or agency is being formed to operate a facility, or when new facilities are being added to an existing operation. The need to acquire management services arises when the company or agency responsible for operating a facility does not have the experience or know-how to do so.

It may be possible to purchase limited management services from a consulting company in some fields, such as forestry. The buyer of management services should realize that the provider of the services is frequently the producer of goods (steel, oil, pulp etc.) looking to benefit from increased use of the services it also offers a greater market for its products. The quality and continuity of the management service frequently depends on the motives of the seller.

The assignment normally consists of a field component, direct assistance in the operation of a particular plant and a back-up function to support the field staff. Specialists from headquarters may be temporarily active in the field in the following ways: *(a)* directors of the management firm will supervise the total assignment and *(b)* technical experts will make visits as needed for special tasks. In addition, the client company will most likely send its personnel to the seller's location from time to time for training and the opportunity to practise their professions. The seller will also provide handbooks, manuals, production standards, access to sources of supply and markets for the client's products. An outline of typical services follows:

- *General management (overall corporate planning and organization and personnel planning)*
  Financial planning
  Financial analysis
  Planning and budgeting
  Financing expertise
  Assets control
  Accounting
- *Personnel administration*
  Job descriptions
  Recruitment
  Promotion and job performance evaluation
  Training
  Replacement of expatriate personnel by indigenous staff
- *Production management*
  Materials management
  Purchasing
  Maintenance
  Quality control, including laboratory testing
- *Sales forecasting and market studies*

Technical services, special investigations, licensing, preparation of training materials and actual marketing of the client company's products are often included in parallel agreements and remunerated separately. Great variety exists in this respect and to generalize about management services agreements is difficult.

The buyer will want to hire a management firm that has deep experience in the pertinent field, can provide the whole range of services described above, and has qualified personnel, preferably from its own permanent staff, to fill positions in the client's field organization. The contracted manager is likely to obtain a considerable amount of influence over the management of the client company operation. This will be so for a number of reasons, including the following: *(a)* the manager has "independent contractor" status, *(b)* the management company's field staff are their own employees and *(c)* the manager has control over the hiring and firing of personnel. Moreover, the management firm usually accepts responsibility for negligence in performing the management services, including that of its own staff, and it remains liable for damage caused to the client in the course of the assignment.

Remuneration for management services will have two parts, field staff and headquarters staff. For the sake of simplicity, the field staff of a management services company will normally be paid for on the basis of a lump-sum per hour, week or month of work. Payment will include both direct and indirect costs. Headquarters staff sometimes perform consultancy type work, such as the preparation and execution of training, but often, the work is less definable and predictable. Corporate know-how cannot be accessed on an hourly or other time rate basis.

The distinction between fees for management service and royalties for access to technical know-how is rarely clear. The element of success normally influences the payment reward, that is, the client may be asked to pay based on profit. If profits depend on external factors (price control, sales restrictions etc.), a more acceptable system may be to reward the management services firm with a fee based on value added (that is, the difference between sales price of goods produced by the client company minus the value of imported raw materials and components).

There is no internationally accepted standard contract for management services. The comments above are suggested as guidelines for operational type management services assignments.

## Preliminary secrecy agreement and option agreement

Before the overall viability of a know-how licence can be seriously evaluated, the prospective licensee generally will have access to enough of the know-how for a sufficient period of time. Once he studies the know-how he will be able to know if he can make industrial and commercial use of it. Test production and possibly some test-marketing may be necessary. These preliminary steps may be needed even where a patent is involved, as specifications frequently leave much in the way of detailed techniques unrevealed.

On the one hand, the prospective licensee should be given sufficient information to evaluate the technology and its profitability. On the other hand, the prospective licensor will wish to avoid giving the prospective licensee particulars that cannot be recovered or whose disclosure or communication cannot be limited if the negotiations break down. The preliminary negotiations will, therefore, be concerned with the problem of disclosure of know-how in particular.

One solution the parties can adopt during the preliminary negotiations is not to give information on the elements but to describe only the result obtained. For example, the information being made available for a more efficient and cheaper technique for the manufacture of an article should disclose the savings in time and cost, the possible cost and time of installing special equipment and training costs. The information on chemical process should indicate yields. The prospective licensee can determine how much it would cost them to achieve the same results and they can be achieved and, by so doing, evaluate what the knowledge is worth under a licence agreement.

### *Preliminary secrecy agreement*

#### *Essential terms*

The two essential terms of a preliminary secrecy agreement are undertakings by the prospective licensee:

- Not to communicate or disclose know-how obtained during the preliminary negotiations.
- To use it only for the purpose of assessing the desirability and value of a licence.

A preliminary disclosure agreement may also be concluded, individually or jointly, with selected employees of the prospective licensee or technology recipient. The agreement may call for an initial evaluation of the information by one individual of suitable standing selected by the prospective licensee. The initial evaluator then advises on the basis of the information received whether or not the technology is of interest. If it is not, he agrees not to disclose the information received; if it is, the potential licensee, as well as the initial evaluator, agree not to use the information and to restrict its disclosure until an agreement is executed establishing the terms and conditions for its use and the acquisition of the technology.

The preliminary disclosure agreement may also contain provisions precluding disclosure to third persons of any correlation or identity that may exist between the technical information supplied by the licensor and other technical information made available to the prospective licensee by other third persons, especially possible competitors of the former.

#### *Monetary consideration for disclosure*

Preliminary disclosure agreements raise a number of problems, such as, in the event of breach, the enforceability of a provision for payment of a fixed sum or, in the absence of such a provision, the valuation of damages. To protect his interests, the prospective licensor may want to require a disclosure payment from the prospective licensee for disclosing the know-how. It may be a lump-sum payment and serve as security for the recipient, and justification for such a monetary consideration is that there is no way the person receiving the know-how can erase it from his mind, even if no licence agreement is concluded. Sometimes the payment can be applied to the total remuneration to be paid by the licensee upon successful conclusion of the licence agreement. If no licence agreement is concluded, the deposit is usually retained by the licensor.

### *Option agreement*

Where preliminary trials or investigations as to the viability and value of know-how are to take place, involving the disclosure of secret know-how, an option agreement is frequently deemed necessary and preferred, in particular by the prospective licensee, over a simple preliminary agreement.

Offers of such options are often considered as short cuts to establishing a relationship that is legally effective, but this is a mistaken notion as the necessary basis of agreement has not yet been arrived at. An option for a licence is a promise by the prospective licensor to the prospective licensee to grant a licence if he so requests, on specified terms within a specified period or on the occurrence of a specified event. The important point is that at least the main terms of the licence must be specified in the option agreement; otherwise the prospective licensor would only have to include impossible terms in the eventual offer to make the option ineffective and worthless.

It is therefore suggested that an option agreement should be drawn up in two parts, the first containing the terms and conditions of the option and the second consisting of the full licensing agreement as it is intended by the parties to become immediately binding on the exercise of the option in the prescribed manner. This enables both parties to know precisely what it is that forms the subject-matter of the option and avoids delay and possible contention after the licensee has been given secret know-how that may then become vulnerable to infringement.

There is, of course, the possibility of adopting a middle course if the prospective licensor's promise is to grant a licence on reasonable terms, or words to that effect, but like all obligations based on subjective concepts like "reasonable," this can create more problems than it solves.

Though an option requires advance negotiations of at least the main terms of the eventual licence, it is not always useful. As a middle course between granting a licence and leaving the matter entirely open, one can grant a right of first refusal, which consists of agreement by the owner of the know-how to make an offer of a licence within a given time or on the occurrence of a specified event. If the prospective licensee refuses this offer, the owner of the know-how is entitled to make an offer to a third party, provided it is not on terms more favourable to the third party than were offered to the prospective licensee.

### Computer related agreement

In the last decade the computer industry in general, and the software industry in particular, was one of the most propulsive and fastest growing segments of industrialized economies. The importance of this development cannot be overestimated, and it can be safely asserted that various kinds of software production will continue to grow in the future, in terms of importance and impact on all areas of human activities as well as productive activities. Because the computer industry is relatively young and different from some traditional industries, it bears certain differences from the established forms of technology transfer.

Acquiring computer software should be considered a modern form of technology transfer. Clearly, technology is being transferred if we accept the definition of technology as a system of knowledge, skills, expertise and organization used to produce and utilize goods and services that satisfy social demand. This new form of technology transfer is even more important, in a way, because the technology is becoming accessible even to small industries, and its overall impact is broader and intensely individual.

After the initial dilemma of selecting the best mode for protecting the computer software legally, that is, choosing between the *per se* protection and the copyright protection, today the main way of protecting software is through copyrights. The fact that many software products were initially made in the United States contributed to the Government of that country calling for software protection worldwide. As a result, even countries that were hesitant gradually accepted the copyright as the principal tool for protecting software products, and the scope of protection based on copyright is increasing in some countries.

Although copyright protection is not formal, in the sense that most countries do not depend on the application and examination processes, certain formalities are customary. One of these is the copyright notice, which usually looks like this: "©1993 John Doe" or "Copyright John Doe, 1993". The sign © or the word copyright indicates the claim. The year noted is the year of first publication. Notice should be placed everywhere possible, including on the label of the disk and on the screen. Generally, software is protected around the world, but to varying degrees and with varying enforcement. Industrialized countries are most advanced in giving judicial protection to software products. In some countries where the law does protect the copyright even if a judicial decision is obtained, enforcement still may be a problem, rendering the letter of the law meaningless.

Copyright protection is the legal basis for development agreements and end-user licences, which are the major types of software agreements and are discussed below. Software can be licensed under copyright, patent law, trade secret law, trade mark law or directly by contract, depending on the country.

Notwithstanding the fact that copyright is the main form of software protection, computer software is patentable under certain conditions in some countries. Generally speaking, software is not patentable *per se*, but it becomes so when and if protection is sought in conjunction with or within the realm of a process or an apparatus that may be patentable.

Know-how, where it is protectable under some kind of trade secret law, can also be an important way of protecting software when the software has relatively limited distribution. But if distribution is wide and international, know-how claims become less viable. Trade mark concerns for software are no different from any other area of trade mark law.

The computer industry, due to the specifics of its production, introduced new forms of contracts in the field of technology transfer—specific legal solutions for the arrangements dealing with software, hardware, services and information. Without attempting to elaborate on any particular type of contract used in the computer industry, those used most often will be summarized. Although it is possible to delineate between the contracts that deal with software as their subject matter solely, very often contracts in the computer industry will be mixed and will deal, in some form, with both software and hardware aspects of the particular arrangement. In addition, very often these subjects are interspersed with the elements of service or with management elements that are to be provided by the supplier.

### *Software contracts*

Generally speaking, the most often used forms of software contracts are the following:

- Licensing agreements for the use of software.
- Software development contracts.
- Contract of sale.
- Maintenance and support agreements.

Because software products differ, chiefly in their purposes and intended use and, accordingly, their markets, further differences between the four general forms should be noted. Will the software be used as an application, so that the user achieves a certain desired result or function related to the activities outside the computer itself, or will it be used for performing a certain function in the computer or on the network of connected computers? Depending on the answer, entirely different contracts may be stipulated between different parties or groups of parties. If the program is an application, a "shrink wrap" licence may be concluded, or in the case of database development, a software development contract may be concluded. Will the software be used by a single user on a desktop computer, or will it be run by multiple users on a mainframe computer or network? Will the software be sold for the market price, for a fixed price with a free trial period (shareware), or simply made accessible on the networks or elsewhere (freeware)? The aspects that determine the category of software are many and often overlapping. Two well-established categories of software off-the-shelf software and custom built software will be examined here and, using them as examples, the main types of software contracts will be described.

### *Development agreement for custom-made (tailored) software*

This type of agreement is used when another party writes a software program to serve the needs of a recipient. It serves the valuable purposes of clarifying ownership, licensing rights, warranty, source code (needed for altering the software by another programmer) and costs. Custom made software is made for specific purposes, such as the production of a particular product or line of products, for a specialized business. The program may be written, for example, for testing the aerodynamic characteristics of a vehicle in a particular jet tunnel or for a particular stock exchange so that trading there is conducted according to a defined set of national or professional rules and regulations. Typically, this type of software will be devised for a particular user, known to the programmer at the time of writing of the program.

Because the structuring and writing of software programs is a sensitive matter, it is very important that the parties are well aware of the specific requirements of the relation they are entering into. Very often the programmers depend on information articulated by the party commissioning the program; thereafter, the matter of responsibility for the product may be a very complex matter. The programming and, even more, the preparation only phases may be time-consuming, so it is very important that realistic time schedules should be planned and maintained. The main sections of a software development contract would consist of the following:

- *Specification.* This section defines key terms: ownership, maintenance, support, warranties and the product to be developed, including manuals and documentation. Care should be taken to assure that all the needed items are in the specifications as that is the section used for settling disputes. It defines the deliverables.
- *Delivery, installation, acceptance, training.* This section defines where the product is to be delivered, who will install it, and how long the buyer has to approve or reject it. The duration and location of training are also defined. For custom-made software, it includes the obligation to notify the proprietor of the location of the program and its copy.
- *Ownership and licence.* Generally, if a developer is receiving his full royalty rate, ownership transfers to the buyer. If not, negotiation is required to resolve rights. If ownership stays with the developer, the buyer, at the very least, will want exclusive rights for his desired field. Conversely, if the buyer gets ownership, the developer will get a licence back for a defined area or areas, except those reserved by the buyer.
- *Payment.* Payment is usually made in several instalments based on milestones defined in the agreements.
- *Remaining provisions.* The remaining agreement provisions are like those found in most licence agreements: support and maintenance (technical assistance), confidentiality and other boilerplate provisions.

### *End-user agreement for off-the-shelf ("canned") software (proprietary package)*

This type of the agreement is used for licensing the use of software that has been developed with a group of users rather than a particular user in mind. It ranges from a low-priced, mass-market, software-oriented licence to a complicated, specific-application software.

So called off-the-shelf, or "canned", software denotes ready-to-use software sold in computer stores for use, mainly, on personal computers. "Proprietary package" means that most of these programs are owned by the companies that produced them, by virtue of copyright law and, very often, trade secret law at the same time. In addition, some elements of the accompanying documentation, such as manuals and packaging, will be protected by copyright law; finally, the trade and brand names used to indicate the manufacturer's name and the product itself may be protected by trade mark law.

The most characteristic legal protection for off-the-shelf software is a shrink wrap licensing agreement. This name originates from the fact that programs are often sold in boxes wrapped in tight plastic foil. The process of wrapping the boxes is called shrink wrapping because the foil shrinks under the influence of heat, thus wrapping the box. A label attached to this foil warns the consumer before he opens the box that licensing agreements are contained inside. The consumer is asked to read the agreement, and if he or she does not consent to its content, to refrain from downloading or otherwise using the program. At the same time, the agreement is structured so that, in accordance with copyright laws, the owner of the right (the manufacturer) does not sell the rights on the work (program) but only licences its use. Therefore, the purchaser of the copy does not become the owner when he acquires his copy. While many consumers believe they own a program by the virtue of the shrink-wrap agreements, they are limited to using the software in a defined way.

While off-the-shelf software may not play an important role in industrial technology transfer, the legal principle underlying this transaction is a good model for understanding copyright protection for computer software.

The shrink-wrap licence usually has only a few terms: a licence grant warranty clause (usually "as is" or for a period conforming to the manual) and a clause whereby the medium can be returned if defective (with all other warranties and liabilities disclaimed); support contained in a manual is referred to only superficially in the licence. General clauses permit using the software at one computer, with permission to transfer the right to use. The right to make copies is limited to the one copy for back-up, or archival purposes. The right to adapt, modify or change copies is sharply restricted in the United States and somewhat less restricted in Europe. The licence includes or limits the right to transmit software electronically. The user normally undertakes to maintain the copyright notice and trade marks. Often, there is one boilerplate clause relating to following "all laws." The intent of this is to shift the burden of abiding by such contracts from the vendor to the buyer, since some software falls under export control restrictions.

Because consent to the terms of the licensing agreement is expressed by using the program, it is rarely legally clear whether the conditions of such an agreement are imposed unjustly on the party in the weaker bargaining position. In common law countries, this may affect enforceability of the contract, and this contractual practice has often been disputed. In any case, commercial practice continues to rely on shrink-wrap licensing.

### *Contract of sale*

Contract sale of software is not commonly used in the computer industry because the nature of the software product requires it be licensed rather than sold. However, under United States law, the transfer of proprietary rights to software may occur between a programmer and his employer or the person who commissioned the work. Such a transfer will be in the form of the copyright assignment. The sale contract will occur in the transactions between the program owner and the party interested in buying these rights, probably another company with an interest in exploiting the program copyright. The rights transferred in this case will always comprise the program source code rights.

### *Contracts of maintenance and assistance*

Maintenance and assistance contracts and their varieties are dealt with in the section on hardware contracts. The next section, dealing with contracts on hardware, also contains some elements often found in maintenance and assistance agreements.

## *Contracts on information services*

### *Data-processing-oriented services*

Computers are used largely for processing information, and the needs of most consumers go no further than this. Accordingly, the relationships into which the parties enter are limited to processing and the results to be achieved.

A licensee may or may not provide the raw data for processing and may wish to contract a service supplier to process it. The supplier, in turn, may process the data using its own hardware, in which case machine time rental and data processing contracts become relevant. This situation occurs when a recipient does not want to invest in computer hardware, or at least in the type of hardware needed for a particular type of processing. Related services include data storage contracts, whereby a supplier is hired to store raw or processed data under specific conditions. As industrialized countries increasingly regulate the conditions for data storage, archiving and accessing, professional data-processing services are used more often.

Another situation occurs when a licensee hires a service supplier to process data using his (the licensee's) hardware. Presumably, this type of contract will be knowledge rather than production-intensive, that is the contracts will be in the nature of expert assistance contracts. The fact that many information service contracts are knowledge-intensive actually brings them closer to technology transfer contracts.

Closely related to this group of contracts are contracts for the exploitation of technical resources, an example of which is a back-up contract. Given the high risk of losing data stored in electronic media and the ever greater quantities of stored data and its growing value, backing-up is an increasingly important activity. When large quantities of data are to be backed-up, professional machinery (and, sometimes, the time of professionals) is needed.

### *Data acquisition services*

Consulting contracts are similar to expert assistance contracts in which an expert's computer-related knowledge is acquired, allowing a recipient to either define or set up its own computer system. Alternatively, an expert may be hired to define and establish a certain computer-related operation or task, in which case the expertise may be contracted by an agreement similar to a software development agreement.

Related contracts are those for access to a database and telematic contracts. As more and more data are stored in or accessed by computer networks, the importance of these contracts is growing and the differences between the types are becoming more clearly defined. One type is with access providers, to establish the range of accessible databases or services, tariffs for the access, communication surcharges and other conditions for using the service. Another is between access providers and the owners of the databases.

## *Hardware contracts*

Contracts on the hardware components of computer systems should also be mentioned because they are often entwined with elements of software contracts because of the interdependent relationships within the computer industry. The nature of computer systems is such that hardware will not function without an operating system, which is a software program, so rarely will hardware be transferred alone.

### *Contract of sale*

While software is rarely the subject of a sale because the rights to use it are chiefly transferred via a licence to use it, a contract of sale is common when hardware is transferred. Such contracts would be comparable to sale of equipment contracts.

### *Rental or leasing of equipment*

Equipment can be rented or leased, with computer equipment being leased more often than rented. However, time is often rented on large systems to perform complex tasks that transcend the capacity of the renter's equipment. Complex tasks that are performed periodically and regularly are especially suitable for this approach.

Equipment is often leased because of the rapid pace at which computer equipment is being improved. The constant growth of capacity, speed and other performance standards, as well as changing and growing user needs, makes it necessary to change equipment before it is amortized completely. This gives a good rationale for leasing arrangements, in which vendors offer customers the possibility of acquiring new equipment soon after its introduction to the marketplace. The leased equipment is later returned to the vendor and new leases concluded.

### *Original equipment manufacturer licensing*

Original equipment manufacturer (OEM) agreements regulate the right to use proprietary "segments" for the production of hardware. This type of agreement, typical in the computer industry, developed out of a need to affordably build compatible computers. Segments denote larger assembled units, not merely components, that are produced by third-party manufacturers and simply bought from them. For example, an OEM agreement may allow a computer manufacturer to legally declare that a printer sold as a package with its computer was produced by itself, although it was actually made to its specification by another party. This type of agreement may, therefore also contain a trade mark licence element.

### *Maintenance and assistance*

Agreement for maintenance and assistance are agreements whereby services, which constitute a separate group of contracts, are rendered solely in connection with computer hardware. As was mentioned above, contracts in the computer industry are rarely devoted only to one aspect, such as hardware; hardware and software are both included when maintenance services are provided.

*Turnkey agreements*

In recent years, there has been a strong trend towards a hardware contractor assuming responsibility for other components of a contracted system. Even if such responsibility is not explicitly agreed to, the courts tend to interpret contracts in this integral manner. This tendency probably reflects the general shift of importance from hardware to software. Today in industrialized countries hardware often is regarded as a staple product, while software is at the cutting edge of technology. This does not, however, mean that hardware development is stagnant in any way.

## *Annex*

## HYBRID AGREEMENT CHECK-LIST

1. Preliminary statements
   - 1.1. Identification of the parties
   - 1.2. Purpose
   - 1.3. Effective date of the agreement
   - 1.4. Place where the agreement is made
   - 1.5. Whereas clauses (recitals, preamble)
     - 1.5.1. Licensor representations
     - 1.5.2. Licensee representations
     - 1.5.3. Background of the agreement
   - 1.6. Definition of terms
2. Subject-matter of the licence: the licence grant
   - 2.1. Patent rights
     - 2.1.1. Exclusivity
     - 2.1.2. Territory
     - 2.1.3. Rights conferred
     - 2.1.4. Limitations
     - 2.1.5. Maintenance and prosecution
     - 2.1.6. Infringement
       - 2.1.6.1. Licensed patents
       - 2.1.6.2. Suits against licensee
     - 2.1.7. Patent marking
   - 2.2. Know-how/trade secrets/confidential information
     - 2.2.1. General
     - 2.2.2. Know-how grant
     - 2.2.3. Secrecy
     - 2.2.4. Licensee's use of the know-how
   - 2.3. Technical assistance
     - 2.3.1. Plant visits
     - 2.3.2. Direct assistance
     - 2.3.3. Consultation
   - 2.4. Improvements
     - 2.4.1. General
     - 2.4.2. Improvements grant
     - 2.4.3. Timing of the disclosure
     - 2.4.4. Grantback of licensee's improvements
   - 2.5. Sublicence Rights
   - 2.6. Payments
     - 2.6.1. Initial payment
     - 2.6.2. Royalties
     - 2.6.3. Separate payments for patents and know-how
     - 2.6.4. Tangible items
     - 2.6.5. Acquisition of machinery
     - 2.6.6. Technical assistance
     - 2.6.7. Payment method
     - 2.6.8. Interest on overdue payments
     - 2.6.9. Licensee records
   - 2.7. Term of the licence agreement
     - 2.7.1. Patent licence
     - 2.7.2. Know-how licence
3. Boilerplate provisions
   - 3.1. Termination of the agreement
     - 3.1.1. Overdue payments
     - 3.1.2. Bankruptcy, receivership or insolvency
     - 3.1.3. Expropriation
     - 3.1.4. Change of control
   - 3.2. Effect of termination
     - 3.2.1. Payments due
     - 3.2.2. Technical information
     - 3.2.3. Non-use of the licensed technology
     - 3.2.4. Machinery
     - 3.2.5. Liquidated damages
     - 3.2.6. Survival
   - 3.3. Best efforts
   - 3.4. Most-favoured nations
     - 3.4.1. Definition of more favourable terms
     - 3.4.2. Notification
   - 3.5. Warranty and indemnification
   - 3.6. Export control
   - 3.7. Arbitration and applicable law
   - 3.8. Retained rights/rights reserved
     - 3.8.1. Retained rights
     - 3.8.2. Proprietary machinery
     - 3.8.3. Restrictions on use of technical information and patents
     - 3.8.4. Licensee undertakings
   - 3.9. General provisions
     - 3.9.1. Assignment
     - 3.9.2. Severability
     - 3.9.3. Entire Agreement
     - 3.9.4. *Force majeure*, contingencies
     - 3.9.5. Notices

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# Module 14

## GENERAL STRUCTURE OF TECHNOLOGY TRANSFER AGREEMENTS

*While no two technology transfer agreements are alike in terms of detail, standard business practice has evolved a general form that these agreements usually take. This module defines the general structure of technology transfer agreements and describes their subject matter in terms of the principal sections, paragraphs and clauses normally found therein.*

*The module focuses on patent/know-how agreements, the type most common in international business dealings, and highlights the important aspects of these agreements relating to intellectual property, including patents, trade secrets, know-how and other forms of confidential information. It explains many of the principles found in most technology transfer agreements and will inform readers interested in concluding almost any type of technology transfer agreement.*

# Contents

# GENERAL STRUCTURE OF TECHNOLOGY TRANSFER AGREEMENTS

## Introduction

Companies of all sizes, in nearly every part of the world, enter into transfer technology agreements whenever it is deemed to be financially, technically or legally advantageous to do so. The benefits for the parties to an agreement are often substantial.

This module describes the important aspects of technology transfer agreements, including agreements relating to intellectual property (e.g. the licensing of patents, trade secrets, know-how, trade marks and copyrights) and agreements on other technology-related matters such as engineering, management and technical assistance. The structure of the technology transfer agreement is defined, and the principal sections, paragraphs and clauses of most transfer agreement are shown in detail along with the rationale for their use.

Technology transfer agreements are usually referred to as licence agreements because the owner (licensor) of the technology permits or allows another entity (licensee) to use or exercise rights to the technology under mutually agreed-upon terms and conditions. Such rights otherwise would be reserved to the owner. If an individual or a company used or uses protected technology without the owner's consent, which a licence agreement gives, that party would be risking a suit for infringement.

In almost all areas of the world a technology transfer agreement is considered a contract with binding commitments, enforceable by law, between the parties to the agreement. The rules governing its interpretation are the same as those governing other contractual relationships. The parties to such agreements have the freedom to regulate their relations as they see fit.

However, that freedom is limited. In many developed countries technology transfer agreements are governed by antitrust laws that prohibit provisions in restraint of competition. In developing countries technology transfer legislation aims primarily at controlling practices considered objectionable by a given government. Aside from legal regulations, care should be taken to ensure the agreement is equitable for both licensor and licensee. This keeps both parties interested in optimizing the returns from the technology transfer.

Sometimes a licensor has an obvious advantage over a licensee in setting the terms and conditions of an agreement. This advantage can tempt the licensor to write excessive demands, restrictions, provisions and royalties into the contract. Even though the demands may be accepted by the licensee because he urgently needs a particular technology, experience shows that such terms can lead to discouragement and underperformance on the part of the licensee. In the long run, fairness results in the best monetary returns for both the licensor and licensee.

A patent/know-how technology transfer agreement was selected for in-depth treatment in this module because it is a common type of agreement in international business dealings. It is also complex and, therefore, serves as an excellent vehicle to explain many agreement principles common to most technology transfer agreements. Such an agreement is often referred to as a hybrid or composite licence as it pertains to more than one subject matter.

Many agreements deal only with one subject matter, e.g. patents, know-how, trade marks, copyrights, a machine sale, engineering or management of an operating facility. There are other types of agreements. Module 13, on types of agreements, supplements this module. It presents an overview of the different types of agreements most often associated with technology transfer transactions and highlights distinctions between such agreements and hybrid ones.

## Overview of a technology transfer agreement

An agreement is a record of a transaction. It spells out the following:

- The exact identity of the parties.
- The subject matter of the licence.
- The licensor's obligations.
- The licensee's obligations.
- The obligations common to the parties.

Almost every licence requires an agreement designed to meet the particular needs and conditions of the technology transfer project. Although most licensors and licensees want a standard, uniform contract for all of their licence agreements, this is not really possible. Each party to a licence generally has certain terms and conditions, beyond the standard contractual clauses, it wishes to incorporate into its licences.

Individuals or companies dealing in technology transfer should assemble a check-list containing the terms and conditions they desire to incorporate into their agreements. Then each situation can be reviewed and the check-list revised to fit specific circumstances. The text below, covers most of the items such a check-list would include. Experience shows such check-lists are very useful during negotiations, especially when they keep negotiations focused on the items and conditions most desired.

A licence agreement should contain the following sections:

- *Preliminary statements.* These contain the identity of the parties, the purpose of the agreement, pertinent background leading to the licence, the effective date and the definitions of the key terms of the agreement.
- *Subject matter.* This is the heart of the licence agreement. It contains the grants of the patents. It also contains, when appropriate, terms and conditions of the know-how rights (including trade secrets, technical assistance, improvements on the technology, payments and the term of the licence).
- *Boilerplate.* This is commonly used to describe the detailed operational obligations of the licensor and the licensee, as well as obligations that are common to both. Such operational agreements include the provisions for governing law, reporting responsibilities, notices, assignment etc. found in almost all licence agreements. Provisions that apply directly to the subject matter items are included in that section. Other more general provisions stand as separate paragraphs.

Incorporating all of the above into a clear, legally binding agreement requires careful drafting of a licence. Not all agreements require all the paragraphs and clauses shown below, while others may require special clauses not covered. There is no precise international format for drafting licence agreements since procedures as well as content vary from one country to another. As readers review this chapter, they should decide which elements best fit their licensing programme objectives. Explanatory and cautionary comments are provided to assist decision making.

## Structure of a technology transfer agreement

### *Preliminary statements*

#### *Identification of the parties*

The opening paragraph should identify the parties to the agreement with their official names, addresses and, when applicable, the location of their governing law of incorporation. Corporations should be identified as parent and subsidiary, parent, or subsidiary alone, and their legal capacity or authority should be given.

Care in specifying the parties to an agreement ensures precise identification of the licensing and licensed parties. For the licensor, this precludes the possibility of extending the licence beyond the intended entity or of not including all of the intended entity. For the licensee, it ensures that the identity and commitments of the licensing party extend to the entire intended entity.

#### *Purpose*

The purpose of an agreement should be stated in a brief paragraph that captures the essence of why the licence agreement is being executed. It can be as simple as "This agreement is to permit company A to make, use and sell product X in the territory, as defined in the agreement, with the help of the technical assistance and the know-how licensed under this agreement by company B and under the licensed patents as defined in this agreement." A statement can also be made, either in this section or in the whereas clauses, on the economic aim of the contract, i.e. to produce the licensed goods economically and competitively.

#### *Effective date of the agreement*

The date when the agreement comes into full force and effect is often stated in a separate paragraph. It can come before or after the date the agreement is signed. The effective date is sometimes defined in the definitions section of the agreement when conditions prevent showing just the date itself.

Some countries require government approval after the parties to an agreement have agreed to all of its provisions and have executed (signed) the document. In those cases the date of government approval usually becomes the effective date.

#### *Whereas clauses (recitals, preamble)*

The whereas clauses give the background and rationale for the agreement. They should be worded carefully to clarify the terms and conditions for people from either party who were not involved in making the agreement but who are asked later to settle conflicts between the parties. Clarity is also important in the event legal action is taken by one party against the other. In a court of law the judge may look to the whereas clauses to improve his understanding of clauses that may be difficult to interpret. Whereas clauses contain such things as licensor and licensee representation and background of the agreement.

### *Licensor representations*

This clause states that the licensor owns the subject technology of the licence (patents, patent applications, know-how, trade secrets, trade marks and/or copyrights), that it has the right to grant the licence and that it has not granted a previous conflicting licence.

### *Licensee representations*

This clause indicates why the licensee wishes to obtain rights to the subject technology. When applicable, it also indicates the patents, patent applications, know-how, trade secrets, trade marks and/or copyrights the licensee owns in the field of the licensed technology. It is also appropriate to include any other pertinent information relating to or affecting the licence in this section. For example, when a licence is being taken to resolve an infringement or some other dispute, mention of such situations helps to preclude future misunderstandings.

### *Background of the agreement*

When warranted, other clauses should include statements about any prior relationship between the parties and any prior agreements that may relate, dominate or affect in any way the present agreement. Cancelled or suspended agreements should be mentioned as well.

### *Definition of terms*

To preclude misunderstandings between the parties, the subject matter and key words that will have broad impact in the agreement require definition. Most important are the following:

- *Licensed patents.* This generally includes the patents, patent applications, continuations, continuations-in-part, and divisions that relate to the licensed technology. If the licence includes foreign countries, the definition would then include the foreign counterparts of the patents and applications in each country. If there are several patents, patent applications etc., they are usually listed in an attached schedule, which shows the necessary specific details of each. Typical schedule headings are licensor identification or docket number, patent title, country(ies) where the patent is issued or filed, filing date, patent number for those that have been issued and the issue date.
- *Licensed know-how/trade secrets.* This is licensor's information to be transferred to the licensee. The technology included in the know-how should be described in broad terms but with enough specificity to avoid misunderstandings. Usually, the licensor agrees to communicate to the licensee information in his possession that it has a right to divulge, as of the effective date of the agreement. The licensee is advised to assure that the information, such as pertinent drawings, manuals, specifications and formulas, will enable it to produce the licensed product or use the licensed process successfully. Sometimes know-how will include the sale and supply of manufacturing equipment or apparatus used to manufacture the licensed products, assuming the licensor has such equipment and proprietary rights on it. In some patent and know-how agreements, the definition is put into the licence grant section. When there is a great deal of material, a listing and description are often made and attached to the agreement.
- *Licensed improvements.* If the licensor's improvements are part of the licence, it is best to clearly define them in this section. Improvements usually include inventions, technical developments and know-how, including trade secrets, as defined in the agreement that: *(a)* the licensor has or has obtained the rights to license, *(b)* are patentable or not, *(c)* are developed or acquired during the term of the agreement, *(d)* pertain to the licensed products, licensed process and licensed apparatus and *(e)* have been put into commercial use by the licensor. Their inclusion is a major consideration that should be thought out carefully by all parties to the agreement.
- *Major improvements.* Defining major improvements in an agreement is difficult. The licensed improvements described above generally relate closely to the technology transferred in the licence agreement. This section usually does not include improvements resulting in a recognizable process or product shift. For example, if a product, such as a metal tube for the packaging of household products, is the subject of a licence agreement, an improvement developed by the licensor in the product or in the process for making metal tubes should be transferred to the licensee under the rights granted in the licensed improvements. However, if the licensor develops a plastic tube for the packaging of household products, it most likely would be considered a major improvement.
- *Grant-back.* This is the term used to denote giving the licensor rights to the improvements made by the licensee on the licensed technology. If the licensee grants improvements back to the licensor, the scope of such improvements requires clear definition in this section. It usually parallels the "licensed improvements" and "major improvements" definitions.

- *Licensed product/licensed process/Licensed apparatus.* The definitions of these terms should be tied into the patent rights and the know-how to be exchanged under the licence. They represent the basis for collecting royalty payments. The licensed product may be covered by patents only, while the licensed process used to manufacture the product may be covered by patents and/or know-how. Equipment in the licensed apparatus can also be covered by either patents, know-how or both.

- *Net sales.* When royalties are based on a percentage of net sales, the parties must decide and stipulate what the term means. Often it is gross sales less discounts, commissions, returns, taxes or other credits as intended by the parties to the agreement. This definition is obviously very important as it is used in calculating royalties to be paid.

- *Territory.* The geographical area where the licence will be in effect should be clearly specified. Each country covered must be named. If the rights vary by country as to exclusivity, or in any other manner such as sales rights vs. manufacturing rights, providing a table usually enhances clarity. Patent rights can only be granted for countries in which the licensed patents are filed or issued, but know-how does not have a territorial barrier.

- *Subsidiary.* A subsidiary is a company either wholly or partially owned by another company. The owning company is called the parent company. If the rights granted in the licence apply to a parent company, as licensee, including its subsidiary or subsidiaries, the ownership (whole, partial, with voting rights) must be defined. Good practice requires that the subsidiary be controlled by the licensed party. For the purposes of the agreement, "control" means the power to direct the management and policies of a subsidiary through the ownership of voting securities, by contract or otherwise. This definition applies to the licensor with respect to his obligations under the agreement. It should be clear whether the rights granted are from a parent, a subsidiary or both.

- *Other definitions.* As a licence is negotiated and drafted, additional terms requiring definition will become apparent. It is best they be added to the definitions section if they are key and apply broadly to the agreement. Otherwise, they should be defined in the first paragraph or clause in which they are mentioned.

## Subject matter of the licence

### The licence grant

The grant is probably the most important part of the licence. Its provisions, outlined below, require careful thought as to their content. To protect all parties, they should be drafted unambiguously, leaving no doubt or open questions regarding the rights being granted.

### Patent rights

The term "licensed patents" should be defined in the agreement in order to identify the patents, applications etc. included in the licence. These items should be shown clearly in a schedule attached to the licence agreement. This applies for each country in the licensed territory.

The grant specifies exclusivity, territory, rights conferred, limitations, maintenance and protection of patents, infringement, and patent making.

### Exclusivity

The grant can be exclusive, sole (exclusive except for the licensor) or non-exclusive. Typically, a licensee seeks an exclusive licence at least for the country concerned, and possibly for the neighbouring region, as a means of securing the market. Exclusivity is even more important if the production capacity being set up is intended to fully cover growing demand for the licensed products over a period of time. The licensee seeking an exclusive licence must be prepared to make a strong case for its ability to market the technology in the licensed territory aggressively.

The governing factor for the licensor, on the other hand, is to determine its goals for optimizing the returns from its own use and/or the sale of technology rights, and then to determine if these goals can be meshed with those of the licensee. Sometimes exclusive or sole licences are given for a limited time period, perhaps three or five years, and then become non-exclusive in case the market targets are not achieved. The exclusivity decision for a licensor can be very complicated, especially if the patents extend to foreign countries. It requires careful assessment of which approach will yield the greatest return. The following questions should be considered:

- Will the licensor use the technology itself?
- If so, will it be only in its own country or in several countries?
- Will the patent protection have a long life?
- Will the licensed product have a broad or narrow market?
- Are there many or few prospects for a licence?
- What is allowed or restricted by the applicable laws?

*Territory*

As territory is normally defined in the "definitions" section of the licence, as shown earlier, it needs only be denoted by a capital T in the licence grant. This is the preferred technique, as otherwise the licence grant paragraph will be needlessly encumbered.

*Rights conferred*

It is proper for the grant to set forth exactly what a licensee is free to do under the patent rights. Depending on the claims in the patents, the licensee can be given the right to manufacture, have manufactured, use and/or sell the subject matter of the licence.

*Limitations*

Depending on the coverage within the claims of the patents, the licensor may wish to impose limitations beyond the geographical territory on the quantity or volume of products sold and on field-of-use. Field-of-use restrictions are sometimes applied to licences of technologies that have many or several uses. In that event, the licensee may be given the right to practise the technology for one or more, but not all, of the applications. It may be noted that under the United States antitrust laws, field-of-use restrictions and territorial restrictions may have antitrust consequences if their effect is to unreasonably restrain competition among otherwise competing parties (see module 10, on the legal environment in developed countries. The licensee and the licensor as well should assess the effect of such restrictions on both the market and its growth potentials.

*Maintenance and prosecution of the patents*

The licensor, except as noted below, usually bears responsibility for the cost of filing, prosecuting and maintaining licensed patents. This includes future patent applications if improvements are included in the agreement.

The future patents, when offered to and accepted by the licensee, become part of the licensed patents and are subject to royalty payments. Therefore, future patents can add to the term of agreements written for the life of the patents. The licensee should understand this consequence before requesting or accepting such responsibility. On the other hand, often the licensee is not given the right to apply for any patent, anywhere in the world, covering any invention disclosed to it under the agreement, without the licensor's permission.

In some agreements, mainly exclusive licences or when the licensed territory consists partially or totally of foreign countries, the licensor may propose that costs associated with prosecuting and maintaining licensed patents are made the responsibility of the licensee. The licensee is advised to avoid this responsibility.

*Infringement*

Licensor and licensee rights concerning infringement suits may vary from country to country owing to differences in the applicable laws. The provisions below apply in many developed areas of the world. Developing countries often have legislation limiting the choice of applicable law and the jurisdiction of foreign courts. The parties to a patent licence agreement should check infringement clauses carefully against what is allowable for the countries covered by the agreement.

The licensor will want the licensee to advise it promptly, in writing, of any infringement the licensee discovers. The licensor will also want the right to sue the infringing party to recover damages after assessing the facts of the alleged infringement. The licensor usually claims the right to choose and control the counsel selected to prosecute the suit and will insist on full cooperation by the licensee. The licensor will also want to control legal action by the licensee against an alleged infringer.

Damages collected in such a suit usually pay for the cost of litigation. The parties then divide the remainder evenly between them if the infringement caused significant damages to the licensee.

After looking into the facts carefully, the licensor may decide not to file suit. Then the licensee is often given the right to pursue a suit on its own. The least that the licensor can do in such event is extend legal and technical assistance to the licensee. The licensee should attempt to have royalty payment relief written into the agreement for situations in which the licensor will not allow the licensee to take legal action against an alleged infringer. Sample clauses intended to protect the licensee in case of infringements are included in module 17, on guarantees and warranties in technology transfer.

The agreement should stipulate how patent suits against the licensee by third parties will be handled. The licensor may not agree to warrant the validity of the licensed patents and may not assume an obligation to defend or indemnify the licensee against a third party suing the licensee for patent infringement. For the licensee, however, it is important to adequately consider possible infringement. A first negotiating position would be to seek full indemnification from the licensor. If the licensor does not agree to this, it should at least: *(a)* affirm that to the best of its knowledge, the technology to be transferred is not covered by any other patents and *(b)* commit itself to joining the licensee in any action to be taken in the event of third-party claims for infringement, including legal action (see the subsection on warranty and indemnification for additional comments).

In some cases the licensor assumes a degree of responsibility and obligation to defend a licensee. The parties may split the actual litigation expenses evenly, or the licensor may agree to pay up to a certain percentage of royalties collected from the licensee at the time of the suit.

An award favouring the licensee usually pays the litigation expenses of the parties on a pro-rated basis first. The surplus, if there is one, is then split evenly between the parties. If the licensor does not participate in the litigation, the licensee should insist that no portion of the award be shared.

### *Patent marking*

The licensor often insists on requiring the licensee to mark patented products with the patent number. In the event of an infringement this identification may help the licensor and/or the licensee to collect damages for the period prior to giving notice of the infringement to the infringer.

### *Know-how/trade secrets/confidential information*

Know-how alone can be the basis for a technology transfer licence agreement. In that event, the licence will have no references to patents. However, when know-how exists along with patents, both are often included in one licence agreement. Including know-how can be especially important to a licensee receiving a new product or process.

If, for some reason, one or both parties wishes to separate the know-how licence from the patent licence, the know-how paragraphs can be pulled out and embodied in a separate agreement. In such cases the know-how agreement should stipulate the pertinent terms and conditions from the patent licence that will also apply to know-how.

Hereafter the term know-how will include both confidential information (trade secrets) and nonconfidential information. It refers to the technical and specialized knowledge that has particular value in making, using and selling the licensed process or product.

#### *Know-how grant*

If know-how is a defined term in the agreement, then the grant can be a statement such as the following: "Licensee is granted the right to use the licensed know-how to make, use and/or sell the licensed products, licensed process and licensed apparatus in the territory."

Licences often include improvements made subsequent to the effective date of the agreement. These improvements are usually the subject of a separate section of the agreement (discussed later).

To the extent possible, and for accurate documentation, know-how disclosures should be made in writing. Very often the agreement will allow conferences, plant visits and the like. In such cases, the substance of oral disclosures should be confirmed in writing within a stipulated time period and made a part of the record of transferred know-how.

In drafting the know-how section, the licensee should assure more than just the transfer of information. Show-how provisions, wherein the licensor agrees to demonstrate how to use the technology correctly, are also vital.

#### *Secrecy*

It is proper and to the advantage of the parties that the licensed know-how be held in confidence. Suitable wording for this portion of the agreement is common and readily available, but attention is needed for exceptions to the confidentiality provisions. A secrecy obligation that permits the usual exceptions should be acceptable, i.e. confidential information that:

- The licensee can prove, with written records, is already known to a licensee or is already in the possession of the licensee.
- Was in the public domain prior to disclosure by the licensor.
- Becomes a part of the public domain by publication or by any other means except an unauthorized act or omission by the licensee.
- Is received from third parties who are under no obligation to maintain such information in confidence.
- The licensee can prove, with written records, was developed by licensee independent of disclosures from licensor.

In practice, a prospective know-how licensee will need sufficient information to evaluate the advantages of the technology to be transferred before a licence is taken. Therefore, a secrecy agreement usually is entered into also before a licence is taken (see module 13, on types of agreements, for a deeper discussion of secrecy agreements). Obligations of secrecy usually continue beyond the term of the agreement (see discussion on survival, in the section dealing with boilerplate provisions.)

#### *Licensee's use of the know-how*

The agreement should provide conditions giving the licensee the right to disclose any portion of the know-how. Any restrictions the licensor requires on disclosures within the licensee's organization, to suppliers or to customers would be included here. The agreement may spell out the basis on which disclosures can be made to include a requirement that the licensee execute agreements with the pertinent employees and third parties.

*Technical assistance*

Technical assistance can greatly reduce the time required by the licensee to move the licensed technology into production. The obvious benefits are that the licensee generates income more quickly and the licensor earns royalties much sooner. While technical assistance benefits both parties, the licensor will need to have the resources available to fulfil this responsibility.

Common elements of technical assistance include the following:

- *Plant visits and training.* The licensee obtains rights to on-the-spot training of its technical engineers, in the licensor's facilities that are developing or using the licensed process and/or making and selling the licensed product. Because training is so important in the technology transfer process, this topic is dealt with at length in module 15 on training.
- *Direct assistance.* The licensee may obtain the right to have site assistance (within the licensed territory) from the licensor's technical personnel to the solve problems related to commercial use of the licensed process and/or the making and selling of the licensed product.
- *Consultation.* This is the right of the licensee to contact the licensor by mail, telefax, telex or telephone through representatives appointed by each party.

*Improvements*

If the parties decide to include improvements made after the effective date of the agreement, this section must be drafted carefully. Many variations are possible depending on the strength and size of both parties, their future intentions and the nature of the improvements. For example, when the licensor is a known leader and technology developer, it would be to the licensee's interest to secure access to the licensor's improvements in order to remain competitive and secure or strengthen its market position.

It is necessary to stipulate the rights to licensor improvements in the grant and to allow for their use as well. A specific provision providing for access to all improvements effected by the licensor during the period of the agreement and the right to their use is desirable from the licensee's viewpoint. Improvements are usually subject to the same secrecy obligations imposed for the know-how and confidential information disclosed during the agreement. Improvements made by the licensee to be granted back to the licensor require a separate clause to specify how they are to be handled (see discussion on grant-back of improvements, below).

*Improvements grant*

As described for know-how, if the improvements are a defined term, the grant usually has the same wording, using "licensed improvements" in place of "licensed know-how": "Licensee is granted the right to use the licensed improvements to make, use and/or sell the licensed products, licensed process and licensed apparatus in the territory." The rights to improvements are usually for the term of the main agreement.

*Timing of the disclosure*

To avoid premature disclosure, it may be advisable to provide that disclosure be made after filing a patent application or after first commercial use in the case of unpatented improvements. A delay in disclosure serves at least two purposes. One is to avoid loss of patent protection; another is to allow time to determine that an improvement is one that will be truly useful rather than one that will be abandoned after closer study of its value.

