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U N I D O **S e r v i c e s**

Handbook

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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

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Explanatory notes: References to dollars (\$) are to United States dollars, unless otherwise stated. References to tons are to metric tons, unless otherwise specified. The term "billion" signifies a thousand million.

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ABBREVIATIONS AND ACRONYMS

BEST	Business Environment Strategic Tool Kit
BINAS	Biosafety Information Network and Advisory Service
BOT	build-operate-transfer
CAD-CAM	computer-aided design and manufacturing
CFC	chlorofluorocarbon
COMFAR	UNIDO Computer Model for Feasibility Analysis and Reporting
DIPP	Databank for Investment Promotion Programmes
ECDC/TCDC	economic and technical cooperation among developing countries
ESCAP	Economic and Social Commission for Asia and the Pacific
ESID	ecologically sustainable industrial development
FAO	Food and Agriculture Organization of the United Nations
FIT	Financial Improvement Tool Kit
GDP	gross domestic product
GEF	Global Environment Facility
HCFC	hydrochlorofluorocarbon
HRD	human resource development
ICGEB	International Centre for Genetic Engineering and Biotechnology
IDA	Industrial Development Abstracts
IDDA	Industrial Development Decade for Africa
IDF	Industrial Development Fund
ILO	International Labour Organization
INTIB	Industrial and Technological Information Bank
IPS	Investment Promotion Service
ISIC	International Standard Industrial Classification system
ISO	International Organization for Standardization
LDC	least developed country
MF	Multilateral Fund of the Montreal Protocol
MVA	manufacturing value added
NCPC	national cleaner production centre
NGO	non-governmental organization
NIS	newly independent States
NISP	National Industrial Statistics Programme
ODS	ozone-depleting substances
PROSPIN	Project Profile Screening and Pre-appraisal Information System
R and D	research and development
REED	Referral Database on Energy and the Environment
RENPAF	Regional Network on Pesticides for Asia and the Pacific
SME	small and medium enterprise
TIES	Technology Information Exchange System
TQM	total quality management
UNCED	United Nations Conference on Environment and Development
UNDCP	United Nations International Drug Control Programme
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	Office of the United Nations High Commissioner for Refugees
UNIDOSS	UNIDO Industrial Subcontracting System
WHO	World Health Organization
WINS	World Investment Network Service

Executive Summary

In 1993, UNIDO underwent a major restructuring exercise. Its objectives were re-adjusted to respond to changes in global economic and industrial development. The Organization itself was streamlined with an eye to quality, efficiency, and optimum use of resources. The new structure and a strong focus on five developmental objectives were approved at the UNIDO Fifth General Conference held at Yaoundé, Cameroon, in December 1993. To target the five objectives, the services and functions of the Organization have been elaborated as the basis for refocusing UNIDO's approved programmes.

Scope and priorities

The present Handbook describes industrial development services currently afforded to developing countries and economies in transition. It is intended for use by government departments and agencies, and by industrial associations, chambers of commerce, research institutions, non-governmental bodies and industrial institutions and enterprises. Twelve groups of services respond to five broad development goals and the priorities agreed at the Yaoundé conference:

- Industrial policies and private sector development
- Operational support for sectoral development
- Investment promotion
- Technology for competitiveness
- Environment and energy
- Human resource development
- Women in industrial development
- Enterprise restructuring and privatization
- Small- and medium-scale industry and rural industrial development
- Quality, standardization and metrology
- Industrial information
- Industrial statistics

Because industrialization itself calls for integrated strategies, UNIDO services are increasingly requested as integrated packages covering several dimensions of the problems to be solved. Their availability is subject to geographic, thematic and funding priorities, as well as human resource constraints of the Organization.

Geographically, priority is given to the group of least developed countries (LDCs) and the African region. In all regions, six programmatic themes further concentrate the Organization's programmes and projects into major thrust areas:

- Strategies, policies and institution-building for global economic integration
- Environment and energy
- Small and medium enterprises: policies, networking and basic technical support
- Innovation, productivity and quality for international competitiveness
- Industrial information, investment and technology promotion
- Rural industrial development

Alongside the major thrust areas, UNIDO responds to other requests in accordance with the priorities assigned to each industrial sub-sector. Highest priority sub-sectors are those having significant overall importance for developing countries, high employment potential, and where ability to use local resources and technological innovation is important. Priorities are also determined by the thematic, geographical and other interests of the main sources of project funding for industrial development: United Nations Development Programme (UNDP), Montreal Protocol on Substances that Deplete the Ozone Layer, voluntary contributions of Governments to the Industrial Development Fund, the UNIDO regular budget and the Global Environment Facility.