*Grant-back of improvements made by licensee*

Subject to antitrust laws in the applicable countries, the licensor generally wants this provision whereby the licensee is obligated to give the licensor non-exclusive rights to improvements, patentable or otherwise, made by the licensee during the term of the agreement. The licensor also often tries to obtain those rights without time limit. Some licensors also may try to obtain a grant-back provision without offering their own improvements. The licensee, in such cases, should negotiate for reciprocal access to improvements on the basis of terms to be negotiated at the time of grant-back, particularly where major improvements are concerned, as earlier defined. When the licensor requires the right to use the improvements in all its plants, the licensee should likewise require access to improvements from other plants of the licensor.

Usually, the licensor wants sublicensing rights for the improvements if it has licensed the subject technology to other licensees. However, the requested sublicensing rights usually do not provide for the use of the improvements by other parties (except, perhaps, the licensor) in the licensee's territory. In a situation where there are several licensees of the same technology in different countries around the world, it can benefit a licensee to give such sublicensing rights, provided the licensee also receives the improvements from the other licensees.

The provisions with respect to definition and timing of disclosure for improvements are commonly reciprocal between the licensor and licensee.

*Sublicence rights*

Subject to individual country laws, a licensee does not have sublicensing rights unless the agreement authorizes them. Should the parties agree to allow sublicensing, the main agreement should specify the rights and obligations of the licensor and licensee with respect to the sublicensee(s). It is usually obvious that granting sublicensing rights is good business for the licensor and licensee. When the benefits are unclear for the licensor, but the licensee wants sublicensing rights, the licensee should prepare and present a market plan to persuade the licensor.

It is general practice for the licensor to have the licensee responsible for assuring that the sublicensee fulfils all the requirements of the principal licence and also for collecting royalties. Determining which party provides the technical assistance to the sublicensee is another major decision for sublicences. This responsibility usually falls to the primary licensee.

The best way to ensure that the sublicensee has obligations comparable to the licensee's is for the licensor to draft the sublicence. By so doing, it can be certain to include all the pertinent requirements from the primary agreement. This procedure should be acceptable to the primary licensee.

*Payments*

The payments in technology agreements usually take the form of a lumpsum, a royalty or a combination of both. The valuation and methods of payments in technology agreements are discussed at length in module 16 on valuation and methods of payment.

*Initial payment*

Technology agreements frequently involve the transfer of valuable know-how. For this reason, the licensor usually requires an initial lump-sum payment when the licence is executed. This payment should reflect the value of information transferred early in the life of the agreement. It is usually justified, from the licensor's point of view, by the transfer of important knowledge. It also precludes receiving no payment should problems develop with implementing the licence. For the same reason, the licensee should avoid, as much as possible, accepting a lump-sum payment provision that could amount to a write-off in the event of non-continuance of the agreement.

Although an up-front payment is usually found in agreements including know-how, it is not unusual for patent licences without know-how to include an up-front payment. From the licensor's viewpoint, it encourages a licensee to pursue the technology diligently. It is most common when the licensor has a strong position, in which case it will probably also require minimum royalty payments. If the licensee has a good negotiating position, deletion of up-front and minimum royalties should be pursued vigorously.

The amount of up-front payments depends on several factors:

- An assessment of the value of the technology.
- Whether the licence is exclusive or non-exclusive and whether it allows sublicensing or not.
- Whether advance payment of royalties is included.
- The rate of running royalties to be paid.
- The amount of minimum royalties.
- The length of the period for which royalties are payable.

*Royalties*

Most licences require payment of royalties based on a percentage of the net sales of the licensed product, as defined in the definitions section. Advance payments are sometimes required to be made initially or over a period of time; they are applied against running royalties. More often, royalties are collected at set periods (three months, six months or yearly) based on the net sales for the period immediately preceding.

Exclusive licences commonly contain a yearly minimum royalty provision representing the yearly guaranteed earnings for the licensor. Such provisions are, however, not uncommon in nonexclusive agreements. The parties generally set the minimums based on a conservative estimate of projected net sales over the life of the agreement. The licensee should be careful when accepting a minimum royalty provision as this could represent a relatively heavy financial burden if there are of delays in start-up of production. Otherwise, the licensee should negotiate for minimums to start after an initial commercialization period and then increase gradually (for five or so years) up to an agreed-on amount that generally remains in effect for the life of the agreement.

From the licensor's viewpoint, minimums in a licence agreement attempt to ensure vigorous effort on the part of the licensee to commercialize the technology. Agreements may provide for termination of the licence if the minimums are not being met or, less stringently, to convert the licence from exclusive to non-exclusive status. For this reason, if minimums cannot be avoided in the licence, the licensee must do its utmost to have fair, realistic minimums set.

Delineating absolute rules on setting minimum royalties is quite difficult, because so many factors are involved. A reasonable procedure is for the licensor and licensee to try to develop theoretical sales projections, or to use market projections based on the project feasibility study and then to reduce those projections by 20 to 40 per cent to arrive at a fair, conservative amount to be used in the agreement.

### Separate payments for patents and know-how

A trend exists to separate patent and know-how royalty payments in licence agreements. There are several reasons for this:

- Patent royalties are subject to risk since there is always a chance they can be declared invalid.
- Patent royalties can remain in effect only for the life of the patent, but know-how royalties may continue well after the licensed patents expire (see discussion on know-how licences below).
- The subject matter of the licence with respect to patents is limited to the scope of the claims, whereas the subject matter can be defined more broadly under the scope of the know-how.

From the above it follows that the licensor may try to obtain higher royalties for the transfer of know-how than can be obtained from patent rights. Naturally, the licensee should guard against this as best as it can during the negotiations.

#### Tangible items

The agreement should specify how the licensor will bill and collect for any machinery sold to the licensee, and for such items as operating manuals, blueprints, drawings, manufacturing specifications, test equipment or devices supplied by licensor to licensee. Such charges may apply for quantities that exceed an agreed-on level to be exchanged initially for no added payment.

### Acquisition of machinery

When a licensor sells proprietary machinery to a licensee, the terms for such a transaction can be shown in a separate paragraph of the agreement, in a schedule attached to the agreement or in a separate sales agreement. On occasion, a licensee is permitted to buy machinery from a third party based on the licensed patents and/or know-how.

### Technical services

In addition to the above payments, the licensee may have to pay separately for specific technical services the licensor may provide in connection with the licence. These may be considered under three main headings: *(a)* training programmes for licensee's personnel, *(b)* specific technical services performed in the licensor's works and facilities, such as special drawings, and *(c)* technical experts supplied by the licensor to the licensee's plant.

The licensor normally agrees to provide training services free of charge, but the licensee is required to cover the travel costs and living expenses of trainees. Fees for *(b)* and *(c)* normally show the hourly and daily rate for personnel plus all travel and living expenses incurred in the case of direct assistance to licensee's plant.

#### Payment method and currency

This is not a concern for host countries where cheques or bank transfers are easily arranged. Where it presents a difficulty, the type of currency, exchange control, governmental taxes and other factors have to be considered. The agreement must provide for how payments are to be handled.

#### Interest on overdue payments

If the licensee fails to make a payment when due, the licence agreement generally provides for interest payments, at a specified rate and in the agreed-on currency. In domestic agreements, a rate of 3-5 per cent above a recognized banking rate in that country is customary. For international agreements, the parties negotiate to select the international bank to be used for the base rate, subject to the applicable government rules in the licensee's country.

#### Licensee records

It is customary for the licensee to furnish a statement, certified by the licensee's appropriate officer or an independent certified public accountant acceptable to both parties (preferred when the parties have not had previous experience with each other), showing royalty calculations in sufficient detail for the licensor to ascertain their correctness.

A further provision is usually included requiring the licensee to maintain records that permit a licensor or his representatives to determine that all payments made and due are accurate. These records should be open to inspection by the licensor or to a third-party accounting firm acceptable to both parties on reasonable notice. If an audit becomes necessary, the agreement should provide for the handling of the cost.

Whenever possible, the licensor will want to avoid the use of an accounting firm for conducting audits as their fees can be high. Depending on the relationship between the licensor and licensee, the licensee may want to insist that any inspection of its records be done by a third party.

### Term of the licence agreement

#### Patent licence

In a patent licence, the term is usually from the effective date of the licence until the expiration of the last of the licensed patents, or until none of the licensed patents remain in effect for any other reason (lapsed or declared invalid).

In cases where there are no existing patents, but only patent applications, it is common to provide that the licence terminate after an agreed-on period, such as three to five years, unless a patent or patents issue during that period. The licensee should negotiate for this provision in such cases.

*Know-how licence*

Typically in know-how (or patent and know-how) licences, the know-how royalty period is established by negotiation. Some developing countries limit the term by law, e.g. five to ten years. Still, in many countries the term does not have to be limited, as it does for a patent licence. At the end of the term of a know-how licence, a licensee may be given the right to continue to use the know-how on a royalty-free basis or may be denied the right to continued use unless the know-how licence is renewed. Renewal is then open to negotiation of the royalty rate, but most often the renewal rate is lower. Some developing countries consider the know-how to be paid up when the term of the licence expires.

In view of the above, the parties have to consider local laws, their plans for the licensed technology and their bargaining options carefully. Then they negotiate to obtain the best position possible.

## *"Boilerplate" provisions*

### *Termination of the agreement*

Termination provisions vary widely. They can be limited to expiration or invalidity of the patents, to a definite time period for know-how and/or to breach of the agreement by either party. With respect to breach or default, it is common to provide that the licence can be terminated if the breach or default is not cured within a 60-day period following notice of the offence. Breach or default is usually determined in arbitration.

Often the agreement will include specifically the following conditions as cause for termination: overdue payments; bankruptcy, receivership or insolvency; change of control.

*Overdue payments*

If a payment remains overdue for a set period, such as 60 or 90 days, the licensor will usually have the right to terminate the agreement without resort to arbitration. In some countries, this does not apply if the overdue payment is caused by a temporary banking or government problem.

*Bankruptcy, receivership or insolvency*

Bankruptcy or receivership may also be cause for termination. Should proceedings take place, by or with the consent of the licensee, that prevent the licensee from paying royalties or implementing the licensed technology, and should these proceedings remain in effect for a specified length of time, such as 60 days or more, the licensor may wish to have the right to terminate the licence at the end of the specified time period. The licensee, at the same time, should push for a longer period of at least 6 months and also try to make this provision reciprocal.

*Change of control*

With the great rise in merger and acquisitions activity around the world, the change of control provision has become very important to licensors. They have become wary that their technology might inadvertently fall into competitor's hands by that route. Although this concern is certainly valid, the licensee must be careful to avoid losing the technology too easily in case of acquisition. The following provisions will demand skilful negotiation and review by the licensee's legal advisor.

A licensor in a strong position may want to have a change of control provision such as the following:

> If during the term of the agreement the licensee sells that part of his operations that is significant to the licensed technology, a third party acquires that part of the licensee's operations, or if a competitor of the licensor takes an equity position of sufficient percentage in the licensee or is able to obtain access to the licensed technology in any other way, the licensor will have the right to terminate the licence within a period of 90 -120 days.

The licensee, however, should negotiate to have the provision apply only if the acquiring firm is a competitor of the licensor. Then, what constitutes a competitor has to be a defined in the licence agreement.

*Effect of termination*

Following a termination, the licensor will usually want to provide for the remedies listed below:

- *Payments due.* Prompt payment for all money due or accrued.
- *Technical information.* Immediate return of all technical manuals, etc.
- *Non-use of the licensed technology.* The licensee is no longer permitted to use any of the licensed patents, know-how or improvements.
- *Machinery.* The return of purchased machinery that embodies any of the licensed technology. In this event, the licensee may be given compensation. The amount of compensation should be stipulated in the agreement, e.g. it may be based on the depreciated value of the equipment.
- *Liquidated damages.* Because of termination the licensor may have to forgo income that cannot be regained easily by licensing to another party or parties following such termination. This might be the case if, for example, the opportune licensing moment had passed or the incident had generated bad publicity. A liquidated damages provision allows the licensor to recover income lost in such circumstances. In a liquidated damages provision the future royalty income of the licence, had it not been terminated, is estimated and discounted for payment in a lump

sum to the licensor within 30-90 days after the termination date. The procedure to be followed is shown in the agreement, and it usually provides for discounting at an agreed-on rate. In practice, the licensee should carefully assess the implications of a liquidated damages provision and negotiate it for a lower settlement or for its possible deletion.

- *Survival.* In this paragraph the provisions of the effect of termination, secrecy, non-use of the technical information and non-use of the patent sections of the agreement are specifically noted to survive the expiration or termination of the agreement, to the extent permitted by the applicable governmental laws.

### *Best efforts*

A paragraph stating that the licensee will use its best efforts to exploit the licensed technology is common in both exclusive and non-exclusive licences. It would be desirable for the parties to agree on the meaning of best efforts, and what may constitute best efforts in terms of specific steps to be taken by the licensee.

### *Most favoured licensee*

Non-exclusive licensees should insist on this clause. It provides that should the licensor grant another licence to a third party on more favourable terms, the more favourable terms will then apply to the first licensee. Normally, the licensor is reluctant to incorporate such a clause, especially if the technology is likely to be licensed to several parties, but the licensee should insist on it. In granting such a provision, the licensor will probably want a definition of "more favourable terms."

#### *More favourable terms*

Frequently the licensee expects to have this right apply to a reduced royalty rate, but the licensor will want it to apply to all the terms and conditions of the additional licence. This safeguards against a situation in which a new licensee may negotiate a reduced royalty in return for requirements more favourable to the licensor elsewhere in the agreement.

#### *Notification*

The licensee will want a reduced royalty to come into force automatically. But the more favourable terms provision precludes this, as the licensor has to agree to all terms and conditions of the new licence. The licensee should insist that the licensor advise the licensee of an additional licence on more favourable terms, but should allow at least three months following execution of the additional licence for such a disclosure. At the same time, the licensor should insist that failure to notify not be treated as a breach. Instead, acceptance of the new terms by the licensee can be made retroactive, with interest applied to any reduced royalties that would have come into effect.

### *Warranty and indemnification*

Many times a licensor, especially one in a strong position, will make no warranty or representation of any kind, express or implied concerning any matter in the agreement. In effect, no warranty is extended. Courts do not always recognize this practice, however. At the same time, if the agreement is silent with respect to a warranty, the licensee should not consider a warranty as implied. The understanding of the parties must be expressed in the agreement. Therefore, the licensee should negotiate as best he can to obtain a meaningful warranty.

The discussion of infringement in the subsection on patent rights covered the responsibilities of the parties in case of infringement suits brought by third parties against the licensee. In spite of any warranty disclaimers, the licensee should at least negotiate for some indemnification against any damages he may have to pay to a third party. An offset equal to a percentage of the royalties paid to the licensor up to the time of settlement of the third party suit is one such solution; a temporary reduction in future royalties until all or an agreed-upon portion of the damages is paid is another. The licensor should not reject such a position summarily. Addressing the matter in this manner will most likely preclude a less favourable court or arbitration judgment should an incident be litigated or arbitrated.

If the licensee cannot obtain a warranty of substance in the agreement, it should insist that the warranty section be used to confirm that the licensor:

- Owns or has the rights to the licensed patents.
- Owns or has the right to disclose the licensed know-how and other technical information.
- Has no ongoing, pending or threatened suit regarding the licensed patents and technology (assuming there is one).
- Has used the know-how to enable him to produce the licensed product. If there is no licensed product, then some statement that attests to the worth of the know-how should be given.

Unless the agreement calls for the licensor to establish a turnkey operation, it is not easy for a licensee to obtain production guaranties based on the use of the know-how. Production guaranties may, however, be feasible with stipulation from the licensor that if specified raw materials, equipments, technical skills etc. are utilized and proper instructions are observed, it guarantees the quantities, quality and consumption figures stipulated in the agreement.

For an extensive presentation of this subject, see module 17 on guarantees and warranties in technology transfer.

### *Export control*

If the technology or products made under a licence are considered sensitive or if they might be utilized in countries to which the licensing country restricts exports, the licensor will require a clause to assure that such restrictions are not violated. The provision should specifically prohibit the licensee from exporting or re-exporting any of the licensed know-how, improvements, other technical information or products to any such country, without prior authorization from relevant authority of the licensing country's.

### *Arbitration and applicable law*

Arbitration is being used more and more frequently as a means to resolve licence agreement disputes because it is usually faster, much less costly and more amicable than lawsuits.

The arbitration clause of engagement is usually very broad. It frequently provides for any dispute arising from or relating to the licence to be settled by arbitration. A more limited clause, however, may be acceptable. Often, unless prohibited by the applicable law the parties will specifically exclude disputes concerning antitrust laws, export control laws, the validity or alleged infringement of patents and royalty rates or other payments stipulated in the agreement.

The parties generally specify that the arbitration procedure be in accordance with the rules of an arbitration association appropriate to the geographic areas of the agreement. Although there appears to be a trend toward selecting one impartial arbitrator, in most agreements it is still common to have three arbitrators, one from each party's country and the third from a different country. Naming the language to be used in the proceedings is also advisable.

There are many subtle points to consider in writing arbitration and applicable law clauses. Patent laws differ around the world. The use of discovery in arbitration can be limited and the generally accepted procedures for arbitration are changing. The licensee and licensor are advised to have legal counsel study the circumstances for each licence carefully before deciding on the most appropriate provisions for such clauses.

### *General provisions*

#### *Assignment*

It is important for the licence agreement to provide for assignment or preclude it. Assignment is commonly precluded for the licensee, although there are exceptions.

Usually the licensor will provide that the agreement be binding and be of financial benefit to any successor to the licensor's entire business (or that part of the business that relates to the licensed subject matter) by merger, consolidation or another means. The same provision would generally apply to the licensee except that it would be subject to the change of control provisions discussed in the subsection on termination of agreement.

The assignment clause may state, in specific language, that the agreement is not otherwise assignable by either party except by the licensor to an affiliated company of the licensor. Such assignment by the licensor should not relieve the licensor or a successor of his obligations under the agreement. The licensee should also be careful about accepting any clause that unduly restricts assignment of the licence agreement to new owners of the enterprise.

#### *Severability*

A clause will usually provide that if a significant provision of the agreement is declared void or unenforceable by arbitration or court proceeding, the remaining provisions of the agreement will remain in full effect. However, the licensor may wish to add that any provision of such importance (in the licensor's sole judgment) that the licensor does not want to continue the agreement without it, gives the licensor the right to terminate the licence within a period of 30-90 days. Naturally, the licensee should strongly oppose such an added clause or have it modified so that the licensor's right to terminate is subject to arbitration. Instead of termination the parties may agree to change the remaining conditions in order to re-establish the initial expectations and balance of the agreement.

#### *Entire agreement*

In general, almost all licence agreements contain an entire agreement clause. It is especially important when there are existing agreements or have been prior agreements between the parties related to the current or another subject matter. Such earlier dealings could be licence agreements, secrecy agreements, letters of intent or other matters. The clause should state that the licence agreement currently being consummated represents the entire agreement between the parties on the subject matter and supersedes all previous agreements or understandings concerning that subject matter. Parties are advised to add that the agreement may only be modified in writing, signed by both parties.

#### Force Majeure, *contingencies*

This clause provides that neither party to the agreement will be responsible for failure or delay in performing their obligations due to circumstances beyond their reasonable control. The circumstances referred to by this clause usually include, but are not restricted to, acts of God (such as fire, flood, storm and earthquake), explosion, major accident, war, terrorism, labour disputes, fuel shortages and transportation embargoes or failures. Payments due by the licensee are usually exempt from this clause and remain due and payable unless the licensor waives such payment.

*Notices*

The parties will designate the principal contacts for the handling of correspondence, fax messages, telephone calls, notices, royalty payments, technical assistance, training, patent administration etc. Generally, each party appoints a technical and/or a licence administrator is appointed to handle the day-to-day business of the licence. The licence administrator may also be the recipient of all contacts and be responsible for referring them to the appropriate individual or department within the organization. Most corporations prefer that all patent and legal matters be sent directly to their general counsel.

Whatever the preference, the desired contact representative should be named in this section of the agreement. This to precludes uncontrolled communication between the parties. If the agreement is between parties who speak different languages, they will need to state in the agreement the language to be used for communication.

### Trade marks and copyrights

In this module, the technology transfer subject matter has been patents and know-how. Trade marks and copyrights are also very important intellectual property assets, as noted earlier. Distinctions for technology transfer agreements regarding trade marks, copyrights and other forms of technology transfer outside the scope of this module are shown in module 13, on types of agreements.

### Cross-licence

In a cross-licence arrangement, each party to an agreement licenses the other. At times, businesses may encounter a situation where one firm's patent or patents dominate, overlap or block the technology of the other. In such cases, neither party is able to commercialize its invention unless it obtains rights from the other. A cross-licence is usually negotiated in these situations. Most often, cross-licences involve patents, but they can apply to other intellectual property as well.

The term cross-licence is a title, and it is not generally used as terminology in the body of the agreement. Many times, in effect, each party trades technology rights to the other instead of collecting royalties. The other terms and conditions in the licence also are usually reciprocal. Occasionally, the cross-licence may result in a lump-sum payment to one of the parties when the value of the traded technologies differs significantly.

### Concluding remarks

In this module many of the most common types of clauses found in technology transfer licence agreements have been explained and discussed. Most will be found in nearly every licence agreement, and perhaps they can serve as a framework for the ideas of the reader, who should feel free to think independently and to invent new clauses that will accomplish the objectives of the parties, whether a licensee or licensor. Getting agreement between the parties always requires creativity and a certain amount of flexibility. The result is likely to be a combination of standard clauses and new clauses that will accommodate the given situation.

The laws governing the licensing of intellectual property do change, and they do vary, sometimes significantly, from one country to another. Naturally, each new licence has to be carefully checked by legal counsel to assure its legality in the geographical areas of the agreement.

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# Module 15

## TRAINING

*Training is a vital, if too often neglected, element in successful technology transfers. This module reviews the basic issues and common practices in structuring contracts for training. It considers the factors that make for effective training, from programme development to selecting capable trainees to measuring the training's results. The module also addresses financial considerations for both trainers and trainees and discusses the roles of various individual clauses in training contracts (aims and purposes, programme conditions, location, periods and language for training, trainee selection and curriculum development). The module's annex contains an outline of training issues to be covered in complex contracts.*

# Contents

# TRAINING

## Introduction

The success of a project based on the transfer of technology depends on a number of factors, including the following:

- Optimal project preparation which entails selecting the proper technology and its transferor.
- Conclusion of fair, correct and balanced contracts.
- Proper implementation of a project within time and budget goals.
- Proper absorption of the transferred technology.
- Proper preparation of the market.
- A plan for further development of the technology.

When a plant has been constructed and taken over by the recipient, all the supplier's experts leave and the recipient has to assume full command of the new unit. Even with all other factors at the optimum, the success of a project depends on proper absorption of the transferred technology. Indeed, it may be argued that a technology is only properly absorbed when the transferee has mastered the technology and can handle it as well, or nearly as well, as the transferor.

A vital element for the proper absorption of technology is the proper training of the transferee's staff. Many projects fail for want of attention to this important detail. This module focuses on the vital element of training in technology transfers. It considers both technical and contractual issues and the common problems associated with each; it also deals with problems that occur regularly in the implementation of training contracts.

The module aims not to present a model training programme but to illuminate the aspects involved, to make potential recipients think about them, to enable them to better understand the risks and results, their own interests and the interests of the other party, to analyse situations and needs, to cover the right points and to find the solutions most satisfactory to both parties.

Experience has shown that in contracts little, if any, attention is paid to the matter of training. While reams have been written on the various issues involved in the transfer of technology, there is practically no literature on this productivity-determining subject. Yet it is a fact that the fate of a licence contract, a transfer of technology transaction, indeed of any new project, will depend considerably on how well the new technology has been absorbed and adapted, which relates directly to the role of training.

In the author's considered personal view, which is shared by a number of authors of works on licensing, the main function of a licence agreement is to impart know-how (a licence or permission to use it) to the recipient and to bring him into a position where he can make use of it, as stipulated in the contract. As a consequence, the transfer of the know-how is part of the main obligation of a licensor. Know-how can be transferred in a number of ways, one of them being training. Consequently, training should be viewed not as a separate activity to be handled in a subagreement of lesser importance but as an integral part of the transfer.

## Training and technology transfer contracts

This module defines training as teaching and skills development performed by the technology transferor (or licensor), through which the transferee (or licensee) acquires knowledge, skills and proficiency in handling the transferred technology.

Training generally takes one of two forms in technology transfer contracts: "training" or "technical assistance," with the latter having a much wider meaning than the former. In the broadest sense, technical assistance as a collective designation includes different obligations, starting from simple advice or consultancy, proceeding through the transfer of know-how, including all the important elements required for the realization of a project and even extending to the supply of equipment. In a narrower sense, technical assistance is a collective designation for various technical services, usually dealing with engineering and construction issues. As part of know-how, however, it often deals with matters related to purchasing and sales as well. The purpose of technical assistance is to help the buyer master a technology and the relevant know-how as thoroughly and quickly as possible so as to achieve successful, timely project implementation.

The term technical assistance is so broad that its meaning must be carefully specified in each contract. Technical assistance is seldom provided alone and is usually combined with other services or forms of technology transfer. Contracts including a licence (patent or know-how), engineering or equipment usually deal with one or more forms of technical assistance (technical services) or are coupled to separate contracts for such services. Technical assistance is an important means of practising the transfer of technology or know-how. Any of the services under the collective designation of technical assistance may and should be considered as a means of technology transfer; those pertaining to services for acquiring knowledge are of particular importance.

Technical assistance and its different forms are such general terms that they become meaningless if they are not clearly described, especially because the techniques by which technology is transferred are of primary importance in a licence or transfer agreement. In the case of contracts dealing with non-material goods, the contract should carefully and precisely specify and stipulate all rights and obligations of each party. The importance of specific language to avoid misunderstandings or differences in interpretation by the parties involved or by the arbitrators cannot be overrated.

### *Technical assistance activities*

Technical assistance activities generally break down into five groups:

*(a)* Delegating experts to perform certain defined tasks with different responsibilities, as, for example, the following:

- Participating in the erection and commissioning of plant equipment, with experts assigned, for example, to carry out erection; to supervise erection, commissioning and/or start-up; or to assist in operating the plant.
- Participating in creating an investment or marketing organization.
- Assisting in organizing investment or maintenance.

*(b)* Rendering expert services that the client cannot provide in areas such as the following:

- Quality control of the product or raw material.
- Process technology research to help make improvements

*(c)* Conducting surveys of a more general character, for example market surveys:

*(d)* Providing special services, such as lending tools or instruments.

*(e)* Providing services, such as personnel training and consultation that help the client acquire knowledge.

### *Types of training contracts*

Contracts dealing with training generally divide into two groups:

- Contracts wherein training is the main subject (contracts for training).
- Contracts wherein training is a secondary feature.

Contracts for training are usually concluded with specialized training institutes or companies providing training in specialty industrial professions, such as welding, casting, moulding, filtration and other types of industrial operations. Contracts in which training is a secondary feature include contracts whose main objective is the granting of a licence (patent, know-how or trade mark) and provision of know-how, supply of equipment or supply of plant.

This module concentrates on the second type, only briefly touching on contracts in which training is the main subject.

The existence of a separate training contract with the technology supplier (i.e. the licensor) or with a key equipment supplier does not necessarily change from secondary to primary if it is part of a technology transfer, because it is still part of a broader package. Such contracts represent a means of channelling the transfer, that is, they help to achieve the economic aims and purposes of the project and the transfer agreement.

Except for rather rare cases in which very simple know-how is transferred in a single act, technology transfer involves many activities and services. As a consequence, contracts dealing with the process are usually complex. The character of and contractual obligations in these contracts are usually mixed: elements of a sales contract (e.g. supply of equipment or documentation), elements of a contract for work (e.g. engineering, training), with the contractor often undertaking to achieve a certain result, and elements of a usufructuary lease (e.g. with equipment leased to the lessee who is entitled to make profits by using it) are commonly combined. A licence, which is a common form of technology transfer, very often contains all three elements.

Further complicating matters is the fact that the technologies being transferred are immaterial, unlike, say, equipment, which is physically tangible. Given that technology is immaterial, no national contract law deals with its transfer very effectively. Thus, contracts must correctly and precisely stipulate all rights and obligations of the parties involved. Disputes arising from ambiguous language, when taken to court, often have serious consequences. For example, courts may rule the reinstatement of the status preceding the contract in the case of something material like the sale of equipment, whereafter the supplier takes back the equipment and the client takes back the money. An intangible, immaterial commodity like know-how, however, is obviously quite impossible to take back once it has already been disclosed and transferred.

### Established international contractual practice

International business practices evolve more dynamically than does international law. Contract professionals understand common conditions and generally accept the following points as established practice:

- In contracts for the supply of individual equipment, three training options are generally encountered:
  - *(a)* In the case of conventional, simple equipment, there is generally no training foreseen in the contract.
  - *(b)* In the case of intricate, complex or advanced equipment, training is foreseen in the contract, usually for a limited number of personnel and for a limited period. The price of this training is either included in the price of the equipment (in which case the training is explicitly declared to be free) or separately negotiated and declared.
  - *(c)* Training is presented as an optional service, that is, as an accepted obligation of the supplier to be met upon request. The client decides whether he wishes to avail himself of such a service, under the conditions stipulated in the contract. This option is usually applied in the case of more complicated equipment or equipment that is important to the transferred technology and that plays an important role in the economics of production.
- In contracts for the supply of complete equipment or in turnkey contracts, a standard stipulation obliges the client to provide for all requirements necessary for appropriate operation, including skilled personnel. Training in such contracts may be referred to as training or as technical services. The same applies to licence agreements.
- The number of trainees and the duration of training is restricted.
- Parties — especially the transferee — are obliged to confidentiality.
- A common feature obligates trainees to observe:
  - National laws and regulations.
  - Factory orders and rules, including safety regulations.
  - Official holidays.
- It is a common practice to include a programme for training or at least a date by when such a programme will be arranged. This programme then becomes part of the contract.
- The training programme is arranged by the licensor. It is common practice for the programme to be approved by the licensee.
- In most contracts no examination is foreseen.
- The selection of trainees is usually left to the recipient. It is often stipulated that the licensor may object to certain trainees if they are deemed underqualified.
- Regarding fees for training payable to the licensor, the following alternatives may be encountered:
  - *(a)* No fee at all for training, except for those expenses connected with the travel and accommodation of trainees, or no fee for training but a declaration that the licence fee includes the price of training with the limits stated in the contract.
  - *(b)* No fee for training in the reference plant (at the licensor's plant or in a plant of one of his licensees or clients) but a fee for on-site training. It is customary to limit the number of trainees to be trained in the reference plant, to limit the number of trainers for the on-site training or in the reference plant and to limit the period of training time at both sites.
- Sometimes on-site training is conducted by the supervisor for the erection and commissioning. In this case there is no separate fee for the trainer.
- The indemnity payable to the licensor for the trainers is commonly paid at a daily rate. Its value varies within rather wide limits. United States indemnities are generally much higher than European and Japanese ones.
- Paying daily subsistence money, as a rule directly to the trainers and usually in the currency of the recipient's country, is also frequent practice.
- It is also common to provide free lodging for the trainers, with the possibility of utilizing the works canteen against payment.
- Lodging for the trainees is either paid for by the licensee or, more frequently, provided free of charge by the licensor.
- It is common to obligate the recipient to take out appropriate insurance for both the trainees and trainers.
- All travel expenses are usually covered by the recipient.
- Expenses for interpreters are usually assigned to the recipient.
- Contracts usually stipulate that both parties will assist one another in obtaining necessary visas.

## Factors for efficient training

### *Content of a training programme*

A teaching document cannot include everything. Even if it could, proficiency cannot be acquired from a document; at the same time, learning by making mistakes, while the truest form of learning, is extremely expensive for any licensee, transferee or recipient. Thus an important part of the transfer must be made by other means, one of which (and an important one) is training.

It is impossible to create a generic training programme applicable to any technology, project, recipient or contract. A training programme must be tailored to a specific project and to the transferee or recipient in question. None the less, the subjects the programme ought to cover may be delineated with a reasonable degree of certainty. A training programme designed for a complex project is described in the annex. This example, of course, offers only headlines; the actual contents must be worked out on a case-by-case basis.

### *Scope of a training programme*

It should be borne in mind that the transferee's personnel should master the technology and that the transferee should be able to implement the economic aims and purposes of the project and contract and produce a competitive product. Keeping these aims and purposes in view, the training should teach both know-how and know-why. It should enable the trainees to assess their own actions and those suggested by others, assess the potential results of such acts and to make correct decisions at any moment in the production process, especially if something goes wrong. Trainees should be capable of operating and maintaining a plant at a level comparable to that of the licensor's, transferor's or supplier's personnel or that of its other licensees or clients.

### *Developing a training programme*

The best programmes are developed by the licensor or transferor, studied by the licensee or transferee, discussed jointly, mutually agreed upon, and finalized. The approved programme should then become part of the contract. If a programme cannot be set up at the signing of the contract, a time limit should be agreed upon for programme development and approval.

Both technology, transfer parties should consider diversifying the training so it addresses the needs of many types of personnel: engineers and technicians, operators and supervisory staff, skilled workers, process operators, quality control staff and design engineers. Furthermore, the factory manager should attend all parts of the training programme. This will allow him to become completely familiar with the entire technology and to get to know his plant personnel.

Training methods should be both theoretical and practical. The process engineers' theoretical training should not only cover the theoretical bases of the process and the subjects noted in the annex, but might also include an introduction to the results of the transferor's own research and development work. If the transferor has a training simulator, it should be included in the training programme for both engineers and operators.

Practical training should be comprehensive as well:

- Training at the transferor's (licensor's) plant or at the plant of one of its other licensees, if possible of a similar size.
- Training by means of participating in the design and procurement of plant equipment.
- Participation in the preparation of the operating and maintenance manual.
- On-site training during erection, installation, and commissioning of the plant, including the start-up and running-in, testing and on-stream periods. For best results, operators and skilled workers should also participate in erecting and commissioning the plant.
- In the case of intricate technologies, it is advisable to continue the training over an additional post-start-up training period using a programme based on the experience gained during the first operating period.

### *Selection of trainers and trainees*

Trainers should possess, in addition to the obvious professional qualifications, special qualifications, such as the following:

- A reasonable understanding of the economic aims and purposes of the recipient's project;
- A reasonable ability to communicate with and understand the trainees;
- Reasonable teaching capabilities.

Selecting trainees is one of the most delicate aspects of training and may also be a decisive factor in project success. Companies in developing countries are handicapped by poor infrastructure, a lack of adequate technological service capabilities, poor financial capacities and poor human resource development. Developing countries have fewer qualified engineers, mid-level technicians and skilled labourers than industrialized countries and also fewer universities and training institutions. What can a recipient do to overcome these grave difficulties?

A first step may be taken when preparing a new project: the level of personnel skills can be raised using any appropriate facility. Another step would be to ask the licensor or transferor to submit job descriptions for skilled personnel, to be used by persons who will assist in selecting trainees. The transferor could also be asked to provide descriptions for jobs requiring technical education, no matter how minimal, or special knowledge.

It would also be advisable to have two or three candidates for each job, have them study the job descriptions and then pass a test. By taking into the account the results of such a test in addition to the past experience of the candidates, the best trainees could be selected from among those available. Similarly, it would be advisable to ask the transferor to have trainers or trainer candidates participate in the selection process as well as the testing process. The last word on selecting trainees should, of course, remain with the recipient, bearing in mind the opinions of the trainers.

Training personnel is a costly business. The higher-than-average level of skill it imparts is a valuable asset for the recipient enterprise and will be recognized as such by other enterprises. This poses a risk of "brain drain" if companies within the country and from abroad try to recruit newly trained workers. The recipient may lose skilled staff at the very moment they are most needed. It would therefore be advisable to have candidate trainees sign a contract obliging them to stay on the job for a given time and specifying the financial consequences for a breach of contract (usually repayment of the amount spent on his training).

### *Evaluating training success*

Evaluating the results of training results is even more difficult than selecting participants, mainly because failure after training raises the question of who is at fault. The licensee can blame the licensor for providing incompetent training and an inefficient trainer, while the licensor can make similar charges against the trainees.

A programme for evaluating training will prevent such disputes from occurring. It should consider a number of questions. Can the result of training be measured? If so, then how? If by means of an examination, who should be the examiner? How should the results of an examination be evaluated, when not all of the trainees pass it? Is a theoretical examination sufficient? What experience should be obtained as part of the training? Each of the above questions is now examined in detail to find fair and practical answers acceptable to both parties.

Can the result of training be measured, and if so, how? Getting good results with training involves effective teaching by the teacher and sufficient learning by the trainee. Subjective elements on both sides (differences of capability among students, their diligence, the ability of a teacher to adapt to such differences etc.) will affect the result. The training process, in short, is a two-way street, an activity that requires effort on both sides.

This brings us to a related question: What exactly is the obligation of the teacher? Is it the teacher's obligation to hold a certain number of classes and lectures and teach — say, mathematics — irrespective of the result (since the students will probably show considerable differences in learning ability)? Or is the teacher obliged to achieve a certain result, for example, to impart the capability to solve mathematical problems, with due consideration given to subjective differences, expressed as differences in trainee scores? It is generally thought that if a great many students fail to pass examinations, a teacher must not be very good.

Teaching may be considered simply as an obligation to teach or it may be considered an obligation* to achieve results. No school in the world expects all of a teacher's students to achieve top marks nor, however, is it acceptable for all of them to fail. In general, it is expected of a teacher that students of average learning ability should master the material taught, that the better students should excel and that even the majority of the poorer students should be able to pass. This expectation is all the more important in the case of technology since teaching transfer is one of the main means of the transfer.

However, no plant, unit of equipment or process can achieve the results expected and promised if necessary conditions, means or resources are not provided. Such conditions, means or resources include appropriate location, appropriate utilities (power, steam, water and sewer), appropriate materials and appropriate personnel. It is the obligation of the recipient to provide these conditions.

The fact that the technology recipient has asked the supplier (licensor or transferor) to train his staff does not oblige the trainer to achieve positive results with the individuals designated for such training, since some of them may, for instance, prove incompetent (or be replaced). Accordingly, the only obligation of the licensor or transferor in this respect is to teach and to do his or her best to achieve a positive result without any obligation for the eventual result.

A licensor cannot be expected to guarantee the results of the training if it is given no control over the motivation, learning power or other qualities of the

*The issue of whether teaching entails an obligation to achieve results is hotly debated internationally and no generally accepted conclusion has been reached.

trainees. Moreover, it is too subjective a matter to determine such things as whether the licensor induced trainees to study properly or whether the licensee provided appropriate personnel for the training.

Ultimately, disputes over the quality of the personnel to be trained or the quality of the training should be avoided, because they are futile. It should be kept in mind that in a licence or technology transfer contract, training is not an independent activity and obligation but a channel for the transfer of knowledge. The main obligation of the transferor or licensor is to the transfer of that knowledge. An effort should be made when drawing up the contract to find a solution to evaluation problems that is fair to both parties. This will be discussed in greater detail later.

One established way to test the success of both learning and teaching is by setting an examination, especially where theoretical knowledge is concerned. When trainees know in advance that they will be examined, they generally feel more responsible for mastering the material presented, and in most cases they get better results. Of course, very simple transfers require no examination.

If training will be monitored by examination, who should be the examiner? Should it be the licensor or the licensee (the transferor or the transferee)? On the one hand, the transferor possesses the professional knowledge and, from that standpoint, is best qualified to examine trainees. On the other hand, it may not be prudent to leave judgement of the fulfilment of an obligation to the obligated party. One need not doubt the fairness, correctness or integrity of the licensor to be concerned about a possible conflict of interest. While clearly the party with the greatest interest at stake, the licensee usually lacks sufficient professional knowledge to conduct the evaluation. A mixed panel comprised of delegates from both sides or a neutral person or panel is a tried and effective solution. Experience teaches that preference should be given to a mixed panel of perhaps three examiners who will establish their own rules for the examination and evaluation.

What would happen if all or most the trainees failed the examination? If training produces disproportionately negative results, clearly it must be considered a failure. Problems must be identified and teaching and learning repeated. At whose expense? The question is answered in the section on guarantees in training contracts.

In the case of only partly satisfactory results, it can be assumed that the transferor has met the obligations. After all, even a few trainees would attest to the effectiveness of the training. It should be decided case-by-case whether the failed trainees are, in fact, sufficiently competent; some should probably be replaced. Others will prove suitable, but in need of repeated training. In such cases, expenses for repetition should be borne by the recipient.

A theoretical examination alone is not a sufficient basis upon which to judge a trainee's mastery of plant operation and technology. While it may be possible to learn from a book how to drive a car, cook a meal or swim, this does not mean that one becomes an experienced driver, cook or swimmer by reading. There is only one way to prove of proficiency acquired by training and that is in practical operation — in short, by doing.

A licensee/transferee can measure the extent of learning by doing among trainees before the training personnel leave the plant through the use of the Performance Guarantee Test (PGT), a standard feature of technology transfer agreements. The PGT is usually carried out under the guidance or supervision of the transferor, licensor or supplier. Its purpose is to demonstrate that the process and the equipment perform as promised. PGTs also show that the guaranteed/warranted performance values stipulated in the contract can be reached. If the lead supervisor of the licensor, transferor or supplier has succeeded in proving and demonstrating during the PGT that the values can be reached, then the transferor has met his guaranty/warranty obligations concerning the technical values and is released from any obligations under the warranty/guaranty. Success in the PGT may also demonstrate and prove the proficiency of trainees; when so used the PGT in effect serves as an examination and proves the competency of the trainees.

Both parties have an interest in the success of the PGT. But since the licensor (or transferor) will eventually leave the site entirely to the recipient's personnel, the recipient must take certain precautions. It is suggested, for instance, that recipients negotiate for trainers to remain after the PGT has been completed. A thorough transfer will allow for an additional period in which the supervisor of the plant is still present but is operated entirely and solely by the recipient's personnel. If all goes well during that period, then the training was successful. If the situation deteriorates, then the training was obviously insufficient, even if the plant is suitable and technical guarantees were found to have been met in the initial PGT.

To deal with poor post-training performance, remedial training should be offered at the site and the PGT repeated, but only to test the results of the repeated training. The transferor should bear only those expenses incurred by his trainer(s). Other normal expenses connected with plant operation, lodging etc. should be covered by the recipient.

A positive PGT gives the recipient some confidence that his personnel are practised and well-trained, if not particularly experienced. Experience comes only with time: one or several good PGTs do not make an experienced work force. Trained personnel have proven their proficiency in normal plant operations under normal conditions. But real proficiency and experience requires an encounter or two with trouble in emergency situations. PGTs may be designed to intentionally create such crisis situations, but this is not always possible or necessarily recommended since considerable loss could be involved. The contract should therefore provide for further consultations and training after the facility comes on stream, especially for projects involving intricate technologies or valuable materials or products.

### Financial aspects of training

#### *Financial considerations for the licensor or transferor*

The transferor will usually incur the following expenditures:

- Expenses of developing and preparing the training materials.
- Expenses of receiving the trainees at his works or other training facilities.
- Expenses of sending trainers to the recipient's site.
- Loss of productivity and profits owing to the absence from production or other activities of key personnel put at the disposal of the recipient. Losses may sometimes be higher than the amounts paid by the recipient to make such personnel available.

The careful transferor will also calculate the risk of losses due to disseminating its technology in whole or in part.

Given these risks, licensors tend to take relatively hard positions on three important points in contract negotiation. They will generally take steps to limit the number of trainees and the training period, limit the duration of the trainers' stay at the recipient's site and refuse recipient attempts to reduce daily fees or allowances and daily subsistence money.

#### *Financial considerations for licensee, transferee or recipient*

The recipient will usually incur the following expenditures:

- Payments to the licensor for training.
- Expenses for travel and accommodation of the trainees abroad.
- Expenses for translators.
- Expenses for travel and accommodation of the trainers at the site.

Two obvious interests of the recipient conflict. On the one hand, extended training would probably improve the results of training. On the other hand, time is money, and extended training means additional expense. Since training is expensive, it behooves the recipient to determine a training period that gives the workers sufficient time to develop the requisite skills but that minimizes the cost of training time. The transferor, driven by similar interests and imperatives, will also strive to limit the number of trainees and trainers and to limit the duration of training. The balance struck between optimum time and expense will also depend upon the quality (and, accordingly, the proper selection) of trainees.

The parties should also consider that because training is an important means for the transfer of technology or knowledge (know-how), it is one of the licensor's main obligations under a licence agreement. A certain period of training for a given number of trainees should therefore be considered the licensor's obligation, and the expenses for it should be covered by and included in the licence fee. Indeed, international contractual practice follows this precept. Should the licensee require more training time, in excess of the number of sessions and periods agreed to, this must then be paid separately.

### Training clauses in contracts

Having reviewed the types of contracts, established contractual practices, efficiency factors and financial considerations that attend training in technology transfers, let us focus now on the particulars of the contract document and the clauses on training normally found therein.

In a contract mentioning any form of training or technical assistance, the following questions should be answered: What, where, how, when, how many, for how much and for what purpose?

#### *Economic aims and purposes of the training*

The goals, aims and purposes of the training should be clearly defined in the contract. So should the technological purpose of the training, in a contract on the supply of individual equipment. It is also advisable to denote contractually that training will be considered part of the technology transfer. If training is dealt with in a separate part of the contract, this should be stated at the very beginning of that part. The recipient should also be sure to state plainly how training will be conducted, particularly where the transfer of know-how is declared. Should the recipient wish to make training an optional service or an obligation of the transferor, then it should be so specified. The same applies in the case of a separate agreement concluded for training with the licensor, transferor or supplier of the plant.

### *The training programme and conditions for its development*

The training programme and its details should be included in the contract as an annex or a deadline should be specified for drawing up the programme completion, with due consideration given to the nature of the project. Also, the programme should be developed by the transferor with a view to the particular circumstances and requirements of the recipient's project; this should be reviewed by the recipient, jointly discussed and approved by the recipient.

### *Number and type of trainees and their selection*

The number of trainees and their qualifications will depend on the nature of the project as well as on the level and experience of the personnel involved. As previously noted, in transfers of more complicated technologies that are unfamiliar to the recipient, the recipient should stipulate that the transfer facilitate trainee selection by providing job descriptions indicating the minimum level of theoretical and practical prequalifications. The right of objection by the transferor and a deadline for such objections should be defined, together with any other assistance he would be able and willing to accept.

### *Location(s), period(s) and language of training*

If the location and training period cannot be identified at the contract execution, a deadline should be stipulated and included in the contract.

If necessary, specify whose duty it will be to provide an interpreter and who will incur the expense.

### *When training can be considered complete*

The professional level or degree of proficiency required to complete training should be stipulated. Otherwise, it may be stipulated that the training should be considered to be complete at the end of a prescribed period of time. One may also require that a journal or log should be kept of the training.

### *Mode of evaluation and consequences of unsatisfactory results*

If the parties agree to achieve a certain result, then it should be so stipulated and the mode of evaluation defined. If an examination is selected as a means of evaluation, then the composition of the board or panel of examiners also has to be defined. Establishing rules for examination and the method for evaluation should be left to them. It would be advisable to have the examination in two parts:

- An examination in front of the examining board, whether oral, written or both.
- A practical test at the new plant. It should be included in the PGT.

The only penalty for deficient or unsuccessful training should be repeat training.

### *Post commissioning consultations or training*

For complicated technologies, it is advisable to provide for the possibility of consultations or training after the facility comes on stream at conventionally calculated fees charged by the transferor to other licensees or clients.

### *Payments*

In this clause training in the reference plant usually is free of a separate charge because the price is included in the licence fee or price of the technology. The same normally applies for training at the recipient's site, except for the obligation to pay daily allowances and subsistence to the trainers.

The contract should provide for the method of paying these allowances (e.g. monthly or upon conclusion of the training) by means of a straightforward remittance, by a letter of credit or by any other means of payment against presentation of a bill and a signed statement giving the number of days involved.

The rate for daily subsistence payable to the transferor or directly to the trainer(s), either partly or entirely in the currency of the recipient's country, should be defined, along with the costs to be borne by the recipient for travel and accommodation for the trainees, as well as insurance. The party that will bear similar costs for the trainers (usually it is the recipient) should also be specified, as should the responsibility of both parties to provide the following services for each other's personnel:

- Assistance in obtaining visas and entry permits for the country and sites of training
- Free medical services and first-aid facility
- Free work rooms, including office facilities
- Free safety devices
- Free communication facilities (telephone, telex, fax) for business communications
- Free transport between the workplace and the accommodation
- Assistance in case of death in arranging all necessary formalities and for transportation of the deceased home at the other party's expense.

### *Taxes and other official charges and duties*

It should be stipulated that if an agreement exists for the exclusion of double taxation between the countries of the transferor and the recipient, then payment of taxes should be as prescribed by such an agreement. Otherwise it is advisable to stipulate that each party has to pay the taxes and duties levied by its own government.

## Other contractual situations

### *Training as the subject of a separate contract*

While all of the foregoing is also valid when training is covered in a separate contract, attention is drawn to the paragraph on economic aims and purposes. It is advisable to link training to the main contract through cross references and to make it clear that both parties consider training to be the means for the transfer of know-how, which is the principal obligation of the licensor or transferor. It is equally important that a separate contract on training have the same governing law and the same forum for settling disputes as the main contract.

### *Training as the subject of a third-person contract*

When a contract for training is concluded with one of the other licensees of the licensor, that is, when training is subcontracted out, all of the foregoing applies. However, it would be advisable to ask that the licensor declare the third party to be acting as his agent.

### *Training as the subject of an equipment supply contract*

It is advisable to distinguish between critical and non-critical equipment* in the contract.

#### *Non-critical equipment*

Dealing with non-critical equipment is fairly straightforward. Should the equipment be familiar to the recipient's personnel no training is usually required. If training is required because personnel have no experience in using the equipment, everything that has been said before applies.

*Critical equipment refers to equipment that has a decisive role in the process and technology, and consequently in the success of the project, such as a reactor in a chemical or nuclear plant, a blast furnace in a metallurgical works, high-precision processing machines etc. Non-critical equipment is equipment that does not have such a decisive role, such as pumps, compressors, tanks, roughing machines etc.

#### *Critical equipment*

In the case of critical equipment, the training issue is more intricate, because the equipment supplier is not responsible for the technology, for its result, or its transfer. Recipients need to protect their interests and reduce their risks under these conditions. Thus, a recipient may request that the licensor assist him in selecting an equipment supplier, in concluding a training contract, in obtaining approvals for the supplier's detailed engineering of the basic engineering submitted by the licensor, in carrying out quality control of such equipment and in testing the equipment.

All technical and operational parameters should be included in an equipment supply contract; they should be guaranteed by the supplier, especially those which the licensor has prescribed in order to achieve the guaranteed performance. In such cases, the training obligation of the equipment supplier should focus on mechanical service, maintenance and repair of the equipment, while that of the licensor should focus on operating it.

### *Training in unit operations*

Training in unit operations is generally quite different from what has been so far discussed because the courses are usually organized by institutes and not by industrial companies. Institutes only teach and do not supply technology or equipment. They do not accept responsibility for the results of their training courses and they usually have standardized general contract conditions not open to negotiation. Quite often there is an examination, which the trainee either passes or fails. If the student fails and still wants a certificate, e.g. for welding, he is free to repeat the course until he succeeds.

## Warranties and guarantees in training contracts

Warranties and guarantees are very intricate and sensitive components of all contracts since they identify responsibilities and liabilities and involve considerable financial risks. Warranties and guarantees are also commodities, with their own prices. An obligated party may try to increase the price of the warranty or the guarantee and may take other steps to reduce its own risk.

This is especially true for a warranty or guarantee for training results, because the elements involved are so subjective: the "learning power" or "learning capacity" of trainees cannot be calculated as it can for tangible items.

When training fails to achieve the desired results, it has to be repeated at the expense of the transferor. Those expenses would include the costs of keeping the trainer(s) on site and the transferor's loss of a highly-valued expert needed for other jobs.

The transferor may try to reduce his responsibility by refusing to accept responsibility for a result. He may say the trainees are incompetent and demand that the recipient should replace them with better trainees, which the recipient may not have. Or, he might say that under such conditions he should be relieved of his responsibility.

This problem has been hotly debated in North-South conferences. A number of international institutions that finance industrial projects refuse to accept responsibility for the result of training.

This is, therefore, one area in which negotiating positions and skills play an especially important role. The negotiations will depend greatly on the special features of a project, the nature of the technology, the experience of both the transferors and the recipients, the training facilities available with the transfer and the skill levels of recipients' personnel. There are no hard-and-fast rules.

## *Annex*

## SUBJECTS SUGGESTED FOR COVERAGE IN THE CASE OF A CHEMICAL PLANT

*Plant operation*

- Normal operation, start-up, stopping (shut-off) and restarting, emergency stopping
- Possible troubles, trouble cause analysis, steps to be taken (troubleshooting)
- Manual and automatic control; control systems applied
- Quality control systems and sampling
- Material characteristics and their effects
- Materials handling
- Effluents and their treatment
- Maintenance requirements
- Shop administration; data recording; data storage; data evaluation
- Plant management and organization
- Economic analysis of operation

*Plant maintenance*

- Drawings of the entire equipment
- Periodic prophylactic maintenance of the entire equipment
- Parts subject to wear and tear; spare parts required
- Erection and dismantling of equipment
- General overhaul
- Cleaning of the equipment
- Electrical systems and training of electricians
- Control system and training of instrument technicians in maintenance, calibration, trouble analysis and repair of measuring and control instruments
- Administration; data recording, data storage
- Economic analysis

*Materials handling*

- Materials (raw and auxiliary) to be processed; intermediates and final product(s) characteristics
- Potential dangers (inflammability, explosion)
- Conditions for delivery and storage at the plant
- Pipe system
- Steps to be taken in the case of leakage, in the case of danger or emergency (fire, explosion, ruptures etc.)
- Fire-fighting methods and tools
- Danger of toxicity, its prevention, advanced warning system and steps, both technical and medical, to be taken in case of an accident
- Security system and how to use it
- Administration; data storage

*Treatment of gaseous, liquid and solid effluents and emissions*

- Composition of normal effluents and emissions and their potential limits; control of composition; permissible levels
- Pollution control regulations
- Effluent treatment systems, their equipment and technology
- Toxicity danger to humans and animals, the atmosphere and waters, as well as soil and vegetation; steps to be taken
- Potentials for recycling effluents
- Administration; organization; data storage
- Economic analysis

*Quality control*

- Quality specification for all materials, raw and auxiliary that are processed and produced (intermediary, final and secondary)
- Laboratory analysis methods for such quality specifications; their accuracy and tolerances
- Permissible and admissible minimums and maximums; acceptance conditions
- Sampling
- Control methods (laboratory and plant); frequency of analysis; reagents and instruments required
- Steps to be taken to reduce or increase the quantity of certain desired or undesired components
- Organization of the laboratory and its work
- Administration; data storage and data processing
- Economic analysis

*Basic engineering*

- Participation in preparation of drawings
- Study of design methods
- Joint preparation of the operating manual
- Joint preparation of the maintenance manual
- Joint preparation of the instructions for detailed engineering

*Research and development*

- Process, product, and equipment development work
- Organization of technical information collecting
- Information processing and evaluation
- Preparation of innovation programmes for further development
- Organization of work and data storage

*Industrial property*

- Patents and other industrial property protection
- Patent search
- System for collecting, storing and evaluating information
- Cooperation with production marketing, and R&D sections

*Marketing*

- Product marketing methods
- Public relations and product promotion; study of methods
- Relations with clients
- System for collecting market information, data storage, data processing and evaluation, including trend analysis and analysis of life curves for the product and technology
- Study of connection and cooperation between marketing, production and research sections
- Cost analysis; pricing
- Administration; management

**Product applications and development**

*Unit operations*

All technologies are composed of such unit operations as turning, lathing, welding, soldering, pressing, moulding, distilling, filtering, heat-exchange, extracting, drying, size reduction, mixing, pelleting etc. Knowing the optimum conditions for these operations and selecting of the best equipment for achieving them enhances advantages offered by the technology, thereby influencing the overall economies of the plant and the project.

*Computer training*

In the case of computer-aided or computer-controlled production, it is strongly recommended that the assigned personnel be trained in the use of both hardware and software at the supplier's workstation.

# Module 16

## VALUATION AND METHODS OF PAYMENT

*Payment schemes in technology transfer agreements are more complex than those in simpler commodity transactions. In technology transfer, simple concepts such as "price" and "cost" take more varied forms ("royalties", "franchise fees", "technical service fees" etc.), each of which carries different meaning. This module offers comprehensive treatment of the varieties of payment in technology transfer agreements and discusses their advantages, disadvantages and attendant obligations. It also provides the rationales behind the different types of payment schemes and includes criteria for quantifying and assessing them.*

# Contents

# VALUATION AND METHODS OF PAYMENT

### The price and cost environment in technology transfer

One of the most critical and complex issues to be negotiated between a prospective licensor (transferor) of technology and a potential licensee (transferee) is the "price" or "cost" of the technology. This module views technology as comprised of two main components:

- The substantive portion of the technology: what it produces or performs, how and with what effectiveness.
- The protection available for the technology through the conventions and systems governing intellectual property rights, for example, patent protection.

When a particular technology is strong on both counts, its proprietor is in a commanding position. The commercial technology spectrum ranges from weak (that is, technologies rating poorly in terms of both substance and protection) to superior. As will be seen shortly, strong technology may quickly become weak technology because of the passage of time and the fierceness of competition in the global market, which gives rise in short time spans to major displacing innovations. However, strong intellectual property protection alone may fetch a high price for technology. A patent right might then be licensed without any accompanying know-how (often the substantive element of technology in developing country contracts).

The question of technology price has to be reviewed in the context of the technology market, a concept that emerged after the Second World War along with the phenomenon of technology transfer and the system governing its transactions. Thus, before taking up the price of technology, there is a need to appreciate the general differences between market operations in the technology environment and other forms of commercial transactions. This will help in understanding the remuneration terminology in technology transfer transactions.

In particular, the following distinctions need to be made:

- In the normal practices of commerce, one encounters several and competing sources of supply complemented by a larger number of buyers. By contrast, the technology market, on the whole, contains few sellers and buyers and there is little or no advertising of the technologies available or sought.
- While in commodity markets there is most often outright sale and acquisition of the commodity (that is, outright and unconditional transfer) and a determinable market price for products, in technology markets the technology is often offered and accepted on "licence" (akin to a lease); thus, the transactions may involve lease payment or rent, information on which is not made public.
- The lease of technology differs from commercial leases of properties in that a technology proprietor can license the technology severally, meaning there can be several legal users of the technology. Furthermore, with judicious constraints on the number of users, the rights given to them and their geographic access to markets, a proprietor can ensure that the value of a technology remains high and is not attenuated.
- Unlike the situation with a traditional commodity product or real estate, the life of a technology can be threatened by radical displacing technologies.

The price of technology has to be viewed not from the perspectives of buyers and sellers, but from the different perspectives of the licensor and the licensee. Different terminology also applies in technology pricing. The most frequent terms include "royalty", "franchise fees", "technical service fees" etc.

From the point of view of the technology owner, technology needs to be priced in the context of its development cost. This is not only a matter of its substantive content but, significantly, the legal protection the owner obtains around the world through product and process patents and trade mark registrations. The corporate image of the developer is also seen as a determinant that should be taken into account when pricing technology. In most cases, however, it is impractical to license a technology by applying a mark-up on its development cost; by this method, the cost of access to a licensee would be prohibitive. Thus, for a licensor, the cost of development and rewards for the risks taken during development can be recovered only through a dual strategy of captive usage of the technology and licensing. (As will be seen shortly, these options are best exercised one at a time rather than concurrently.)

For parties interested in acquiring technology, licensing represents a quicker, less risky and less expensive means of acquisition than attempting to develop an equivalent competitive technology. Of course, the oligopolistic control on sources of technology puts the prospective licensee at something of a disadvantage, and, in any case, the cost of licensing technology must be assessed from the aggregate net benefit gained by the potential licensee. To put it simply, a licence is not worthwhile unless the return from its usage: *(a)* is higher than the cost of obtaining it and; *(b)* is commensurate with or superior to the returns obtainable through alternative competing investments.

## The technology life cycle curve

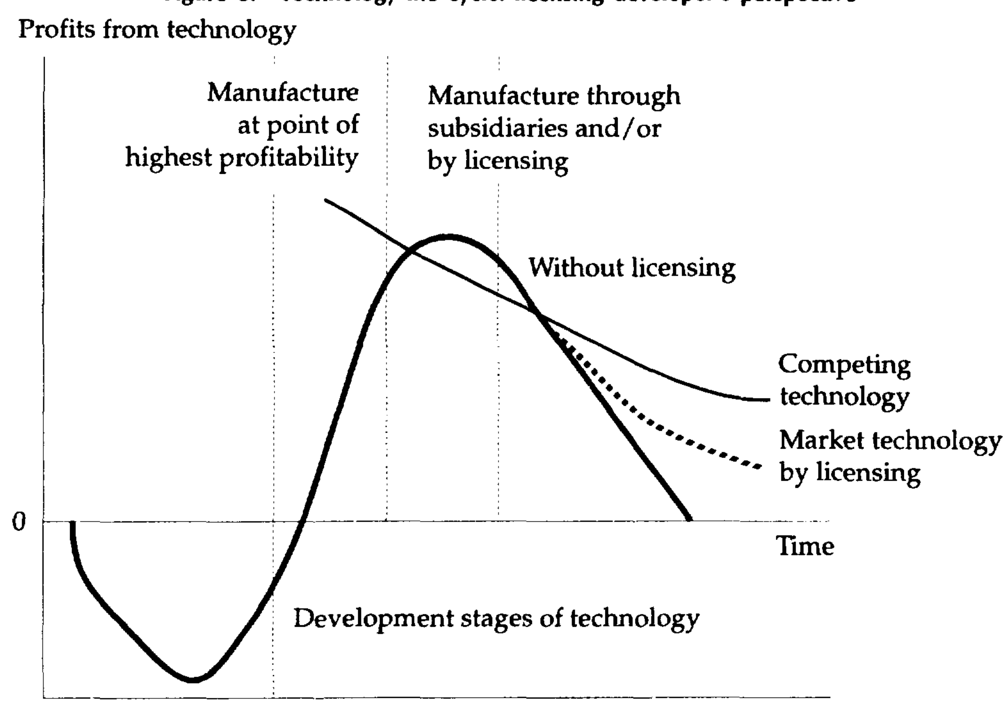
Figure 8 presents the general shape of the technology life cycle (TLC) curve, which frequently appears in marketing and technology literature. It should be noted that development costs are undertaken only after R and D and prototyping have indicated strong prospects for the technology. When the TLC is computed, the costs borne earlier for R and D, successful and unsuccessful, are debited to it.

The horizontal axis represents the time frame covering both the phase of development and the period over which a technology remains viable. The vertical axis represents the profits its developer makes over that time frame. The curve can be visualized as constituted of four rather clear phases:

- The development phase, during which no profit accrues from the development of the technology.
- The growth phase, showing the ascending path of successful technologies, with the slope defining the level of success.
- The saturation phase, which is often seen as the phase of established, tested technologies; the flatness of the curve can be short or long, depending on competitive forces.
- The decline and decay phase, which is inevitable with technology. It should be noted that in the decline phase a technology loses momentum of its own accord (for instance, when patent protection expires) and also as a result of emerging imitative and displacing technologies with, for instance, superior economies of manufacture.

Faced with the TLC, the proprietor-licensor of the technology will attempt to maximize returns by adopting the dual strategy of captive utilization and licensing. The options open to a technology developer are highlighted in figure 8. Generally, these consist of direct manufacture, manufacture through foreign subsidiaries and joint ventures (to increase profits by expanding the market, while keeping close control over the technology) and licensing out (to increase the gross global market share of the product of the technology, while relinquishing some control). In fact, as the dotted line indicates, the life of a technology, and the income potential of the licensor, can indeed be extended by licensing.

**Figure 8. Technology life cycle: licensing developer's perspective**



The implications of the TLC for a firm interested in acquiring the technology in question are several. When a technology is in the ascendant phase, its licensing is expensive, as the proprietor-licensor would rightly price the technology to recover a large proportion of its development cost. Strategic alliances (see module 19) and cross-licensing typically involve such cost-sharing exercises or licences. Some of the newly industrializing countries also licence-in technology at this phase to leapfrog conventional development.

Licensing technology during the saturation phase of the technology life cycle is common practice. There is little risk of technology failure, so the technology would be priced to give the licensee a level of return not much different from the return from a stable business not involving technology. Licensing in this phase can be attractive to a prospective licensee when the local situation (by virtue of, say, tariff protection) permits the products of the technology, which are not otherwise available, to command a price premium. This situation prevails in many developing countries.

Issues related to licensing technology in the declining phase of the TLC will be taken up after some of the basic terms and concepts in payment for technology transfer have been discussed.

## The concept of remuneration

Remuneration is probably the most neutral term for the sums of money paid or received in technology transfer, because it does not connote, without prequalification, the sum of money it represents. Remuneration is most often a negotiated sum of money in technology transfer. It is payable in particular forms, sometimes, and carries legal implications.

The language for discussing technology transfers can get complicated, particularly when transactions involve enterprises in developing countries and the substance of what is transferred is a matter for debate. (This will become clearer in the course of the module.) Much of this module aims to assist enterprises licensing-in technologies, particularly into developing countries, and to give them an understanding of the methodological strategies by which remuneration can be quantified and assessed. These are strategies, moreover, with which a licensor of technology in the developed country would be comfortable.

To see the problem head on, one should place terms such as "consideration", "income", "return", "technical service fees", "royalties", "administrative charges" etc. in their proper perspective in the technology domain. Simple terms such as "price" and "cost", which have their origins in commodity trade, need to be put aside in discussing the complexities of remuneration in the technology trade.

A crucial term in technology transfer is "consideration". For legal exactness and enforceability, a remuneration paid or received must be for a consideration, (although the term consideration may be replaced by an equivalent term in the legal draft of an agreement). Remuneration clauses in an agreement almost always begin with the phrase "In consideration of . . .". This consideration may be the rights granted through a licence, services performed by an engineering firm under a contract or advice given by a consultancy organization through an agreement. A remuneration that is not associated with a consideration is ambiguous.

This focus on consideration permits an important distinction to be made between remuneration received (or paid) for the performance of services and that received (or paid) for the grant of rights and legal privileges.

### *Remuneration in technical services agreements*

Of the two types of remuneration, the easier to handle is that paid or received for technical, engineering, construction, consultancy and related services. These services are performed by professionals acting in their own right or through an organization with expertise in providing such services. As part of the technology transfer process, these services lead to efficient production and are important to the business success of the recipient organization. They are not qualitatively different from services performed by lawyers or cost accountants. Without much trouble, a user's requirements (the "shopping list") can be detailed and put out for bid by competing firms.

While methods of assessing the costs of such services are dealt with later on, here it is important to recognize that they are offered competitively and are widely advertised. The recipient enterprise is not legally bound by any limitations on its rights to use the knowledge or benefits gained through such assistance.

Technical services are not always one-time-only affairs. Many of them are rendered over a period of time. When performed in their own right (that is, independent of other engagements between the parties), a technical services agreement is best defined as a contract rather than a licence. Furthermore, there is a transferor-transferee relationship rather than a licensor-licensee relationship. Remuneration is strictly in the nature of a fee. This implies both a price and a cost, and the concepts of normal commercial commodity practices carry over to these services. The consideration in such exercises is the technical components of the service, the substantive element of which should normally be listed in the agreement.

### *Remuneration in licence agreements*

Remuneration in a licence agreement relates to the rights granted to a recipient enterprise by the owner of such rights, usually called intellectual property rights. These include patents, trade marks, copyright and know-how (knowledge and experience held privately).

In practically all countries, there is now concordance over what the first three terms mean, at least in the context of the technology transfer process. Patents and copyrights have a fixed life-span and thereafter enter the public domain, after which they cannot command a value or price. Trade marks have a perpetual life, provided their registration is kept in force through periodic renewals with national statutory bodies. Know-how is different in that it lacks a clear legal definition that is accepted in all national environments. It is best defined as a trade secret, but whether all of the technical knowledge it refers to is held privately is often a matter of dispute. Know-how is often the most important element to licensees, particularly in developing countries. When properly defined in an agreement, it can be viewed as a right conferred to its proprietor and, therefore, valuable intellectual property.

In contrast to technical services, remuneration for intellectual property rights is determined in terms of any business advantage that might accrue to the acquirer of the rights. The acquirer of rights obtains a licence to the rights — the right to use, make or sell. The ambit of the rights, that is, the area over which the rights prevail, is not indeterminate. Through statutory provisions governing intellectual property, the owner (or licensor) can circumscribe the rights of the acquirer (or licensee) in the grants clause of the licence. For example, a non-exclusive grant under patent rights is a limitation on the right to use patented technology since it provides scope and right for a licensor, or a third party, to operate in the same territory under the same patents.

The all-important criterion of consideration in the licence agreement is, therefore, the set of grants granted and obtained on licence. Remuneration must explicitly be tied to the technology as expressed through patent, know-how, trade marks and copyrights as packaged in the negotiation process. In short, the ambit of grants is significant to a licensee's business potential and needs to be defined and negotiated, particularly in an arms-length transaction where the licensor does not have a stake in the profits of the licensee enterprise.

### *The concept of royalty*

In licensing intellectual property rights, there is no market price for the "product", as the product can range from the intangible right-to-use trade marks to the highly tangible right-to-use substantive knowledge encompassed in know-how. Consequently, the field has its own language. The most important term in this language is royalty rate.

Royalty probably has its origin in the royal franchise given by the Crown to individuals or corporations for the exploitation of foreign territories or national resources such as minerals. The franchisee paid a royalty, or share of the proceeds, to the Crown for the advantage he derived from the royal concession; at the same time the royalty was a token of the grantee's express acceptance of the Crown's continued sovereignty over the territory or resource or property. This general concept has been carried over to the field of intellectual property rights.

## **The assessment of remuneration**

The technology elements and grants package is typically priced in terms of royalty. A particular package could, for instance, be priced at a "running royalty" of 5 per cent of net sales value. The variety of forms in which remuneration is expressed in technology transactions can be quite perplexing. Besides a running royalty, which may be on sales or unit product produced or value-added, there is lump-sum royalty and a down payment royalty fee combined with a running royalty.

Can an enterprise gauge the implications of a royalty to its business operations, other than to view it as an exogenous cost element that must be deducted from income to arrive at profits? Perhaps more importantly, what means are available to negotiate the royalty rate other than to shop around for a lower royalty rate, which might not obtain a better business advantage? The alternative to no methodology is to engage a licensor in a bargaining exercise on royalty rates.

Given the how can we compare, say, a running royalty of 5 per cent of net sales value, a lump-sum royalty of $ 600,000 and a down payment of $ 200,000 combined with a running royalty of 3.5 per cent on sales value? The comparison exercise, fortunately, is not difficult. All forms of royalty can be arithmetically reduced to a lump-sum royalty using well-accepted principles employed in the financial analysis of business performance. However, such a reduction requires assumptions about the future and does not fully reflect the relative benefits.

### *The present value method for the capitalization of royalty rates and licence fees*

The concept of present value (PV) is routinely applied in financial analysis of industrial projects to select among alternative financing modalities. The approach can be readily, and equitably, applied for comparing different forms of royalty remuneration. The objective in present value assessment is to capitalize periodic and variously distributed technology-related expenditures of a licensee by discounting future receipts in terms of the present value of money. The arithmetic is quite simple.

The present value of a future receipt of money is conceived as less than its future nominal value. If \$0.9091, say, is banked today, it would yield \$1.00 a year from now at 10 per cent interest. Conversely, \$1.00 received 10 months from now is worth only \$0.9091 today. The \$1.00 has been discounted at 10 per cent. At the same discount rate, \$1.00 received two years from now is worth \$0.8264 now. These fractions 0.9091, 0.8264 etc., are generated using the following compound interest formula:

$1/(1 + r)n$

where $r$ is the discount rate of money and $n$ is the number of years from the year 0 until the year when the money is received; $r$ is not, in fact, the simple interest rate. It represents the cost of raising capital (demand and supply of funds), conditioned by the risk factors of the capital market as they affect the availability of public funds, bank loans etc. One of these risk factors is the bank interest rate. Financial institutions usually establish these discount rates for their own project evaluation programmes, and they would be the best sources of this information. But for the simple exercise of capitalizing future incomes to make a comparison of flows of income (or outgoes), any rate of discount can be applied so long as it is regarded as a constant.

This method demonstrated by comparing five competing technologies whose owners have stated their royalty expectations in various ways (table 12).

The total technology fees can be seen to be as follows (in million \$): technology A, 0.90; B, 1.68; C 2.52; D, 1.00; and E, 3.63.

Although remuneration is expressed in different forms (lump-sum, flat fees, running royalties etc.) and involves different flows of money over time, a finite number can be generated to represent remuneration for the technology in an unbiased manner that allows it to be used as a negotiation tool. However, no further conclusions can be drawn from the comparison of these numbers. They do not reflect the substantive benefit from or the suitability of the technology (see module 6, in evaluating and selecting technology) nor do they reflect the business protection or advantage available from the licence.

**Table 12. Five hypothetical schemes for remuneration**

| *Item* | *Technology* A | B | C | D | E |
|---|---|---|---|---|---|
| Annual product sales value[a] (million \$) | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 |
| Down payment (million \$) | 0.9 | 0.15 | – | 1.2 | 0.1 |
| Number of instalments | 1 | 1 | – | 3[b] | 1 |
| Royalty on sales (%) | – | 3 | 7.5 | – | 6 |
| Period over which the royalty is payable (yr) | 5 | 5 | 3 | – | 6 |

[a]It is assumed, for the purpose of describing this method, that for all of the technologies being compared, the annual sales value remains constant at US\$ 13.5 million for every year under computation.

[b]To be paid at the beginning of the first, third and fifth years.

**Table 13. Present value of remunerations received or paid in technology transactions**
*(Millions of dollars)*

| | *Year* 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Discount factor, 10% | 0.91 | 0.83 | 0.75 | 0.68 | 0.62 | 0.56 |
| Running royalties | | | | | | |
| A | – | – | – | – | – | – |
| B | 0.37 | 0.33 | 0.30 | 0.28 | 0.25 | – |
| C | 0.92 | 0.84 | 0.76 | – | – | – |
| D | – | – | – | – | – | – |
| E | 0.74 | 0.67 | 0.61 | 0.55 | 0.50 | 0.46 |
| Flat fees | | | | | | |
| A | 0.90 | – | – | – | – | – |
| B | 0.15 | – | – | – | – | – |
| C | – | – | – | – | – | – |
| D | 0.40 | – | 0.33 | – | 0.27 | – |
| E | 0.10 | – | – | – | – | – |

### *The profit share concept*

One means of assessing technology remuneration, independent of who is engaged in the exercise (the licensor or the licensee) would be a methodology that accurately relates the profit of an enterprise (seen as business advantage) to the expense borne when acquiring of technology rights against royalty payments.

The method developed for this purpose can be illustrated by a rather simple analysis of profit realized by an enterprise during the royalty-bearing period and immediately thereafter (table 14). A few assumptions have been made:

- The licensor and licensee are unrelated organizations and the licensor does not have a stake in the capital of the enterprise being analysed.
- The royalty (on any basis) is to be paid by the enterprise for the transfer of some right the use of which benefits the enterprise in the form of profits.
- The enterprise is obligated to pay royalties, due at the end of each year, and this obligation holds for a period of only five years from the commencement of commercial operations.

**Table 14. Enterprise profit and royalty payments**
*(National currency units)*

| | Year 1 | 2 | 3-5 | 6 |
|---|---|---|---|---|
| Net sales value | 100 | 100 | 100 | 100 |
| Cost of production (excluding royalty) | 46 | 46 | 46 | 46 |
| Royalty payable to licensor, R | 4 | 4 | 4 | – |
| Total cost of production | 50 | 50 | 50 | 46 |
| Profits before income tax ($PBT_R$) | 50 | 50 | 50 | (PBT)54 |

Note that in year 6, when royalty payments cease, the profits before tax (PBT) of the enterprise have increased from 50 national currency units in the fifth year to 54 units in the sixth, i.e. by 4 units. This is not a real increase. It is the "intrinsic profit" of the enterprise, during the royalty-bearing period, from which a royalty has been paid in the past; only in the sixth year does this intrinsic profit manifest itself as conventional enterprise profit.

The profit share (PS) is therefore as follows: PS = 4/54 or, algebraically,

$$PS = \frac{R}{PBT_R + R} \tag{1}$$

where $PBT_R$ is the profit-before-tax amount in a royalty-bearing year and R is the absolute amount of royalty payable to the licensor. This equation reduces to:

$$PS = \frac{1}{1 + \frac{PBT}{R}} \tag{2}$$

and to

$$PS = \frac{1}{1 + TTF} \tag{3}$$

In equation 1 the profit referred is the conventional accounting profit as determined on a pre-tax basis. Similarly, R is the absolute amount of royalty paid and does not need to be expressed in terms of a percentage or lump-sum and royalty combination or similar. The acronym TTF is explained shortly.

The term "intrinsic profit" (profit before tax) is, of course, a conceptual construction and is unknown to conventional accounting practice. Rightfully, profit before tax is always calculated after allowing for royalty. That is, the accountant treats royalty payments in more or less the same manner as any other cost, say, interest cost.

Although the financial picture changes from year to year, this does not affect the methodology. The various incomes and costs must be reduced to single figures by the method of discounting presented earlier and use these figures in the equations. An example is provided in the annex.

Some information can be obtained by taking a snapshot of the operations of an enterprise over a single year. Suppose that the following applies during a particular projected year during the royalty-bearing period (all figures in $):

| | |
|---|---|
| Net sales value of goods sold | 155,000 |
| Royalty payable to licensor for enterprise's operations in that year | 5,425 |
| Profit before tax, $PBT_R$ | 20,000 |

Then, from equation 1,

$$\begin{aligned} PS &= R/(PBT_R + R) \\ &= \$5,425/(\$20,000 + \$5,425) \\ &= 0.2134 \end{aligned}$$

The computation shows that the intrinsic profit of the enterprise was ($20,000 + $5,425) = $25,425 and that 21.34 per cent of this amount would be the share of the licensor for the benefit derived by the enterprise through the application of granted rights. It is important to note that for the calculation to be valid, the profit before tax must apply to the period when royalty is a charge on profits. This is the purpose of the subscript R on the acronym PBT. The payment of $5,425 on a sales of $155,000 represents a royalty rate (on sales) of 3.5 per cent, which appears innocuous when seen by itself.

The conceptual importance of this exercise lies in the fact that it allows a licensee to convert the rather abstract figure of 3.5 per cent sales royalty into a more comprehensible figure representing the profit sharing between the licensor and licensee and, in the process, to make a judgement as to whether such a sharing is equitable.

The equation developed is also of value for the licensor's firm, provided it is feasible to generate a profit-and-loss projection (of the licensee firm). Before a royalty is set, some such calculation must be carried out.

It is not feasible to expand on the concept further in this module. The reader can readily verify that, for a given royalty, the higher the $PBT_R$, the lower the profit share of the licensor. Conversely, a low-profit position increases the share. The accent here is on share, which goes back to the original meaning of the term royalty, as mentioned earlier. The profit share term can also be viewed, as coefficient for distributing income between the licensor and the licensee.

The ratio $PBT_R/R$ is termed the technology turnover factor (TTF), an important concept in its own right. It has the character of a multiplier and applies well to the technology transfer process. It refers to the profit generated by an enterprise per unit of royalty fee paid. The purpose of technology transfer, from the viewpoint of the licensee, is to obtain as high a TTF as possible. This is a function of the quality of the technology employed and of the entrepreneur's business acumen. In the example in table 14, $PBT_R/R = 50/4 = 12.5$, a very high (and very desirable) ratio. (As can be seen, the profitability on sales is 50 per cent, far greater than the margins achievable in commodity products but typical of those in software licences or in the newly emerging fields of biotechnology, new materials etc.)

It is important to recognize that all of these calculations require a licensor to give a licensee information about the costs of raw materials, utilities, fixed costs etc., so the licensee can make the projections. General information such as this should be readily available, particularly under conditions of confidentiality.

## Income-sharing in the context of the technology life cycle

### *Technology transfer in the development and growth phases*

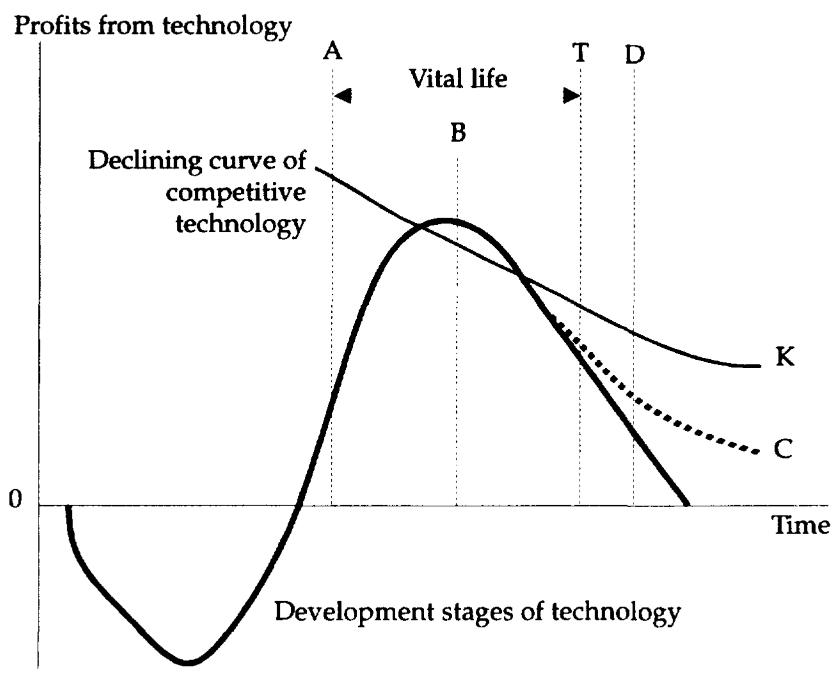
While an analysis of the type just undertaken arrives at a figure for the licensor's share of a forecasted business operation, it does not answer the question of what would, in practice, be a fair share. Confidential studies by the Governments of some developing countries in the early 1980s, covering a wide range of industries and sectors within particular industries, generally of the commodity types, indicated that in practice the share (PS) of the licensor averaged around 25 per cent. This is a generally accepted figure: the licensee, who takes practically all the risks associated with the investment, gets the greatest share of profits, 75 per cent. Such a sharing of income when licensing out technology to developing countries is commonly known in developed countries as "the 25 per cent factor". Typically, the 25 per cent factor would, in the context of PS analysis, mean royalty rates in the range of 3-7 per cent for consumer products. Such factoring does not provide any clue as to the payment period that can be tied to the royalty rate. Given the shape of the TLC curve, an indeterminate period would be a gross violation of the fair-share principle.

However, in the modern context of globalization and rapid industrialization worldwide, there is great danger in holding fast to the 25 per cent factor, except where the level of technological complexity (see module 6, evaluation and selection of technology) of the country or region or the industry is comparatively low and "appropriate" technology is being licensed-in (see below).

Figure 9 provides some idea of what causes this concern, when seen from the licensee's perspective rather than the licensor's. The fair share of the licensor must be gauged taking into account the point on the TLC curve at which a technology is being licensed. In fact, a closer look at TLC brings out the qualitative component of technology assessment referred to early in the module.

Beyond a certain point, which is determined qualitatively (line DD), the technology would have passed its peak and overall profits would be declining; the technology would then typically degenerates into a technique, that is, into a professional skill of the technology developer. It would no longer have the characteristic(s) of valuable competitive technology and should be contracted out as technical services. Obviously, such technology cannot command a premium and the PS should remain below 25 per cent.

**Figure 9. Technology life cycle: licensing general perspective**



However, in the current global context, technology is being licensed in and licensed out at all points of the TLC by enterprises in both the developed and developing countries. In commercial strategic alliances and alliances based on R and D (see module 19, on strategic alliances, technology is routinely licensed on the ascending curve of the TLC. Cross-licensing, which is widely practised by corporations in highly industrialized countries, involves an exchange of technologies (but without an out-of-pocket cost to the parties concerned) on the ascending curve paths. Should such cross-licensing prove fruitful, there will eventually be a sharing of incomes.

In the case of emerging technologies, particularly software technology, the low cost of intellectual talent in developing countries is taken advantage of by indigenous enterprises, allowing them to rapidly develop globally competitive, commercial-level technology based on the licensing in of embryo-level conceptual technology. Developed countries also look to developing countries with this in mind. Since such technologies would not have passed, say, line AA in figure 9, they would not be able to command as high a premium as technologies well past this point. None the less, they will command high prices or be negotiated under various restrictive conditions.

It is obvious that with technologies well into the ascending phase, income-sharing would tilt heavily in favour of the technology innovator, and the heuristic "25 per cent factor" would not apply. Quite often, a technology is licensed in at this point for the purpose of improving it or applying it in another context.

### *Technology transfer in the saturation phase*

As mentioned earlier, newly industrializing countries tend to acquire technologies in the saturation phase. Such established technologies would be applied in plants with scales of production similar to those operated by the licensor organization, minimizing thus, the risk of down-scaling. The technology is fungible in this phase and translates well when relocated to an area of reasonably high technological complexity (see module 6, on evaluating and selecting technology). Furthermore, the skill levels in newly industrializing countries make it possible to take full advantage of a licensor's process improvements and to conduct research on licensed technology to extend its quality and utility. Indeed, with the usual reciprocal grant-back provisions in licensing agreements, the net effect could be to extend the saturation phase and increase the length of the TLC. Moreover, as was seen in figure 8, it is at this stage that the licensor is liable to engage in joint ventures.

The income-sharing concept (PS) would apply when negotiating remuneration in the saturation phase. But one must take into account the remaining life of the technology — that is, the period during which remuneration needs to be paid to the licensor. This determines the overall cost of the technology if it is licensed on the basis of a running royalty over a finite term. The life of the technology from line AA to line TT can be termed the vital life of the technology. It is measured, of course, in years.

While a licensor of a technology might know from the decline in royalty earnings that the technology has probably entered the declining phase, the potential licensee would not be able to assess this. Although this limitation is real, the licensee should consciously try to analyse whether the technology being negotiated has a faster rate of decline than a competing technology, whose trailing curve is shown as KK.

### *Technology transfer in the declining phase*

Countries with low levels of technological complexity often look for appropriate technologies that are on the descending part of the TLC curve and available at lower absolute costs. Here, it may not be fair to apply the 25 per cent factor. From the information in figure 9, it can be judged whether the technology being accessed has vitality or has become a technique. It should also be possible to identify equivalent technologies that are also on the decline. If, for instance, the curve KK of a competing technology is declining less steeply than that of the technology in question, it should have a higher commercial value. Since the technologies are in their declining phases, licensors may be less guarded, more accessible and more open about them.

## Remuneration for technical assistance and technical services

The terms "technical assistance" and "technical services" can be used synonymously, but they can also be used to distinguish the two types of service needed for setting up and running a manufacturing plant. The first type involves services required prior to plant start-up. Services required to create an efficient and viable operation after start-up comprise the second type. It is useful to refer to the pre-start-up services as "technical assistance" and the post-start-up services as "technical services" when assessing remuneration.

Typically, technical assistance is furnished by engineering contractors, of whom there may be several. Sometimes, however, there may be a single managing contractor who assumes overall responsibility for building a plant and who then distributes the work to various subcontractors. The contractor(s) set(s) up the plant under the supervision of those responsible for the commissioning and running of the plant. The contractors are dismissed once the plant is commissioned satisfactorily. The compensation to a contractor or contractors is determined on the basis of competitive bidding for the work specified by the plant owner and acceptance of the most suitable bid (see module 7 for a full discussion of bidding practices).

Technical services, in contrast, are rendered by those who have prior experience in manufacturing products and operating the plant efficiently. In carrying out this work, service providers may also be responsible for training staff of the plant to make it self-sufficient.

In many cases, technology transfer amounts to nothing more than firms engaged in similar operations rendering technical services. The services are rendered over a pre-determined period, particularly when training is involved, which is generally the case. No proprietary rights transfer in such cases. The organization rendering these services may be referred to as a licensor, but this, as noted earlier, is a misnomer.

The remuneration paid to the organization rendering these services is scalable, that is, it can be assessed in terms of skill and measured in terms of man-days or man-months required. Professional journals often publish statistics on typical salaries of professionals in various disciplines (e.g. mechanical engineering, chemical engineering and computer services), based on their educational qualifications and years of working experience.

Of course, this is not the only cost. There is the overhead for organizing and managing the technical service team as well as the mark-up. Because those two costs are added to the basic costs of skills, their relationship can be established and tested by commercial norms. For instance, the management overhead component can be tested against overheads generally applicable to subsidiaries of foreign firms or joint ventures operating in the national economy. Such information is readily available from the profit and loss accounts of firms incorporated under rules requiring the publication of accounts. There are other yardsticks: it is sometimes considered, for instance, that technical services should amount to a certain percentage of the total investment in plant. On this basis, the technical service cost would be expressed as a lump sum and paid in several instalments. Generally, however, it is useful to convert this to a royalty-like fee tied to sales, because such a formulation involves the technical service group in increasing sales.

This conversion is, roughly, a reversal of the method shown earlier for calculating present values. It uses the following equation:

$$P_0(1 + r)^n = RS \qquad (4)$$

where R is the average rate to be calculated, S is the simple aggregated sales value over the contract period, $P_0$ is the lump sum fee calculated for technical services on the basis of scalable factors, overheads and profits (or the accepted bid of the services supplier), $r$ is the discount factor and $n$ is the period of time for which the service is contracted.

The time-scale of the effort, $n$, is transferee-determined and relates to the recipient enterprise's desire and ability to absorb transferred technology and will not be related to the vitality of the TLC.

Quite often, technical service complements know-how and in developing countries, licensing trade mark rights. For instance, a licensor may provide technical services together with the right-of-use to know-how or to a trade mark against an aggregate of, say, 7 per cent royalty on sales for the combination (a commonly encountered pattern in developing country agreements). Alternatively, the licensor may set separate rates for them, say, 2 per cent of sales (value) per year for five years for technical services and a 3 per cent royalty (on sales value) for the know-how (or the trade mark) for the period of the licence. The LSEP principle can be used to test the reasonableness in the case of the separated rights and fees (second example). It may also be applied to the first example if the licensee judges that technical service is a minor element complementing know-how. However, if it is felt to be otherwise, equation 4 may be employed for assessment of the equivalent running royalty rate. (It should be clearly understood that in this exercise a comparison is not being made between alternative payments proposals; the recipient of technology is receiving only a single offer on one or the other of the two bases on a take-it-or-leave-it option and has to make the assessment.)

The concept of technical services raises concerns for some enterprises in developing countries. They fear that, while services and training may be provided in accordance with the provisions of an agreement, once the term of the agreement is over and skilled personnel leave the enterprise, its productivity will fall. This situation requires renewing the contractual relationship and is usually accompanied by contractor demands for higher remuneration. Obviously, the higher cost reflects the poor bargaining position of the transferee at this stage. To prevent such uncomfortable situations, the transferee should arrange to complement the transferor's technical service agreement for his personnel to understudy for their eventual roles so he can gradually phase out the transferor's personnel as trained enterprise counterparts take their positions.

## Remuneration for technology transfer in a joint venture

The joint venture mode has many advantages for both the licensor and the licensee. It is becoming an important method for technology transfer around the world. In many cases, the joint venture is almost the sole mode by which particular technologies can be accessed, at least before the technology loses its vitality. Indeed, some assurance of that vitality is obtained when the technology is ensconced in a joint venture.

Of particular concern in this module is the equity joint venture, wherein a part (or sometimes the whole) of the equity of the licensor-cum-venture partner arises from the capitalization of technology fees. When cash equity is injected into the project by a venture partner and technology is licensed-in, the share of the licensor-cum-joint-venture partner in an enterprise's profit is straightforward:

$$\text{PAT} \times \text{Share of equity capital PS} \qquad (5)$$

where PAT stands for profit after tax.

However, two issues arise when technology is capitalized. The first relates to the technology's value, which depends on its position on the TLC curve and its competitiveness with other technologies. It may be judged as a technology worthy of, say, a 10 per cent rate of sales royalty as having a vital life of six years. The capitalization of its value follows methods already discussed, although the prevailing discount rate needs to be applied instead of the nominal rate used earlier for comparing different technology offers.

Generally, it is not a good idea for the capitalized technology cost to constitute the entire equity of the technology proprietor. In transfers to developing countries, even to the more advanced among them, there are statutory or administrative limits on the percentage of expatriate equity that can be represented by capitalization. Thus, a non-capitalized component of an equity investment is needed: an injection of cash or a transfer of equipment and machinery, whose values are more assessable.

The second issue is more contentious. It relates to the question of whether royalty income should be independent or dependant on dividend income (the actual profit sharing after providing for reserves). In so far as sharing reflects sharing of risk, it might be asked why a joint venture enterprise should bear yet another risk, that of the technology being priced at the same level as under an arm's length transaction. That technology should be so priced may not be an issue since capital and technology are separate factors of production.

A licensor-venture partner receives a share of the profit in return for his investment, that profit being the residue after royalty has been deducted from enterprise income. Thus, in the two streams of income, profits and royalty, royalty is deducted in one and paid in the other. A high level of profits must accordingly be generated to offset this counter-effect or a higher royalty rate must be applied than would be the case in straightforward licensing. Table 15 illustrates this point. The table was developed using the same assumptions as those of table 14, but it is now assumed that the licensor firm has a 50 per cent stake in the host country joint venture and that the host country corporate tax is 30 per cent on profits before tax.

**Table 15. Income-sharing in joint venture enterprise**
*(National currency units)*

| | *Royalty period* | *Post-royalty period* |
|---|---|---|
| Net sales value NSV | 100 | 100 |
| Cost of production | 50 | 50 |
| Royalty, 10% on NSV | 10 | – |
| PBT | 40 | 50 |
| Tax, 30% on PBT | 12 | 15 |
| Profits after tax, PAT | 28 | 35 |
| Foreign venture partner's share of PAT | 14 | 17.5 |

Note that whereas the notional receipts of the foreign venture partner could have been 27.5 (10 + 17.5) during the royalty period, representing the total income from royalty and post-tax income, the actual receipts are 3.5 units less. Of course, the taxation rate and the joint venture partner's share affect the difference.

## Other payment issues

Up to this point, the emphasis has been on factors affecting the relationship between remuneration and the consideration received (or granted) and on evaluating compensation for technology and technology rights. Three further aspects of remuneration require discussion in some depth, as they have an important bearing on the ways technology fees can be expressed in the contract:

- Forms of expressing royalty.
- Royalty basis.
- Legal-administrative provisions: terms and conditions of payment.