Industrial policies and private sector development

The growing consensus on the effectiveness of market mechanisms for bolstering growth is reflected in a strong emphasis on private sector development, and in policies that set up a conducive environment and ensure fair play of market forces. Industrial policy support concentrates on enhancing competitiveness, bringing transparency to industrial markets, and helping develop appropriate regulatory frameworks. UNIDO's strategy combines an integrated package of products and services that address concerns at the policy, institutional and enterprise levels. UNIDO's assistance strengthens national and regional capacities for formulating and implementing industrial strategies and policies to enhance the productivity and competitiveness of the private sector. Policy issues include management and development of human, financial, technological, administrative, information and natural resources. Activities involve marketing, staff training, building databases and creating software.

Operational support for sectoral development

UNIDO provides wide-ranging technological support to three key industrial sectors: agro-based industries, chemical industries, and the engineering and metallurgical industries. Assistance extends from state-of-the-art analytical studies and assessments of production and technological trends to technical support to institutions, and to formulation, implementation and appraisal of sectoral programmes and projects. Each sector and sub-sector is supported with: training; provision of expertise in production, engineering design and quality control systems; advice on harmonizing codes and standards, and on integrated programmes for improving quality.

For the agro-based industries, support in the form of policy, strategy and technical advice extends from local processing of food products and leather to manufacturing of textiles, garments and wood products. Services to the chemical industry cover petroleum refining, petrochemicals, pharmaceuticals, agro-chemicals, building materials and mineral-based industries. Support to engineering and metallurgical industries focuses on machinery manufacture, computer applications, transportation, packaging techniques, and environmental and energy equipment. Special services are provided to the chemicals and engineering industries in connection with the implementation of the Montreal Protocol.

Investment promotion

Linked with technology services through UNIDO's Investment and Technological Partnership Initiative, investment promotion assists governments to formulate and assess policies and strategies. At the institutional level, they are encouraged to

build up capacity to formulate and promote investment projects. Investment services for enterprises include identification of opportunities, preparation of feasibility studies, negotiation of investment projects and identification or mobilization of financial resources. UNIDO's tools include databanks, forums such as Techmart and Invesmart, training programmes, manuals, software packages, and studies.

Technology for competitiveness

As a basis for integrated regional, subregional and national programmes, UNIDO advises on policies and strategies, assesses national innovation systems, provides access to technological information, supports technology acquisition and transfer, and monitors developments in new and generic technologies. Policy advice covers all elements critical to the use of technology for competitiveness; building up technological capabilities, including investing in human capital; strengthening national innovation systems; managing technological change effectively; acquiring foreign technology efficiently; and improving, upgrading and developing technology. UNIDO's national programmes therefore tackle the gamut of integrated policy, institutional and enterprise concerns. They provide packages of selected services designed to meet specific country needs.

Environment and energy

UNIDO promotes cleaner industrialization by building ecologically sustainable development (ESID) into all its activities. The Organization works with developing countries to integrate ESID strategies into their national development strategies, identifying policy and supportive measures needed by industry to meet agreed goals at the least social cost, and to encourage cleaner production. To improve and optimize production processes, UNIDO co-supports national cleaner production centres in approximately 20 countries, and also offers support at the enterprise level. At the international level, UNIDO cooperates in preparing sub-sector-specific guidelines on pollution prevention and abatement. A self-learning training course on environmental management can be supplemented by sector- and subject-oriented courses.

For energy conservation, activities address the provision of environmentally sound energy (including low- and non-waste technologies, and alternative sources of energy), and the ability of developing countries to respond to concerns arising from increased energy consumption.

Human resource development

While human resource development (HRD) is acknowledged as a priority investment, developing countries suffer from a lack of well-trained industrial personnel at managerial, professional and technical levels. UNIDO offers advice to policy makers, emphasizing interactive linkages between the education system, training schemes, and industry. Institutions are supported through the training of trainers and managers, and through training instruments addressing select themes and sub-sectors. At sub-sectoral and enterprise levels, UNIDO assists in developing and implementing HRD programmes and activities in key areas. The Organization's HRD activities include in-plant training, group training programmes, individual fellowships, study tours and ad hoc training programmes in specific areas of industry, including the integration of women.