When these are effectively dealt with, the possibilities of conflict during performance of the agreement are reduced. The following sections treat each of these aspects in detail.

In drafting a contract, two things must not be lost sight of:

- There is a functional relationship between the lump sum, recurring amounts or combinations of these, and the rights received or services rendered.
- The licensee organization is looking for an economic reward by accessing the technology.

The factors determining how compensation is expressed in an agreement are the same as the factors determining how the technology is valued and how the income is to be shared:

- The product(s) or process(es) covered by the technology.
- The size and sales potential of the assigned territory.
- The complexity of the technology and the technological complexity of the recipient industry or host country environment.
- The technology elements being licensed (patents, trade marks etc.).
- Export rights, buy-back and contracted manufacturing arrangements.
- The duration of the agreement.
- The relationship between the licensor and the licensee (is the latter a wholly owned subsidiary, an affiliate, a joint venture partner or an entirely unrelated third party?).
- The exclusive or non-exclusive character of the rights granted, and grants such as sublicensing rights.
- The risk (or, from the licensee's standpoint, the value) attached to the disclosure of secret or specialized know-how by the licensor.
- The prospective profit margin on the licensed product or operation.
- The degree to which the licensee organization depends on the supply of sub-assemblies, components, catalysts etc. from the licensor.
- The capital investment required on the part of the licensee.
- The engineering and technical assistance required to launch the licensed operation and the continuing service obligations of the licensor.
- The reciprocal licence rights (grant-backs) and non-monetary benefits granted or anticipated under the contract, which are an important consideration today in licensing technology to newly industrialized countries.
- The size of the initial lump sum payment and other forms of remuneration provided in the contract.
- The conventional royalty rates for a particular product or industry.
- The competitive offers from rival licensors of alternative products or processes.
- The attitudes of the host country Government with respect to acceptable rates and forms of remuneration.
- The relative bargaining positions of the contracting parties.

### *Forms of expressing royalty*

In a modern licensing agreement, pricing technology is likely to include any or all of the following types of remuneration, the first four of which are discussed below:

- Direct profit sharing.
- Running royalties.
- Lump sum payments, which have some variations.
- A combination of down payment and running royalties.
- Lump sum or periodic fees for technical services.
- Equity interest in the joint venture mode.
- Reciprocal licence rights and other intangible benefits (e.g. cross-licensing).

As pointed out earlier, no matter how royalty is expressed in an agreement, it is almost always possible to determine its capitalized value. Thus, the manner of expression implications beyond the cost of the technology to the licensee or the price obtainable by the licensor.

### *Direct profit sharing*

The easiest and most direct way income can be shared between the licensor and the licensee is by dividing the profit earned by an enterprise during a contract's term. There may be difficulties in directly dividing profit, however. Such difficulties can arise under the following conditions:

- If the licensee defaults, the enterprise does not make a profit during the expected period of the contract and the licensor can lose a large share of the anticipated income.
- If profits are earned, the method the licensee adopts to report them may not be acceptable to the licensor, although a profit formula can be mutually devised.
- The licensor may need to have access to licensee's books to determine the validity and accuracy of profit reporting, which often poses problems; an independent audit is sometimes feasible.
- If the licensee reports profits but the profit is partly derived from other operations not connected with the technology, the apportioning of profit becomes very difficult.

Profit can be shared when the parties are engaged in a joint venture and there is direct involvement of the licensor in the joint venture; however, the issue of the licensor obtaining additional revenues by licensing intellectual property can become a problem.

### *Running royalties*

The basic, most prevalent types of remuneration are unit sales and unit production royalties. These are royalty rates based on sales value or per unit royalty fees based on the actual volume or value of products manufactured, processed or sold with the help of the licensed rights or know-how. Both are recurring payments arrived at by applying a specified royalty rate to some agreed-on measure of use of benefits derived from licensed rights. The remuneration corresponding to unit sales (for example 5 per cent of net selling price) or unit production (for example, per kilogram of product produced) royalties are payable at fixed predetermined intervals. It is sometimes possible to negotiate a deferred royalty until sales stabilize, if a licensee can demonstrate a cash shortage for his operations. Royalty arrangements always require a licensee to maintain records of sales and production for inspection by a licensor or an independently selected auditor.

The relative merits of unit sales and unit production royalties will be discussed in greater detail later.

### *Lump sum payments*

There are several types of lump sum payments, the most frequent being: *(a)* an initial lump sum payment, *(b)* a down payment and *(c)* a convertible lump sum option, which leads to a paid-up licence.

An initial lump sum payment is almost always a non-creditable, non-returnable payment. Usually, it must be made upon execution of a contract or before the know-how is disclosed. It is a separate and supplementary form of income to the licensor. It also demonstrates the licensee's good faith.

A down payment can be one of two kinds: *(a)* a first instalment payment of a lump sum technology fee, payable in instalments, generally over a short interval or *(b)* a non-returnable, creditable fee. This second form is associated with running royalties. The down payment represents an advance payment of the royalties due. Royalties due to the licensor for which credit has been exhausted are then paid as cash royalties.

Licensors sometimes provide the option for a lump sum paid-up fee, which can have advantages for both a licensor and a licensee. The paid-up fee is a prestated, contracted, lump sum amount that, if realized by the licensor, by some cut-off date defined in the agreement, relieves the licensee of liability for cash royalties. By making this option available, a licensor usually hopes to motivate a licensee to quickly become paid-up so as to be free of encumbrances, particularly if licensee's business acumen or the local situation promises rapid growth of sales or production.

Frequently, the lump sum royalty payment is introduced because of the host country government policies on limits for running royalties, taxation of running royalties and fluctuating exchange rates for the host country's currency.

### *Down payment and running royalties*

A down payment and running royalty schedule combines the above two types of payments. This format allows a licensor to recover the sometimes considerable costs of transferring technical and engineering know-how and pre-contract expenses (that is, out-of-pocket costs). It helps establish a licensee's active interest in exploiting licensed rights. It also insures a licensor against default and the loss of valuable know-how and ensures a minimum income. The combination of down payment and running royalties is often a stand-in for prepaid minimum royalties when such are resisted by the host country Governments. It is sometimes possible to negotiate a deferment, for running royalties due under an agreement in lieu of the initial lump sum payment or down-payment provision.

Some licensors are willing to negotiate royalty-free agreements with all their licensees because they expect to profit from the licensing arrangements in other ways. Many soft drink manufacturers, for example, profit from the manufacture and sale of the concentrated syrups supplied to the concerns licensed to bottle and distribute finished products.

### *Payments relative to subsidiaries*

Parent corporations may treat their subsidiaries differently from third parties, although host country legislation and global changes, including privatization, tend to create an environment wherein technology agreements are drafted at arm's-length, blurring the distinction between subsidiaries and third parties with respect to monetary obligations. None the less, an important consideration applies to remuneration: in the modern context, there is little threat to confidentiality or know-how, because a parent corporation closely controls its subsidiary. There is, accordingly, greater flexibility in remuneration alternatives, and some of the motivations for lump sum and down payments, and even for royalty payments, may no longer be relevant.

### *Lump-sum vs. Running royalties: comparison and contrast*

#### *Lump-sum royalties*

In licensing intellectual property rights, a lump-sum royalty is a payment made in lieu of running royalties. It is not a fee for professional services. Thus, a licensor receiving lump-sum royalties should have the same obligations as one receiving running royalties, a condition that should be stated in the licensing agreement.

While lump-sum and running royalties are conceptually the same, and arithmetically equivalent, there are reasons for choosing one form of payment over the other.

The advantages of lump sum royalties are as follows:

- For the licensee, the cost (or foreign exchange burden) of a technology is known in advance, and the licensor is compensated for the risk that a licensee will fail to exploit available business opportunities as well as for the vagaries of a remote relationship.
- The licensee does not suffer the intrusiveness of a licensor examining the licensee's accounts or having them audited; lump-sums also relieve a licensor of having to examine a licensee's accounts and understanding his accounting methodologies, which often are statutorily mandated.
- For the licensee, an upward movement of selling prices owing to local factors does not increase the licensor's income at stable exchange rates; for the licensor, currency fluctuations will not impact income.
- For the licensee, lump-sums make it easier to compare competing licensing offers, since complicating considerations (e.g. the duration of a licence agreement and the need to estimate future incomes) are avoided.
- For the licensor, the lump-sum royalty is attractive when there is a sale or assignment of intellectual property rights or when the element of technology transfer is a simple one, for example, an assembly drawing.
- For the licensee, the lump-sum payment may be of interest if the grants straight-forwardly apply to obtaining rights in a patented product or to a patented process or to sets of drawings, specifications or other technical information that are sufficient to enable the licensee or technology recipient to manufacture and sell products. For other licensees, this would not be sufficient support, and know-how complementation might be indicated.
- For the licensor, the lump-sum payment may be a very attractive proposition in the context of host country tax laws, which often exempt from taxation lump-sum payments made outside the host country for the transfer of rights or disclosure of technical data/know-how.

On the other hand, certain disadvantages attend lump sum payments:

- In a lump-sum agreement, the licensor does not risk income, a cardinal consideration in licensing; correspondingly, however, incomes do not increase if host country opportunities develop rapidly.
- The licensor's interest in a licensee's enterprise is difficult to maintain over the period of agreement because remuneration has been obtained in advance.
- Because expansion of the licensees market would bring no additional income to him, the licensor has no incentive to participate in advances such as process improvements.
- In a non-exclusive licence without a most-favoured-licensee clause, a licensor can license a competing firm within the licensee's country if market opportunities expand, which might jeopardize the advantages of the first licensee.

*Running royalties*

Similarly, running royalties have advantages and disadvantages. Among the advantages are the following:

- The licensor shares the licensee's risks and, where royalty incomes are likely to deteriorate, a licensor can be expected to provide risk-minimizing strategies, e.g. changes in manufacturing processes, product design and product/market-mix.
- By agreeing at some later time to reduce royalty rates, a licensor can induce growth in the licensee's market if the licensee's output falls behind market growth.
- If the licensor defaults in carrying out the provisions of an agreement, royalty payments can be stopped. On the other hand, if the licensee defaults or goes into liquidation, the licensor's royalty incomes are threatened.
- Royalties ease the cash flow situation of the licensee (or foreign exchange outflow rate), and the most appropriate of a wide range of royalty bases for running royalties can be selected.
- Where a most favoured licensee provision has been negotiated, a reduction in royalties rendered to another licensee can be immediately passed on to the licensee.
- Royalty rates can be differentiated with respect to import and export markets or other matters and can be contracted to change over time.
- At any time in a licensing contract, royalties can be converted to a lump-sum (with the approval of the licensor), thus limiting future liability for payments.

- Adjusted royalty rates are possible, e.g. the cost of components imported from the licensor or sales of products made to the licensor can be deducted from the product sales value in calculating the royalty base.
- Royalty rates can be readjusted if the know-how fails to perform or if co-granted patents are invalidated and so forth.

The disadvantages of running royalties are as follows:

- An increases in the price of products owing to local inflation or the taxation of inputs can enhance the licensor's income without the latter making any contribution to the enterprise.
- Neither the licensor's income nor the licensee's payments liability over the contract period cannot be estimated with any certainty.
- For the licensor, there is no assurance that anticipated incomes from the transfer of intellectual property rights will indeed be realized.

Obviously, running royalties have more advantages than lump-sum royalties, which accounts for their wide appeal.

### *Royalty bases*

#### *Sales vs. unit product*

Typically, royalty clauses in technology agreements utilize one of two bases: *(a)* product sales price or sales value or *(b)* unit production. There is, however, a wide variety of techniques for expressing royalties. The type of royalty rate and base selected must be suited to the products and industry operations covered by a particular licensing arrangement. With due regard to this primary consideration, there are various advantages and disadvantages to be weighed when deciding between a per-unit and a per-cent-of-value royalty rate, and between alternative royalty bases.

#### *The sales-based computing basis*

The sales-basis computing base is probably the most widely used in licensing agreements; it is the most easily communicated and can be readily monitored. Independent of whatever base the final agreement incorporates, licensors and licensees first gauge the royalty using this base.

The sales-based royalty directly links the income of a licensor to the amount of product actually sold, not to product in inventory or goods returned. It is probably the only base that can be meaningfully applied to trade-marked merchandise. It is a useful base for a licensee: because a poor quality product fetches lower prices, it makes the licensor accountable for the quality of the product. It is used most appropriately where there is a wide mix of products, such as pumps and valves of various sizes, each of which carries a different price tag.

Sales-based computing is disadvantageous when exchange rates fluctuate, because sales value is computed in local currency. It is also an inappropriate base when products are manufactured with licensed technology but sold indirectly, through parties who have a special relationship to the licensee. Nor is it suitable when the product is converted to another product for sale. A plastic resin, for example, may be the end-product of the licensed technology, but it might be converted to a film in a secondary operation that is not part of the licensed technology. It may be possible to solve this type of problem by developing a fair market price for the resin using competitive prices (national or international) or by creating an *ad valorem* royalty, which is a percentage of the price at which a value-added product (in this case, film) is marketed.

#### *The unit-product computing basis*

Royalties may be linked to the unit or volume of production and calculated as a fixed monetary amount per unit of product produced, such as $0.06 per kilogram (or litre or metre or other measure of output) of production. When there is a mix of similar products of different capacities, units of measure such as dollars per horsepower or per 1,000 BTU can be employed.

Unit-computed royalties overcome some of the problems encountered with sales-based royalties. The licensor is not concerned with the disposal of a product (such as its conversion into another product) or with marketing through an organization having a special relationship to the licensed enterprise. It is easier to monitor or to assess records, and it is possible to do this by knowing the machine capacities, etc. Importantly, adverse exchange fluctuations do not affect the income to the licensor or the expenditure of the licensee. Unit computing is also a useful device when there are several technologies at work in an enterprise.

Unit-of-production royalties may be particularly appropriate, to the licensee, when the domestic sales price of a product is expected to be much higher than the international price owing to inflationary pressures in the economy.

On the downside, if the units incorporate any components purchased from the licensor, unit-based royalties are not feasible. Calculating the net value added on which royalties should be computed becomes too difficult to manage; in such cases, some other computing base needs to be employed.

## Types of rates

### Variable, graduated and cumulative rates

In most contracts, although different groups of products may be licensed, the royalty rate remains the same for the contract's duration, independent of the volume of products produced or sold. However, some licensing agreements provide for variable, graduated or cumulative royalties. In the variable rate contract a lower starting rate may apply, followed in subsequent years by a higher rate. For example, a contract may provide for a 4 per cent sales royalty rate for the first year or two and a higher royalty thereafter, so as not to burden a licensee when a market for the licensed product is being established. Some contracts, on the other hand, provide for higher royalty rates initially, when sales are lower, to give the licensor a reasonable compensation, and lower rates afterwards, when sales are higher and the licensor can afford this concession.

### Cumulative royalties

Cumulative royalties also can be negotiated in agreements. In this case, a royalty is payable on the volume of product and is unrelated to time. Thus, the royalty rate may be 5 per cent for the first 10,000 units produced, 4 per cent for the next 10,000 and so on. However, minimum royalties may apply in such cases. After a specific volume of production or sales is reached, the licensee has no further liability.

### Differential royalties

Differential royalties, that is, different rates of royalty, may be incorporated into agreements for products made under licence when some will be marketed under the licensor's trade mark and others will be marketed on a private label basis without a trade mark.

### Excluded royalties

In contracts where a licensor expects a licensee to have initial problems opening a new market, a certain volume of sales may be excluded when royalties are computed. Such an exclusion may be for several months or for the first year. Excluded royalties are appropriate when a large front-end royalty is paid. This method, which may be considered an advance on royalties payable in the future, but not set down in the contract for some reason, consists of excluding a fixed volume of production or sales when computing the royalty owed to a licensor. The exclusion applies for the full duration period of the agreement. For example, against a front-end payment of $100,000, the agreement may provide that the first 300,000 litres of paint produced in each year (by the licensed process) will be free of running royalties.

### Minimum royalties

In some cases the licensor sets a minimum annual royalty requirement that must be met regardless of a licensee's output, sales or use of the licensed rights. It indirectly establishes a licensee's minimum operational goals with respect to sales or production and is most common when a licence has been granted on an exclusive basis or when there is a sublicensing grant. If a minimum royalty is set too high, it almost amounts to a fixed annual royalty. Many times, lump-sum payments and down payments are nothing other than arrangements for minimum royalties to be paid in advance. Some developing countries do not allow minimum royalties. Where they are met up with, minimum royalty provisions should be accepted on the basis of reasonable market forecasts and should also be accompanied by a maximum royalty.

### Royalty-linked definitions

A major portion of the definitions section in most agreements is devoted to terms defining the basis on which sales and unit royalties are calculated. Defining the sales-based royalty is the most troublesome of these.

## Price basis

Royalties can be calculated on three prices: gross selling price, net selling price and fair market price.

### Gross selling price

Royalties based on the gross selling price are convenient since the requisite information is commonly presented in company balance sheets or can be totalled from sales invoices. A licensor commonly prefers this arrangement, even if it is to be offset by some reduction in royalty rates. For a licensee, a disadvantage is that the profits made by the licensor on components purchased from a licensor are not deducted. Furthermore, the gross selling prices may sometimes (for example, with machinery) contain parts that are not made by using the licensed technology, placing an unfair burden on the licensee.

### Net selling price

The net selling price is useful for calculating royalties to eliminate a licensee's disadvantages when the sales price contains items unrelated to the technology or when related items, for which a profit has already been gained, are supplied by a licensor or others. The net selling price, therefore, consists of the sales price less certain cost elements. The items to be deducted (vary from licensor to licensor) and in developing countries government agencies tend to define the base. The objective, of course, is to obtain the direct value added by the technology.

Among the specific items whose subtraction from the selling price the parties may have to negotiate are the following:

- Packing expenses.
- Insurance premiums.
- Transport expenses.
- Export and import duties, customs tariffs.
- Turnover or sales taxes.
- Ordinary commercial discounts.
- Returned merchandise.
- Installation expenses at the place where the product is used.
- The price of raw materials, intermediate goods, parts or their components supplied by the licensor or by persons in a special relationship to the licensor or by others.
- The portion of the price of the product that reflects the royalties.
- Fees paid by the licensee for the maintenance in force of patents or trade marks.

#### *Fair market price*

When a licensee sells a licensed product at an unreasonably low price to a third person in a special relationship, which is not uncommon, the calculating base has to be artificially created. The fair market price is one such base. It is defined in terms of one or more of the following methods:

- The uncontrolled price method, i.e. the price offered to, or bid by, a purchaser of the product who is not in a special relationship with the licensee or licensor.
- The resale price method, i.e. the price obtained on the resale of a product by a licensee's customer, less resale markup.
- The cost mark-up method, i.e. the cost of producing the licensee's product with a specified percentage of that cost or a fixed sum added as the profit on that sale.

## *Legal-administrative provisions*

In addition to establishing the types and levels of remuneration to be paid by the licensee, the royalty provisions of a contract should settle a number of other:

- The frequency, time, method and place of payment.
- The currency in which payment is to be made.
- The exchange rate to be used.
- Whether or not the payments are to be free or net of local taxes and fees.
- The procedure to be followed and the options available to a licensor in the event payments are blocked or cannot be transferred in the manner or form stipulated.
- The methods of calculating, reporting and verifying royalties and other fees due under the terms of the contract.

### *The accounting period*

The frequency with which royalties are computed and remitted to a licensor depends somewhat on the royalty base selected and on the accounting practices and preferences of the negotiating parties as well. The size of the royalty obligation is also likely to influence how often accounting and remittance are desirable. Some contracts provide for calculating and remitting royalties on an annual basis, with the payment date corresponding to the anniversary date of the agreement. Other contracts provide for semi-annual, quarterly or monthly remittances. Quarterly payments are perhaps most common. Some contracts indicate only the length of the royalty period; others establish the exact dates on which payments are due, such as 1 January, 1 April, 1 July, and 1 October of each calendar year. The due date for royalty reports and remittances is variously set at 30 days, 60 days or 90 days following the close of the royalty period.

### *Place and form of payment*

Licensors generally prefer all royalties to be remitted to them in the currency of the licensor country or in other acceptable stable (hard) currency. When the foreign exchange laws of the licensee's country permit such payment, there is no problem. Generally, liberalization movements all over the world make it increasingly feasible to accommodate this requirement.

When payments are computed in local currency, which happens when the royalty is based on sales value, problems of conversion arise even if the host country Government permits converting local currency at the going exchange rate. Because exchange rates may vary considerably over an accounting period, some contracts provide for using a calculated average rate for the royalty period; others simply state that the effective exchange rate on the last day of the royalty period, or on the day the royalty payment is due, will be used in computing the amount to be remitted in foreign exchange.

### *Liability for taxes and fees*

The licensor generally desires that the licensee should be liable for all local taxes, production fees and other charges imposed by the host country Government and for any costs incurred in remitting the royalty payments. However, some tax experts believe it is not always to the long-run advantage of a licensor to insist on a tax-free royalty arrangement. In some instances, doing so may serve only to increase the net tax burden on the licensed operation without materially benefiting the licensor, who can often, by assuming foreign tax liability, utilize the foreign tax credit to reduce domestic tax liability. In some circumstances, therefore, it might be mutually advantageous to negotiate a slightly higher royalty rate and relieve the licensee from any commitment to transmit royalties on a tax-free basis.

In any case, it is always advisable to consider the impact of host country tax laws, credits available in the licensor's country, the impact of double taxation arrangements on incomes and the tax laws of the counterpart countries with respect to the treatment of royalty incomes as revenue or capital receipts (or, for the licensee, revenue and capital expenditures).

### *Reporting and auditing requirements*

Most licensing contracts require the licensee to submit periodic royalty reports showing the unit production or sales value of licensed products and the royalty amounts due under the contract. The agreed procedure for calculating the aggregate sales or other value figures is worked out in connection with the reporting requirement in such cases.

Licence agreements may require licensees to itemize sales by type of product, by geographic area or by type of customer. In some cases, customer names, invoice numbers and amounts, and the date of each shipment are also required, together with the direct taxes applicable etc. Licensors generally have the right to verify the accuracy of royalty statements by inspecting the sales and other accounting records of the licensed concern or of having their auditor, or another mutually accepted auditor, do so.

## *Annex*

**Determining profit share of the licensor during the royalty-bearing period using discount factors**

*(In United States dollars)*

| *Year* | *1* | *2* | *3* | *4* | *5* |
|---|---|---|---|---|---|
| Net sales value | 1 200 | 1 400 | 1 800 | 2 500 | 4 000 |
| Royalty, 3% of sales (undiscounted)[a] | 36 | 42 | 54 | 75 | 120 |
| Profits before tax (undiscounted), $PBT_R$ | (150) | 0 | 450 | 600 | 1 300 |
| Discount factor, 10% | 0.909 | 0.826 | 0.751 | 0.683 | 0.621 |
| Present value of discounted royalty referred to year 0 | 32.7 | 34.7 | 40.6 | 51.2 | 74.5 |

[a]Royalty is assumed as paid at end of year.

From the table, it can be seen that the present value of the royalty (R) is 233.7 and that of the $PBT_r$ is 1,418.6. Thus

$$\frac{R}{PBT_R + R} = \frac{255.1}{1418.6 + 233.7}$$

$$= 0.14114, \text{ or } 14.14\%$$

# Module 17

## WARRANTIES IN TECHNOLOGY TRANSFER TRANSACTIONS

*This module discusses the topic of warranties in connection with certain technology transfer agreements. It focuses on various warranties and guarantees that a licensor may undertake when transferring industrial property through patent licence agreements, utility model licence agreements, trade mark licence agreements and know-how licence agreements. For each type of agreement, the module outlines warranty provisions and disclaimers commonly made and provides standard contractual language. Warranties and guarantees in other types of technology transfers, such as equipment sales or contracted services, are discussed briefly, for comparative purposes. The legal status of warranties and their standing in different legal systems is also considered.*

# Contents

# WARRANTIES IN TECHNOLOGY TRANSFER TRANSACTIONS

## Introduction

This module is devoted to the topic of warranties connected with technology transfer agreements. For the purpose of this module, the terms "warranty" and "warranties" are used to encompass the meanings of warranties and guarantees. In technology transfer the technology may encompass different kinds of technical knowledge and/or rights. And the transfer itself may take place in numerous ways and as part of practically any kind of business or commercial agreement.

Licensing is one form of technology transfer agreement. The primary purpose of a licence is to permit an organization or individual to use a protected secret or unaccessible industrial right or knowledge. Typical licence agreements include patent licence agreements, utility model licence agreements, trade mark licence agreements and know-how licence agreements. The rights granted through such agreement are commonly referred to as industrial property rights. This module analyses the various warranties and guarantees a licensor may undertake when concluding this type of agreement. It does not deal with other licence agreements, such as copyright licence agreements, franchise licence agreements, industrial design licence agreements or (copyright) software licence agreements because they are not considered industrial property rights.

Technology may also be transferred by numerous other arrangements, for instance, by an agreement to supply a complete industrial plant turnkey contract or by engineering contracts, management agreements, technical assistance agreements and the like. Technology may also be transferred by direct foreign investment, a wholly foreign owned subsidiary or a joint venture.

This module concentrates on warranties and guarantees in industrial property licence agreements (patent, utility model, trade mark and know-how) because these are the licence agreements most frequently used in industry. However, for comparison purposes, it also discusses warranties in the other types of technology transfer agreements mentioned above because they offer alternative sources of proprietary technology.

A licence is given by an industrial property owner to third persons. The purpose of a licence is to grant a right to use knowledge embodied in a specific unaccessible technological achievement. In the case of patents, utility models and trade marks, the right to use them is protected by law and by registration requirements. In the case of know-how, the knowledge is not accessible because it is a secret.

### *Forms of technology transfer*

Technology may be transferred by agreements other than licences or technology transfer agreements. Thus, for example, a simple sale-of-machinery agreement or a supply-of-equipment agreement or a technical assistance agreement may be a vehicle for technology transfer. However, unless technology transfer is specified as a subject of an equipment supply agreement, the warranties and guarantees connected with the agreement will be regulated by the rules applicable to sales transactions, not by the rules applicable to technology transfer transactions. A similar situation may exist in a technical assistance agreement, where, for example, there may not be any warranties for technology transfer at all. In such an arrangement, the technology transfer may only be implied in the performance of some duties connected with implementing such agreements.

The same is true of agreements for constructing large industrial plants. In such agreements, if technology transfer is a specific issue, i.e. if the new owner wishes to acquire the right to use a patent, a trade mark or some other know-how, a separate technology transfer agreement must be concluded. But if technology transfer is not outlined as a specific obligation, the transfer will be only implied as incidental to using the machinery.

### *Difference between warranties and guarantees*

"Warranty" is a term that originated in the common law of Great Britain, and it is used today in countries where the legal system is based on common law. A warranty is a contractual promise. The individual making the promise is regarded as undertaking contractual liability. This contrasts with mere statements or representations, which are not the equivalent of a promise. Simple statements were not considered warranties unless responsibility was expressly undertaken. However, over time it became common to consider an affirmation at the time of sale a warranty, provided it appeared to have been so intended. The present tendency is towards readier imposition of liability and less stringent requirements for express statements by the parties. If a warranty exists, the maker undertakes strict liability for what he asserts.

Although warranties have a long history in British common law, the modern concept of warranties is best expressed in the British Sale of Goods Act of 1893. In that Act, "warranties" and "conditions" are used differently. Warranties are less important promises than conditions. As the Sale of Goods Act states, warranties give rise to a claim for damages but not to a right to reject the goods and treat the contract as repudiated or discharged. On the other hand, a condition is a contractual term on which the very contract depends.

For example, a contract may contain a specific condition stating that the property will not be transferred until payment occurs. In this case, payment is a condition of the contract. Similarly, if delivered goods do not correspond to their description in the contract, the buyer may reject the goods. Some of these terms have become implied conditions by law in contracts of sale. If the condition is not fulfilled, the contract may be repudiated. However, it should be pointed out that the parties are free to either contract out a condition or to vary it.

Consequently, British law does not use the term "guarantee" to describe the promises described above, whether in relation to warranties or to conditions. The terms "guarantee" or "suretyship" in British law are used mostly in connection with bank guarantees. In such a relationship, there are three parties: the creditor, the debtor and the guarantor who undertakes to be liable to the creditor if the principal debtor fails to discharge his obligation. The arrangement between the creditor and the guarantor is called the "contract of guarantee".

In international trade, the contract of guarantee often has a different meaning, namely, that of an independent undertaking by the guarantor to pay if the conditions of the guarantee are not satisfied. The word guarantee is also sometimes used simply as an undertaking. The term warranty/warranties is used in this module to encompass both meanings.

In German legal practice, as sometimes is the case in modern British and American legal practice, the term guarantee is used to describe what French would mean by the term *la garantie* or what German law would understand by *Gewährleistung*. The fact is that the French term *garantie*, like *force majeure*, has found wide application in international trade. From international trade, these terms are spreading into everyday usage in different languages.

### *Meaning of warranties and guarantees in this module*

For the reasons outlined above, when the term warranty is used in this module, the difference that still exists in English law between warranties and conditions is not implied. When the term guarantee is used, it is not used in the meaning of suretyship or bank guarantee. Unless otherwise indicated, the two terms are here interchangeable and have the meaning that they would have in the French and German legal systems. However, because the module deals not with contracts of sale but with contracts of licence, it does not talk about sellers and buyers but about licensors and licensees. Similarly, in licence agreements it does not talk about warranties or guarantees concerning the legal or physical properties of goods sold but about the legal or other (factual) properties of the licensed rights or of the technology to be transferred.

### *Warranties in different licence agreements*

Not all licence agreements have identical warranty provisions. Although there are similarities between agreements, there are also important differences among them. The differences stem from the different characters of the subject matter regulated by each agreement. A patent owner, for example, is not giving identical warranties to licensees, as is a know-how or a trade mark owner. For this reason, the warranty provisions of patent, trade mark, and know-how agreements have to be analysed separately. An attempt will be made to point out these differences and similarities.

Furthermore, the parties to licence agreements are free to structure the warranty provisions in their agreements as they wish. This freedom may be curtailed only if there are mandatory applicable legal provisions. However, in many legal systems there are only a very few mandatory provisions applicable to the warranty provisions in technology transfer arrangements, so in principle it is most often up to the parties to set standards of expectations and risks in their agreements.

It is not implied here that the parties to an agreement should agree in any specific form to warranties. However, it is assumed that the parties in technology transfer agreements wish to reach a reasonable balance of rights and obligations. Such reasonable expectations undoubtedly imply a fair and equitable structure of warranty provisions. The definition of equitable structure varies from one case to another and depends on different variables, such as payment provisions, territorial application and technical preparedness.

If the parties omit to mention warranties in an agreement, it is probable that a court or an arbitration tribunal with jurisdiction over the dispute will accept their free decision not to provide for warranties. However, in such a case, if there are no warranties, the courts or arbitrators will apply the proper rules of the applicable law to address any omissions.

### *Warranties in different legal systems*

Many countries have laws and regulations, including court decisions and precedents, which together create the national legal framework for intellectual property rights. Depending on the national legal system, the answers and solutions to certain questions may differ from one jurisdiction to another. In principle, the practice of licence agreements within a national legal system allows the parties freedom to agree on the scope of warranties for transferred technology. Nevertheless, caution may be warranted, because encroachment by legislators in this area may not be entirely excluded. In other words, in some legal systems there may be no mandatory legal rules applicable to licence agreements. In such a system, the parties' wishes, as spelled out in the licence agreements, will be accepted by the courts. When the parties do not raise a specific matter in their agreement, or if their intention cannot be derived from the wording of the agreement, the courts will substitute the will of the parties by applying non-mandatory legal provisions. In other legal systems, mandatory rules may apply to the contents of licence agreements and specifically to the warranty and guarantee provisions of such agreements. In such cases, if the matter were to come before a court, the courts would overrule the agreement and apply the mandatory rules. For these reasons, parties to an agreement should consult the applicable legal system before concluding an agreement.

### *The risk element in technology transfer agreements*

Technology transfer agreements (patent, trade mark and know-how agreements) are considered "risk" contracts, because there is relatively little mandatory legislation regulating these transactions; because the parties are free to shape the contracts as they wish; and because there are no inherent warranties that the undertaking will succeed. For all these reasons, the parties are left to structure their relationship, including warranties, according to their own wishes and needs. In this framework, it is not surprising that the negotiating skill of the parties, as well as the strength of their market position, often plays a decisive role in balancing the parties' rights and obligations.

In the area of warranties and guarantees, the risk element is especially accentuated, because it is largely up to the parties to set the scope and the limits of their rights and obligations. Many legal systems are silent on the warranties a licensor should extend to his licensee.

Normally a licensor attempts to limit his warranties. In order to do so, a licensor may use all available preferences. For example, a licensee may fail to conclude a technology transfer agreement if the requested warranties exceed those acceptable to a licensor. Therefore, licensees structuring licence agreements, especially the warranty sections thereof, must be alert to protect their interests.

## Warranties in patent licence agreements

The common warranties in an exclusive patent licence agreement refer to the following matters:

- Legal status of the patent.
- Technical applicability or usefulness of the patent.
- Commercial exploitability of the patent.
- Third-party infringements.

In the legal literature, the phrase "deficiency in the thing itself" is used when a patent cannot be used as foreseen in the agreement because of its technical shortcomings. When it cannot be used due to some third-party infringement of rights, the phrase "legal deficiency" is used.

### *Legal status of patents*

Licensees should clearly understand the legal position of a patent. They must know if a patent has been granted or if it is only under examination and/or if an application is filed. Because the future use of a patent depends to a great extent on its legal status, licensees are entitled to full and detailed information about patent status.

Consequently, the first reasonable warranty expected from a licensor is that a patent exists and is legally valid. Of course, a patent may not yet be granted, but only applied for or requested. In such a case, the licensor should warrant the exact and described legal status of his patent application or "lay it open for public inspection".

If a patent has been granted, the licensor should also warrant that he has unhindered right to grant the patent licence, that there are no mortgages or pledges of third parties on the patent right, or that the patent is not dependent on some prior patent or on a utility model. If there is a prior right to use the patent,* the licensor is expected to inform the licensee about it.

An essential feature of patents is that they are valid only in countries where they have been properly registered. Warranties concerning the legal status of a patent should include the obligation of a patent holder to register the patent in the territory where a licence is granted and to maintain its registration.

A patent may become void and be revoked if it is discovered the technology is not novel and patent protection should not be awarded. In such a case, the licensee may terminate the contract; there would be no justification to continue paying a fee for an invention without patent protection. However, the question of whether a licensor should warrant the novelty of his invention remains. Furthermore, the question of who should bear the risk of expenses incurred by the licensee during the period until the withdrawal of the patent must be answered.

The annex contains 24 sample clauses often found in technology transfer agreements. They are not intended to serve as "good" or "bad" examples. Of course, clauses that tend to decrease or entirely eliminate any warranty by the licensor should be looked upon with caution by licensees. Four such clauses are presented in order to make them easily recognizable when they are made a part of contractual proposals (annex, examples 1, 2, 3, 4.)

Generally speaking, a licensor is not responsible for the future validity of a patent, but the parties may consider the consequences of a subsequent invalidation of a patent. The usual remedy in such cases is contract termination, most licensors would not assume liability for damages. The licence contract remains operable until the patent is finally revoked; a mere danger that a patent will be declared invalid does not necessarily entitle the licensee to terminate the agreement (annex, example 5).

The costs of maintaining a patent normally falls, on the licensor. However, if there is an exclusive patent, the licensor may request the licensee to bear the cost of patent maintenance. Some developing countries have developed sample licence agreements in which they attempt to protect the licensees in cases of infringement (annex, example 6).

When a patent is sold and there is no agreement, a licensor generally does not warrant its validity. An argument often heard in favour of this approach is that because patent sale agreements are typically risky contracts licensees should bear the risk of unpleasant surprises. This explanation is given in spite of the fact that a patent sale contract is a "contract of sale" in which the sellers' liability for the quality of goods sold is well established and where it is clear sellers are liable for defects in goods sold.

*Prior right to use a patent may arise under some legislation and in certain circumstances if the invention was used prior to the granting of the patent.

Consequently, the invalidity of a sold patent does not necessarily create a basis for rescission or modification of an agreement. In cases of payment by instalments, payments must be continued. For these reasons, it is very important for the licensee to provide for an adequate warranty provision in the agreement.

### *Technical applicability and usefulness of patents*

Generally speaking, the modern tendency is to hold a licensor responsible for the technical applicability and usefulness of an invention but not for the commercial profitability of products based on it. However, because licence agreements often are not subject to mandatory legal rules, the actual scope of licensor warranties depends on the agreement's wording.

In many cases, licensees are not acquainted with the technical usefulness of the patent and rely on the licensors' representations. Licensors should know the field of application and the usefulness of their patented technology. Licensees are not expected to validate technology applications before concluding a contract. Consequently, the licensor is expected to warrant the applicability and technical usefulness of the patent.

If the parties do not mention a technical usefulness warranty in their contract, a question may arise concerning the implied warranty of the licensor. Various laws and authors respond differently to this issue. Sometimes the courts rule that the warranty is implied, and sometimes that it is not.

Licensors often tend to disclaim any responsibility for the legal and technical deficiencies of their patents (annex, example 7). If the parties wish to specify the licensor's warranties for technical usefulness, these should be written precisely and specifically. The parties should precisely describe the technical function for which the patented technology will be used and describe any testing that demonstrates the patent's usefulness. If a licensor warrants the technical usefulness of a patent, a licensee is entitled to terminate the agreement if such usefulness cannot be demonstrated. Similarly, if the patented technology is inoperable, the licensee may terminate the agreement.

### *Commercial exploitability of the patent*

In principle, the risk of commercial exploitation and profit making should be borne by the licensee. There is nothing to prevent a licensor from providing a warranty that the protected product or process can be commercially produced and that it can be sold and distributed. However, these warranties are not standard or usual and for them to exist, they must be expressly negotiated. In the absence of such agreements, the normal balance of contractual risks will favour the licensor.

Licensees may also negotiate for the right to terminate an agreement when continued working of the patent represents an undue burden. Such situations may arise when continued production would mean excessive costs, or when production becomes unprofitable, economically unreasonable or impossible. The test of economic viability may be structured in relation to the royalties to be paid. For example, if a minimum royalty is specified and the commercial results show that even that minimum royalty has not been reached, the licensee may wish to exercise his right to terminate the agreement (annex, examples 8, 9, 10 and 11).

It could be argued that a licensee, if commercial potential does not exist, should have the right to terminate the licence, even if he does not have a right to be indemnified by the licensor. Likewise, if a licensed technology is apparently outdated, a licence agreement should not be considered as a "life rent" for a licensor and should not be allowed to drive the licensee into bankruptcy.

### *Third-party infringements*

In any patent licence the possibility exists that the activities conducted under the licence could infringe patent or other rights of third parties. However, seldom will a licensor agree to indemnify the licensee against such infringement possibility. Licensors are reluctant to undertake this kind of warranty because they rarely are in a position to know or foresee the nature of a licensee's future activities nor do they have control over such future activities. For this reason, in principle, they are unable to evaluate the magnitude of risk in extending an indemnity obligation.

Nevertheless, licensors sometimes agree to assume the defence of any suit brought against the licensee for infringing the rights of third parties. Most often the licensor agrees only if the technology and/or technical information is applied by the licensee without any substantial modification. If such a warranty is assumed by the licensor, usually the licensee is required to promptly inform the licensor of any claim made against him, to give exclusive control of the defence to the licensor, to limit the overall liability to a certain amount (usually in relationship to fees paid) and other similar conditions.

Similarly, licensees or third parties (for example, customers of licensees) may seek remedy against the licensor. Such claims may occur in cases when the products produced under the licence are defective. Licensors may wish to exclude liability for such contingencies, and provide contractual provisions to that effect. If there is a possibility of use in jurisdictions where "strict liability" principles would make the licensor liable to third parties, a licensor may wish to be indemnified by the licensee for costs, damages, expenses and similar claims enforced against him.

### *Warranty clauses in utility models*

Utility models can be protected through registration in the form of a description, a drawing or other picture, or a model. Protection is accorded using somewhat less strict requirements than for a patentable invention. Therefore, utility patents offer less protection (for example, shorter duration) than patents. Otherwise, the rights granted under a utility model are similar to those granted under a patent.

Licensors usually warranty the existence of the utility model on the date of a contract. They also guarantee that they own the utility model and that there are no rights of third parties to the utility model. Licensors also warrant that they will not abandon the utility model during the contract period.

In cases of infringement, licensors try to transfer the burden of defense to the licensees (annex, example 12). The reason given for obligating the licensee instead of the licensor to defend the utility model is that he will learn about infringements in his territory before the licensor. Similarly, licensees have a paramount interest to use the utility model without any disturbance from third parties.

Licensors often attempt not to undertake any additional warranties of the legal kind. However, they are often ready to warrant that the invention, as embodied and in accordance with the utility model, can be factory-produced and economically marketed. A warranty of this kind does not necessarily mean that a licensor is liable if a licensee cannot produce the product due to his own inexperience or shortcomings. Under such a clause, a licensor will still not be liable for the profitability or for the economic results of production based on the utility model (annex, example 13).

## Warranties in know-how licence agreements

Know-how may be secret or non-secret. If the know-how is secret, licensors want to be sure it is not revealed to third parties, because it would lose its value. The fact that know-how is not legally protected implies that licensors are not supposed to warrant its legal protection, although they are expected to keep it secret or confidential. Licensors are not expected to reveal the know-how to the public, because once it becomes public knowledge, it becomes accessible to everybody, which may destroy the justification for continuous payment of royalties. Nevertheless, it seems that secrecy of know-how is not necessarily one of its essential elements. In other words, it is possible to consider as know-how a body of knowledge that, although not secret, is simply not easily accessible.

It might be expected that a licensor would warrant that using the know-how will not infringe third parties rights or that its use will not cause damages to third parties. However, many know-how licensors decline to undertake liability of this or any other kind. Therefore, licensors often decline all warranties for the transferred know-how (annex, example 14). In spite of a licensor's tendency to exclude any specific warranty for know-how, there still are areas where such warranties typically are expected and required. In broad terms a know-how licensor may extend warranties in two specific areas: *(a)* a warranty that the know-how has certain technical properties and *(b)* a warranty that using the know-how will not infringe the industrial property rights of third parties.

Generally speaking, in know-how licence agreements, the following areas may contain explicit warranties from the licensor:

- Accuracy and completeness of technical information.
- Stage of the development of technical information.
- Adequacy and suitability for specific production.
- Third-party infringements.
- Warranty of results.
- Warranty against infringement.
- Secrecy arrangements.

This is by no means an exhaustive list of warranties which a licensee may request from the licensor of a know-how: rather, it is a sample. Furthermore, these warranties may not be sharply differentiated from one another. In such cases the exact scope of a warranty may be judged only by its description and definition. In formulating specific warranties, it may easily happen that some of the extended warranties spill over into a wider scope than originally intended.

### *Warranties of accuracy and completeness*

It is usual to demand from the licensor a warranty that the technical information supplied under the know-how licence agreement is complete in terms of what has been described and promised, and that it is complete in the sense that it contains all the information necessary to achieve the anticipated results. This is not a warranty of results but a guarantee for accuracy and completeness of the delivered material. Such a warranty is usual when the know-how has to be handed over in tangible form. In these cases, a list of the material's headings and description of content may be provided in the agreement. Using this technique, there is no danger of revealing the content of secret know-how, while it is possible to specifically identify the items to be delivered and describe the substance of materials to be delivered.

Due to the intangible character of some technology, there may be a problem in defining completeness, particularly when the technology is not documented. In such cases, additional measures may be needed to assure completeness, such as visiting the plant or receiving training.

In the same manner, a warranty of accuracy of the supplied information may also be requested. This means the licensor must ensure that the technical information supplied under the agreement does not contain errors, mistakes, omissions and similar shortcomings. The warranty of completeness and accuracy, because its wording is sensitive, may sometimes be a warranty of the results (annex, example 15).

### *Warranties for the stage of technological development*

The know-how licensor may be supplying his latest technology or an older technology. It could be very useful to clarify, in the agreement, the stage of technological development. If a disclosure of this kind is not made in the contract, licensees may not know exactly what they will be receiving. They may believe they will receive the latest technology, while this may not be the case.

If the licensor gives a warranty that the know-how is its latest technological development, it will be responsible for damages if it supplies an older technology (annex, example 16).

### *Adequacy and suitability for specific production*

There is nothing to prevent a licensor from warranting the suitability of its know-how for certain technological requirements of the licensee. In cases of such warranty, the licensor will attempt to acquaint itself with the circumstances and other relevant technical and environmental conditions under which the know-how will be applied by the licensee. The warranty of suitability implies not only that the technology is applicable but also that it is technically suitable.* However, such a warranty would not necessarily imply that the licensor has undertaken to warrant the results of applying its technology. It may be saying only that, if specific conditions in the licensee's

*An attempt has been made to differentiate between "technical applicability" and "technical suitability" with a concrete example: the first term implies that metal ornaments may be stitched to the porcelain background, while the latter term implies that the ornaments will remain there.

production process are met and complied with, then the technology will be suitable for achieving certain goals. Such a sensitive warranty, often tied to multiple conditions, requires very exact and precise language to define its precise scope. Here, licensors are often reluctant to use broad language and very often the warranties end up being very narrow. Sometimes licensors are ready to warrant the suitability of technology for specific production but intend to tie in such clauses to the further provision of technical assistance, the supply of specific raw materials or similar additional undertakings. Samples of such warranties show the difficulties connected with them (annex, examples 17 and 18).

### *Third-party infringements*

If a know-how agreement is explicitly based on secret knowledge, the licensor warrants, even without any specific provisions in this respect, that the knowledge is secret and is not known to third parties. Because know-how is not legally protected, licensors cannot move against third parties for infringing know-how secrets. If secret knowledge covered by the know-how agreement becomes public knowledge, the duties of the licensees, and particularly the duty to pay fees, becomes void.

To protect the secret or privileged information contained in the know-how, licensors may bind their own employees not to reveal the secrets to any third party. Likewise, they can contractually oblige licensees not to reveal to any third party know-how secrets, including all technical drawings, plans, maps etc.

### *Warranty of results*

Warranty of results is not necessarily implied in a know-how agreement. In order to exist, this warranty must be specifically mentioned in the know-how licence agreement or, at least, implied through relevant provisions of the agreement or other connected circumstances. Nevertheless, there is nothing to prevent a know-how licensor, like a patent licensor, from giving a warranty of results.

In a warranty of results, a licensor warrants the licensee to achieve specific results by applying the delivered know-how. This warranty has to be proven by obtaining the results produced when using the technology. While earlier mentioned warranties do not imply any warranty for the economic results of the technology, a warranty of results may imply, or even explicitly undertake, a warranty for economic results. This guarantee may also contain warranties concerning the consumption of raw materials, energy or lubricants and similar economic parameters. A reasonable licensor will agree to this type of warranty only if issues like training and raw materials are specified in the contract.

Sometimes warranties are formulated in a positive manner, affirming liability for certain results, but more often one encounters a refusal to warranty any results (annex, examples 19 and 20.) Even when the licensor does warranty the technical possibility of achieving specific results, this does not automatically mean the licensor has undertaken a warranty for profitable use of the licence. Such an obligation could be assumed only if specified in the agreement.

### *Warranty against infringement*

Although know-how, unlike patents and trade marks, is not protected, its use may infringe the industrial property rights of third parties. Often a licensor will warranty that using specific know-how will not infringe third-party rights.

If the licensor is not sure whether his know-how is infringing some industrial right of others, it may at least warrant that it has no knowledge that third parties' industrial property rights could be infringed by the use of the know-how. Regardless of its knowledge, the licensor may warrant that the licensee will be able to use the know-how without legal interference by third parties and that no infringement suits will be filed against him, or if they are filed, that it, the licensor, will defend and bear the cost of such defence (annex, examples 21 and 22).

Laws in some countries provide that an agreement between parties may not exempt the technology supplier from liability in the case of actions by third parties for infringement of industrial property rights.

### *Secrecy arrangements*

In a know-how arrangement, a licensee typically agrees to keep received know-how secret, because any disclosure could destroy the value of the know-how, thereby harming the licensor.

An essential feature of know-how is that it can legally be protected only within a contractual framework. There is a danger of revealing know-how during negotiation, when the licensor explains the basic characteristics, traits and experiences of the know-how. At this stage, there is no other way to protect know-how than to obtain a pledge of confidentiality. For this purpose, a licensor usually proposes signing a secrecy pledge. This pledge may obligate the licensor not to use acquired information for his own purposes and not to reveal the information to third party. Such a pledge may be mutual, if licensees as well as licensors are likely to reveal privileged information or secrets to each other. Any pledge may be strengthened by including a penalty or damage liability clause. Such a pledge would not apply to information publicly known or already known to the other party (annex, examples 23 and 24).

### Warranties in trade mark licence agreements

Trade mark licensing contains considerably fewer warranties and guarantees of the foreign licensor than patent and know-how licensing. Trade marks generally denote the product's origin and do not have such a finite character as the technical information contained in patents. In many cases trade marks are tied to patent and know-how licences, or they may constitute one element of another kind of technology transfer agreement.

Nevertheless, trade marks are often the primary and the only subject of a licence agreement. Moreover, they have become increasingly important in modern global competition where a distant, but known, name or mark can increase sales beyond all expectations. Warranties in trade mark agreements could cover the legal status of the trade mark, with no special warranty of results.

#### *Legal status of trade marks*

In a trade mark licensing agreement the licensor may warranty the legal status of a trade mark. It usually warrants that the trade mark has been properly registered and that its registration will be maintained in force throughout the duration of the agreement. At the same time, the trade mark ownership should be duly recognized and not be subject to any sort of qualifications.

In some countries the condition for continued validity of a trade mark is continuous use by the owner. "Use" may sometimes mean manufacturing and selling a product bearing the trade mark. Use by a licensee is considered the same as use by the trade mark owner. In such cases licensors seek a reverse warranty from licensees stating the trade mark will be "used", within the meaning required by local regulations, in order to maintain the registration. Licensors may require bona fide intention to use the mark for goods and services as a legislative shield against stockpiling trade marks by people who have no intention of ever using them. Such requirements may be reflected in trade mark licence agreements.

#### *No warranty of results*

A trade mark licensor will almost never warrant the quality of any product produced by a licensee. In most cases the licensor retains the right to control products manufactured under the licensed mark. In a way, this is a logical distribution of risks. On one hand, a licensor has no control of the production process. This is true even when the trade mark licensor provides instructions for manufacturing the product. It is the licensee's obligation to abide by the production instructions. However, the trade mark owner has a vested interest in ensuring that the products manufactured under his trade mark are the same quality the public is used to receiving. Therefore, trade mark owners seldom extend any warranties concerning the goods produced with the trade mark but retain a right to inspect goods before they are put on the market.

### Warranties in other agreements

As already mentioned, there are alternative means for transferring proprietary technology including, but not limited to, a simple sale of machinery and equipment, turnkey arrangements, foreign investments and management agreements. This section examines the use of warranties in these technology transfer agreements.

#### *Warranties in sale transactions*

Warranties in a sale transaction tend to be limited to the quality and quantity of goods comprising the transaction. If machinery and equipment are being sold, the warranties focus on the quality of goods and the ability of the equipment to perform the functions and operations for which it has been manufactured. For example, if a pump is sold the seller may warrant it will operate as specified for a certain period of time (usually 12 months). The period through which the warranty remains in force is called the guarantee or warranty period. Once this period expires, the seller, in principle, will not have any further warranties. An implied warranty is that the seller has title to the goods sold and that he may transfer that title by delivering the goods.

In an outright sale, there are no warranties for the transferred technology. The technology embodied in the pump is not the subject of the transaction. The transaction deals with the pump itself; therefore the warranty is on the pump's quality and operation for a specific period.

#### *Warranties in turnkey arrangements*

The subject of a turnkey contract is usually a whole plant, including the individual pieces of delivered equipment and machinery. These contracts warrant that the plant will function and perform according to the warranted parameters.

If some machinery and equipment does not function as contracted, the contractor has to remedy the defects. A contractor also is obligated to provide a plant that produces the contracted output. The output is usually measured for a limited period of time (testing period). Once tests show the plant produces the agreed quantity at a certain quality, the warranty period begins. Because the contractor is no longer in charge of the plant after the tests are complete, it no longer warrants the plant will actually produce a certain quantity or quality. Nevertheless, the contractor remains obligated to correct all machinery and equipment defaults throughout the warranty period. This period is often called a maintenance period.

The difference between a guarantee or warranty period and a maintenance period often lies in the slightly different contractor obligations. Under a warranty obligation, the contractor is obliged to replace at his own cost the machinery and equipment that defaults in performance. In a maintenance obligation, the contractor is only expected to do whatever is necessary to rectify defaults, at the expense of the facility owner.

Again, in some turnkey agreements there is no special warranty for the transferred technology. If, for example, the turnkey arrangement involves supplying and erecting a hydropower station, the owner will receive all the technology needed to run the station. The combined working and operating machinery delivered implies that specific results can be achieved. The machinery warranty implies a warranty of technology. However, as in sales arrangements the technology is not the subject of the contract.

However, if the owner believes the machinery and equipment will not enable him to manufacture the intended goods without additional insight into using the technology, he may request a special technology transfer agreement. Such an agreement may be either a direct licence agreement or an indirect technology transfer agreement such as a technical assistance agreement or a management agreement. In such cases, there may be special process performance guarantees based on separate technology transfer agreements. A detailed discussion of process performance guarantees that become particularly relevant in case of complex industrial projects is given in module 18, on contracting complex industrial projects.

### *Warranties in engineering contracts*

For the purpose of this review, engineering contracts are considered to be contracts concluded by engineering firms. These firms provide the wide range of services required to conceive, design and begin operating complex, capital-intensive industrial and metallurgical projects,* including licences and technology, with management, recruitment and training.

The warranties engineering firms undertake vary depending on the type of obligations they agree to assume. If the subject of the contract is to provide technology through licensing or to provide management or training services, the scope of warranties must be agreed by the parties. If the agreement is a turnkey one, the warranties shall be as described above. In combined turnkey/technology transfer/technical services agreements, the warranties reflect the warranties typical of such contracts.

### *Warranties in technical assistance agreements*

A technical assistance agreement provides for one party to render technical assistance to another party. The party rendering the assistance may agree to send technical experts to the other party or to train the technical experts of the other party or to maintain certain equipment or to perform some similar function.

There is no doubt that technology transfer is taking place in a technical assistance agreement. However, the main subject of such agreements is not technology transfer, but technical services. Therefore, any warranty is directed toward properly fulfilling obligations connected with rendering the service, not with transferring the technology.

### *Warranties in management contracts*

The purpose of management contracts is to assume certain management functions for one party. Such contracts are usual, for example, in the hotel industry, but they are also feasible in other industrial sectors. In this arrangement, a management contractor warrants the performance of his management functions. Within these functions, he may be obliged to transfer know-how and technology to the recipient.

In principle, this transfer is not the main object of the contract but incidental to the management function. Such contracts usually provide for training the recipients' personnel in such a manner that they acquire the knowledge necessary to run the business by themselves. However, the knowledge and skills transferred during management operations are not the subject of these contracts. The subject is the management function itself. Therefore, the warranty in such contracts is directed towards performance of the management functions rather then towards the technology transfer and skills.

If the parties to a management agreement wish to achieve the transfer of specific know-how, they may prefer to conclude a separate transfer of know-how agreement.

*This description is the one used by the World Bank in its *Guidelines for Use of Consultants* (Washington D.C., 1981), pp. 25-28.

*Warranties in joint-venture agreements*

Joint-venture agreements represent a form of foreign direct investment. In such arrangements, foreign investors combine their investments with the participation of local partners. Foreign investments may be in a tangible or intangible form. Intangibles are usually rights owned by foreign investors. Most often such rights are industrial property rights such as patents, trade marks or know-how.

If the investment is not comprised of industrial property rights, it is likely that a foreign investor will invest tangible assets, such as money or machinery and equipment. In such cases, it is also very likely the foreign investor will conclude a separate contract for technology transfer with its local partner or with the newly established joint venture company.

In the first case, i.e. when industrial property rights are invested as capital, foreign investors are expected to warranty certain properties of the transferred technology just as if the technology was being transferred under a separate contract. Local recipients of foreign technology are entitled to expect the same quality and protection regardless of whether a technology is invested as capital or is licenced under separate contract.

# *Annex*

# WARRANTY CLAUSES OFTEN FOUND IN TECHNOLOGY TRANSFER AGREEMENTS

**Example 1**

If the use of the patent forming basis of this agreement results in a claim for infringement against the licensee, the costs and any damages awarded against him shall be borne by __________ [either licensee or licensor].

The costs and expenses of any counter-claim or of settling a claim shall be borne by __________ [either licensee or licensor].

The licensee shall inform the licensor of any claim made against the licensee for infringement and shall enable the licensor to join in any legal proceedings.

**Example 2**

The licensor also warrants that on the date of signing of this agreement, to the best of his knowledge, it is not aware of third parties' valid patent rights or similar protection for inventions which would be infringed upon by licensee's use of the technology subject to this agreement.

**Example 3**

Licensor guarantees that it is not aware of any legal deficiencies of the patent licensed hereunder. It particularly guarantees that it is aware of neither any third party's prior rights to use, nor of a dependency of the licensed patent on third party's patents, nor of technical deficiencies of the invention on which this patent is based. Licensor assumes no liability for lack of deficiencies mentioned.

**Example 4**

The licensor does not warrant the novelty of its invention, but should it transpire that the patent is void by reasons of its publication, whether wittingly or unwittingly, the licensee shall be entitled to determine the agreement wholly or in part by notice in writing.

**Example 5**

*Partial or complete invalidation of the licensed patent*

This agreement and its validity shall not be influenced by the fact that the licensed patent should finally be declared invalid. Licensee shall, however, have the right to terminate this agreement within three months from such a final declaration of invalidity of the licensed patent or to request from the licensor an adjustment of royalties with respect to the licensed know-how.

Previously paid royalties shall not be refundable. Royalties which were due prior to the final declaration of invalidity, but have not yet been paid, have to be paid by the licensee. The latter does not apply if the licensee has informed the licensor by registered mail of the fact that competitors infringe the licensed patent and have refused to sign a cease and desist declaration submitted to them with a warning letter. If licensee does not file a patent infringement complaint within a reasonable period, it shall remain obligated to make royalty payments hereunder.

If the licensed patent is partially invalidated or the licensed patent is determined to be dependent upon an earlier patent, licensee has the right to request an adaptation of this contract to changed circumstances. This does not apply to a case of dependency of an earlier patent, if licensor holds licensee harmless, e.g. by royalty payments to the owner of the earlier patent.

### Example 6

*Infringement*

1. The licensee shall promptly advise the licensor in writing of any notice or claim of infringement and of the commencement of any suit or action for infringement of any patent against the licensee which is based upon the use of any invention that is the subject of the patent(s) or of any patent of an improvement granted to the licensee and which is used by the licensee under the authority and in accordance with the terms of this agreement.

2. The licensor shall upon receipt of such notice and if promptly requested in writing to do so, undertake at its own expense the defence of any such suit or action and the licensee shall have the right to be represented therein by advisory counsel of its own selection at its own expense. The licensee agrees to cooperate fully in the defence of any such suit or action and to furnish all evidence in control.

3. In the event the licensee undertakes the defence of any such suit or action against it, the licensor shall nevertheless bear the expenses of, and fully cooperate in, such defence and shall have the right to be represented therein by advisory counsel of its selection.

4. Neither the licensor nor the licensee shall settle or compromise any such suit or action without the consent of the other if the settlement or compromise obliges the other to make any payment or part with any property or assume any obligation or grant any licence or other rights or be subject to any injunction by reason of such settlement or compromise.

5. The licensor will release, acquit and discharge the licensee from any and all claims or liabilities for infringement or alleged infringement of the patents prior to the date of validation by the __________ Government authorities of this agreement.

### Example 7

Licensor undertakes no liability whatsoever for legal deficiencies of the patent and is not aware of any rights of third persons on the patent. Licensor is likewise not aware of any deficiency or defects of the invention. Licensor is not assuming any guarantee or warranty or other liability for legal or other defects of any kind.

### Example 8

The licensor undertakes no responsibility for the risks of industrial realization, which are assumed solely by the licensee. The licensee shall be deemed to understand the subject matter of the licence and shall undertake its industrial realization. If it fails to do so within a period of __________ [it is advisable to specify a date before which determination may not take place] the licensor shall be entitled to determine the contract. It shall also be entitled to recover damages. (This variant may be used when the subject matter has been manufactured before the contract is made.)

### Example 9

The licensor does not warrant that the invention is capable of industrial realization nor shall it be responsible for the consequences of any failure to realize it. If industrial realization proves impossible or too difficult for the licensee, either party may determine the contract. In such a case neither party shall be liable in damages to the other.

### Example 10

The licensor does not warrant that the invention is capable of commercial exploitation. The risks of such exploitation shall be assumed solely by the licensee.

### Example 11

Licensor guarantees neither the patentability and validity of the licensed patent nor the commercial exploitability and/or readiness for plant use of the invention, and shall not be liable accordingly.

### Example 12

*Obligation to defend*

1. Licensee promises to defend the utility model against challenges by third parties at licensee's costs. In the case of an infringement of the utility model it is incumbent upon the licensee to pursue, at its costs, infringements within the licensed territory. This is inapplicable if the infringing activities are insignificant and the litigation costs will be disproportionate to possible losses of sales.

2. If the licensee fails to pursue infringers, then licensee shall not have the right to back payments or reduction of royalties. In the case of a successful prosecution of an infringer, the possible damage awards shall belong to the licensee.

3. If third parties bring an invalidity suit against the utility model, the royalty payments are reduced to one half, regardless of whether the third parties abide by the utility model or not. The other half of the royalties is to be paid into escrow account until the final decision in the invalidity suit. If the utility model is cancelled the amount in the account is paid to the licensee; if it is upheld, the payment goes to the licensor."

### Example 13:

*Liability for defects*

1. Licensor assures that it is not aware of legal defects with respect to the utility model, and that it is not aware of any technical defects of the invention underlying the utility model. Licensor shall not be liable for any unknown defects, particularly resulting from patents or utility models of third parties.

2. Licensor guarantees that the invention in accordance with the utility model can be factory produced and economically marketed *en gros*.

### Example 14

*Warranties*

1. The know-how and technical data which are provided under this contract are those which the licensor itself uses in the production of the licensed article. Nevertheless, the licensor does not make any guaranteed promises that the know-how and technical information is correct and without defects, that the use of the information makes possible the adequate production of the licensed article or that the technical information is complete.

2. There is no warranty that the use of the licence does not infringe third parties' rights or does not cause damages for third parties.

3. All warranty claims are excluded as far as these are based on the technical data or the know-how transferred. No warranty is made for the reliability, the quality, the economic utilization, the usefulness of the licensed article for the intended purpose or for any other purpose.

### Example 15

*Guarantee by transferor*

Subject to the terms and conditions hereinafter set forth, the transferor makes to the transferee the following guarantees: all the written know-how and the technical information handed over or disclosed to the transferee pursuant to the provisions of this agreement will be correct, complete, up-to-date and adequate to [manufacture the product] [apply the process].

### Example 16

Licensor guarantees that the technical documentation supplied by licensor to licensee with the contract shall be the latest technical documentation which is actually used by licensor and the improved and developed technical documentation shall be supplied in time by licensor to licensee in the course of the contract.

### Example 17

The licensor hereby warrants that the technical information supplied as know-how as described in this agreement is suitable for manufacturing the product as stipulated herein, but provided that the technology is used under the same conditions, and with the same intermediaries and other materials, as used by the licensor at its plant at the time of the signing of the contract.

### Example 18

The transferor guarantees that the process has been technically tested in its works and that the process has resulted in the production of the product. However, transferor will take no part in the use made by the transferee of the know-how supplied under this agreement and accordingly gives no guarantee that the transferee will obtain the same or similar results in the use thereof.

### Example 19

The licensor guarantees that the know-how delivered under this agreement and transferred to the licensee will enable the recipient, through its acquisition and application, to achieve the proposed technical aims ....

### Example 20

Licensor does not warrant that the invention and know-how are capable of industrial realization nor shall it be responsible for the consequences of any failure __________ to achieve this. If industrial realization proves impossible or too difficult for the licensee, either party may determine the contract. In such a case neither party shall be liable in damages to the other __________. Similarly, licensor does not warrant that the invention and the delivered know-how are capable of commercial exploitation. The risks of such exploitation shall be assumed solely by the licensee.

### Example 21

Licensor guarantees that it has lawful ownership of all the know-how and technical documentation supplied by licensor to licensee in accordance with the contract, and that licensor has the right to transfer them to the licensee. In case a third party brings a charge of infringement, licensor shall take up the matter responsibilities which may arise.

### Example 22

*Warranty by the transferor*

The transferor hereby warrants that as of the date of the signing of this agreement, it has no knowledge of any patents granted or rights insuring to third persons that would prevent the full enjoyment of the technical information furnished under this agreement.

### Example 23

*Confidentiality*

The licensee undertakes to preserve the confidentiality of all designs, drawings, technical information and know-how furnished by the licensor and shall not divulge any part thereof, except what is normally required for the sale and use of the products covered by the licence, and for manufactures of parts and/or components or raw materials in [the country name]. The licensee shall place his staff under strict obligation not to divulge the know-how, in any circumstances, during the period of validity of the contract.

### Example 24

Licensee agrees to keep the know-how and technical documentation supplied by licensor under secret conditions within the validity period of the contract. If a part or the whole of the above mentioned know-how or technical documentation will be opened to the public by licensor or any third party, licensee is no longer to have the secret obligations to the opened parts.

# Module 18

## CONTRACTING COMPLEX INDUSTRIAL PROJECTS

*This module examines the negotiating and contracting environment for establishing large industrial works with respect to project management options and strategies. Written for the recipient of services, particularly in developing countries, it provides a comprehensive discussion of the different types of contracting methodologies for infrastructure projects (fully unpackaged, fully packaged, semi-turnkey, joint venture and build-operate-transfer project modes). Modalities for the construction of process-based projects and protocols for contracting design engineering support are also discussed. Performance guarantees and liabilities for deficiencies, price and payment considerations (and the different types of contracts in which they are embodied), incentives and payment terms are also considered.*

# Contents

# CONTRACTING COMPLEX INDUSTRIAL PROJECTS

## Introduction

Contrary to what might logically be expected, the first technologies developing countries need to acquire are, typically, large and complex industrial projects: because they lack infrastructure — electrical power, waterworks, roads and bridges etc. — it is neither feasible nor economically viable for these countries, especially the less developed ones, to start by introducing the less complex and easier-to-implement technologies for consumer goods. Once a country is more advanced economically, it may be able to avoid contracting some complex industrial projects by importing the needed products, such as steel or capital goods. However, the country may still need to work on other complex projects. Essentials such as cement or fertilizers or petroleum products must be sourced locally to, for instance, reduce the need for foreign exchange. Thus, the development process inevitably requires a country to come to grips with the management of large projects, and sooner rather than later.

Contracts for constructing large industrial works are typically very complex, involving as they do a number of things: *(a)* the technical aspects of planning and construction, *(b)* project contracting strategies and (c) legal relationships with the various parties that come together to set up a project. Establishing such projects often takes several years. Efforts can be interrupted for many reasons — technical, financial, legal and political — which the planning process also needs to take into account.

This module examines the negotiating and contracting environment for establishing large industrial works in the context of project management options and strategies. It is written for the recipient of services (referred to as the "operating company") rather than for technology transferors and licensors.

Large industrial projects are of several kinds, ranging from civil works (such as tunnels, bridges, waterworks and railroads), to utility plants (such as hydroelectric power stations), plants producing capital goods (steel and aluminum) and plants producing petroleum products (refineries), fertilizers, petrochemicals, cement etc.

Industrial projects divide into two basic types: those employing open-architecture technologies and those employing closed system, or closed-architecture technologies.

Nearly all infrastructure projects employ an open architecture. Open-architecture technologies are those generally in the public domain; they are familiar to professionals and consultancy companies and can be inspected by the transferee with the easy consent of the transferor or a third-party engineering contractor. Typically, the various segments of the plant can be conceptually disembodied to assess their merits and demerits or reverse engineered to obtain their principles. Open-architecture infrastructural projects do not produce goods. Some yield services, like electricity or transportation, while others provide "platforms" for industrial development, such as bridges, railroads and oil pipelines. Closed-system technologies are those whose critical and vital elements are not transparent upon inspection, they are not generally known to professional consultancy organizations or discussed or disclosed in the public domain. Even when the component processes are patented, very little information can be extracted from the patents that would allow achieving acceptable production economies (such knowledge is encompassed in the know-how).

This module surveys both infrastructural and process-industry contracts. It pays special attention to industrial projects that have a closed-system architecture, that incorporate several major pieces of equipment and that involve several separate contracting parties, licences to practise technology and output products (petrochemicals, fertilizers).

## The preparatory and decision-making stages

Large projects involve planning over a long gestation period, contracting with and managing the work of tens or scores of contractors and suppliers and intricate technical coordination and financial management. Recipient countries, especially developing countries, require that project execution also be associated with the transfer of technology. They want to acquire both know-why for certain inputs and actions and the capability to manage the operation after its completion, that is, know-how, which is accomplished through training.

Pre-contract studies are an essential part of large project contracting. They assess project feasibility, help to determine the nature and scope of the projected works and suggest financial modalities and management strategies. Pre-contract studies often proceed in stages, with the results at one stage providing the basis for a decision on whether to proceed to the next stage. Pre-contract studies include opportunity studies, which set parameters for investment, production costs and potential return on investment. When indications are positive, pre-feasibility and (full) feasibility studies follow. The preliminary feasibility study will often enable the purchaser to evaluate various options concerning the scope and manner of execution of the project. Such studies are not only essential decision-making tools for the operating company, they are often required by the lending institutions that will provide financing for construction. The feasibility study should also include an investigation of the construction site (its topography, geological characteristics and climatic conditions), which provides vital information for the contractor(s) who will construct the facility. A feasibility study must also address issues pertaining to the environmental, ecological and social impact of the project. It must determine whether the project or project operations will violate local or national laws, upset important pressure groups etc. Many of these issues become important only once a visible structure begins to rise.

Only after the feasibility study does it generally become possible to approach financial institutions or banks (and, in some countries, the investing public) for funds (bonds), to decide on the best contracting approach and to establish a project management team to proceed with the work.

In developing countries, the operating company will seldom have the capability to undertake these tasks on its own. Assistance from an experienced consulting firm is usually needed. The consulting firm may be selected competitively, perhaps with the proviso that it may become involved, at a later stage, as a project adviser (formally referred to here as the project consultancy company). Having the consulting firm follow through in this manner has its advantages and disadvantages.

As a rule, pre-contract studies should not be conducted by firms likely to bid on construction, owing to potential conflicts of interest. In some highly specialized fields, however, it may be necessary for the studies to be so conducted to minimize technical risks.

## Contracting methodology in infrastructural projects

An enterprise that intends to contract out the construction of public works has some choice in selecting a mode of contracting. Several contingent factors should be considered, including, for instance, the following: *(a)* the ability of an enterprise to function as construction manager, *(b)* the time that such an enterprise can devote to the work, considering the length of time involved and *(c)* whether the lending institutions will agree to the enterprise as the lead contractor. Generally, large works entail a considerable amount of contracting-out. Much of this section focuses, therefore, on the roles and interactions of the players" in the execution of large projects.*

In infrastructure projects, specialized firms generally supply one or more critical piece(s) of equipment (turbine-generator assemblies for a hydroelectric station, for example) and install the equipment themselves as part of supplier contracts. In other cases, specialized, but not necessarily proprietary information such as architectural, civil and mechanical engineering drawings may be involved (design transfer). In particular types of contracts (e.g. dredging or tunnelling contracts), the transferor company may also lease out specialized equipment and operating personnel.

There are six modes by which an infrastructure project may be executed, many of which apply to closed system technologies, with modifications.

- The fully unpackaged project mode.
- The fully packaged turnkey project mode.
- The semi-turnkey project mode.
- The contractors' consortium project mode.
- The joint-venture project mode.
- The build-operate-transfer (BOT) project mode.

The choice of a contracting mode ultimately depends upon the following factors:

- Project cost.
- Payment mode.
- Coordination efficacy and effectiveness and means of their accomplishment.
- Reliability (credentials) of contractors.
- Scope for negotiation in matters of project responsibility and liability of contractor(s).
- Need for lending agencies to approve contractors and contractual terms.
- National laws.
- Taxation.

Aside from this, there are other considerations:

- The technical complexities of the project, specifications of ultimate performance, its staging and timeliness of completion, feasibility of detecting defects and rectifying at intermediate stages of the project, and the quality of the technical service involved.

*Since this discussion focuses on open-architecture technologies, it need not consider whether the contracting approach finally adopted is compatible with a transferor of technology. Patents, trade marks or critical knowledge that is held confidentially (know-how) are seldom used in infrastructural projects.

- The legal aspects of contracting and the establishment of liabilities both in terms of scheduled completion and ultimate performance of the project (project performance guarantees).
- Financial aspects, including lender conditions on loans and other means of financing the project, the magnitude of payment and payment terms, security of advances made, monitoring and financial audits.

### *The fully-unpackaged project mode**

In the fully unpackaged project mode, the operating company manages all aspects of the project, as depicted in figure 10. The solid arrows indicate that all contractual arrangements and liaison are between the operating company and participating agencies and firms. In this mode, the operating company must have the ability and experience to coordinate large projects. It must prepare the tender documents, evaluate the tenders and select suppliers and contractors to carry out project tasks. The operating company also assumes the responsibility for managing the interfaces during project implementation.

*Contractual matters pertaining to large projects are distributed among the various types of projects discussed in this module. Hence discussion in a later section may apply to the project mode being currently discussed. Conversely, contractual matters already covered in one project mode are not repeated in subsequent discussion, although they may also be relevant in that context.

Coordinating a project of the dimensions envisaged here would be a difficult task, even for advanced country enterprises. However, where such capability exists, enterprises may take the go-it-alone, fully unpackaged approach in order to protect vital information (e.g. nuclear power plants). Sometimes Governments also create special agencies, such as the National Aeronautics and Space Agency in the United States to carry out complex and strategic projects. However, where security of information is not vital or is protected by other means, these enterprises and agencies commonly bring in consultants.

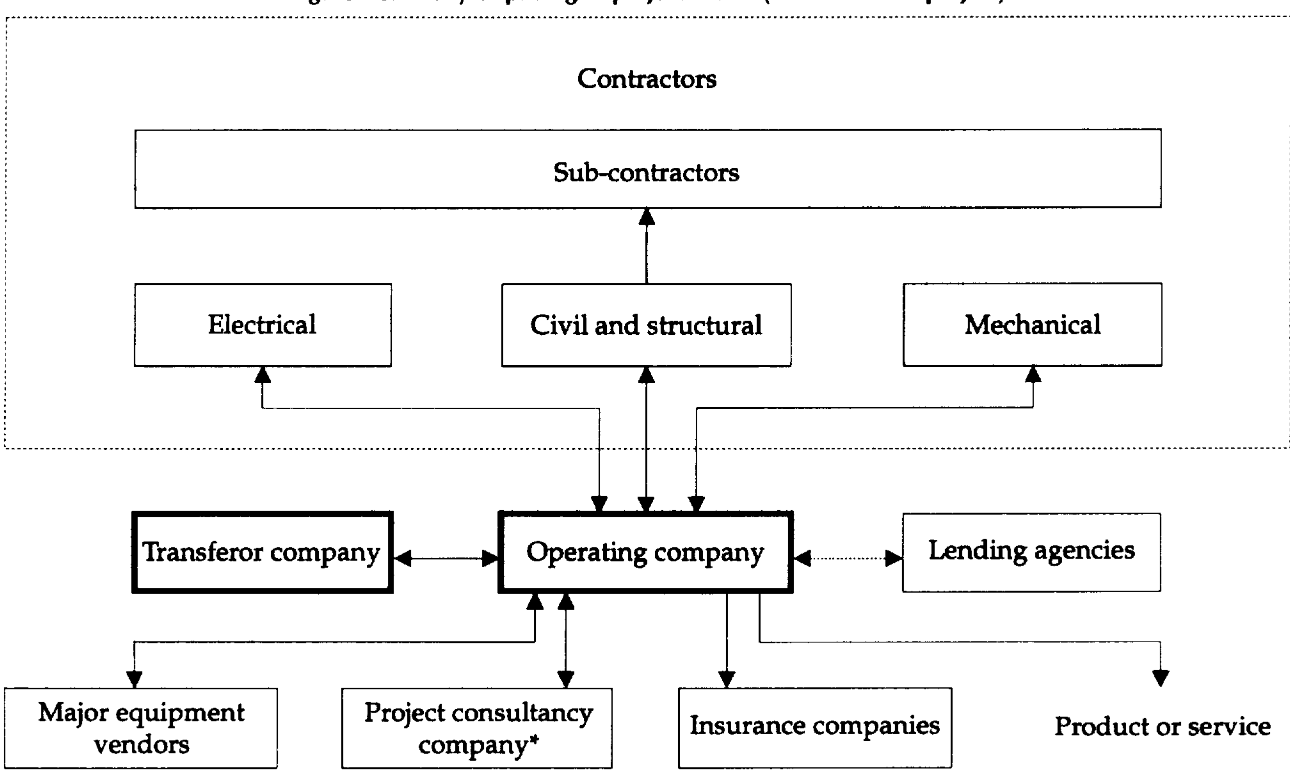
The operating company's risk in coordinating several simultaneous contracts can be considerably reduced by calling in a consulting engineering company, a project consultancy company, to advise on coordination. Alternatively, the operating company may delegate responsibility for some parts of the coordination to one of the construction contractors.

It should be noted that this mode of executing an infrastructure is not very common.

### *The fully-packaged turnkey project mode*

When project complexity dictates that implementing a project should be entrusted entirely to a single contracting organization, the project is said to be in the turnkey mode. In this mode, a turnkey contractor obtains a definition of the scope of the works from the operating company and then contracts to deliver

**Figure 10. Fully unpackaged project mode (infrastructural project)**



the completed project at an agreed-upon time at virtually pre-determined costs. Once the contract has been executed and the plant site handed over to the contractor, the project becomes a black box to the operating company until the time scheduled for take-over. (Standard practice does provide for some small measure of oversight to the operating company.)

Turnkey projects are quite common in advanced countries. The turnkey mode offers a lower cost alternative to direct management because costs and operating risk are shifted from the operating company to the turnkey contractor. The costs of delays (on one ground or another), defective deliveries of equipment and rectification of commissioning failures, among the many other potential headaches, are borne by the turnkey contractor.

Generally, on infrastructure projects, competitive tenders for construction are solicited from pre-qualified turnkey contractors in closed or open bids (see module 7, on procuring technology), with plant site, scope of works and completion times all defined. Each tenderer will, typically, present an individual design. The operating company will be free to choose the design best-suited to its purposes. Since outside financing is generally involved in large-scale works, lending agencies usually have a substantial say in the choice of the contractor and in formulating contract terms as well, particularly those for payments and payment terms.

In some cases where the objective of the project is to produce a product, for example, cement, the turnkey contractor may offer to ensure that, after completion, the works will perform at production levels specified by the operating company's own personnel. Such arrangements, while not particularly applicable to infrastructural projects, certainly apply to the construction of process plants. This approach is referred to as the product-in-hand contract approach.

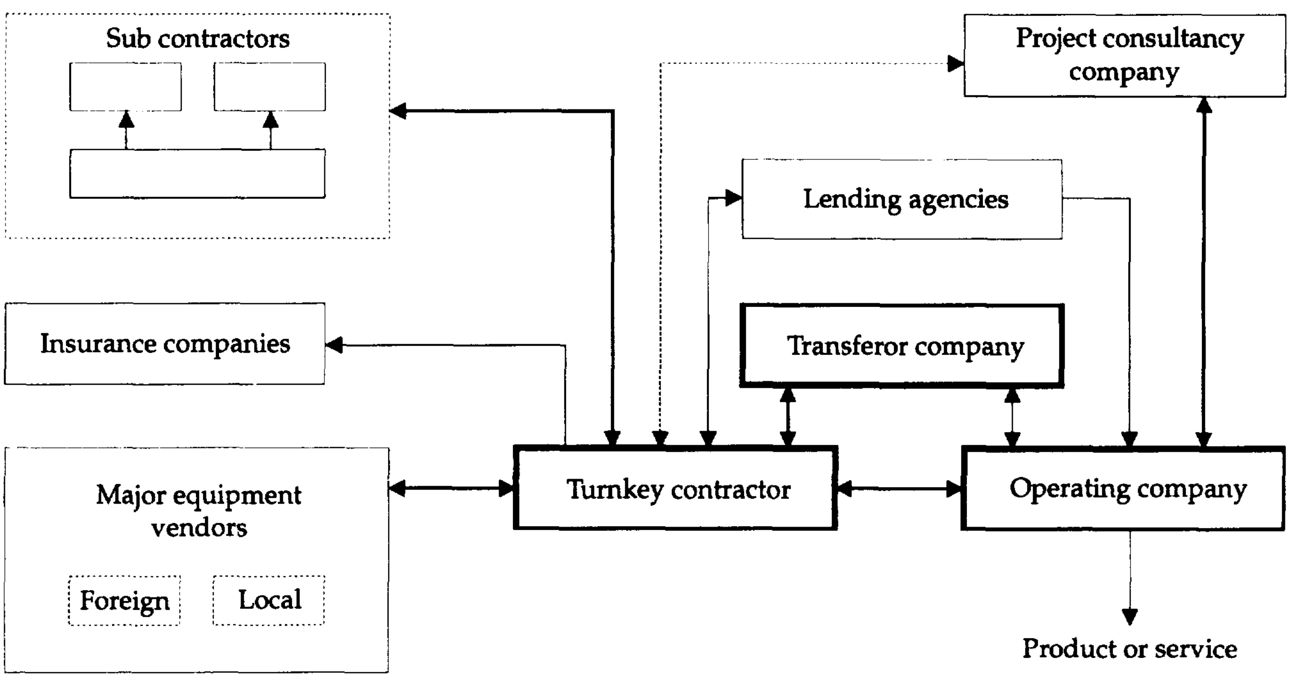
The turnkey contractor will generally be an expatriate firm. It will farm out work to a number of other contracting firms, foreign and local. Some of these may be responsible for placing orders for specific pieces of equipment or for a complete subunit of the industrial complex.

Figure 11 presents a schematic view of how the work of a turnkey contractor is organized. The various relationships that will be established for the construction of the works are also shown. Note that the operating company's only major link is with the turnkey contractor; its links with other physical and functional units will be informal.

A project consultancy company can be employed on sole-responsibility turnkey contracts, although its function in such cases is primarily to monitor and report on the progress and the quality of the construction. A project consultant has no *locus standi* in the eyes of the turnkey contractor, and contractual arrangements will have to be made in the turnkey contract to give the consultancy company access to the plant site.

Since a single contractor bears great risk, given all the obligations undertaken, and must incur costs to guard against this risk, the total price of a turnkey contract will be generally higher than one involving several contractors. There is nevertheless the motivation to offer an attractive price, which means cutting project costs. Such cost-cutting may jeopardize the durability, reliability and maintainability of the project after completion. (On the other hand, a turnkey contractor usually has no incentive to overdesign

**Figure 11. Fully packaged turnkey mode (infrastructural project)**



the works.) Another disadvantage of the turnkey mode is that the contractor tends to be very conservative in the choice of a technology supplier. While this may not be so such a critical concern in the infrastructural area, in the process industries it can matter a great deal.

In the developing countries, a turnkey contractor typically contracts with an operating company. In that connection, it will:

- Specify, in consultation with the operating company, the vendors from whom critical equipment is to be purchased.
- Have the right of approval over all layout plans for the plant, to provide for future expansion and orderly site development.
- Have direct access to basic designs from the transferor to ensure operational capability at the design level.
- Have authority to assign operating company engineering personnel at the contractor's office to observe the development of detailed engineering designs and preparation of procurement specifications (without however, giving access to subcontractors' contracts, prices, etc.).
- Have authority to approve all changes in the technical parameters and construction materials specified in the contract or changes in the equipment or construction specifications that are made to solve problems that arise during project implementation.
- Carry out pre-shipment inspection of procured equipment (a normal procedure in most turnkey contracts).
- Follow the progress of the works through payments linked to actual work done at the site and offshore.

Turnkey contracts are very specific and list all the tasks that have to be carried out by the turnkey contractor. The operating company typically takes over a fully operational plant performing at agreed-to levels (see section on performance guarantees below). It is not always possible to foresee all of the problems that may arise on a large project or to have contingency plans for them. Contractual provisions are made to bridge this gap. They stipulate that any activity, work or equipment not specifically mentioned in the turnkey contract but necessary, in the opinion of the contractor, for satisfactory performance of the works is the responsibility of the contractor.

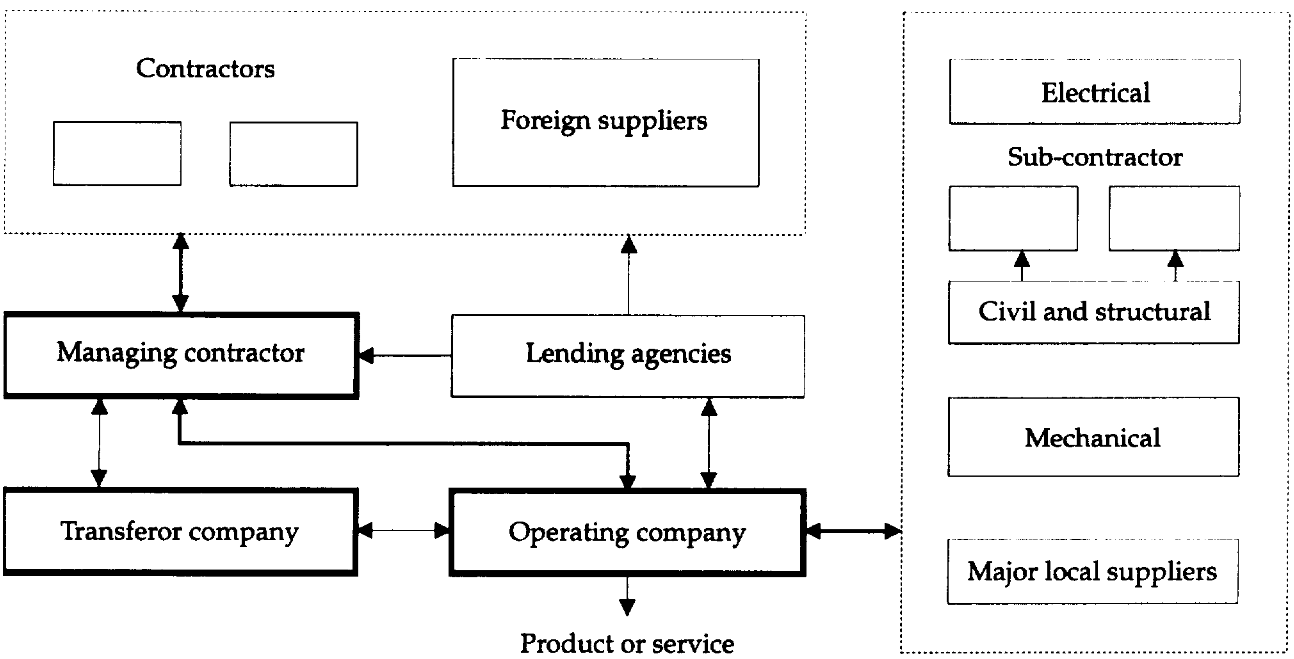
### *The semi-turnkey project mode*

Of the several project modes, the semi-turnkey project mode is the most common in both advanced and developing countries. In the former it reduces costs, and in the latter it reduces foreign exchange expenses and encourages local competence and technology transfer.

#### *Variations*

The semi-turnkey mode has within it a number of variations and is thus highly flexible. This section discusses three such variations. The general mode is depicted in figure 12 where the turnkey contractor is

**Figure 12. Semi-turnkey project mode (infrastructural project)**



replaced by a managing contractor, whose responsibilities and accountabilities are entirely different.

*The managing contractor mode*

The managing contractor, a company, acts on behalf of the operating company. The managing contractor may be more than a manager, bringing in specialized designs etc. In the general mode, the managing contractor contracts with third-party contractors and suppliers on behalf of the operating company rather than subcontracting work under an umbrella contract with the operating company (as is done in the turnkey mode).

The managing contractor may have additional responsibilities, such as assessing and accessing technology or designs for the operating company. Other responsibilities might involve supplying the design for the entire works and the construction of some vital segments of the works (this case the managing contractor assumes the dual role of contractor and managing contractor). The managing contractor may also be responsible for handing over to the operating company, at agreed times, completed units that are capable of being put into operation. Typically, in the developing country context, the operating company will work with competent local contractors and large local suppliers of important equipment, who, as mentioned earlier, must also install the equipment. The managing contractor bears the rest of the responsibility, as explained above, and may even be responsible for interfacing with local contractors and equipment suppliers.

The way construction is apportioned among the various parties will depend on the nature and size of the works and on national policy in the country of the operating company. Where a managing contractor undertakes responsibilities for coordinating work done by local contractors, a project consultancy company may be needed since the two roles would overlap.

Divided responsibility has its disadvantages, in contrast to the unitary responsibility of the turnkey contract. When risks are shared, costs are reduced. Giving the operating company direct control over all aspects of the works during the implementation phase offers an attractive means for training managers and engineering personnel in the methodologies of project management, project design, and accessing licensed technology.

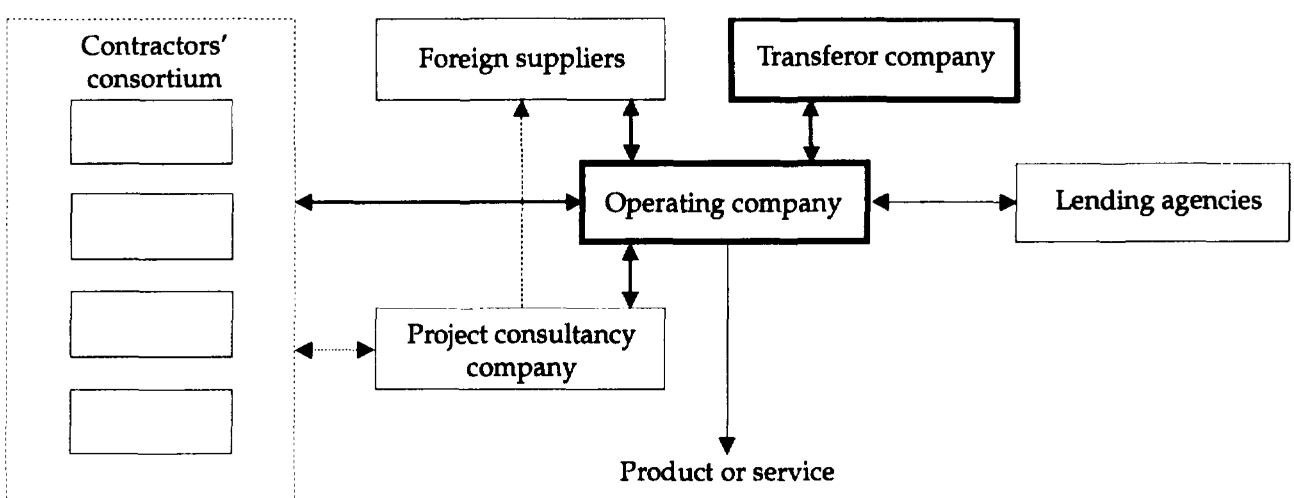
The liabilities of the contractors who actually perform the work are defined in the individual contracts executed between them and the operating company under the guidance of the managing contractor.

*The contractors' consortium project mode*

The contractors' consortium project is a second variation of the semi-turnkey mode and is illustrated in figure 13. Here the operating company, instead of contracting with individual contractors, contracts with a group of contractors jointly to provide the resources and expertise necessary to construct the works. The contractors handle all of the work, with the operating company working in a supervisory capacity.

The contractors can form a consortium, with each contractor having a separate contract with the operating company but being jointly and severally responsible for the completion of the works, whose integration and functionality is known to all of them. This form of arrangement is known as the external consortium. In it, each contractor assumes firm obligations. If a deficiency develops at any construction stage or during commissioning of the works, all contractors have the obligation to resolve the difficulty. In such a consortium, there may be a lead contractor or spokesperson for its members, but the representative power of the spokesperson has to be contractually defined. Liability for defects is shared by the members under some formula developed by the consortium to settle such issues and with which the

**Figure 13. Contractors' consortium project mode**



operating company is not concerned. National laws have to be observed for the assumption or distribution of liabilities.

With joint and several liability, the operating company would be able to claim performance against any one or a combination of the members of the group without having to attribute the failure of performance to a particular member, as each member would be personally liable for any such failure. In the event of a successful claim, the operating company would be able to execute the award in its favour against the combined assets of the members against whom the claim has been raised.

There are, however, certain disadvantages to working with a consortium that is not a legal entity. These relate to *(a)* the settlement of a dispute that may arise with respect to work performed by one of the members and the arbitration procedures to be followed and *(b)* how to formulate the performance adequately given by third parties among the members of the group.

#### *International consortium*

In an alternative modality, the contractors may form an independent legal entity known as an internal consortium. In this case, many of the considerations applicable to turnkey contracts apply. The operating company deals with only a representative of the consortium. Some contractual aspects of this and other modalities are discussed below.

### *Contractual issues*

#### *Project description*

In a turnkey contract, either the tender documents or the turnkey contractor, depending on the contract mode, normally provides a comprehensive description of the works and the design/technology to be applied. When there are contracts with several contractors, however, the description may be missing. This may result in excessive overlapping or, more dangerously, non-convergence. Thus, the operating company would have to incorporate in all key contracts complete descriptions or the general perspective of the works and its expected functionality.

Wherever possible, the technical characteristics of the works or equipment to be installed by a contractor are best incorporated in contracts in terms of operational capability rather than in static references to designs, materials and workmanship. This approach attributes failure, where encountered, to failure of capability without necessarily identifying the cause of failure (i.e. defective design, materials or workmanship). For example, an oil pipeline must carry oil at the required viscosity, flow rate and pressure; failure to do so is simply a matter of operational capability rather than a result of defective design or some other cause.

#### *Contracts with subcontractors*

The operating company should avoid any contractual interface with subcontractors appointed by another player in the project. The absence of a contract could benefit the operating company by, for example, insulating it from disputes between the contractor and the subcontractor, such as a failure by the subcontractor to perform or a failure by the contractor to pay the subcontractor. This insulation is usually not complete, however, so it may be desirable to have a contract that deals with matters of approval of subcontractors (and some other concerns addressed in this section).