- Women in industrial development** *A systematic, programmatic plan of action for the integration of women in industrial development features either "mainstreaming" or "women-specific" project approaches. Through development of such practical tools as a database on women in industry, and research and policy advice, and implementation of technical cooperation projects, UNIDO promotes activities for women entrepreneurs in small and medium enterprises (SMEs) and micro-enterprises, emphasizing the strengthening of associations and linkages to resource and service networks. Activities include a training programme for women entrepreneurs in the food processing industry, assistance to women entrepreneurs in various sub-sectors, and training programmes for women in the transition economies.*
- Enterprise restructuring and privatization** *The need to restructure large industrial plants in the public sector is a major issue for many developing countries and economies in transition. Normally undertaken to increase efficiency, economic performance and competitiveness, enterprise restructuring is now also perceived as a means of attracting potential private sector investors to an enterprise slated for privatization.*
- UNIDO's restructuring strategy offers an integrated, interdisciplinary approach encompassing an enterprise's four major functions, namely, purchasing, production, sales, and management. The Organization offers assistance at all levels and phases, and in every aspect of the process, i.e. finance, technological upgrading, production and operations, and physical and ownership restructuring. UNIDO fields multidisciplinary teams, offers unbiased assessment and advice, and is committed to ensuring adherence to international standards for the quality of products and services.*
- Responding to the global trend towards privatization, UNIDO has developed a comprehensive support programme on privatization. This covers the range of services required in large-scale privatization, including economic, technical, promotional, financial, legal, human resource, social and ecological issues. Areas of specialized expertise include policy advice, enterprise diagnostics, assessment of technical requirements in specific enterprises and sectors, financial analysis, identification of potential investors, and design of a social safety net.*
- In addition to direct technical assistance, UNIDO reviews the results of specialized firms such as auditors and valuers, and the promotional activities of investment banks. This honest broker role helps avoid unbalanced deals.*
- Small- and medium-scale industry and rural industrial development** *In the new global economy, SMEs are emerging as the prime engine of industrial growth in most developing countries. UNIDO's strategy for promoting dynamic, efficient SME sectors strengthens national capacities through comprehensive, integrated technical support. In addition to policy advice, the SME programme encourages SME associations to develop joint activities and cooperation among their members; it promotes institutions that support SMEs in areas such as entrepreneurship development, inter-firm cooperation, and dialogue between the government and the private sector. Support is also given to public and private specialized institutions that provide specific help to SMEs such as information on markets, trends and technologies; management advice and technological support services including product design and quality management, and managerial and*

technical training; and facilitating access to finance, and assisting in the identification of business partners.

Focusing on industry in rural areas is increasingly emerging as a key element of their development. The opportunities that rural industry offers for the socio-economic transformation of rural areas call for the effective integration of rural industrial development into national industrial programmes. UNIDO offers integrated, coordinated support, ranging from advice on policies designed to decentralize production to direct interventions in rural areas, including the informal sector. Assistance, mostly in the form of technical cooperation activities, features advice to policy makers in simplifying rules and eliminating biases that disadvantage small industries, and institution-building to improve the management and production skills of small and micro-enterprises and to increase their access to industrial services and financial resources. Interventions at the enterprise level increase the marketability of rural labour within the locality, and focus on the processing of farm products.

Quality, standardization and metrology

ISO 9000 is one tool within a complex system of continuous process and product improvement. However, for sustainable market performance, companies must go beyond ISO 9000 to comprehensive systems that generate continuous improvements in quality, cost and flexibility. The crucial issue determining competitive success is the ability of managers to create production systems that channel all the resources of the enterprise towards improving products and processes.

UNIDO offers comprehensive assistance for national quality, standardization and metrology endeavours, including advice on policies, and activities at the institutional and enterprise levels. UNIDO's own ISO 9000 approach is a programme for the implementation of Total Quality Management (TQM) systems and continuous improvement of the overall production process, from product design to customer delivery, including the integration of user-friendly and precise instruments for measuring the technical as well as the managerial performance of the enterprise. The programme includes implementation of TQM in enterprises, application of statistical process control, preparation for ISO 9000 certification, ISO diagnostics at the plant level, assessment methodologies for product certification, continuous operational performance evaluation, computerized production and business performance evaluation, and strengthening strategic planning and decision-making capabilities. UNIDO also assists in setting up centres for productivity and quality, and in rehabilitating metrology laboratories.

Industrial information

UNIDO supports transfer of appropriate information on markets, industrial production, technological developments, and potential sources of investment and technology through both global and country-level research and promotion of national information systems. Research is published in the form of annual reports on global industrial development and in country industrial reviews. Through its Industrial and Technological Information Bank, the Organization assists in development of national information systems through technological and market information networks, industrial information services for SMEs and comprehensive national systems support by the private sector. The Organization also offers a range of innovative tools such as Techmart (a business forum for pre-matched

seekers and suppliers of technology), the International Referral System (an inventory of all the specialized sources of information in each Member State).