#### *Inconsistencies in contracts, drawings and specifications*

Despite the best efforts of the parties to achieve consistency among contracts, provisions in separate documents sometimes appear to be inconsistent with the interpretation of required performance. It is therefore best to define the principal contract agreed to by the interacting parties. Where another document contains an inconsistent or conflicting provision, the provisions of the principal contract should prevail. When this is not feasible, contracts may need to be prioritized by agreement. Generally, the principal contract document identifies the type of works to be constructed and contains a general description of the scope of the construction and the technical characteristics of the works.

The scope of the project, the technical characteristics of the works and the nature of construction/erection processes to be used are typically contained in contractual documents titled "specifications" and "drawings." Specifications describe the technical characteristics of the project (e.g. the engineering properties of the pre-stressed concrete to be used in certain areas), while drawings depict the appearance of the product, spatial relationships of parts, dimensions of parts, permissible tolerances, materials standards, manner of construction, manner of use etc. Sometimes technical standards are specified in a separate document so as to apply to the whole of the project.

Contracts may also sometimes conflict in these areas. Where specifications and drawings are inconsistent, which are to prevail? In civil engineering, for example, drawings generally prevail over specifications, provided standards are not violated.

#### *Transfer of documents to the operating company*

Contracts with contractors should typically provide for transferring of ownership of project documents to the operating company. Such documents include specifications, drawings and other technical data used for construction of works, which the company may need for maintenance of the works. Where designs etc. are covered by licensed rights, the contractor should be instructed to negotiate the right to them, under obligations of confidentiality, to the operating company so that they can be used for maintenance (but not, of course, for the construction of other works).

*Transfer of equipment warranties*

Where the contractor (or subcontractor) installs a machine or piece of equipment obtained from third-party manufacturers, he will need to limit his liability, by obtaining performance and life warranties from the manufacturers. In such cases the contractor should be obligated to inform the operating company of the terms of the warranty. The operating company needs to ensure that the warranties are transferable to it at the end of the subcontractor's term of contract. If the warranties are not transferable, then the warranties provided by the contractor should extend beyond the period of the works contract until the expiration of the mechanical warranties.

*Quality guarantees in works contracts*

The operating company should also provide for a quality guarantee to be furnished by the contractor in works contracts in which liability is assumed for defects in the works and for inaccuracies or insufficiencies in the technical documents supplied. The operating company must discover deficiencies and notify the contractor prior to the expiration of the warranty or guarantee. The liability of the contractor will not pertain to those deficiencies due to factors such as the following:

- Normal wear and tear.
- Faulty operation or maintenance of the works by the operating company or third parties engaged by it.
- Defective design equipment, or materials supplied by or incorrect instructions given by the operating company (which instructions the contractor did not know to be incorrect).
- Events that cause loss or damage to the works if the risk of such loss or damage is borne by the operating company.

The guarantee period in the turnkey contractor mode usually commences on the date of acceptance of the works by the operating company, or on the date on which the works are taken over by the company. The latter option is chosen when performance tests cannot be conducted until the entire works are complete, which is typical with closed-system technologies. If several contractors are engaged for the construction and a portion of the works constructed by a contractor (such as a power station) can be operated and performance tests conducted before the completion of rest of the works, the guarantee period may commence when the accepted portion of the works is taken over by the operating company. The contractor may be reluctant to postpone commencement of the guarantee period until the date of acceptance of the entire works since this might extend the period for which the contractor is responsible for defects.

### *The joint-venture project mode*

There are two types of joint ventures: *(a)* the contractual joint venture, where two or more enterprises come together to perform an activity and, upon its conclusion, distribute gains or losses and dissolve the joint venture and *(b)* the equity-based joint-venture, where the objective is an on-going association in which the participating entities jointly take equity positions in the venture by injecting cash and other assets to complement each other's contributions. The association is intended to continue for a long time.

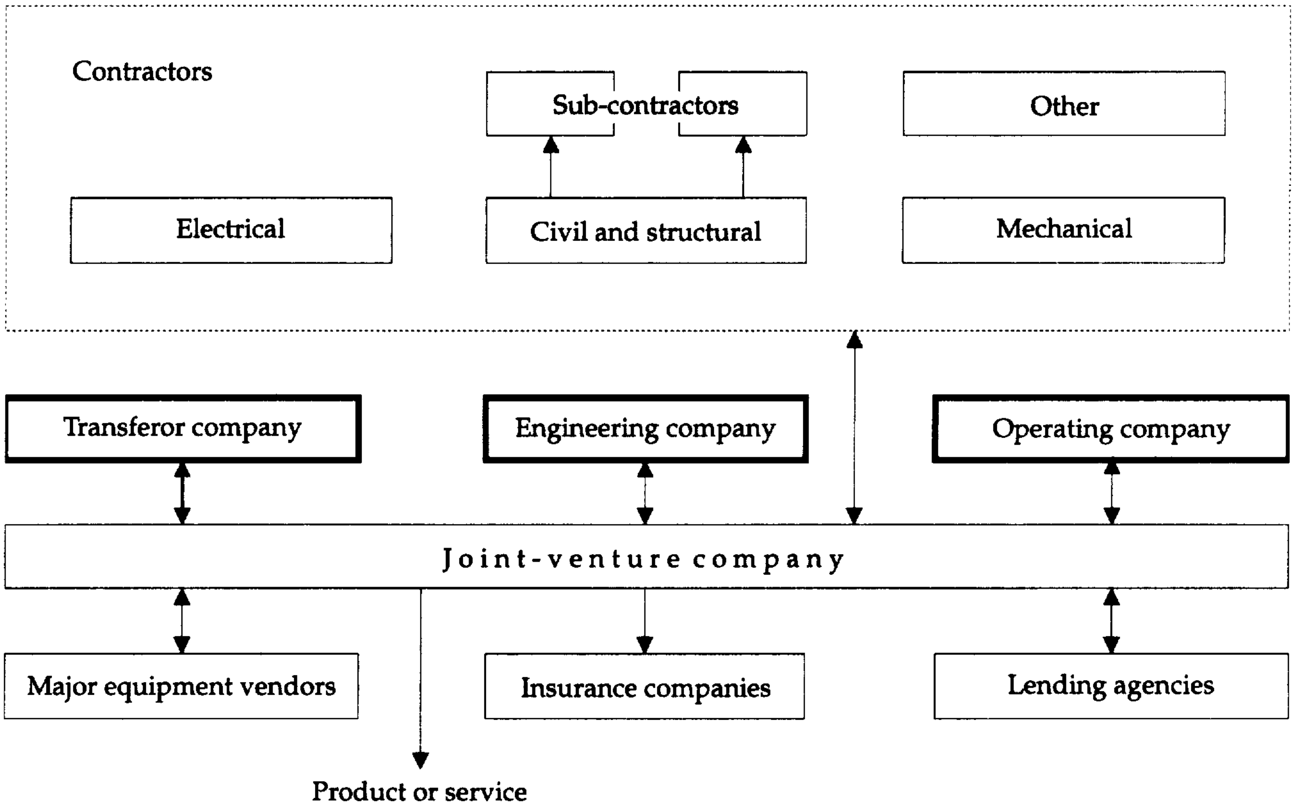
While both types of joint venture are feasible for the construction of industrial works, the equity mode is more practical and useful for product-based industries. It is moreover eminently workable in infrastructure projects.

Figure 14 illustrates such a venture. The operating company joins an engineering company possessing specialized design and construction management skills to set up a joint venture whose end-product is a facility to produce a product or service. The joint venture is, of course, a separate entity from the operating company, which will, in this case, inherit the works and routinely produce the product or service. Typically, in such a joint venture the major beneficiary is the engineering company, which will obtain the revenues otherwise claimed by works contractors. The joint-venture mode perhaps allows a better management of cash flow and gives the engineering company security by virtue of the growing assets of the enterprise.

Quite frequently, engineering companies engage in what are called product-in-hand ventures, in which the profits of the up-and-running enterprise are shared between the engineering company and the erstwhile "operating company." Where this double strategy (of building and producing) is found, the engineering company functions not only as a contractor but can be expected to capitalize a significant part of its profits (from contracting) in the equity joint-venture. The real expenditure on the project is thus reduced, and the engineering company obtains, in lieu of payments for engineering services, a share of the profits of the operating enterprise. Because of the expert involvement of the engineering company partner, joint-venturing reduces the risks of establishing the works.

In a variation of the product-in-hand type venture, the engineering company enters into the joint venture

Figure 14. Joint-venture project mode




to obtain rights to a share of the production, which it can independently market in pre-identified markets. Thus, in exchange for a future right to market a portion of the products, which may also include services such as power generation or oil exploration, the engineering company capitalizes a part of its profits from construction during the construction phase.

### *The build-operate-transfer project mode*

Despite a number of variations, all BOT projects involve the establishment of a private sector project company that finances, builds, maintains, and operates an infrastructure project for a certain period and thereafter transfers it to a publicly owned enterprise or to the public sector of the country in which the project is situated. One of the most notable of projects of this type is the EURO Channel Tunnel. The return on investment for BOT project comes from the collection of toll fees and similar charges under rights obtained from the Government of the country where the project is situated.

Central to a BOT project (see figure 15) is a contract between a project company and the government of the host country, which grants the franchise right. This contract defines the operational ambit of the project company, payments for the franchise, the hand-over date. Thereafter the project company enters into a variety of contracts.

Many of those who will help in building the works will also capitalize part of their services and obtain common stock of the operating company. The construction contract in the BOT concept is ordinarily a fixed-price turnkey contract covering all of the work. The facility, when completed, will be operated by an operating company, which will manage the operations of the project for a fee, under the direction of the project company.

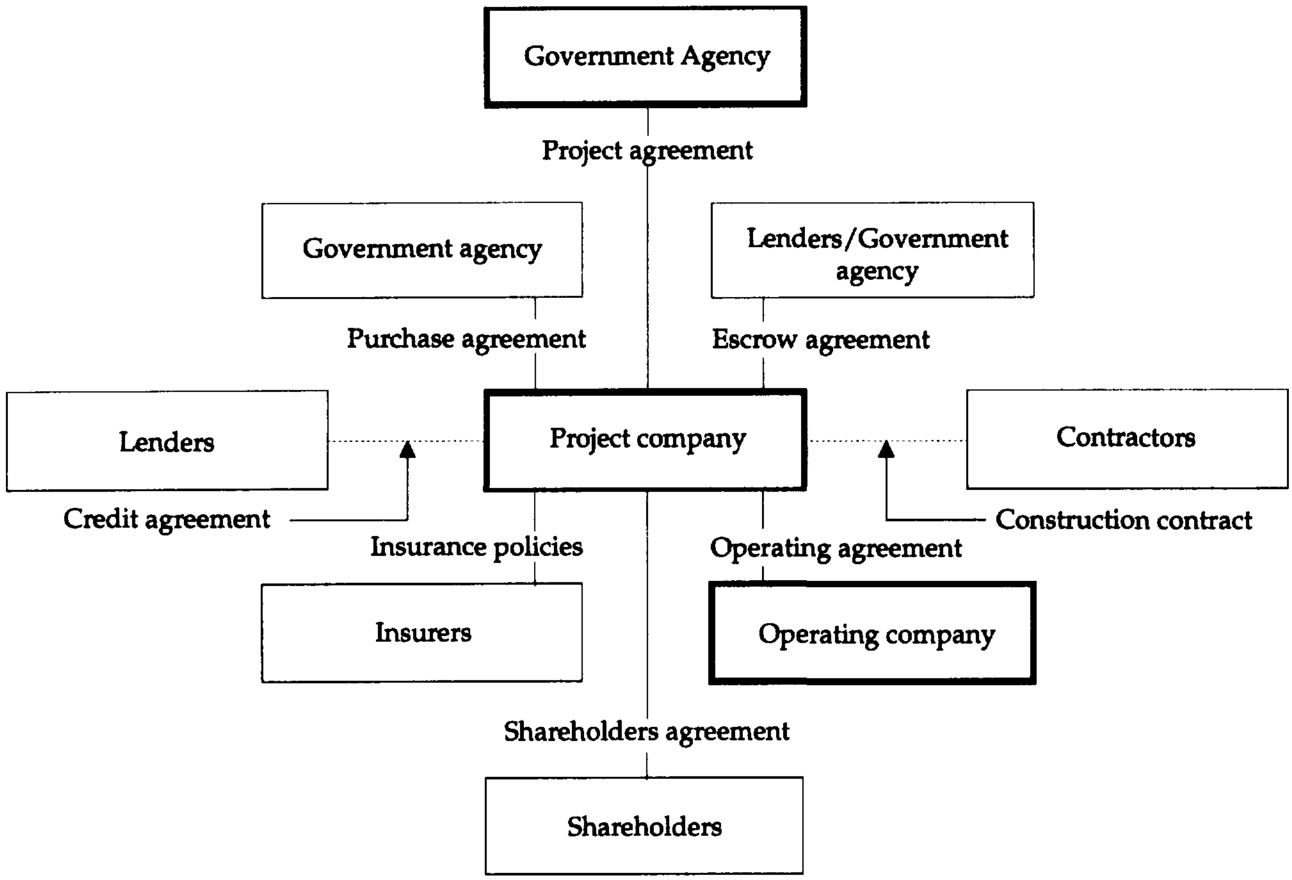
## Construction modalities in process-based (closed-system) plants

A "design engineering company" is the pivotal point in all modalities for the establishment of high-technology process plants—turnkey, semi-turnkey and fully unpackaged modes—but its importance and functionality vary with the project mode. The modes are shown in figures 16-18.

### *Turnkey and joint-venture modes*

In a turnkey contract, (figure 16) the entire project can be delivered on a turnkey basis by the design engineering company or the turnkey can apply only to construction of the plant, with technology supplied by the operating company. In either case a licence agreement has to be executed between the li-

Figure 15. Build-operate-transfer (BOT) contract




censor company and the operating company so that the latter obtains the right to practise the licensed process. Where the design engineering company, in a turnkey contract, is a licensee of the licensor company with rights to sublicence the technology, the licensor company will be selected by the engineering company with the concurrence of the operating company, since the right-to-practise criterion must be met. However, the latter does not assume any liability with respect to plant performance arising from its concurrence.

Where the design engineering company has primary responsibility for the selection of a licensor, there is, as pointed out earlier, a tendency to take no risks on technology, which would lead to the selection of conservative or very mature technologies. In the fast-changing world of today, this would be a disadvantage.

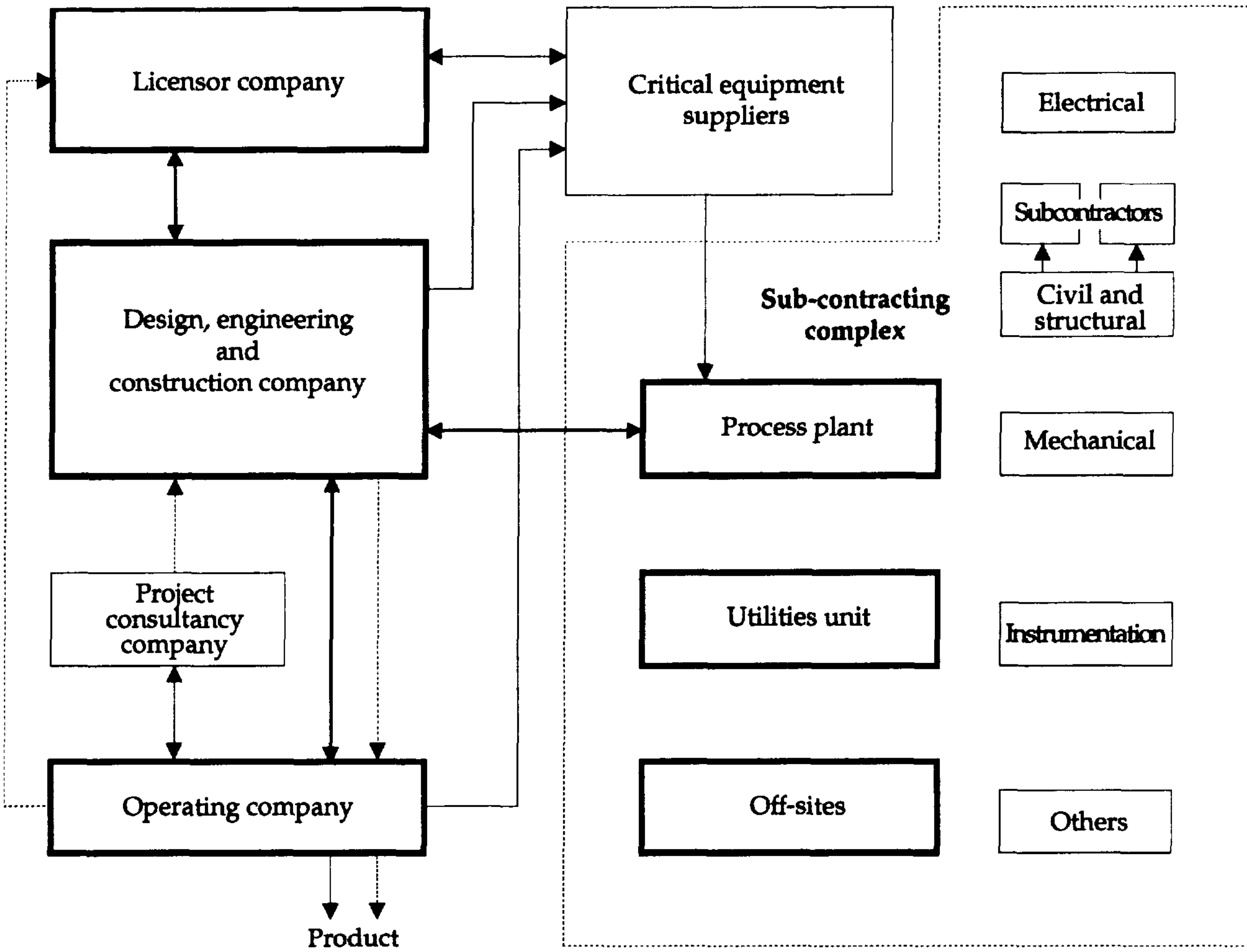
In the full turnkey mode, the design engineering company is also the construction company. In practice, many engineering companies have construction subsidiaries or affiliates or "partner firms" to whom they normally subcontract the execution of the plants they design.

A list of the main tasks contained in a turnkey contract follows:

- Project administration
- Licensing of the process
- Design and engineering
- Procurement and expediting
- Materials control
- Inspection of equipment prior to delivery
- Shipment, transportation, customs clearance and storage
- Construction
- Subcontracting
- Control of schedule and quality
- Completion and precommissioning
- Commissioning and performance guarantee testing
- Supply of spare parts
- Training of the owner's operating and maintenance personnel

While the role of the licensor company in process technologies is more important than that of the trans-

Figure 16. Licensed-process, turnkey mode




feror company in infrastructural technologies, the turnkey contractor has the greatest responsibility of all. The turnkey contractor furnishes a wide variety of warranties and guarantees and accepts several liabilities. These include *(a)* warranties for the timeliness of deliveries of equipment, of erection and of completion times for civil and mechanical works; *(b)* warranties for workmanship in the construction and erection of the works, according to the agreed specifications, and guarantees that proper standards are used; (c) liability for property or equipment under the control of the design engineering company and for the safety of personnel engaged for the construction and operation of the plant; *(d)* civil and mechanical engineering warranties, in the latter case that mechanical performance will be maintained for a defined period of time; *(e)* training warranties; and, very important, *(f)* process performance guarantees. Any deficiency in project execution times, in design competence or in process performance will be solely attributed to deficiencies in the technical and management capabilities of the design engineering company as contractor. Financial and other liabilities will be determined in this context and are discussed later.

Generally, in turnkey contracts with a North-North axis (advanced country environment), management passes over to the operating company after provisional acceptance of mechanical completion (see later). The commissioning and start-up of the plant and bringing it to a steady state are carried out by the operating company under the guidance and supervision of the design engineering company, generally in the presence of the licensor's representatives. This is done on the grounds that the permanent personnel of the plant are under obligation to the operating company and hence will, under the commissioning procedures, act under the instructions of the operating company.

Since the principal responsibilities of the turnkey contractor do not cease until a final acceptance certificate is signed by the authorized representatives of the operating company under the acceptance protocol, which is a detailed procedure set out in the turnkey contract, any arrangement that gives the contractor rights to instruct operating company personnel during the commissioning of the plant is fraught with problems. If, for any reason, the personnel of the operating company do not carry out the instructions given by the contractor and some equipment or subsystem of the plant is subsequently damaged, it would be difficult to hold the contractor responsible.

Accordingly, in developing countries, although the operating company is the party responsible for commissioning, the contractor should have advisory, review and supervisory responsibilities, with the right given, in writing if necessary, to the operating company not to accept the advice, review or supervisory guidance. If advice is rejected or an instruction is not followed by the personnel of the operating company, then the burden of responsibility shifts to the operating company; otherwise, the obligations of the contractor to ensure proper commissioning of the plant hold.

The turnkey mode, as noted earlier, is an ineffective means for transferring technology to host country personnel, since such contracts generally offer no opportunity for the personnel of the operating company to gain hands-on experience by working on the project. Where training responsibilities fall to the turnkey contractor, they usually pertain to plant operations (and perhaps, to the extent possible, maintenance) but not to project methodology. It is therefore prudent to state in the tenders floated for turnkey contractors that an operating company's follow through team will be associated with the project, but without any advisory or approval rights or responsibilities, to ensure project mode training for at least some operating company personnel.

In the product-in-hand approach (mentioned earlier), the turnkey contractor becomes associated with the project after its acceptance by the operating company, with the time of involvement determined by negotiation. Since, in this approach, the contractor not only assumes extensive training obligations but also bears the risk of failing to achieve the agreed training results, the price charged for the contract is likely to be higher than that charged under the turnkey contract approach.

The operating company's final choice among the various approaches may be guided by considerations that go beyond simply the financial costs of the construction. An alternative to both the turnkey and product-in-hand approaches is the joint-venture mode.

If the operating company undertakes a joint venture with the licensor company, many of the issues discussed in this section will not apply, except that the risk of defect correction will be shared, in some prearranged proportion, between the partners. In this mode also, a design engineering company may be responsible for constructing and erecting the plant. But it will not have any liabilities with respect to process performance since the licensor company has the ability to closely inspect the selection, deployment and intermediary testing of equipment and has experienced personnel to run or supervise the plant commissioning tests. The scope of work for the Design Engineering Company can be very clearly defined and, of course, will be limited.

### *The semi-turnkey mode*

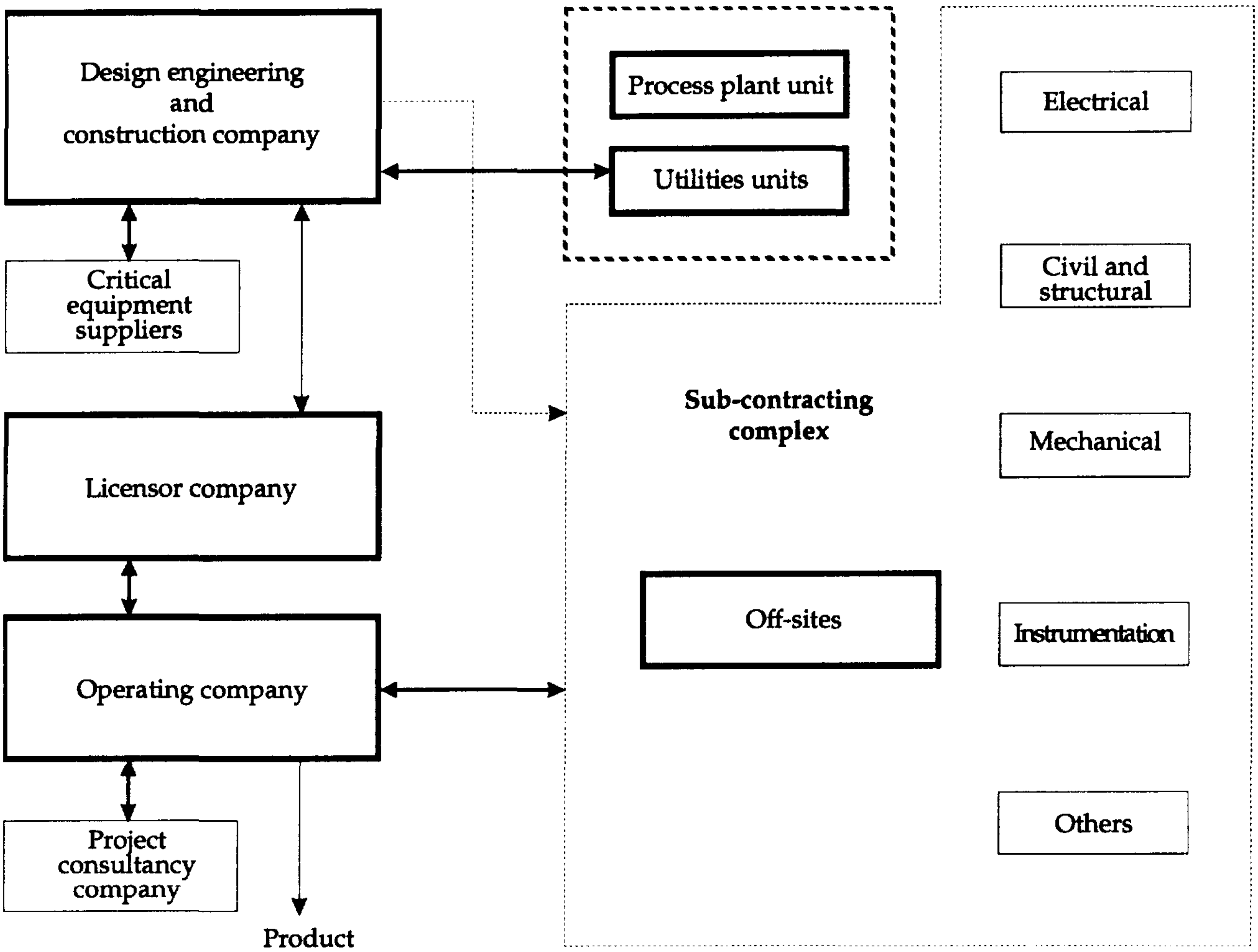
The semi-turnkey project mode (see figure 17), the more common mode for constructing and commissioning process plants, raises a variety of issues. In this mode, there are different categories of design engineering companies, which may directly or indirectly impact the technology selected. Major technologies, with their intricacies, are seldom directly licensed-in from the proprietor of the technology. They are generally routed through design engineering companies with experience in implementing projects based on such technologies, although contractually a licence agreement will still need to be executed between the licensor and the operating company that will practise the process.

Technologies are routed in one of two ways: *(a)* through an engineering company with which the licensor company does not have a special relationship but with which it is willing to associate during the project construction phase (a short-listed or "competent engineering company") and *(b)* through an engineering company with whom the licensor company has a special relationship and that commonly constructs plants based on such technology and sometimes sublicences the technology (that is, offers a technology tie-up). Typically, the licensor will have this special relationship with at least two engineering companies so that some choice can be exercised by the operating company.

Licensors themselves very seldom undertake responsibility for plant design and construction, except when a process is being tried out for the first time. Engineering companies have large staff and are, in good times, engaged in designing and/or constructing several plants simultaneously. Thus, they have an enormous pool of experience. However, when technology needs to be transferred to engineering companies who are in their embryonic stage, as often happens in developing country contracts, the obligations of the licensor can be quite substantial.

Indirect routing takes place because the performance of the technology, which is first gauged during the performance test runs depends on how the engineering design of the plant incorporates the technology and how the construction of the process plant, in turn, reflects it. The process guarantee postures of licensor companies are never as comprehensive or as negotiable as with engineering companies implementing the technology.

Figure 17. Licensed process, semi-turnkey mode




The licensor-engineering combine has the merit that process excellence arises from the synergistic interactions of process and engineering. Technology is not static: it develops through the process of learning and through the incorporation of process improvements made by the licensor or engineering company or transmitted to them by licensees. Every new licensee has access to the experience that has been captured by the engineering company. Thus, many technologies are indeed licensed under the specific names of the process licensor and the engineering counterpart, and in these cases the engineering company may have certain rights with regard to the technology, including the right of acting as the sole implementer of engineering.

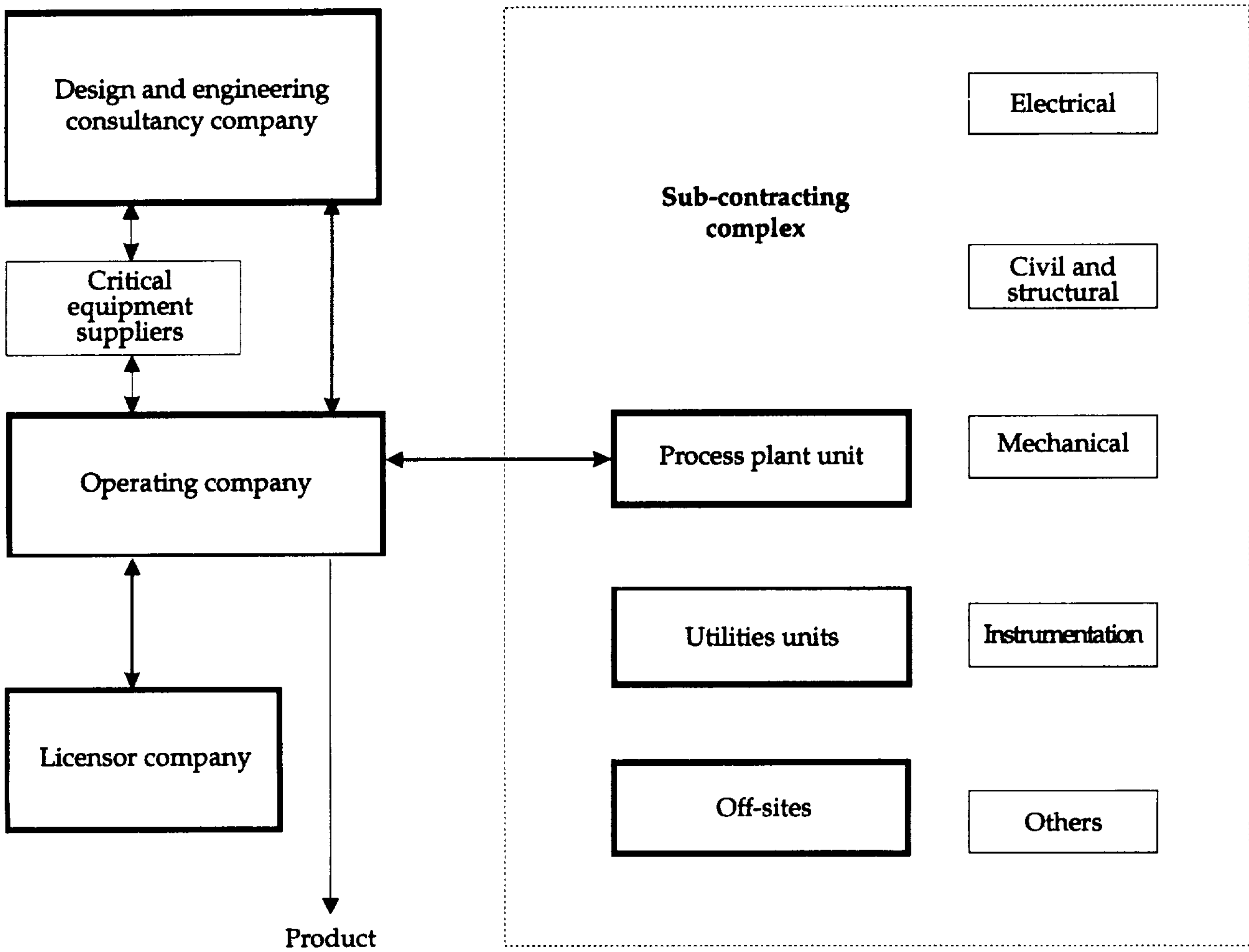
In some process plants, such as cement or paper plants, there may be little need for considering plant design and construction in the context of a licensor-engineering company combine because there is not a great deal of process integration in the plant system. These processes are substantially open-architectured. However, process plants covering petrochemicals, fertilizers or refineries with extended operations (e.g. hydrocracking) will generally require a close integration of the process (know-how), process engineering and plant design.

### *The fully unpackaged mode*

Figure 18 illustrates the strategy of the fully unpackaged mode in the process industry. The issues of managing this strategy are largely the same as those discussed under contracting infrastructural projects (figure 10). The operating company becomes responsible for contracting all elements essential to the construction of the plant and this, of course, imposes a large load on that operating company, which may be lessened by using a competent, independent design and engineering consultancy company.

The operating company often chooses this strategy when the process unit being established is an expansion of an existing unit owned by it or when a new unit is being built within a large industrial complex (owned and operated by the operating company). The design and engineering consultancy company in

Figure 18. Licensed-process, fully unpackaged mode




such a case would be the engineering department of the operating company. Many minor modifications may be required in existing utilities, off-sites etc. Such modifications are best undertaken under the direct supervision of the operating company since they should not endanger other process units being serviced by those utilities or off-sites etc. and whose shutdown is not envisaged.

Where, however, a greenfields project is being established under this mode in the process industry, there is most often a major subcontractor for the entire complex except the process plant unit whose construction would be closely supervised by the technology owner and generally subcontracted out independently.

## Contracting basic and detailed engineering design

Five basic features of detailed engineering are negotiated and dealt with in-depth in the design engineering contract: *(a)* the responsibilities to be assumed by the design engineering company in the context of project execution; *(b)* responsibilities for demonstrating that the constructed plant can yield the promised performance *(c)* the obligations of the company in respect of meeting project schedules; *(d)* modalities of expressing compensation payments ("consideration"); and *(e)* financial/operational responsibilities of the design engineering company in the event that the plant does not meet the targeted performance standards.

Typically, no knowledge relating to how a plant should be engineered to suit the operating company's requirements (product specifications and product volume, for instance) will be available until after a licence contract has been executed, when the licensor discloses to the operating company two essential sets of data and information: *(a)* the process description package and *(b)* the basic engineering package. The process description package provides a detailed description of the process unit: how it operates, how it is to be organized, the relationship among its component elements and how the licensed process works to yield the products of interest. The basic engineering package is that component of engineering knowledge inherent to the process; it is generally indispensable for undertaking the detailed design of the process plant and associated facilities.

This disclosed information forms the bedrock on which a strategy can be developed to contract the engineering and construction of the plant and assign performance responsibilities and liabilities. Where technology is routed through the licensor company-design engineering company combine, the scope of work of the engineering company can be specified sooner. But even here the operating company must wait for the licensor company to submit its basic design package, since feedstocks, site situation, public utilities available, local pollution laws etc. differ from plant to plant, and adjustments have to be made to account for them.

Where the engineering company does not have the special relationship, the engineering contract is executed after the receipt of the said packages, or on a basis that the detailed scope of the work of the engineering company will be incorporated into the agreement subsequent to the receipt of the packages. This conditionality has implications for contract pricing.

To facilitate the development of contracting methodology, a process disclosure agreement — a special type of agreement — is sometimes negotiated between the licensor company and the operating company, under confidentiality restraints, before the licence agreement.

The design engineering company, in the semi-turnkey mode, should therefore be viewed as the organization that carries out detailed engineering and assumes other responsibilities as contracted. In other words, detailed engineering amplifies and supports the basic engineering package.

Although much of the work entrusted to the design engineering company is likely to be subcontracted, the design engineering company generally has special and direct responsibility for engineering the process plant unit, whose outer periphery is defined by the term "battery limits." The engineering company may also make important contributions to facilities outside battery limits, particularly to the utilities plants and significant segments of off-site units, e.g. an effluent treatment plant, which would typically be subcontracted.

One of the major problems faced in contracting closed-system technologies is to define the scope of work to be performed by each of the parties contributing to the project. In fact, even after formal disclosures, scope-of-work presents problems since the process licensor makes certain assumptions about what the other two parties to the contracts will provide, and these assumptions may not, in the event, be correct.

In practice, the licence and design engineering/construction contracts are executed simultaneously to shorten the project implementation period. At that point, the technology is a black box to the operating company and to the engineering design company (unless it has the special relationship mentioned earlier).

### *Basic engineering package*

Basic engineering can be of three types: *(a)* functional design of the process plant, *(b)* basic engineering design and *(c)* extended basic engineering design. The selection of the design mode is dependent on the competence of the licensee and the design engineering company.

Functional engineering design is often found in process licences that are not accompanied by a design engineering contract; it includes engineering design information for proprietary one-of-a-kind equipment and for critical equipment such as catalytic reactors, special instrumentation, shut-down configurations, etc., which cannot be independently assessed. A competent recipient company may be able to develop the total design of the plant based on such information. Such contracts are not unusual in the advanced countries. Engineering companies are often able to develop the basic engineering package from such data.

Basic engineering is more detailed than functional engineering. Its depth and extent are often determined by the capabilities of the operating company and the proposed design engineering company.

Basic engineering cannot be discussed more than perfunctorily in this module, but a typical illustration may serve to illustrate what type of information it generally encompasses. If the process has, say, a catalytic reactor as a key unit, basic engineering would disclose the physical dimensions of the reactor, the heat and mass balances around the reactor, temperature and pressure conditions, the reactor's connectivity to other critical equipment, its material of construction, what catalyst is used, in what form, in what amount, where it is placed in the reactor, its life-span, methods of regeneration, and modes of ensuring continuity of operation while the catalyst is being regenerated etc.

If, under the process description, the catalytic reactor has to be pressurized to a given pressure and controlled at a defined temperature, basic engineering would not generally cover how these are to be accomplished. Nor would it specify wall thicknesses of the reactor or how the reactor should be mounted. The latter are the tasks for detailed engineering; a competent engineering firm should be able to accomplish this without additional know-how or assistance from the licensor company (except perhaps for review assistance).

The basic engineering package is developed on the basis of basic design data supplied by the operating company. Besides providing the expected basic performance of the licensed process, such as designated plant capacity and specifications of product grades, the design data provide the general layout of the plant site, information on the site, geological and meteorological data, availability and characteristics of public utilities, host country design codes and standards, local regulations and the design data for the battery limits of the licensed plant. The basic design data also incorporate the flexibility requirements and design margins desired by the operating company. Annex I provides an illustrative list — almost a model list — of the typical contents of a basic engineering package for a hypothetical petrochemical plant to be established in a developing country, pursuant to the receipt of basic design data.

Extended basic design refers to a modified design of the process. Although the licensor does not employ this design, it has the R and D background to prepare it to meet the special needs of the licensee facility, such as capacity flexibility or the capability to make a product with modified properties. Extended basic design may also apply to the detailed engineering of certain critical equipment other than proprietary equipment. It is a particular requirement of developing enterprises dependent on a local design engineering company.

### *Detailed engineering package*

Unless there has been prior discussion, there can be considerable uncertainty as to the appropriateness and completeness of the basic engineering package to be furnished by the licensor company in the context of the needs and capabilities of the operating company and the design engineering company if the latter does not have a special relationship to the licensor. To overcome this problem, the licence agreement (or a concurrent agreement) will typically call for a first design conference or a first basic engineering meeting within weeks of the execution of the agreement. This meeting is technically only between the operating company and the licensor company and precedes the detailed preparation of the basic engineering package. Its objective is to obtain consensus on detailing the contents of the basic engineering packaging, since now the licensor company will be prepared to part with the technical information necessary for the execution of the project. Only after the full basic engineering package has been received and approved by the operating company can detailed engineering proceed.

Once the basic engineering package has been prepared and approved by the operating company, the stage is set for the first detailed engineering conference. At this meeting the licensor company, the design engineering company and operating company will discuss the basic engineering package to identify the work to be carried out by the design engineering company and to flesh out the project schedule. The design engineering company must obtain clarifications from the licensor company on the basic engineering package presented by it, mediated by the operating company. Of course, the design engineering company would have studied the basic engineering package, disclosed to it in confidence by the licensor company, before the meeting. The meeting may result in more process or engineering information being obtained from the licensor company, which may be required to approve detailed engineering as it proceeds.

Contracts between the licensor and the operating company typically provide that the agreed minutes of the formal meetings stated above come under the ambit of the executed contracts; that is, they are contracted elements with assigned responsibilities and liabilities. Contracts also provide for second and third basic and detailed engineering meetings for the review of the basic and detailed engineering packages in stages and for the reconciliation of disagreements.

It is not always possible for an operating company to anticipate all of the inputs required for a complete, functional plant, although the achievement of process guarantees is indicative of completeness. It is therefore necessary to provide in both the basic and detailed engineering contracts that any activity or work not specifically set down in the contracts but which is, in the opinion of the designers, necessary for the completeness and durable operation of the plant is part of the responsibilities assumed by the respective parties.

## Process performance guarantees

An operating company's investments in large projects cannot be left exposed to the possible indifference of the licensor or engineering design company to the expected results of the investments. Those providing services or inputs to the operating company need to assume a degree of accountability for meeting the operating company's economic expectations. The process performance guarantee is one of the most important and effective mechanisms for establishing such accountability where the process is a large component of the project and correspondingly expensive and the design engineering company is fully or significantly responsible for the construction of the plant and for demonstrating its operational status. The requirement is all the greater for closed-system technologies.

There are usually many "guarantees" and "warranties" (different legal systems define the terms differently, but they are used interchangeably in this discussion) in an agreement, particularly for projects in the semi-turnkey mode. They pertain to aspects such as completeness of know-how, product outputs, utilities consumption rates, delivery schedule guarantees, guarantees of project completion times, mechanical warranties pertaining to performance of particular pieces of purchased equipment (such as pumps and compressors) or piping design, adherence to codes, initial and interim advance payments made, environment warranties and training warranties (see module 17 on guarantees and warranties in technology transfer.) There are also "associated guarantees" with respect to the technology selected, for example, that it does not infringe on the patents of third parties etc. Each of these warranties or guarantees is associated with a liability assumed by the contractor in the appropriate contract(s), which may or may not find numerical expression.

This module focuses on process performance guarantees and associated guarantees, both technical and non-technical, and amplifies material presented in module 17. Among the issues addressed here are the following: How, and under what conditions, are performance guarantees expressed in contracts pertaining to large process plants? What are the protocols and modalities under which performance guarantee tests are carried out? How is "acceptance of performance" determined? What arrangements are made for the correction of defective performance? What remedies are set down in contracts if, for some reason, performance cannot be attained or the contractor defaults?

Process performance guarantees express the anticipated performance of the constructed plant in technical terms and may relate to output, product quality, utility consumption rates etc. They are usually framed under terms such as "acceptable performance" or "performance guarantee parameters". The guarantees are designed to be demonstrated in one or more process guarantee tests (PGT), or test runs. They are very specific and relate only to the vital expectations of the operating company. They are termed critical parameters and reflect the superiority of plant design and the know-how embedded in it.

Process performance guarantees are obtainable only under certain conditions: *(a)* the plant must be constructed by a competent engineering firm, and its design must conform to the process description and the basic engineering packages and *(b)* the plant must be started up and competently operated in a manner set out in the operations manuals that will be prepared by the party providing the guarantees.

The guarantees may be furnished by the licensor company directly to the operating company, or they may be furnished by the design engineering company. The former applies when the operating company elects its own design engineering company or the design engineering company is on the licensor company's short list of approved companies. The latter applies in the turnkey mode or if the design engineering company has a special relationship with the licensor company, as described earlier (the licensor company-engineering company combine).

In both cases, the design engineering company is a nodal agency in carrying out the performance tests. It must certify, in the form of a warranty prior to the tests, that the plant, or the component of the plant entrusted to it, has been constructed to meet the requirements as set out in the basic engineering package and is ready for commissioning. If the design company is responsible for only part of the plant, agencies carrying out the balance of the works have to provide their respective certifications; this divides responsibilities, and accountability becomes diluted.

After the certifications, the plant will be commissioned. After attaining steady-state conditions, the PGT will be generally run under the supervision of the licensor company or, in the turnkey mode, by the design engineering company. In certain modes, however, the latter may be authorized to provide guidance, with the ultimate responsibility being left to the licensor company through a back-to-back agreement executed between them.

The agency furnishing the process guarantees, represented by its authorized representatives and manned by its engineers, is contractually required to conduct the PGT, typically within a specified time after certification of the plant and in the presence of authorized representatives of the operating company.

All of the preliminary preparations for the performance tests are made by the operating company or the design engineering company, depending on the type of contract, which may include pre-commissioning and bringing the plant to steady state conditions. Except for turnkey contracts, it is generally safer for the operating company to involve the party offering process guarantees only after mechanical completion of the plant, where it is ready for start-up. The plant is then commissioned and brought to steady state conditions under the supervision of those guaranteeing performance.

The length of the test run period is expressly defined in the contract, and performance data are averaged over the period. The period varies with the technology, from 72 hours to 180 days. It is usually the averaged figure (stated in the contract) for meeting acceptable performance. The methodologies for weighing output, metering utilities consumption etc. are also part of the original contract. Where catalyst life (which can be guaranteed from several hours to several years, depending on the process and quality of the technology) is a critical parameter, special provisions are made so that measuring the performance of the catalyst does not require the continued presence of the representatives present at the PGT.

If acceptable performance, usually certified by those who have supervised the test runs, is obtained, the authorized representatives of the operating company then issue the acceptance certificate. If residual liabilities pertaining to matters such as catalyst life or the life of a particular and expensive material of construction exist, then a provisional certificate is issued that may automatically become the acceptance certificate if the operating company does not, within a stipulated period, bring to the notice of the concerned counterpart that a default has occurred.

Acceptances also apply to the design of the plant. Final certification in this context is issued after the run-in period specified in the contract with the design engineering company (usually 6 months to a year) and mainly relates to the mechanical stability of the plant.

### *Guarantee postures in the turnkey mode*

In the turnkey mode, the responsibility and accountability of the design engineering company, the turnkey contractor, is absolute. Generally the PGT, which is demonstrated in the presence of the representatives of the operating company, is run only after informal tests have taken place and any defects discovered have been rectified by the design engineering company. If the tests do not yield the guaranteed performance, the contractor is required to redesign the plant or plant sections to overcome defects and re-run the PGT. Usually, there are no limits on the number of PGTs to be run, but there is typically a cut-off date beyond which the operating company can encash the posted performance bond or other surety and/or adopt other measures (some of which are discussed under the "semi-turnkey" mode).

To ensure efficient operation of the plant after its ownership or custody moves to the operating company, turnkey contracts generally give the contractor training responsibilities. Where this is the case, not only is the contractor obliged to carry out the PGT as set out above, but the conditions of the guarantee have to be met with the trained personnel operating the plant (in the presence of the contractor's personnel). Plant handover takes place after such a PGT is accepted.

### *Guarantee postures in the semi-turnkey mode*

Contracting in the semi-turnkey mode has important implications for process performance given the division of responsibilities among the licensor company, the operating company and the design engineering company, with the latter being the company that carries out the detailed engineering of the plant based on basic engineering provided by the licensor company.

The PGT, also referred to as the first test run, is conducted by representatives of the licensor company in the presence of the personnel of the operating company, assisted by those of the design engineering company. It takes place after the operating company delivers to the licensor company the "mechanical completion" and "ready for start-up" certificates. Annex II presents the model statements found in contracts between the licensor company and the design engineering company. The licensor company posts a bank guarantee (also called a performance guarantee) or performance bond* for a predetermined sum of money before the PGT takes place.

In the semi-turnkey mode, acceptable performance is not achieved if the design engineering company or the operating company fails to satisfy mechanical completion or start-up provisions or if there are deficiencies in the know-how and/or basic engineering packages supplied by the licensor company. Unless the licensor company accepts that failure to achieve one or more guaranteed results are caused by defects in basic engineering and/or know-how, the engineering and other input criteria listed for mechanical completion and ready for start-up have to be reviewed before fault can be attributed to the licensor company. Where fault can be so demonstrated, the licensor company will be obliged, in line with contractual provisions, to review plant features that need correction and arrange for their correction. This rectification will normally be done by the design engineering company (as should have been provided for in the contract), but at the expense of the licensor company.

A second test run will then be conducted. If this run or further runs allowed to be completed within a defined period or by a particular cut-off date once again fail to meet the guaranteed performance, the contract may have provided for the operating company to exercise one or more of the following alternatives:

- For the licensor company to pay penalties or liquidated damages (see later), which it may accept if the alternate cost of plant rectification would be more expensive. This, in effect, allows the

*Typically, the bank guarantee is a guarantee furnished by a commercial bank giving the operating company the unrestricted right to make a claim for any amount (within the guaranteed amount) on the grounds that there has been a default on the part of the licensor. The bank is not required to obtain the licensor's concurrence. A performance bond, on the other hand, can be obtained from a commercial bank or a bonding company (typical in the United States). Normally the operating company will not be entitled to draw on the bond without the concurrence of the entity posting the bond, an arbitration decree or an order from a court with competent jurisdiction. The important advantage of the bond is that in the event of a default that is not made good by the defaulter, as required under the contract, the bonding company is entitled to appoint a new contractor to complete the defective scope of work. A performance bond is therefore more expensive, and its cost may be passed on to the operating company.

operating company to cash the bank guarantee or draw on the performance bond to the extent provided by the liquidated damages provisions. Additionally, the operating company could have negotiated with the licensor company for adjustment of damages claimed, should the financial limits of the guarantee or bond be exceeded, against royalties that may be due under the contract.

- For the licensor company to redesign faulty areas at the expense of, but in consultation with, the operating company.
- Where the above-referenced option fails to yield desired performance, or in the opinion of the licensor company is unlikely to yield desired performance, the operating company may contract a third party to undertake the rectification. The third party will either have access to know-how and basic engineering under a confidentiality agreement with the operating company, or the operating company will be free to disclose know-how without the consent of the licensor company.

### Liabilities for deficient process performance

The liability of the entity that has provided the process guarantees has necessarily to be related to the failure to achieve one or more of the guaranteed results, some being more crucial to the operating company than others. Thus, the critical results expected of the licensed technology have to be expressly and unequivocally formulated in the agreement, together with the liabilities that correspond to the guaranteed result. Assuming that the critical results expected of the plant have been exactly formulated, the issue of how liabilities can be established and expressed in a contract can be taken up.

Process-related liability in a contract usually takes one of three forms: *(a)* absolute guarantees, *(b)* limited liability guarantees and *(c)* penaltiable guarantees. What type of liability can be negotiated — and this constitutes one of the most important elements of negotiation — depends on several factors, among them the uniqueness of the technology; its newness or its maturity; the competitive environment; and host country legislation, national and local.

#### *Absolute guarantees*

Absolute (unlimited) guarantees, often referred to as make-good guarantees, are defined as guarantees to rectify defects (and obtain guaranteed performance) without any limitation of liability; they cannot be satisfied by the payment of liquidated damages. For instance, if the plant were to produce an effluent whose profile violates local environmental laws, an absolute guarantee would be necessary (otherwise the plant would be shut down by the local authorities).

Absolute guarantees are also to be found in mature technologies and where there is keen competition in the sellers market (e.g., fertilizers). This type of liability is also found in the context of patent indemnification of the licensed technology. It should be noted that unless the liability with regard to a guaranteed process parameter is limited by contractual provisions, the liability of the entity providing the guarantee is necessarily unlimited.

Liability for negligence on the part of the design engineering company or of the licensor company is also an absolute liability. However, it is usually determined by arbitration or recourse to courts, where negligence has to be proved. Contracts can remain silent on this matter since liability for negligence is always applicable. Personnel of the operating company can also be held negligent if, when under the guidance of the supervising party, they did not follow instructions given by the supervising party during the test run and, consequently, the test failed in whole or part. Where this charge of negligence holds, the guarantee tests are considered to have been successful.

#### *Limited liability guarantees*

In limited liability guarantees, the entity furnishing the guarantees accepts to rectify defective performance at its own cost and under its own or third-party effort. However, if follow-up test runs are unable to achieve guaranteed performance in one or more guaranteed parameters, the party stands relieved of the liability to expend funds above the limited liability amount. The amount set down in the contract is negotiated as a fraction of the engineering fee or licence fee.

Limited liabilities typically apply if the technology involved is new, if there is a substantial division of responsibilities under the contract, if the licensor or turnkey contractor is unfamiliar with the raw materials to be used or in other, similar situations.

#### *Liquidated damages*

Liquidated damages are payments made by contractors to the operating company for damages resulting from some inattention, wilful or otherwise, on their part that can be redressed, through an option provided in the contracts, by making financial payments in lieu of correcting the damage through redesign of plant and equipment or additional procurement. This type of provision is often beneficial to the operating company, which does have to get involved in litigation and which may be able to set right the defects on its own, at a reasonable cost, as it gains process experience.

Liquidated damages are designated in currency units but are always defined in terms of measurable units such as yield, capacity, time etc. For instance, if the realized capacity of a plant was 4 per cent below guaranteed capacity and liquidated damages provisions applied to deficient capacity, then the liquidated damages provision in the contract would set the financial liability at, say, $x$ dollars per unit of deviation from acceptable performance.

Liquidated damages are the most frequently expressed form of liability in technology agreements and appear in the context of process performance as well as liabilities for delays in delivery etc. There is invariably an upper limit to the liability.

In high-investment plants and where product competition is very keen — for instance, fertilizers — certain parameters such as operating capacity have an overbearing importance on plant economics which cannot be set off against economies achieved elsewhere. For example, in an urea plant, if the production of ammonia and urea were, say, less than 95 per cent of designed world-level capacity, the fertilizer unit would probably incur unsustainable losses. If, however, the capacity was less than 100 per cent (guaranteed capacity) but more than 95 per cent, the fertilizer plant would be competitive but might not be able to achieve the targeted profitability immediately. In consequence, a competent operating company negotiating with a design engineering company or licensor company of high repute would tend to make the achievement of 95 per cent capacity an absolute liability, with provisions for liquidated damages for achievements below 100 per cent capacity but above 95 per cent.

An example liability clause that reflects the above case but is more lenient on the make-good liability is presented in annex III.

### Price and payment considerations

Projects have so far been discussed in terms of their form of association and the roles of the principal players; here they are discussed in terms of the way in which price is determined and payment made. Financial risks can be reduced by adopting an appropriate method for remunerating the contractor, and incentives can be built into the contracts to control costs. The method selected is sometimes also influenced by how a lending agency, if it is a significant player, regards the project in terms of the safety of its funds.

Before proceeding further, it may be instructive to differentiate payments made for work under contract and payments made for licensing technology. There are significant qualitative and quantitative differences between the two types of payments, with little crossover between concepts.

- Payments made for work under contract, with the exception of product-in-hand projects, are made during the construction phase of a project. Payments made for technology licensing relate to the operational phase and are generally made to employ the technology for some productive purpose, although part of the technology may be embedded in the constructed plant. Payments are also made for rights to use immaterial components of technology: for instance, an exclusive right, a right to sublicence, a right (under patents) to prevent others from using the technology or a right to use a trade mark for the product yielded by the technology. There are no corresponding rights received from contractors in works contracts.
- Payments for works are largely made for the work-content in projects, however measured, and project contracts are most often executed in a competitive environment of many suppliers (tendering). Payments in technology licensing are not related to content in any substantive context but to the net benefit of the licensee. Prices are determined in an oligopolistic market (see module 16 on valuation and methods of payment).
- Payments for projects are made in the context of the considerable uncertainty of ultimate cost and are characterized and structured to minimize that uncertainty. Technology costs can, on the other hand, be rather closely estimated in advance if stated as a term royalty, lump sum and term royalties, etc.
- Payment modalities in contracts are developed in projects with a view to expediting construction; such mechanisms do not apply in the licensing of technology.
- Because the overall and staged magnitudes of payments in projects are typically several times larger than those made in technology licensing, efforts have to be made to minimize the exposure of the operating company to defaults of the contractor.
- Payments to contractors for large projects are often based on loans from lending institutions. The latter may influence both how the operating company makes its payments and whether and to what extent the institutions therefore have a lien on the property being constructed.

### *Pricing modes*

The mode adopted for remunerating the contractor allows contracts to be classified as follows: *(a)* lump-sum (fixed-price) contracts, *(b)* cost-reimbursable contracts and *(c)* unit-price-based contracts. The first mode may be considered performance-based pricing and the other two, cost-based.

Contract price in a project is determined in the context of the actual contributions made by and deliveries taken from the contractor, plus a certain margin that reflects the reputation and experience of the contractor and the risk assumed in accepting contractual obligations.

The price of the contract is realized by the contractor through the payment terms established under the contract. Rich variations exist in payment terms, and they carry considerable potential for innovation. In effect, payment terms can be used, simultaneously, as incentives to the contractor and as accountability criteria. The overall negotiating position of the contractor would be to minimize the time interval over which the contract price is realized and, in incentives-based payments, to obtain a bonus.

#### *Lump-sum (fixed-price) contract mode*

As noted earlier, the contractor in a turnkey contract assumes a high degree of risk. This includes dependence on several other players, time of project, uncertainties in the deliveries of hardware and possible delays in the performance of work by subcontractors, apart from liability for meeting operational performance requirements. Therefore, contractors in fixed-price contracts tend to incorporate a substantial margin for error into the price. While these contracts are probably the most expensive form, they do provide the operating company and the lending agency with a predetermined financial outlay. Since costs become known at the commencement of contracts, lump-sum contracts provide better price definition and ease the administrative role of the operating company during the execution of the contract.

The disadvantages of lump-sum contracts are substantially higher prices than in other modes of contract-pricing, a tendency to conservatism on the part of the contractor in sourcing designs or technology (and related inputs), and other compromises that might affect the quality of deliveries made. The right to approve the selection of licensor and technology, or the source of designs, can be of benefit, but it shifts responsibility without financial gain. The possibility of compromises on quality can, however, be offset by contractual provisions relating to the right of the operating company to inspect the quality of equipment prior to shipment to the site or call for an independent quality audit; this, however, adds to project cost. It is sometimes feasible to have the contractor breakdown and allocate the lump-sum costs to portions of works or deliveries so that some level of control can be exercised on deliveries made, but even if the operating company does not intend to make these provisions, lending institutions, may call for them or exercise control in relation thereto.

Fixed-price contracts are currently not built with complete pricing rigidity. One common attenuation is accommodation for inflation. Inflation adjustments are, however, often indexed to basket currencies such as the ECU, which are not as variable as national currencies.

Another variation in lump-sum contracts is to negotiate the lump sum in two components, one representing remuneration for local deliveries and the other for foreign deliveries. This is to the advantage of developing countries, which would like to limit foreign exchange exposure, but it carries the disadvantage to the contractor that local currencies are prone to higher rates of inflation than basket currencies. Sometimes a provision for resplitting deliveries is made in lump-sum contracts, which may favour either party in certain events. In such contracts, formulas for escalation appear for each component of the payments package.

#### *Redeterminable-fixed-price contract mode*

As seen earlier, in closed-architecture technologies, the scope of the work of the various players involved is determined only after the licensor company has provided the working documents relating to process description and basic engineering. In the redeterminable-fixed-price contract mode, there is little possibility of the operating company obtaining a firm pre-estimating price, otherwise eminently feasible in open-architecture technologies or when bids are made against tenders. But even in works contracts, such as tunnelling contracts, a considerable amount of physical investigative work has to be done, and final costs cannot be estimated within acceptable orders of uncertainty.

In some cases, such as the licensor company-engineering company combine, a provisional bid can be made by the contractor. This price is then revised in consultation with the operating company when the project obtains better definition. This price redetermination procedure may take place some time after the said disclosures, but it is done by a prestated date. Generally the contractor will proceed with the work scope tentatively defined in the contract.

In a price-redeterminable contract, the mark-up of the contractor must be revealed. Otherwise the revised fixed fee will have little significance. Thus, if the mark-up is settled at 10 per cent and the mutually developed revised cost is 100 currency units instead of the original 120, the fixed fee is determined by applying the mark-up. This formulation carries the disadvantage that contractors will tend to maximize margins at the estimated-cost stage or to maximize costs up to the moment of redefinition.

The introduction of incentives in fixed-price contracts may respond well to these situations. Methodologies for incentives are dealt with shortly.

### Cost-reimbursable contract mode

In the cost-reimbursable contract mode, the project contractor is entitled to be reimbursed for all expenses incurred for performance under the contract plus a predetermined margin. The contract may include a pre-estimate of the cost. Each invoice or set of invoices furnished by the contractor carries a predetermined modality for determining the actual billing. The invoices are made presentable only after defined stages of the work are completed, accompanied by (inspected or uninspected) certificates of completion.

An alternative approach has been to entitle the contractor to receive progress payments for the construction completed within specified periods of time, with the amount of the payment depending on the extent of construction completed within that period. The contract should specify which documents the contractor is obliged to submit in order to obtain payment, such as invoices, bills of lading, certificates of origin, packing lists and quality and packing inspection certificates. These, of course, permit a degree of control over costs.

All of these mechanisms are intended to reduce the chances of the contractor overpricing services. They permit the operating company a wider margin of control. There are many variations of this mode.

#### Cost-plus-fixed-fee variation

Cost-plus-fixed-fee contracts are used when a relatively small project needs to be executed in a short time or when a project's shape will take time to define. The contractor, in this mode, obtains a fixed fee or amount, rather than a percentage, as a margin on billed costs at actuals. The billing may take place in stages or at the end of the contract.

#### Cost-plus-margin variation

In this most frequent variation, the contractor bills the operating company at actual expenses with the margin defined as a percentage over actuals. In either this variation or the cost-plus-fixed-fee variation, there is no incentive for the contractor to control costs since its profit margin is independent of the costs incurred by the operating company. In fact these variations provide a means to bloat costs, since the contractor's margins increase as project costs increase.

This disadvantage is sometimes counteracted by contract provisions for a cost ceiling or by giving the operating company the right to terminate the contract if costs overshoot reasonable levels. The termination provision, however, implies the need to find another contractor to complete the work, which could put the operating company in a weak bargaining position. The prospect of project delays can also give the new contractor an incentive to raise margin expectations.

Cost-reimbursable contracts should make some standard provisions: *(a)* the compensation for repair work and modifications must be separated from the mainline work of the contractor and separate margins established or margins disallowed, *(b)* the discounts obtained by the contractor should revert to the operating company and (c) the operating company's auditors should be free to access suppliers of major equipment or subcontracted services.

### Unit-based contracting mode

Unit-based contracting involves payments made to the contractor for units of work completed (such as cubic metres of concrete poured or material dredged or metres of piling or of advance in tunnels) or for man-hours spent in engineering, producing drawings, training operating company personnel, etc. The compensation to the contractor is the margin or fee as discussed in the preceding contract modes.

These pricing formulations are very practical when the conditions to be met during the progress of work are not easily predetermined e.g. for exploration in mining, tunnelling and other subterranean work. They are also useful when extra work, not contemplated in the scope of work but necessary for project completion, has to be carried out.

As in the cost-reimbursable mode, the unit mode does not provide a mechanism or incentive to control overall costs or to increase work productivity. To reduce cost overruns, the contractor may be contractually required to provide a price estimate for the works as well as estimates of work to be done over stipulated intervals of time. Definitions are very important in this payment mode. For example, when the contract involves dredging, the period of time over which soundings are made should be preidentified.

This contracting mode is particularly suitable when most of the work is done on-site and inspection by auditors or estimators is readily feasible. It is not very suitable for process-based technologies.

### Hybrid pricing modes

Hybrid pricing modes combine the advantages of the respective modes while still further reducing the cost uncertainty in a contract. In a typical variation, a cost-plus contract can become a fixed-price contract, with the option for conversion present in the original contract. This pricing mode is attractive when a great deal of work whose ambit cannot be determined in advance has to be carried out before information becomes available on the scope of the work. When a contractor, for example, must carry out prefeasibility and feasibility studies for a large project and short-list technology licensors before a decision can be taken on a project, it is attractive to provide a cost-plus pricing mode for the survey work. When costs get better defined, the contract may be converted to a lump-sum contract.

Another hybrid mode is to contractually fix a price ceiling in a cost-plus contract. If the ceiling is exceeded, the contractor completes the works without expense to the operating company. During the negotiation phase, however, the contractor will attempt to raise the ceiling amount, in effect trying to arrange a disguised lump-sum contract.

### *Incentive pricing concepts*

Incentives can be innovatively introduced into the pricing schemes of any of the contracts discussed above. The incentive provides a reward for efficient performance — the achievement of contractually fixed goals — in the context of penalties for deficiencies, (as seen in the context of ceiling price, just discussed).

In principle, incentive systems are based on sharing the benefits of reduced project costs. In the concept there are target disbursements, target costs and target fees to contractor. Arithmetically, the concept is formulated by the following relationship:

$$T_0 = C_0 + F_0$$

where $T_0$ is the target disbursement under the project, $C_0$ is the target cost of the project and $F_0$ is the target contractor fee for the project. Within this general formulation, it is feasible to incorporate different targets for different measurable variables.

To take a simple instance, if $X$ is the income-sharing coefficient negotiated with the contractor (stating how the saving in the project, $C_0 - C$, is distributed between the contractor and the operating company) and $C$ is the actual realized cost of project, the fee, $F$, payable to the contractor is calculated from the following relationship:

$$F = (C_0 - C)X + F_0$$

and the total disbursement, $T$, under the project is

$$T = C + F = C + (C_0 - C)X + F_0$$

A hypothetical project will illustrate the arithmetic. The targets of this project have been contracted as follows:

$$\begin{aligned} C_0 &= 100 \\ F_0 &= 10 \\ T_0 &= 100 + 10 = 110 \end{aligned}$$

with the share of the contractor, $X$ having been negotiated at 20 per cent of savings on target cost. If the actual realized cost, $C$, of the project (through, say, cost controls exercised by the contractor) is 80, the saving to the operating company is $(C_0 - C) = 20$. The fee, $F$, received by the contractor is therefore:

$$\begin{aligned} F &= (100 - 80)(0.20) + 10 \\ &= 14 \end{aligned}$$

or 4 units more than the target fee of 10 because of the positive savings achieved. The total disbursement, $T$, under the project is then:

$$T = 80 + 14 = 94$$

instead of anticipated disbursement of 110 (a saving of 16 units to the operating company).

If, however, actual cost, $C$, had been 120, greater than the target, the contractor's fee would have come to 6 units and the total disbursement on the project would have gone up to 126 instead of the targeted 110 (without the incentive adjustment, negative this time, the operating company's total disbursement would have been 130).

In some cases, two different share coefficients can be defined, one for cost overruns ($X_p$, when $C > C_0$), generally more to penalize the contractor, and another for cost savings ($X_b$, when $C < C_0$), $X_p > X_b$ (the subscripts $p$ and $b$ stand for penalty and bonus). Therefore the function $T = f(C)$ will show two trends, converging in the singular point where $T_0 = C_0 + F_0$, that is:

$$\begin{aligned} T &= C - X_p(C - C_0) + F_0 && (C > C_0) \\ F &= F_0 - X_p(C - C_0) && \\ T &= P_0 + F_0 && (C = C_0) \\ F &= F_0 && \\ T &= C + X_b(C_0 - C) + F_0 && (C < C_0) \\ F &= F_0 + X_b(C_0 - C). && \end{aligned}$$

### *The share coefficient with limits*

The incentive system can be complemented by the establishment of upper and lower limits (or both), beyond which the share principle does not apply. For instance, if the sharing principle is made to apply only for costs up to $C_1 (C_1 > C_0)$, for $C$ above $C_1$ the following are, respectively, the disbursement of the operating company and the receipt by the contractor:

$$\begin{aligned} T &= C_1 - X_p(C_1 - C_0) + F_0 && (C > C_1) \\ F &= F_0 - X_p(C_1 - C_0) - (C - C_1) && \end{aligned}$$

where $X_p$ is the penalizing share coefficient.

Thus, it will be seen that when the cost ceiling is exceeded by the contractor, the difference of actual cost over $C_1$ is entirely borne by him, a formulation very often met within cost-reimbursable construction contracts. The operating company is unaffected by the corresponding excess cost of the project.

The reverse of the above situation holds if a bonus coefficient, $X_b$, is introduced. Any savings in construction costs beyond the set limit reverts wholly to the contractor:

Where $C_0 > C_2$, $C_2 > C$, the "bonus" $(C_2 - C)$ totally reverts to the contractor:

$$T = C + X_b(C_0 - C_2) + F_0 \qquad (C < C_2)$$
$$F = F_0 + X_b(C_0 - C_2) + (C_2 - C)$$

Where the ceiling price methodology is not negotiable, the following formulations can be set up. They may be considered as formulations of a cost-plus-fixed fee contracts with controls applied:

$$T = C + F_0 - C_m(C_1 - C_0) \qquad (C > C_1)$$
$$F = F_0 - C_m(C_1 - C_0)$$
$$T = C + F_0 + C_m(C_0 - C_2) \qquad (C < C_2)$$
$$F = F_0 - C_m(C_0 - C_2)$$

Where $C_m$ is the agreed mean cost-sharing coefficient.

Other examples of incentive/disincentive pricing in project contracts are presented in annex IV.

### *Cost-plus award-fee contracts*

In cost-plus award-fee contracts, the operating company establishes (usually in a meeting with the contractor) a reward or a group of rewards that will be won by the contractor if certain well defined and measurable project targets are met. The definition of the rewards and targets, and their evaluation, may be established by the representative of the operating company working alone with the contractor or through a committee of professionals within the operating company and third-party auditors.

The proposed rewards may be determined and awarded at the end of the project or, with suitable formulation, during the project, which provides yet another incentive. Of course, awards would be determined in consultation with the contractor.

### *Selection of an incentive pricing system*

The selection of an incentive pricing system depends on the following:

- Total project cost.
- Relative degree of certainty in cost appraisals, and distribution of the estimated costs.
- Management capacity of the operating company or access to competent consultancy organizations, and ability to monitor and control project costs.
- The degree to which the contractor allows accounts to be examined and audited.

Different pricing systems are recommended by experts for different degrees of uncertainty in the project cost estimate (see below).

| *Degree of uncertainty in project cost estimation* | *Proposed pricing system* |
|---|---|
| up to 10 per cent | Fixed-price contracts |
| 10 - 20 per cent | Fixed-price with incentitives |
| 20 - 30 per cent | Cost-plus with incentitives fees |
| 30 - 40 per cent | Cost-plus fixed-fee (cost-plus) |

### *Payment terms*

In complex contracts, payment terms are expressed in several interconnected contracts involving the operating company, the contractor, the lending institutions, insurance agencies of the main countries involved in contract performance and supplies, national financial administrative authorities etc.

In large-scale infrastructure projects, a down payment is normally required. It varies from 5 to 20 per cent of the contract value, so as to provide resources that allow the contractor to relocate personnel and purchase supplies. The amount also depends on the resources of the operating company. For engineering contracts, the common down payment is generally not more than 10 per cent of the contract value.

The down payment usually becomes due with the execution of the contract or after the effective date if contracts have to be approved by national agencies or lending institutions. Usually, a certain part of the total project fee is retained by the operating company as security, to be paid to the contractor after full and satisfactory contract execution, including the attainment of process and mechanical guarantees, is achieved. This amount is generally 5-10 per cent of the contract value but may be partly released on provisional acceptance (25-50 per cent of the retained amount). It may be partly or totally replaced by a suitable and irrevocable bank guarantee or performance bond. There are a great number of variations (conditionalities) in the types of bank guarantees and bonds posted.

Intermediate payments, that is, payments excluding the first and last payments, can be contractually based on project progress, which in turn is based on certification provided by the contractor or a pre-identified auditor. If the intermediate payments are advance payments, they have to be secured against bank guarantees posted by the contractor. For payments due to the contractor but delayed by the operating company without default by the contractor, time limits need to be simultaneously incorporated.

## Formula for escalation

A typical model formula for revising prices to take into account escalation is provided below. While there are only four components to the price here, there can be others. For example, a component for training services can be included in the formula if technology is transferred under the contract, or the materials component can be divided into foreign-procured and locally procured components.

$$P_1 = \frac{P_0}{100}\left(a + b\frac{M_1}{M_0} + c\frac{N_1}{N_0} + d\frac{W_1}{W_0}\right)$$

where $P_1$ is the price payable due to revision, $P_0$ is the price stipulated in the contract and $a$, $b$, $c$ and $d$ represent the contractually-agreed percentages of individual elements of construction price covered by the index clause ($a + b + c + d = 100$):

$a$ = Proportion of price excluded from adjustment
$b$ = Weight of design and engineering
$c$ = Weight of materials
$d$ = Weight of wages

Moreover,

$M_0$ = Base level of price indices for design and engineering
$M_1$ = Price index design and engineering at time of price revision
$N_0$ = Base level of price indices for materials
$N_1$ = Price index for materials at time of price revision
$W_0$ = Base level of price indices for wages specified under $d$
$W_1$ = Price index for wages under $d$ at time of price revision.

# *Annex I*

# SCOPE AND CONTENT OF THE PROCESS ENGINEERING DESIGN PACKAGE*

### A. Scope of work of the licensor

The licensor shall supply the process engineering design package which shall provide sufficient process and mechanical engineering design data such that a qualified engineering contractor can carry out the following:

- Execution of detailed engineering design.
- Procurement of all equipment and materials required for the construction of the plant.
- Construction of the plant.
- Start-up and commissioning of the plant.
- Safety and maintenance instructions for the plant.

The licensor shall provide all data for the process engineering design package in the (English) language. All data will be specified in ____ units.

The licensor shall approve as agreed with the licensee:

- The contractor's detailed engineering design for the plant.
- Specifications for the procurement of critical items of equipment.

### B. Contribution of the licensee

The licensee shall supply the licensor with the basic design data according to the description in an annexure on scope and content of engineering services and coordination of work.

### C. Content of the process engineering design package

1. Basis of design and process description. This section of the package will have information contained under the following headings:

*(a)* Basis of design for all cases.

*(b)* Feed and product specifications and properties.

(c) Battery limit conditions.

*(d)* Description of flow; this includes normal operations, start-up, shutdown and alternative operations.

(e) Design features of the process.

*(f)* Physical and chemical properties of streams whose properties have not been defined previously, including those of effluent streams and hazardous materials.

*(g)* Summary of estimated utilities, including electrical power, steam, condensate, boiler feed water, fuel, cooling water, process water, plant air etc. This will be a schedule of estimated individual users, totalling up to the maximum estimated utility quantities for the unit. This overall maximum will be for one consistent case for each utility. Where the estimated maximum utility quantity for a particular item of equipment is not part of this consistent case, this maximum will be stated separately.

*(h)* Estimated catalyst and chemical consumption. Initial catalyst charge and subsequent catalyst and chemical consumption will be tabulated for each unit.

*(i)* List of effluent streams. Liquid and gaseous effluents requiring further treatment before disposal will be tabulated.

*(j)* Process flow sheets that contain the following information, with all figures given in the agreed-on units of measurement.

- All process equipment diagrammatically marked with an equipment number.
- Operating temperature and pressure of equipment.
- Main process lines (marked with a stream number where applicable to the mass balance), including direction of flow.
- Main process controls.
- All lines essential for understanding the mass balance around each piece of equipment.

*Based on UNIDO/PC.50/Rev.1, annexure 8.

- Heat and material balance and pressure balance. For each stream number on the process flow sheet, the following information shall be given where required for complete understanding of the heat and material balance and pressure conditions: total hourly flow rate (mass/volume), hourly molar flow rate for each major component, molecular weight, pressure, temperature and density.

*(k)* Materials of construction flow sheet. A materials of construction flow sheet will be included to provide the information as described in exhibit ____.*

2. Process and engineering design specifications. The information contained within this section will be presented under the following headings, details of which are further developed in this section.

*(a)* Equipment list, including at least the following:

- Equipment identification letter and number.
- Equipment description.

*(b)* Equipment data sheets and specifications:

- Vessels. A standard process sketch will be provided showing:
  - — Maximum operating temperatures and pressures.
  - — Mechanical design temperature and pressure.
  - — Materials of construction and corrosion allowance.
  - — Diameter and height or length.
  - — Number, type and spacing of trays for towers.
  - — Number, size, rating and location of nozzles.
  - — Insulation requirements.
  - — Detailed of special internals.
  - — Catalyst type, size of bed, bulk density, and design.
  - — Where applicable, tray process information will be provided (see exhibit ____).
- Heat exchangers and air coolers.
- Fired heaters.
- Pumps.
- Compressors.

(c) Relief valve load listing. A summary will be provided of the loads from each relief valve for each emergency condition under which the relief valve opens, e.g. fire, power failure, steam failure (and other utility failures), blocked in condition.

*(d)* Process line summary list. A summary will be provided for all process lines. However, it will be the responsibility of the engineering contractor to check the hydraulics of the unit.

*(e)* Preliminary engineering flow sheets (P and I diagram). This will be a complete first issue of the engineering flow sheet and will include:

- All process equipment.
- Line size and material specification for all lines.
- Maximum operating temperatures, insulation tracing and jacketing requirements of lines (heat conservation, personnel protection, process stabilization or "not insulated" only).
- All valves and check valves.
- Significant equipment details.

*(f)* Preliminary plot plan. This will be a suggested plot plan based on the licensor's know-how regarding requirements of normal and emergency operation, safety and maintenance requirements. It will include preliminary layout of the equipment and elevation diagrams.

*(g)* Drainage and effluent disposal.

*(h)* Basic data for piping.

- Fluid handled.
- Operating pressure and temperature.
- Design pressure and temperature.
- What phase? Liquid, vapour or both?
- Specific gravity and viscosity.

*(i)* Teleautomation/telecommunication engineering design.

- Process input/output lists.
- Functional specifications for teleautomation.
- Electrical power supply diagrams.
- Control room design.
- Interconnection diagram for process utility signals communication layout drawings.

*(j)* Safety requirements.

- Equipment required.
- Monitors, eye-washers, shower and sprinkler locations.
- Special requirements.

*(k)* Building specifications.

- Suggested layout of the plant building, control room, electrical switch room and other buildings.

3. Basic data for operating manual. The operating manual will include an outline of start-up, shutdown and alternative operations. It will also indicate emergency procedures covering utility failures and major operating upsets. Its scope will be sufficient for the engineering contractor to prepare a comprehensive operating manual. In addition, it will describe special safety features incorporated in the design of the unit. Data will include start-up procedures, normal operation procedures, normal shutdown procedures and emergency shutdown procedure.

*(a)* Description of process:

- A discussion of process flow to provide adequate background for the plant operating personnel.
- Process specifications and process flow chart. Quality of feedstocks, composition of various streams and designed yields, and qualities of products, intermediates and by-products.

*(b)* Process operating conditions. A simplified discussion of cause and effect, exemplified where possible, of operating variables with consequent changes in yields, purities etc.

*(c)* Details of operating procedures:

- Start-up procedures.
- Normal operation.
- Shutdown procedure.
- Detailed flow charts and process equipment.

*Sample exhibits to be added where required.It ist recommended that such exhibits should be provided by the licensor and checked by the licensee.

(*d*) Equipment summary. Details on equipment by categories and in accordance with the agreed coding system.

(*e*) Utility and utility summary. On the basis of utility levels agreed to for the plant, utility requirements on guaranteed and expected figures for both plant and its auxiliary/off-site facilities.

(*f*) Operating records.

(*g*) Personnel required for operations and maintenance.

(*h*) Safety precautions in plant.

4. Basic data for maintenance manual.

5. Analytical methods manual describing in detail all the methods of analysis for all raw materials, process streams products, by-products, catalysts and chemicals required for the efficient operation of the plant.

6. General design information. The information contained in this section will essentially be akin to the data supplied by the licensee. However, as some data may be supplied by the licensor, the total design information is reproduced for the benefit of the engineering contractor. This data will include but not necessarily be limited to:

(*a*) Outlet steam conditions for equipment feeding steam into plant headers.

(*b*) Inlet steam conditions of equipment using steam from plant headers.

(*c*) Battery limit conditions for boiler and steam generators feedwater.

7. Licensor's standard drawings. The standard drawings will be referenced in the process and engineering design specifications and represent design details and practices that are part of the mechanical specifications.

8. Names of vendors of critical equipment.

9. Mechanical specifications. These will represent licensor's or licensee's current standard practise for design and installation of the equipment in the particular process unit.

10. The operating manual will be prepared by the design engineering company, which will work on the basis of the data delivered by the licensor. The manual should be revised and approved by the licensor, even if no other approval would be provided for. This is the most crucial point in the checking of the detailed engineering, whereby small, seemingly insignificant errors or mistakes that could have serious consequences can be discovered and corrected.

# *Annex II*

## MECHANICAL COMPLETION AND READY FOR START-UP*

The performance guarantee test shall be run only after the mechanical completion certificate has been issued and the plant's ready for start-up condition has been demonstrated.

"Mechanical completion" shall mean that the licensed plant has reached a stage when adequate checking has shown that:

- All columns, vessels, pumps, heat exchangers, piping and other mechanical equipment have been installed, cleaned, and flushed out in full conformity with flow schemes, construction drawings, project specifications and manufacturers recommendations.
- All instruments, control valves, differential pressure devices interlocks, programmers and other instrumentation are correctly installed and functioning and that all preliminary adjustments have been made.
- All electrical supplies have been installed and protected as prescribed; that motors have the correct voltage supply, speed, horsepower and direction of rotation and are free, with the associated equipment, to turn without obstruction.
- All relief devices, relief valves and bursting discs are correctly installed for the safe functioning of the licensed plant.
- All effluent handling facilities, flares and incinerators are ready to accept effluent/wastes.
- All ventilation systems and other systems for the protection of the operators and the environment are available and functioning.
- All safety facilities, including fire-fighting, first aid, are adequately available.

Ready for start-up shall mean that the licensed plant has reached a stage when all conditions relating to mechanical completion have been accomplished and that:

- All legally required tests have been carried out and licences and governmental authorizations have been granted.
- Sufficient trained operators and maintenance personnel familiar with the unit and the ____ process (including competent interpreters) are available and the laboratory is ready to provide full analytical service.
- All utilities and services are available in the quantities required under the conditions prescribed.
- All pressure and vacuum drop testing has been satisfactorily completed, with all instruments correctly protected during testing and correctly returned to service thereafter.
- All preliminary process operations have been carried out and all equipment has been cleaned, dried and returned to a state of readiness to accept process materials.
- All mechanical equipment has been adequately tested under load and has been properly lubricated.
- All necessary feedstock, chemicals and catalysts are in storage or available in sufficient quantities to permit start-up and subsequent continuous operation.

*Taken from UNIDO/PC.50/Rev.1, annexure 13.

# Annex III

## LIQUIDATED DAMAGES PROVISION IN SAMPLE FERTILIZER CONTRACT FOR DEVIATION FROM ACCEPTABLE PERFORMANCE*

The design engineering company guarantees that, during the guarantee test, the plant and all parts thereof shall attain the functional guarantees specified in appendix XX to this agreement.

If, for reasons attributable to the design engineering company, the minimum level of the functional guarantees specified in appendix XX to the agreement are not met either in whole or in part, the design engineering company shall at its cost and expense make such changes, modifications and/or additions to the plant or any part thereof as may be necessary so as to meet the minimum level of such guarantees. The design engineering company shall notify the operating company upon completion of the necessary changes, modifications or additions and shall request the operating company to repeat the performance guarantee test until the minimum level of the guarantees has been met.

If, for reasons attributable to the design engineering company, the functional guarantees specified in appendix XX to the agreement are not attained either in whole or in part but the minimum level of the functional guarantees is met, the design engineering company shall, at its option, either:

- Make such changes, modifications and/or additions to the plant or any part thereof as may be necessary in order to attain the functional guarantees at its cost and expense and request the operating company to repeat the performance guarantee test.
- Pay liquidated damages to the operating company in respect of failure to meet the functional guarantees in accordance with appendix XX to the agreement.

### Appendix XX

*Liabilities clause: Failure in guarantees and liquidated damages*

*Product ammonia*

If the average quality of the product produced in the ammonia unit during the performance guarantee test fails to meet the performance guarantees set forth in paragraph ____ and the design engineering company elects to pay liquidated damages to the operating company in lieu of making changes, modifications and/or additions to the unit pursuant to [principal clause] of the general conditions, the design engineering company shall pay to the operating company the following specified amounts of liquidated damages:

- If the average ammonia content is at least minimum level ____ per cent (____%) and this ammonia is suitable for the production of urea, then for each complete ____ per cent (____%) by which the average ammonia content falls short of ____ per cent (____%): ________ (amount).
- If the average oil content is not more than ____ ppm and this ammonia is suitable for the production of urea, then for each complete ppm by which the average oil content exceeds ____ ppm: ________ (amount).
- If the average water content is not more than ____ per cent (____%) and this ammonia is suitable for the production of urea, then for each complete one tenth of one per cent (0.1%) by which the average water content exceeds ____ per cent (____%): ________ (amount).

In calculating the liquidated damages for ammonia content and water content, either will be applied.

*Product urea*

If the average quality of the product produced in the urea unit during the performance guarantee test fails to meet the performance guarantees set forth in paragraph ... and the design engineering company elects to pay liquidated damages to the operating company in lieu of making changes, modifications and/or additions to the unit pursuant to the [principal clause] of the general conditions, the design engineering company shall pay to the operating company the following specified amounts of liquidated damages:

- If the average $N_2$ content is at least ____ per cent (____%), then for each complete one tenth of one per cent (0.1%) by which the average $N_2$ content of urea is less than ____ per cent (____%): ________ (amount).
- If the average biuret content is not more than ____ per cent (____%), then for each complete five hundredths of one per cent (0.05%) by which the average biuret content exceeds ____ per cent (____%): ________ (amount).
- If the average moisture content is not more than ____ per cent (____%), then for each complete five hundredths of one per cent (0.05%) by which the average moisture content exceeds ____ per cent (____%): ________ (amount).
- If the product urea of the guaranteed particle size (between 1 and 2.4 mm) is not less than ____ per cent (____%) of the total urea product, then for each complete one per cent (1%) by which the product urea of the guaranteed particle size is below ____ per cent (____%) of the total urea product: ________ (amount)

*Minimum levels*

Notwithstanding the provisions of this paragraph, if as a result of the performance guarantee test(s) the following minimum levels of process performance guarantees and the consumption guarantees are not attained by the design operating company, the design operating company shall at its own cost make good any deficiencies until the ammonia unit and/or the urea unit reach any of such minimum performance levels, pursuant to [principal clause] of the general conditions:

*Taken from Engineering Advancement Association of Japan, *ENNA Model Form International Contracts*, vols. I-V (1992).

- Production capacity of the ammonia unit and/or the urea unit attained in the performance test: ninety-five per cent (95%) of the guaranteed production capacity.
- The average total cost of consumption of all the raw materials and utilities of the ammonia unit and/or the urea unit: one hundred and five per cent (105%) of the guaranteed figures.
- The minimum product quality of the ammonia and the urea are as follows:
- Ammonia
  $NH_3$ content ___% by wt. minimum
  Water ___% by wt. maximum
  Oil ___ ppm by wt. maximum
- Urea
  Nitrogen content ___% by wt. minimum
  Biuret content ___% by wt. minimum
  Moisture content ___% by wt. minimum
  Particle size ___% by wt. minimum between 1 and 2.4 mm

*Limitation of liability*

Subject to the paragraph on minimum levels above, the design engineering company's aggregate liability to pay liquidated damages for failure to attain the process performance guarantees and consumption guarantees shall not exceed ___ per cent (___%) of the contract price.

# Annex IV

## METHODOLOGIES FOR INCORPORATING INCENTIVES INTO COMPENSATION FORMULAS FOR LARGE PROJECTS

Other parameters, such as completion time and use of local labour may be included in incentive systems devised for controlling costs in large projects. In such cases, the expression of the compensation to the contractor becomes more complex, since coefficients are established for each area of targeted performance.

### Fixed-price incentive-fee mode

The incentive system may be applied to the fixed-fee contract. In this case, the operating company will negotiate with the contractor the following cost parameters and share coefficients (expressed in the contract):

- The targets $C_0$ and $F_0$.
- A zone of costs where the share coefficient, $X_f$, will apply.
- A ceiling cost for the project, $C_1$, beyond which all additional expenses will be absorbed by the contractor.

The resulting formulas are as follows:

$$T = C + X_f (C_0 - C) + F_0 \qquad C < C_0$$
$$F = F_0 + X_f (C_0 - C)$$
$$T = C_0 + F_o \qquad C = C_0$$
$$F = F_0$$
$$T = C - X_f (C - C_0) + F_0 \qquad C_0 < C < C_1$$
$$F = F_0 - X (C - C_0)$$
$$T = C_1 - X_f (C_1 - C_0) + F_0 \qquad C = C_1$$
$$F = F_0 - X_f (C_1 - C_0)$$
$$T = C_1 - X_f (C_1 - C_0) + F_0 \qquad C > C_1$$
$$F = F_0 - X_f (C_1 - C_0) - (C - F_1)$$

To illustrate the effect of these formulas, let it be assumed that $C_0 = 100$, $F_0 = 10$, $T_0 = C_0 + F_0 = 110$, $X_f = 0.2$ and $C_1 = 125$.

The above simple equations then yield the following results:

| | C | F | T |
|---|---|---|---|
| | 80 | 14 | 94 |
| | 90 | 12 | 102 |
| Target cost, $C = C_0$ | 100 | 10 | 110 |
| | 110 | 8 | 118 |
| | 120 | 6 | 126 |
| Ceiling cost, $C = C_1$ | 125 | 5 | 130 |
| | 127.5 | 2.5 | 130 |
| | 130 | 0 | 130 |

The risk exposure of the operating company is the negotiated ceiling price, which acts as the upper limit of a fixed-fee contract. Providing an incentive for sharing the benefits of a cost lower than the target cost often allows the project to be realized for about the target cost. The formula are good in situations carrying an average degree of uncertainty and where the contractor's performance is likely to influence overall project cost.

### Cost-plus incentive-fee mode, with limits

The general equations applicable to this case have already been dealt with in the main text. The applicable parameters are as follows:

- The targets $C_0$ and $F_0$ that apply in the cost-plus contract.
- The share coefficients, $X_s$ and $K$, which operate in the two cost zones defined by $C_1$ ($C_1 > C_0$) and $C_2$ ($C_2 < C_0$), which represent the upper (ceiling price) and the lower cost limits. (The contractor pays high penalties if the ceiling cost is exceeded and does not benefit if project costs are below the lower limit.)

To illustrate this case, it may be assumed that $C_0 = 1{,}000$, $C_1 = 1{,}200$, $X_s = 0.1$, $F_0 = 40$, $C_2 = 800$ and $K = F_0/C_0 = 0.04$. Also,

$$F_i = K.C \qquad (C1 > C_0 > C_2)$$
$$F = F_i + X_s (C - C_0)$$

In this case, the following calculated results emerge for various realized costs:

| | $C$ | $F_1 = KC$ | $C - C_0$ | $X_a (C - C_0)$ | $F$ | $T = C + F$ |
|---|---|---|---|---|---|---|
| | 650 | – | – | – | 52 | 702 |
| | 700 | – | – | – | 52 | 752 |
| Lower cost limit $C_2$ | 800 | 32 | 200 | 20 | 52 | 852 |
| | 900 | 36 | 100 | 10 | 46 | 946 |
| Target cost $C_0$ | 1 000 | 40 | 0 | 0 | 40 | 1 040 |
| | 1 100 | 44 | (100) | (10) | 34 | 1 134 |
| Upper cost limit $C_1$ | 1 200 | 48 | (200) | (20) | 28 | 1 228 |
| | 1 300 | – | – | – | 28 | 1 328 |
| | 1 350 | – | – | – | 28 | 1 378 |

This modality establishes a fair balance between the operating company and the contractor, avoiding at one extreme extraordinary earnings and at the other a ceiling cost beyond which the contractor is heavily penalized. This type of formulation would apply best when there is a degree of uncertainty but it is relatively modest and when $C_1$ and $C_2$ are predictable.

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# Module 19

## TECHNOLOGY TRANSFER BY STRATEGIC PARTNERING

*A new form of business organization, the strategic alliance, has become increasingly commonplace in the past two decades in response to changes in the global conduct of business. This module discusses the evolution of the strategic alliance, its classical precedents and the factors driving its continuing development. Like older forms of interfirm cooperation, strategic alliances permit the extension of market share and the penetration of new markets. Yet they provide these benefits in ways that maximize flexibility and rapid response to changing conditions with minimal bureaucratic impediment. Strategic alliances are essentially of two types: business-related alliances, to respond to the demands of the marketplace today; and alliances related to research and development, emphasizing the demands of the marketplace of tomorrow. This module addresses both types (and their several forms) and provides examples from the real world of how strategic alliances work.*

# Contents

# TECHNOLOGY TRANSFER BY STRATEGIC PARTNERING

## Introduction

The most significant drivers of change in the world today, globalization and technological innovation, are accelerating at a pace that will make them even more important in the decade ahead, and this bodes well for developing countries. Globalization is proceeding differently in different industries, driven by the increasingly similar demands of end-users for global products (e.g. detergents, appliances), the changing needs and capabilities of evolving enterprises (e.g. the Daewoo group in the Republic of Korea or the Tata group in India), the economies of scale now available in world markets which permit the undertaking and amortizing of large R and D expenditures, and growing global access to cost-competitive skilled personnel, components and materials.

Technological innovation, in the global context, spurs, and is in turn spurred by, the following six factors:

- The growing knowledge-intensity of production.
- Changes in the concept of company organization and new ways of doing business.
- The globalization of competition.
- The revolution in communications (the collapse of time and distance in business transactions).
- Rising uncertainty in business decision making.
- A need for flexibility.

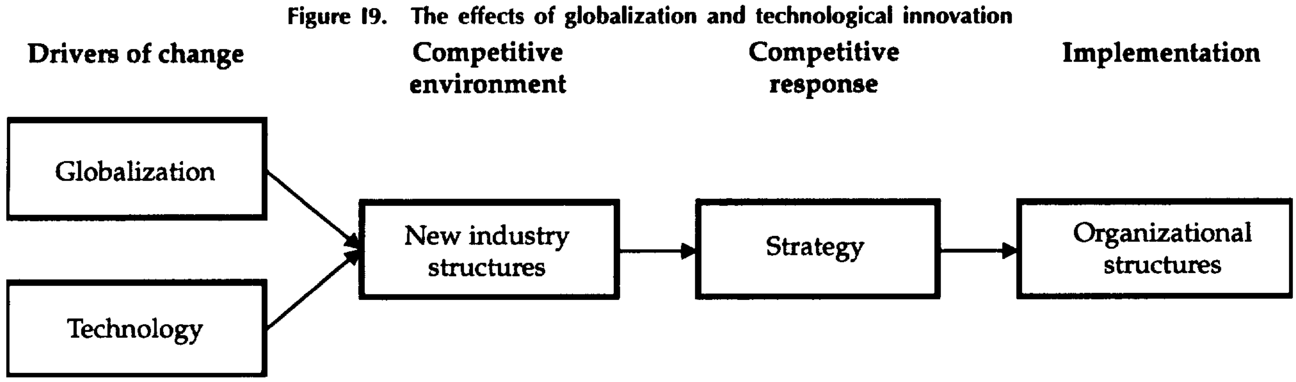
The changes wrought by these factors are illustrated in figure 19, with strategic alliance emerging as a major new structure of business organization. Strategic alliances constitute a wide spectrum of two-way or multi-firm alliances, including those between unrelated organizations. They range from relatively loose, undefined associations through more concrete alliances or partnerships (e.g. equity joint ventures, entire corporate structures whose boundaries have been altered by the new form of alliance). Strategic alliances in the commercial arena are alternative strategies for increasing regional or global market presence, otherwise achieved by creating subsidiaries, mergers and the like.

While strategic alliance may be the most frequently used term, these organizational forms are also referred to as strategic partnerships, cooperative arrangements, strategic extensions of a firm's core business and so forth. Such terminology reflects the nature of these linkages.

Strategic alliances are beginning to display another dimension, perhaps of greater significance than merely reaching new markets or increasing market share. They represent a change of mind-set from hierarchy-bound corporate "citadels". They flexibly define that which is inside and that which is outside the organization: outside there is a collage of markets, suppliers and competitors, while inside it is more cohesive, centralized and provided with set purpose. Whereas the citadel form preserves cultural and linguistic cohesion and is still favoured by many corporations in Europe, strategic alliances benefit from the cross-cultural interchanges required to manage international businesses.

Today's strategic alliances are not commonly alliances of organizations working in compatible or non-conflicting areas of activities (such as interfirm collaborative R and D). Rather, they range from customer

**Figure 19. The effects of globalization and technological innovation**



and supplier alliances (frequent in Japan, but also exemplified by networks in the aircraft industry of Europe and the United States) to alliances between firms that otherwise are, or would be perceived as, competitors (e.g. General Motors and Toyota in the United States based NUMMI joint venture for making small cars and the Proctor & Gamble and Godrej Soaps contractual alliance in India). Strategic alliances are now attempted between public sector agencies (and parastatals) and private sector organizations, often as a prelude to privatization. This modality is of considerable significance to countries that have hitherto relied on public sector agencies as engines of growth.

A third dimension of strategic alliances is global networking of organizations, which is increasingly being seen as the development of porous organizational peripheries. Strategic alliances of corporations such as General Motors and International Business Machines (IBM) yield vast global networks. This venturing has hitherto been mainly in the form of product links, but other important linkages, such as knowledge links, are developing.

Another dimension of strategic alliances is a change in emphasis from generic technology innovations to non-material innovations, for example, the just-in time method (in inventory management), training programmes, software development, R and D and design and engineering. These provide firms, particularly Japanese motor car makers, with strong strategic positions.

Since the 1970s, strategic partnering in research and development has been encouraged at all levels—municipal, regional, national, and supranational—and in countries with widely differing traditions of government intervention in the economy. Policymakers wish to see another Silicon Valley or Boston Route 128 created. To nurture infant sciences, policy makers implemented business incubators, industrial parks and "technopolises." The Japanese were first with Tsukuba City, followed by the French with Sophia Antipolis. Strategic alliances are now quite prominent in the research and development area, where interfirm collaboration is supplemented by linkages between firms and non-profit organizations, such as corporate-university collaborations, and regional interfirm research and development consortia. The EUREKA and ESPRIT programmes in Europe are partially supported by European Union intergovernmental funding; the United States supports SEMATECH to increase the country's competitiveness in the semiconductors field.

Both European and United States consortia imitate earlier interfirm consortia in Japan, in which the State consciously facilitated strategic partnering of competing firms through mediation and funding. Thus, research and development strategic alliances increase international competitiveness.

## Precedents to the strategic alliance

The concept of strategic alliances can be illustrated and appreciated by reviewing the methodologies traditionally used to increase market reach and share.

### *Licensing*

Licensing agreements, classic one-way relationships between firms, go back over 150 years. A licensing agreement is generally an asymmetrical relationship through which a licensor seeks to incorporate a licensee within its strategic planning parameters. Incorporation is accomplished by permitting the use of brand names or process know-how subject to a set of negotiated conditions. By allowing a licensee to sell in other markets, the licensor also reaches new markets without sharing proprietary information such as know-how or making new investments.

While some sharing of knowledge takes place in this asymmetrical relationship, it was, initially unforeseen by licensors. This is best illustrated by the massive grant-backs Japanese licensees made in the 1960s (succeeded by increased competitive capabilities, and then a reverse flow of technology in the same spheres). As a result, licensing is used today to consciously build superior competitive positions by actively promoting grant-backs.

While licensing has its advantages to a licensee in terms of immediate access to markets and, perhaps, achieving economic rents, the process can occur at the expense of future technological dynamism. This is particularly true if a licensee substitutes licensing for the development of in-house capabilities to modify products or processes or if the licensee defers the capability to introduce new products through home-grown initiatives to a later date.

### *Subcontracting*

Subcontracting has also been largely a unidirectional relationship. Almost all subcontracting relationships involved a principal, the client firm, which designed the product, often consigning components to a supplier who manufactured it to a set of specifications. For instance, few opportunities existed in the garment industry for a supplier firm to develop sourcing, design or marketing capabilities when a client firm supplied fabric pieces (precut to its own design and size specifications) and the supplier firm merely sewed the garment.

Today, however, many one-way subcontracting relationships are being transformed into two-way client-supplier networks with two-way flows of knowledge, thereby including supplier firms in product design and/or assembly. Two-way developments are quite evident in the aircraft and automobile industries, in which client firms assemble the finished product and work closely with suppliers to design components for new models. Many components can be grouped into modules or sub-assemblies, which may permit some suppliers to enter the realm of manufacturing.

### *The joint-venture*

A joint-venture is defined as an agreement in which two independent legal partners establish a third independent legal firm for the pursuit of common interests. In many instances joint ventures are a new form of more classical investment activities, in which a firm creates a wholly owned subsidiary in a host market. Transnational corporations have traditionally favoured internal hierarchies on the grounds that they reduce transaction costs and, in a context of market imperfections, enhance a company's ability to appropriate rents from tangible or intangible assets.

Nevertheless, because wholly owned subsidiaries face increased risks, higher financial and managerial costs, restrictions stemming from national regulatory policies and expansion of the international business area (best demonstrated by developments in South East Asia), they become increasingly impracticable or undesirable. The joint-venture mode of operating has been replacing the subsidiaries made since the early 1960s, although the subsidiary has not wholly faded away.

In a conventional joint venture, the equity arrangement between firms determines their respective roles and the influence of the partners; the flow of knowledge and capabilities is basically unidirectional, while access to markets is multidirectional. The conventional joint-venture mode does not have a strategic outlook in the sense that the principals do not seek to improve the joint venture's future competitive position or imbue it with that objective. In the newer form of joint ventures, where equity is not associated with control, the partners' relationship is more informal and the social relationship more important. Many strategic alliances are joint ventures that emphasize producing and sharing knowledge.

### *Cross-licensing*

More symmetry is seen in classic cross-licensing arrangements where market power rises from sharing knowledge and obtaining strong production as well as marketing positions through shared patent rights. Thus far, cross-licensing has been dominated by large corporations, although more and more medium-sized firms in the developed world are now engaging in cross-licensing.

## Factors driving strategic alliances

Strategic alliances are not merely the result of innovation in business organization they are a consequence of much larger forces at work. Considerable evidence suggests that the economic downturn in North America and much of western Europe in the late-1960s, which accelerated during the 1970s, was due less to the two "oil shocks" and more to a rising inflationary trend (evident in agro-allied products) and to relative and absolute declines in manufacturing productivity. These declining levels of productivity reflected in part the exhaustion of the technical possibilities of traditional production methods, notably the mass production techniques associated with the manufacture of cars, textiles and clothing, synthetic fibers and electronics. Furthermore, increased competition from Japanese industry, where the production organization differed from that in Europe and North America, stimulated the emergence of new forms of global competition.

### *The growing knowledge-intensity of production*

In classical economics the sources of wealth are land, labour and capital. Now, another engine of wealth is at work: a vast stock of commercial knowledge. It takes many forms, including technology, innovation, science, know-how and information. At one time, knowledge was produced in only a few nations; today more and more countries are contributing to a knowledge pool, through the efforts of companies, institutions and universities. While the pool of commercial knowledge is large, much of it remains uncommercialized (i.e. it has not been converted to products, services and/or infrastructure).

The statistics are impressive. For example, there were roughly 100 scientific journals in 1800, about 1,000 by mid-century, and roughly 10,000 in 1900. Looking at *World List of Scientific Periodicals*, it appears the next milestone of 100,000 journals will be reached soon. An estimated 80-90 per cent of all scientists and engineers who ever lived and worked are now living and working. Chances are, the number will double in the next 10-15 years. Between 1964 and 1980, the number of researchers increased 260 per cent in Japan, in the former Soviet Union and West Germany the number doubled and in the United States and France it increased by 130 per cent. Between 1965 and 1980, research and development expenditures tripled in Japan, West Germany and the Soviet Union, rose by 50 per cent in France, increased by a third in the United States and rose by 25 per cent in Britain (all inflation-adjusted). The *National Register of Scientific and Technical Personnel*, which listed

54 scientific specialties after the Second World War, listed 900 specialities 20 years later. Between 1970 and 1984, United States firms in pursuit of business interest tripled their expenditure per scientist or engineer in chemicals, machinery, automobiles and electrical equipment.

Many European companies are investing in research and development at high levels focused on the potential afforded by a unified European market. Many of the world's largest companies are already based in Europe, including 6 of the largest 10 pharmaceutical firms and 7 of the 10 biggest chemical companies. Moreover, venture capital is flowing much more heavily into smaller European firms. These investments rose 25 per cent in 1989 to reach $5.5 billion, more than twice the level in the United States. European governments and companies plan to spend roughly $20 billion during the 1990s on multinational research projects in superconductors, fibre optics, information technology and advanced manufacturing processes.

Even more revealing of the growing knowledge-intensity of production are data for the manufacturing sector showing that research and development expenditures have grown at three times the rate of tangible investment over the past two decades. The share of non-material investment (e.g. research and development, training, software development and design) in the gross domestic product (GDP) of the major advanced industrial countries has been rising steadily over the past 10 years. Just as new knowledge creates new technology, so new technology creates new knowledge. Through gene research, advanced chemical analysis, cell culture techniques, the electron microscope and high-speed photography, scientists can study and report on phenomena inaccessible in the past, thus creating still newer libraries of knowledge.

Again, during the 1970s, research expenditures began to rise in the more dynamic enterprises as shifts in demand together with new competition led firms to develop strategies based not only on cost reduction but on customization, quality and close supplier-client relationships.

A significant proportion of all of this knowledge is assimilated, improved, protected, and renewed, and sped to markets in a stream of rapidly and continually improved products or services. As knowledge-driven competition spreads and intensifies, companies have had to rethink deeply rooted assumptions about what a company is, how it should be organized, what its managers do and how it can remain competitive. This stress on knowledge-intense production and market factor shifts is a fundamental contributor to the spread and significance of strategic alliances.

*Changes in the concept of corporate organization*

The corporate organization of the mid-1950s, particularly in the West, consisted of a sphere of managerial authority within which decisions regarding external issues were made. The hierarchal system defined levels of authority within rigid systems and structures. Those within a firm acted as communities bound together by shared values, social norms and a common purpose. Loyalty to the firm ensured efficient operation of the hierarchical organization. Typically, firms sought to own their crucial assets (e.g. plant, equipment and intellectual property rights) and performed needed research and development within the walls of the corporate citadel. Finally, firms defined and protected spheres of managerial power through classical contracting. Formal legal arrangements clearly specified the rights and obligations of a firm and of the parties outside it, including labour unions.

The citadel walls were semi-permeable. Knowledge flowed in through skilled personnel, market research and the like. Knowledge flowed out through marketing, financial reports, patent applications and other channels. However, critical knowledge was protected by patents, copyrights, trade marks, know-how etc. and thus was internalized.

There were two organizing principles: *(a)* firms have boundaries and *(b)* they must be separated. Thus, firms could be characterized as "islands of managerial coordination in a sea of market relationships". But this classical concept has changed.

Boundaries and separation have blurred in recent times. The 1980s saw a sharp increase in domestic joint ventures in the United States most of them in the service industries. Cooperative arrangements proliferated among manufacturers of electrical equipment, consumer electronics, computer peripherals, software, electrical components and aerospace products. In some of these sectors, more domestic joint ventures were announced in a single year in the early 1980s than in the previous 15 or 20 years. In Europe, cooperative agreements increased roughly ten-fold between 1980 and 1985, and international joint ventures involving United States firms and overseas partners nearly doubled in the years after 1978. Joint research and development among European and United States firms grew rapidly. Many innovative financial arrangements now also link small and large firms in joint research and development. Cooperation between universities and private companies has proliferated, creating the university-industrial complex. By 1987, approximately 200 industry-university consortia were operating under the United States National Cooperative Research Act, enacted to develop national competitive capabilities.

### *The globalization of competition*

The globalization of competition emerged from two factors: *(a)* a dramatic shortening of the product life cycle in dynamic, knowledge-intensive industries, with every succeeding generation of products demanding new production techniques and *(b)* a need to attain global markets to amortize the enormous research and development costs required to stay at the cutting edge of technology and to remain competitive. The magnitude of these new costs is illustrated by the $1 billion development cost of a new digital switching mechanism in the early 1980s. To amortize these costs, markets of nearly $14 billion in sales were needed over a 10-year period. In 1986, the top 10 firms in the telecommunications industry spent an average of $750 million each in research and development, representing 7.5 per cent of turnover. The traditional expectation that national markets would counterbalance high research and development expenditures, aided in part by tariff and non-tariff barriers, became an untenable proposition in the new context. Reaching global markets became imperative and new forms of organization had to be devised to attain such goals.

### *Revolution in communications*

To understand the significance of communications today one must examine globalization. In an IBM-sponsored study with Nolan, Norton & Co., researchers defined a global company as one driven by a global strategy that enables it to plan, to treat each activity as part of a whole-world system and, therefore, to serve its customers with excellence. There are three components of excellence. The first is that a global company has low or no boundaries and undertakes mission-critical business activities where they make the most sense (e.g. research and development would be carried on wherever the necessary talent lives). Internal decisions, such as the location of headquarters, are transparent to the market or the individual customer. Being global is having influence and scope broader than a firm's actual facilities. Further, a global company must have a business delivery system that is highly sensitive to local customer needs (customizing the global company products to meet local requirements). Finally, a global company must coordinate people around the world who are culturally diverse.

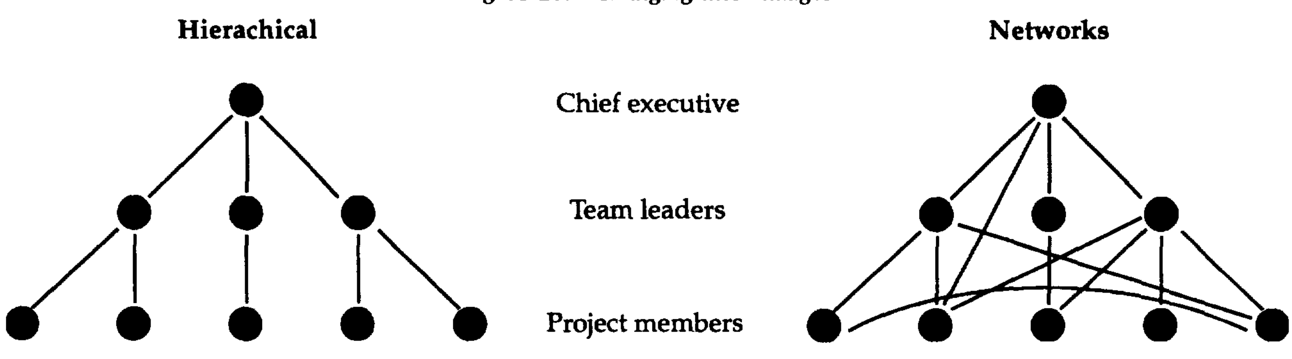
Whereas the Industrial Revolution of the last century was driven by changes in the economics of production and transportation, global business is driven today by changes in coordination. Wherever people work together, they must communicate, make decisions and allocate resources.

The first effect of enhanced communication is reducing coordination costs by substituting information technology for human coordination (e.g. replacing thousands of clerical workers in banks or insurance companies, replacing expediters in factories). Another effect of enhanced coordination is to increase the overall amount of coordination (e.g., people travel more air miles as the costs of travel coordination decrease). Enhanced communication also creates new organizational structures. The structure now emerging is the network structure, which is characterized by an alternative management system of interconnectedness; that is, interconnected organizational parts that function without an established hierarchical chain of command (see figure 20). Interconnectedness also connotes efficiency in that communication happens quickly. There is greater reliance on point-to-point (electronic-based) communication and people working as teams (core competencies), and there is also greater reliance on strategic alliances to extend reach and market share.

### *Uncertainty and the need for flexibility*

The 1950s and 1960s were characterized by a strong linear relationship between a rapidly growing market, defined in terms of a range of goods, a heavily equipped manufacturing base that permitted economies of scale and a set of research and development activities focused on product differentiation.

**Figure 20. Changing interlinkages**



This necessitated a vertically integrated large firm selling products in a big market in which the firm held an oligopolistic position. In this way, market shares were stabilized and oligopoly rents secured. Within this framework, firms developed new technology to penetrate new markets.

The slowdown in advanced countries' purchasing power in the 1970s and 1980s, together with crisis conditions in much of the third world, led to shifts in market demand that undermined the mass consumption model of standardized goods. Added to this was segmentation of demand resulting from new products and processes and a proliferation of suppliers, geographically and sectorally. Competition came from unsuspected places. The big firm in a big market was less significant. Meeting the new challenges required flexibility that larger firms often did not possess.

To achieve the twin goals of critical mass and reducing uncertainty without adding to the inertia of a firm, managers developed new competitive strategies. Two of these bear on the strategic alliance: *(a)* the decentralization of research and development to domestic and foreign universities and research institutions and *(b)* the development of interfirm collaboration in research and development.

## The concept of strategic alliances

The strategic alliance, a concept some 20 years old but still in the making, provides a fresh forum for technological and managerial collaboration, and other forms of alliance are becoming redefined in its context. Strategic alliances encompass cooperative relationships and strategic extensions between companies and competitors, customers, suppliers, government bodies (the parastatal and private sector alliances), universities, labour unions and other organizations. Excluded from the concept of strategic alliances are international technical coalitions, which are fairly stable cooperative arrangements for the supply of parts and components (pure subcontracts).

Traditionally, the reason firms worked together was to achieve market domination (oligopolies) or to share risks, combine resources and capabilities and surmount national barriers (joint ventures). These forms of association coexisted with parent-subsidiary organizational structures, acquisitions and mergers. Many organizational features of these associations reflected the features of United States and European firms, and technology flowed from the same sources. The ascendance of Japan as a new economic force and a source of technology, new organizational methodologies and a strong work ethic began to affect international competition, resulting in the emergence of Hong Kong, the Republic of Korea, Singapore and Taiwan Province of China as economic forces. First they offered low-cost competitive labour together with excellent management, resulting in inflows of investment and technology. Then, they assimilated knowledge and skills, emerging as sources of competitive technology and technical excellence in their own right. These new economic forces, coupled with the developing markets and capabilities of India, China, the countries of Commonwealth of Independent States and eastern Europe, set the stage for the proliferation of new organizational forms and for redefining global interrelationships.

**Table 16. Motivations for interfirm cooperative agreements, 1978-1983***

| *Motivation for the agreement* | *Share of total reported motivations (%)*[b] |
|---|---|
| Technology transfer (a one way flow of information, generally via a licence) | 29 |
| Technological complementarity (long-term transactions involving the exchange or sharing of technology between parties) | 41 |
| Marketing agreements (often between a producer and a distributor) | 21 |
| Economies of scale in production and/or distribution (including rationalizing production through specialization in component production) | 16 |
| Risk-sharing (agreements that involve none of the above motivations, but provide for the management of an operation by one partner while the other contributes capital and absorbs some risks of failure) | 14 |

*Sample of 143 European and 157 United States companies, 1978-83.
[b]Some arrangements have more than one purpose.
*Source:* Database of Futero Organizzazione Risorse (FOR), reported in P. Mariti and R. H. Smiley, "Corporation agreements and the organization of industry", *Journal of Industrial Economics*, vol. CXI, No. 4 (June 1983), pp. 437-451.

**Table 17. Agreements by function***

| *Region/ country* | *Function of agreement (% of total)* | | | |
|---|---|---|---|---|
| | *Development* | *Production* | *Marketing* | *No. of agreement* |
| Intra/ European Community | 74.4 | 51.2 | 15.9 | 195 |
| European Community/ United States | 65.0 | 49.1 | 24.2 | 169 |
| European Community/ Japan | 49.3 | 55.0 | 27.5 | 69 |
| United States/ Japan | 42.4 | 62.7 | 42.4 | 59 |
| United States/ United States | 71.4 | 33.9 | 17.9 | 56 |
| Japan/Japan | 57.1 | 28.6 | 14.3 | 14 |

*Some agreements had more than one function. INSEAD Database.
*Source:* Adapted from M. Hergert and D. Morris, "Trends in international collaboration agreements", *Columbia Journal of Worls Business*, Summer 1987, pp. 15-21.

The discussion in this module will now focus on two types of strategic alliance:

- Those with immediate business interests as the principle objective.
- Those, alliances, temporary or on-going, whose objective is to generate and share knowledge through technical research and development.

Tables 16 and 17 attempt to quantify the motivations and functions, respectively, for interfirm agreements. These tables come from an article by Mytuka [1].

### Business-related alliances

Business alliances range from brief, informal links to arrangements so intricate one can hardly tell whether the organizations involved are indeed separate. Alliances are based on contractual arrangements that are specific or open-ended and are managed through classic modalities or relatively unstructured arrangements. Alliances are formed between small organizations, between the giants of industry (e.g. General Motors-Toyota) and between large and small firms.

Typically, business-oriented strategic alliances are two-way relationships in which globalized knowledge-sharing plays a significant role. Strategic alliances pervade all four components of business organization: production, distribution, communication and research and development. They may therefore involve developing new products, new production processes, new markets or new systems to manage interfirm contractual relationships. They most often take the form of product links, such as the Renault-Volvo alliance for coproducing and using common auto components in Europe or the General Motors-Daewoo alliance for manufacturing the Pontiac LeMans in the Republic of Korea for the United States small car market or the Ceat-Goodyear Tire alliance in India for coproducing radial tires for the Indian market.

The prefix "strategic" often reflects a cooperative alliance of firms who are otherwise competitors (or potential competitors) or whose interests conflict (clients and suppliers) and who, through the alliance, will manufacture a product or provide a service in their area of competitive excellence. The alliance partners retain their respective identities and competitiveness in markets excluded by the alliance. While protecting their self-interests, alliance partners bring to the contractual entity highly viable protected and unprotected knowledge and share this knowledge for the new enterprise's good.

An alliance can take the shape of a classical joint venture, from minority positions to a 50:50 cleavage, or, depending on the objective of the alliance, be a merely contractual agreement. For instance, the IBM-NTI alliance (NTI is the Japanese telecommunications monopoly for large-scale computer networks, now being privatized) is a formal equity joint venture, while the Godrej-Proctor & Gamble alliance in India is a contractual alliance without equity participation. In many cases, when an alliance involves equity arrangements, the intent is less to exercise management control than to help finance some activity of the partner's firm.

In contrast to parent-subsidiary and formal equity-based joint-venture relationships, a strategic alliance typically frees the organization of centralized, overbearing bureaucracies while improving its flexibility. In contrast to mergers, an alliance avoids the need for a merged unit to harmonize differing work cultures and differing approaches to problem-solving. However, a strategic alliance is not a substitute for all the ways a firm can conduct business; it is an important, complementary technique that provides for the creation and sharing of knowledge.

Strategic alliances enable a firm to increase its international reach and market share without risking its core businesses. Alliances provide a firm with alternative strategies to vertical integration or diversification, within a national or regional market. Increased investments in research and development, in sophisticated modes of communication and information technology have shifted the composition of industry costs away from manufacturing to the less variable costs noted above; these can be substantially lowered by strategic alliances. Command over volume enables a strategic alliance complex to negotiate better terms from suppliers, which further improves margins against less dominant competitors.

The globalization of knowledge is the root factor in the strategic alliance phenomenon. Knowledge production and sharing through synergistic capabilities and intercultural differences lead to new approaches and streams of thought, novel modes of organization and so forth.

Strategic alliances also promote a do-it-now attitude rather than the typical wait and watch modality, because they do not require heavy investments. A wait and watch philosophy is particularly inconsistent with increasingly short product life cycles. IBM Japan, for example, recognizing that each new generation of personal computers had a very short life, built a vast network of dealers to move the product as fast as possible after its introduction, thus maximizing profits before rival products or clones appeared.

Strategic alliances can have other objectives: they can reduce financial risks, speed delivery to markets, improve flexibility and neutralize potential competitors. At the same time, however, they pose the danger that the alliance partner will become the competitor.

Although firms with strategic alliances may be different from each other in the way they are organized (that is, as formal corporate entities or as entities having "social links" with the technology/market partners), if they have a common business purpose or orientation they can be, as mentioned earlier, networked through modern information technology. The new networks drive their energy from the synergies of shared information. The absence of a formal hierarchy enables the entities in the network to react fast and flexibly to new challenges and thus achieve a greater vitality than can be achieved through formal coordination.

Where strategic alliances have been formed for purposes such as sourcing components for a car or a washing machine, the otherwise disparate units can be networked into a "confederation". Here again, information shared by means of information technology provides for synergy and unit resilience.

"Network" and "confederations" are not necessarily global in the sense of a firm that sources raw materials in one country, converts them to components in another, produces sub-assemblies in still another country and assembles the product in a fourth for a fifth client country market.

A strategic alliance network can, however, become global in scope when it markets or (franchises) almost identical products under its own trade marks in many or all countries of the world, as has been happening in the fields of small computers, soaps and detergents and cosmetics.

However, to be truly global, the organization must change in several ways:

- The hierarchical mindset of the "pyramid" must be discarded in favour of "flatter" and less formal lines of communication.
- In every country the local organization must be responsive to local needs.
- People with skills and talent and brains must be recruited, developed and used wherever they are found.
- Information technology must be deployed so that decision making can be faster and more flexible.
- Control and coordination systems and management practices must be transformed to cope with the ambiguities that attend the internationalization of business.

### *Migratory knowledge and its contribution to strategic alliances*

J. L. Badaracco distinguishes between two kinds of knowledge movement in the globalization process: *(a)* a migratory knowledge and *(b)* embedded knowledge [2]. Their significance is totally different, but each contributes to the growth of strategic alliances. He further defines two types of linkages: product links and knowledge links.

Migratory knowledge is knowledge that moves very quickly and easily because it is encapsulated in know-how, patents, designs, manuals or books or encompassed in machinery (frozen knowledge). It travels through the medium of professionals who relocate and through consultants and teachers, or it becomes available through licensing, joint ventures and other channels of technology transfer. A substantial proportion of this information is open-architectured or articulated or it becomes obvious upon formal disclosure. Capable individuals and organizations can reverse-engineer a machine or use encapsulated knowledge to identify its principles. They can then improve upon a technology to, for example, extend machine efficiencies and capabilities in the mechanical engineering industry or to upgrade quality or improve production economics in the chemicals or pharmaceuticals industries. In the process, the improvers become owners of know-how or patents, while also becoming competitors. Perhaps the most vivid example of migratory knowledge, and its corollary, the rise of competition, is illustrated by the speed with which the IBM personal computers and its later modifications were first imitated and then differentiated and improved upon, finally displacing the original products in their entirety. In nearly every country there are entrepreneurs who can (legally) assemble excellent machines, without technical collaboration, from parts easily bought worldwide.

Machines can also be sources of knowledge in the sense that the software in computers, for example, can access knowledge from data banks or, in an expert-system mode, act as an artificial intelligence device. For example, computer software can be a user friendly aid in contract drafting or medical diagnostics. Even when knowledge can be closely protected by creating subsidiaries, contracting out parts manufacture or contracting services helps knowledge to migrate.

Japan employed migratory knowledge to improve foreign technology for its economic advantage and then moved the improved technology across Asia. Exposure to technology enabled the Japanese to create new technology and then market it to the very same regions from which it was originated. The Republic of Korea, Singapore and Taiwan Province of China were not far behind in using this strategy. Using national industrial policies and creating skilled labour at low wage rates, they have encouraged knowledge to migrate. In the mid-1970s, for example, Taiwan Province of China used protection and subsidies to promote the local production of capital goods such as automobile components and turbines. As a result, some of the largest exporters from Taiwan Province of China are General Electric, IBM, Hewlett-

Packard, Mattel and other United States as well as Japanese firms that were persuaded to manufacture there. At the same time, Taiwan Province of China became a knowledge-generating country and, hence, a source of competition.

Because migratory knowledge, unlike a product, can move in several directions at the same time, it creates many islands of knowledge: in a word, increased competition. This, in turn, stimulates innovation, which can take material and non-material forms. New forms of organization are an important non-material innovation from which strategic alliances result, the objectives of which are to extend reach, enhance market share and build new knowledge.

From the financial resource viewpoint of an innovating organization, it is not possible to use the classical approaches of joint-venturing or acquisition to achieve global reach. Alliances with firms already operating in other markets afford a valid solution. Also serving to encourage alliances are the delays, complexities and failures of patent and copyright protection. Firms must act as quickly and aggressively as possible while the window of opportunity is open. An alliance partner may be able to greatly benefit from an innovation, both in terms of what it does and its knowledge content.

The strategic component of such alliances lies in each party's obtaining an almost immediate benefit which otherwise could take years to develop. An alliance is also strategic because synergies can yield new knowledge as the product of the alliance is reshaped through design, engineering or research and development to meet the requirements of the targeted markets. Knowledge is thus both produced and shared.

Several strategic alliances have recently been struck in India. Two of these alliances may be of interest for their relevance, importance and advantage to developing countries. The first of these was formed in early 1993 between Proctor & Gamble (P&G), which is a world leader in soaps and detergents, with a small base in India, and Godrej Soaps, which is a local, highly respected, nationally networked firm with excellent brand recognition and a substantial share of the Indian medium-priced soap market. In this alliance, P&G India (a 65 per cent subsidiary) contractually bought the entire brand equity of Godrej Soaps (i.e. all brand labels of Godrej soaps became the property of P&G) to promote under the P&G name. In exchange, P&G undertook to *(a)* use the production facilities of Godrej Soaps to manufacture soap; *(b)* use the same facilities to manufacture P&G products for which it would provide the know-how, *(c)* promote all labels of the alliance and *(d)* use P&G's research and development to improve all products, the production process and other aspects of the business. This alliance was conceived in the context of the very strong Unilever position in India. To directly compete with Unilever P&G would have had to bear huge expenses, with no substantial certainty of success. Though an alliance has been formed that is contractual and does not carry a name, the corporate identities of both organizations, decisions in their own spheres of influence and responsibilities to their respective shareholders remain unaffected.

The second alliance, which is in the nature of a joint venture, was formed in late 1993 between Coca-Cola Inc., of the United States and Parle Exports, a firm of the wholly Indian-owned Parle Group. The 50:50 joint venture, whose chairman will be from Parle, will use Parle's 60-odd franchisees in India to bottle three products of Coca-Cola Inc. (Coca-Cola, Sprite and Fanta) as well as four brands of Parle, all to be marketed jointly, but with brand equity purchased by Coca-Cola. This alliance enables Coca-Cola to re-enter the Indian market, which it left in 1977, thereby permitting Parle to penetrate the cola market and dominate it with a 60 per cent share (others being Pepsi, with 20 per cent, and Pure Drinks, the original bottler for Coca-Cola, with a 15 per cent share). While providing ready entrée for Coca-Cola without the need to create a network of bottlers, it neutralizes an important competitor that Pepsi has not been able to shake off. Likewise, the alliance ensures that Parle's share will not erode rapidly and allows Parle to participate in markets where Coca-Cola has considerable influence. Both Coca-Cola and Parle will make the concentrates using their separate Indian facilities; a marketing company will promote the products jointly.

The first strategic alliances undertaken by United States companies about 20 years ago established product links. In those arrangements, the alliance partner manufactured part of its product line or built complex components that the United States firm had previously had manufactured by captive suppliers or obtained from local suppliers. The alliance partner, in turn, was able to obtain know-how and negotiate funding as well as access to markets for some of its own products in North America. Badaracco [2] attributes such motives to General Motors, Ford and Chrysler in taking minority equity investments in three Japanese motor car makers during the early 1970s. In return, their Japanese allies were able to offer small cars, small trucks and components in the United States. Later, as their own costs for labour grew, Japanese firms established a complex network of similar product links elsewhere in Asia to enlarge or protect market shares.

A particular set of strategic alliances entered into by General Motors illustrates this approach to technology transfer and its business advantages. In order to protect its small car market share, under serious threat first from Japan and then from the Republic of Korea, General Motors entered into four product-link-based defensive alliances with small car manufacturers: *(a)* a joint venture with Isuzu Motors in 1971 with a 34 per cent equity interest, *(b)* an alliance with Suzuki Motors with a 5.3 per cent equity position in the firm, *(c)* a United States-based 50:50 joint venture in 1983 with Toyota (NUMMI) to make 200,000 cars a year and *(d)* an alliance in 1984 with Daewoo in the Republic of Korea to make small cars them for the United States market (Pontiac LeMans, distributed through the Pontiac dealer network). This set of alliances gave General Motors the capacity to sell over 500,000 cost-competitive cars a year in the United States in an explosive and fiercely competitive market. The approximate investment made by General Motors to secure these alliances was a mere $1 billion. The alliances also reduced General Motor's risk that one of the partners would become a competitor, and dependence on a single partner was reduced. For the partners in Japan and the Republic of Korea, the alliances brought several benefits while providing a mechanism to overcome United States protectionism. Equally important, these alliances provided a window through which General Motors could examine and learn about technological developments in Asia through the eyes of its partners. General Motors also forged several product-linked alliances with a host of Japanese and other Asian firms for motor car parts (e.g. with Nihon Radiator, Kyoritsu Hiparts, Mitsui Toatsu Chemical, Akebono Brake and NHK Springs, the last two being major players in the parts market).

IBM, and in particular IBM Japan, likewise entered into a host of alliances to maintain its stake in the small computer business. IBM Japan broke tradition and transformed itself from being just a large subsidiary with its own sales force in 1980 to becoming the pivot in a confederation of 17 joint ventures with Japanese firms by 1987. This confederation sold its products through a network of 136 dealers and 107 resellers while striking relationships with some 800 software and service organizations.

### *The significance of embedded knowledge to strategic alliances*

The second mode by which knowledge crosses boundaries and is encompassed in strategic alliances has been termed embedded knowledge by Badaracco [2]. Unlike migratory knowledge, embedded knowledge moves slowly, for it resides in complex social relationships that cannot be easily articulated and shipped. Embedded knowledge is the collective competence (i.e. core competence) of the people forming a team, a department or a company. Individuals cannot possess this competence. It is embedded in the manner in which an entity uses information for research and development or business, examines an issue and makes its decisions and by which it succeeds. It is a holistic competence, a knowledge form and a memory system. It is strategic and valuable.

The enabling mechanism for transferring this competence is the knowledge link. A firm may be able to secure this embedded knowledge on its own with great effort or through an alliance. Once it is grasped, it becomes a composite of capabilities, skills, know-how and knowledge crucial for success, secure for a much longer period than migratory knowledge; it also does not slip away as easily, which partly explains why small-car technology has not spread as quickly as the small computer. Another type of strategic alliance is formed to learn embedded knowledge, which carries a much deeper strategic potential.

Badaracco illustrates this knowledge system by considering the capability within Toyota Motor Company, an interactive composite of the entire constellation of operating policies, traditions, norms, specialized knowledge and routine practices that Toyota has evolved over the past 50 years, through its managers and suppliers, networked in special relationships [2]. It includes the just-in-time (JIT or *kanban*) inventory system, participative labour management relations and intense commitment to the success of the Toyota family of affiliated companies. By perfecting the "Toyota way," the company has become one the most profitable and powerful companies in the world. Many important relationships in which knowledge and capabilities are embedded are not inside a firm but lie in a matrix of close relationships between a firm and external organizations. In the case of the Toyota Group, Toyota Motor Company is only the pivot of a vast network of primary, secondary and tertiary subcontractors with special relationships with each other. Although many organized groups possess this knowledge, no one group knows what Toyota knows about making cars.

Under some circumstances, the most successful response to an organization's need for new capabilities is a strategic alliance characterized by a knowledge link. Learning from the partner is a central objective of the alliance. While less permanent than an acquisition or merger, it is more targeted and efficient. It allows allying partners to gain needed knowledge without disturbing the delicate balance of social relationships in which the knowledge is contained. Partners can combine their special capabilities to create new embedded knowledge, thereby increasing strategic capabilities with greater permanence than migratory knowledge. Competition is then met with a combination of superiority in products as well as capabilities.

The General Motors Daewoo alliance is an example of a knowledge link coupled with a product link. General Motors quickly formed an alliance when it realized that motors made in the Republic of Korea could take a slice of the United States market and that Daewoo might be sought as a partner by a competitor. It created six joint ventures with the Daewoo Group. Both automotive giants planned to develop a state-of-the-art motor car and a state-of-the-art assembly line through intensive collaboration between engineering teams from the German subsidiary of General Motors, Adam Opel, and Daewoo. The car incorporated a one piece assembly of driver's instrument panel, steering column and wheel, an innovation at the Daewoo Motor Company not found at plants in the United States. The LeMans model first produced by Daewoo was a variation on the Opel Kadett (a European car-of-the-year award winner). For General Motors, the alliance represented a product link. The LeMans was not totally different from the Opel Kadett. But for Daewoo, the alliance was a knowledge link.

In the NUMMI venture, the knowledge link is valuable for both alliance partners. Toyota, which had less experience than Honda or Nissan in overseas business management, learned to work with United States trade unions (i.e. the United Auto Workers) dealer networks (and their complex relationship with car-makers), suppliers and trucking companies, while abiding by local and national regulations. Toyota also learned about managing large United States organizations, whose cultural, social and contractual relationships are considerably different than those of Japanese organizations. Later, all of this knowledge became valuable for Toyota in operating its own plant at Greenfield, Kentucky. Likewise, General Motors learned the Toyota way of management (the Quality of Work Life Program) and about Toyota's complex relationships with Japanese suppliers, and so on.

Badaracco frames the following rules for the creating and managing this kind of strategic alliance:

- Formulate a clear strategic concept of the alliance in terms of present and expected future capabilities of the allying firms.
- Examine the advantage and flexibility of a wide range of alliances, including alliances with suppliers, research organizations etc.
- Analyse the values and commitments of prospective partners to see how the firms will meld and learn to trust each other.
- Evaluate the risks of opportunism, knowledge leaks and obsolescence.
- Avoid undue dependence on alliances, which should be seen as enriching a firm's embedded knowledge not as replacing it.
- Structure and manage alliances like separate companies, which should be led rather than merely managed.
- Learn from the alliances they form [2].

## Strategic alliances in research and development

While globalization of knowledge is a primary factor in the rise of business-related strategic alliances, another category of strategic alliances has developed as the result of the growing knowledge-intensity of production. Mytelka cites data showing that R and D expenditures have grown three times as fast as tangible investment over the past two decades [1]. The share of non-material investment (e.g. research and development, training, software development, design) in the GDP of advanced nations has been steadily growing. Further, with the globalization of markets and shorter product life cycles, individual firms are obliged to spend large sums of money to stay competitive. In Europe, the research and development expenditure of the top 10 pharmaceutical companies, for example, averaged 10.6 per cent of turnover in 1987-1988, having risen in parallel with a doubling of the number of drugs under development. In Japan, research and development accounts for one third of Fujitsu's spending. Nippon Telegraph and Telephone (NTT) has tripled the number of its research laboratories.

Taken together, these two factors have given rise to a set of dynamics that has increased the costs, risks and uncertainties of research and development, heightened the importance of non-material investments in productivity and growth and intensified competition for market share on a global scale. These changes have created a tension between the need for flexibility, on the one hand, and the need for critical mass in research and development on the other.

More importantly, partly as a result of the globalization of knowledge, in certain industries the traditional sequence from R and D to manufacturing and marketing is being replaced by synchrony, in which specialists in all these fields work as a team from the inception of research to the establishment of product markets.

For a firm, this involves trade-offs such as the following:

- Between internalization, which increases the inertia of a firm, and the higher transaction costs of arms-length relationships.
- Between short-term financial gain and longer-term positional advantages.
- Between older governance structures focused on reducing uncertainty and newer approaches calling for increased flexibility as well as new institutional forms through which both needs can be met.

To contain the costs of R and D and to achieve critical mass and reduce uncertainty without adding to the inertia of a firm, two new competitive strategies have evolved, partly supported by Governments:

- The decentralization of R and D to domestic and foreign universities and research institutions
- The development of interfirm collaboration in R and D.

### *Decentralized research and development*

The decentralization of research and development does not come easily to companies where most of it, by tradition, was done within the company. In the mid-1970s, 97 per cent of the research and development of multinational corporations was done in-house. Mytelka cites a study of 420 United States overseas joint ventures in the manufacturing sector created in 1974-1982, only 15 per cent of which were found to be engaged in research and development (defined to include minor product modifications). In the new environment, a significant amount of new knowledge is being produced by relocating research and development in offshore laboratories. IBM France, IBM Germany and IBM Switzerland, for example, are powerful research and development actors in their own right, so much so that high-temperature superconductivity was first demonstrated by German and Swiss scientists in IBM's Swiss laboratory. Likewise, in the automobile industry, Toyota relies on its design studio in Southern California. In pharmaceuticals, likewise, Glaxo increased its staff from 1,500 in 1978, to 5,000 in 1988, when 37 per cent worked outside the United Kingdom (in 1978, all staff worked in the United Kingdom).

The 1980s also witnessed growing investment by firms in university-based research institutions both in their home country and abroad. In the United States, for example, industrial R and D expenditures within corporations rose from 113 per cent from 1967 to 1980, while over the same period such expenditures in universities and non-profit institutions rose 281 per cent. These expenditures increased considerably in the years 1980-1985 as supercomputer centres were established at Cornell, Princeton, the University of California at San Diego and the University of Illinois at a cost of $400 million, of which $200 million came from firms such as IBM, Exxon, AT&T Telephone and Telegraph and Lockheed. At the same time, universities in general have become more open to collaboration with industry, although in certain countries, such as Germany, such collaboration has a long history.

### *Strategic partnerships in research and development*

From the perspective of a typical firm, the arms-length interfirm collaboration in a strategic partnership reverses a fairly long tradition of directly appropriating knowledge through in-house research and development. Thus a change in mindset is a required when interfirm research and development alliances are formed.

In business alliances, as we have seen, product and knowledge links are the main motivations for partnering. Knowledge links are not as oriented to producing knowledge as they are to sharing it. Producing knowledge (e.g., product and process research and development, design, engineering, marketing, management capabilities, and software development) is a basic objective of the resource development strategic alliance. This knowledge, of course, is then shared. Strategic alliances in R and D are generally contractual in nature, with equity investment being made for purposes such as funding research equipment, rather than simply gaining control. One illustrative and important interfirm strategic alliance is that between the $50 billion Daimler-Benz (the largest German company) and the $200 billion Mitsuibishi Group for intensive cooperation in automotive, electronics, aerospace and other businesses.

The MERIT-CATI database (University of Limberg, Maastricht) has compiled nearly 9,000 cooperative R and D agreements between firms. Some 3,600 parent companies are involved and the fields covered are information technology, materials and biotechnology. Of these agreements, some 4,600 are for international cooperation. The number of agreements rose from about 60 per year in the period 1975-1979 to 300 per year during 1980-1984 and then nearly doubled in the period 1986-1989. At that point, the number of strategic alliances was 718 in biotechnology, 1,482 in information technology and 688 in new materials.

### *Research consortia*

As a consequence of the serious threats posed by government-supported Japanese technology, several Governments, among them those of the United States, Canada, and the European Union countries, have put in motion programmes to partially fund cooperative research carried out by industry in strategic sectors. Thus, a new form of strategic alliance emerges in which there is multifirm involvement in knowledge production and sharing. The European Strategic Program for Research and Development on Information Technologies (ESPRIT) programme and the EUREKA project constitute two examples of research consortia.

ESPRIT is one of first major European initiatives empowered by article 235 of the Treaty of Rome to promote the competitiveness of European industry. In ESPRIT, Europe's 12 largest information technology firms were invited to draw up programmes for European competitiveness in that industry. Nearly

800 firms and 500 research laboratories in universities and research institutes across the European Union participated in the first phase of ESPRIT (1983-1987), involving about 250 specific subprojects. Basically, the sub-projects were developed as pre-competitive research and development to discourage anti-competitive behaviour. The second phase of ESPRIT, consciously selected projects and created project clusters for their commercial potential. Pre-competitive research and development constituted about a third of the projects, and application-specific close-to-market projects (three years to reach markets) rose to nearly 50 per cent. This second phase of the programme was directed less at anti-competitive behaviour and more at meeting international competition. In ESPRIT each project requires the association of at least two firms from two different European Union countries, with or without the association of universities or research organizations as partners. (More than 70 per cent of these projects did, however, involve the cooperation of these organizations.) Mytelka says that 50 per cent of the projects were small and medium-sized enterprises, which have gained substantially by participating [1]. Many have been able to fend off acquisition by predators.

The EUREKA project, with a membership of 19 European countries has, like ESPRIT, the objective of promoting cross-border alliances to improve European competitiveness. EUREKA's 19 members partly finance the programme. They contribute to maintaining a secretariat in Brussels and they support national project coordinators and staff who may or may not be public servants. EUREKA supported 500 projects at the end of 1992, 80 per cent of which are targeted for commercialization within four years. There are several large projects under EUREKA with funding in excess of ECU 300 million. While considerable freedom is given to firms in selecting projects (the bottom-up approach), several umbrella projects cover well-defined technology areas that Governments and industries consider to be strategically important for the competitive position of Europe. Among these is FAMOS, the robotics project.

Unlike ESPRIT, there are no organized calls for projects in EUREKA. Interested firms and research organizations find partners, prepare a proposal, negotiate a cooperative agreement amongst themselves and organize financing for their project. Once the consortium is in place, each participant submits a proposal to its national project coordinating body. Acceptance or rejection takes place at this level. So, too, do decisions concerning project financing.

Again, in contrast to ESPRIT, EUREKA has opened its projects to a few non-European country participants, such as Canada. An Argentine firm, Vilmax which has 30 years of experience in organic dyestuffs and which holds an important patent involving an original way to derive dyes and then to copolymerize them into homogeneous three-dimensional polymers, has joined with IBF Biotechnics (a subsidiary of Rhone Poulenc), SmithKline Becham Biologicals and the University of Patras in EU384, a project designed to study dyes and dye sorbents for purification of biologicals. Vilmax's participation in the EUREKA project was the result of a previous research and development alliance between IBF and Vilmax.

Although EUREKA's administrative rights give it the authority to have other members join a project (within 45 days notice, subject to the veto of the sponsoring firms), Mytelka reports that firms prefer the greater freedom they have within EUREKA to chose their own partners and restrict sharing new knowledge through negotiated agreements among a project's partners [1].

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