Industrial statistics *UNIDO is virtually alone among development institutions in offering technical assistance in the field of collecting and disseminating the industrial statistics of developing countries and transition economies. The emphasis is on turning statistics into information for decision makers in private industry, and on serving a wide audience including private industrialists, policy makers and potential investors. To this end, UNIDO has developed a generally applicable package of methodologies, procedures and tools. The National Industrial Statistics Programme (NISP) offers projects based on a complete yet flexible software system.*

NISP offers the double advantage of cost-effectiveness and quality improvement, as well as the obvious benefits of access to accurate information on industrial trends. The outcome of a NISP project would typically include trained, self-sufficient staff, and the capability to provide customized returns and to generate analytical indicators, among other features. NISP encourages collector and user cooperation, and offers each country a means to adapt its industrial data classification to conform with the latest International Standard Industrial Classification (ISIC) system.

Scope and Priorities

For most developing countries, industrialization is the cornerstone of socio-economic progress, a crucial engine of economic growth. As their industrial development activities expanded over the last four or five decades, developing country governments turned particularly to the social and economic programmes of the United Nations for help. The international community's response was the United Nations Industrial Development Organization (UNIDO), set up in Vienna in 1967. Its mandate: to promote and accelerate industrial development in developing countries.

This *Handbook* describes UNIDO's current services for the industrial development of not only developing countries but also countries in transition from centrally-planned to market economies. The services reflect an updated view of the goals and mechanisms that work for countries at differing stages of industrial development in the social and economic circumstances of the second half of the 1990s. The development objectives to which each service responds, the importance of integrating it into a package tailored to specific country requirements, and the framework of priorities governing its use in particular situations are outlined below.

The service descriptions and other information are intended for government departments and agencies in all countries where industrial development is a concern—be they beneficiaries, or providers of funds and service components. The *Handbook* will also guide industrial bodies and institutions, chambers of commerce, business organizations, industrial research institutions, non-governmental bodies involved in industry, and institutions and enterprises involved in industrial and technological development as to what they can expect from UNIDO as an international centre devoted to industrial development issues and services.

Changing scenario

Over the last two decades, UNIDO has undertaken a wide range of activities in support of industrialization in many developing countries. Despite considerable industrial and technological progress in some of them, and the notably high rates of growth in several South-East Asian economies, there is a continuing need for specialized industrial support services in all developing regions. This is most marked in the least developed countries (LDCs) and African developing economies where the pace of industrial growth remains very unsatisfactory. What has changed in the 1990s is the nature of industrial support services developing countries require. Emphasis on the private sector, the market orientation in most countries, rapid changes in the global economic environment as a result of technological innovations, and increased globalization mean that support services for industry are increasingly complex. On one side they must

be geared to greater competitive capability; on the other they should encourage socially and environmentally sustainable growth.

In response to changing demand, UNIDO too has changed. Following a period of extensive reorientation and restructuring during 1993-1994, UNIDO has emerged as a service organization, dealing primarily with industrial development on an integrated basis and at different levels of development. The integrated approach responds to the multidisciplinary nature of modern industrial development. It features linked components for enhancing competitive skills, raising quality standards, and making manufacturing environmentally sustainable. Industry is also a major instrument for achieving equitable growth, providing a source of employment and generating incomes and improving living standards for vulnerable sections of the community. Integrated industrial development also underpins the efforts of all the actors involved: governments, institutions, universities and non-governmental organizations (NGOs), as well as public and private enterprises, in achieving social and economic goals.

Development objectives

No two countries are alike. Even apparently similar neighbours differ widely in their national and regional priorities and requirements. Nevertheless, in building up their industrial capacity, developing countries share several broad objectives. The services described in the following pages are conceived in the framework of those objectives and structured to respond to demand. The objectives themselves were approved at the Fifth General Conference of UNIDO in December 1993 and can be summarized as follows:

- **Industrial and technological growth and competitiveness:** accelerated industrialization, combined with competitive technological applications and quality standards, and production efficiency as a *sine qua non* for competitiveness in a global economy characterized by liberalized trade, globalized industry and rapidly changing technologies.
- **Equitable development through industrial development:** industrial growth perceived as a major instrument for bringing about socio-economic development; industrial development seen as a major instrument for achieving social progress—through employment creation, regional development and poverty alleviation.
- **International cooperation in investment and technology:** promotion of foreign direct investment, joint ventures, strategic partnerships, technology licensing agreements, and other contractual linkages and arrangements between enterprises in different countries, to increase efficiency, capability and competitiveness.
- **Development of human resources for industry:** enhanced human capacity to meet industrial objectives in the form of upgraded knowledge, specialized skills and experience in entrepreneurship, management, technology acquisition, absorption and adaptation, research and design, and the capability for competitive production or services.
- **Environmentally sustainable industrial development:** harmonization of

industrial strategies and programmes with the needs of the environment in terms of reducing industrial pollution and degradation; use of sector-specific clean production concepts, selection and transfer of environmentally suitable technologies; phasing out of ozone-depleting substances and ensuring improved energy efficiency in production processes.

Each objective requires specialized services at policy and institutional levels that impact on enterprises and on their competitive efficiency and capability. For practical reasons, most services to enterprises themselves are channelled through institutions and organized industrial groups such as chambers of commerce and industry, and manufacturers' or business associations. Exceptions are cases of enterprise restructuring or privatization of state-owned industrial enterprises, and where promotional linkages are sought between enterprises in different countries for investment, technology or other forms of cooperation or participation.

UNIDO provides 12 major groups of services (see box 1). Subject to a system of priorities described below, they relate to one or more of the five development objectives above, and they apply primarily at the policy, institutional and enterprise levels.

Integrated industrialization strategies

The industrialization process ideally follows an integrated strategy covering interrelated functions, services and programmes. Too often, functions such as investment promotion, development of small or medium industries or entrepreneurial development are pursued separately. They should, however, be seen as part of a broader process of integrated and sustainable industrial growth. While important prerequisites for such growth include political and macroeconomic stability, these have to be combined with adequate physical infrastructure—facilities such as power generation, transportation and communications—and a broad range of basic policy and institutional elements. These include: creation of a conducive climate for mobilizing private sector investment, both domestic and foreign; promotion of foreign direct investment and technology transfer arrangements; restructuring and/or privatization of state-owned industrial enterprises; institutional support for entrepreneurship development; technological assistance and promotion of small, medium, and micro-industries;

Box 1

UNIDO services

- Industrial policies and private sector development
- Operational support for sectoral development
- Investment promotion
- Technology for competitiveness
- Environment and energy
- Human resource development
- Women in industrial development
- Enterprise restructuring and privatization
- Small- and medium-scale industry and rural industrial development
- Quality, standardization and metrology
- Industrial information
- Industrial statistics

promotion of rural industrial development; and ensuring that industrial growth at various levels and in different sub-sectors is environmentally sustainable. It is also vital that these functions, and the programmes relating to their activities, are effectively integrated. For example, promoting foreign direct investment and technology inflow has to be linked with development of local entrepreneurship and small and medium enterprises (SMEs). SME development itself includes several services: promotional policies and incentives, financial, technological and marketing support in various industrial sub-sectors, strengthening of national institutions, integration of environmental requirements, and the development of enterprise-to-enterprise relationships. It is the provision of such an integrated industrial growth strategy that constitutes UNIDO's principal strength and expertise in the context of different industrial sub-sectors and varying country situations. Broad goals such as accelerated industrial growth and greater competitiveness also call on nearly all of UNIDO's specialized services including use and development of competitive technologies, and quality and standardization (see box 2).

The need for an integrated approach to industrialization is all the greater because of recent global economic developments. Liberalization of trade following the Uruguay Round Agreements, globalization of communications and markets, innovative technological developments in most fields—not only the high-tech, but also nearly all areas of production and industrial services—are significantly changing the location of comparative advantages. They are also a significant source of employment pressure. As a result, increased competitiveness and export orientation of private sector enterprises are emerging as major objectives of industrial policy. At the same time, there is growing pressure to use industrial development itself as an instrument for equitable socio-economic growth and promotion of social goals, such as job creation, higher household incomes in poorer regions of each country, and advancement of women and other vulnerable sections of the population.

Service priorities

The demand for UNIDO services is broad, and their availability is necessarily subject to constraints of human resources and funding. Financial considerations (including the interests and priorities of various sources of funding) are discussed in the following section. In addition, UNIDO has its own priorities. Geographically, highest priority goes to the least developed countries (LDCs) and Africa (see box 3). Their share, already over 40 per cent of country-specific and intercountry projects, is expected to increase further, as set out in the Yaoundé Declaration*. The focus will include activities linking industry with agriculture. In all developing regions, six substantive themes further concentrate the way resources are deployed:

- Strategies, policies and institution-building for global economic integration
- Environment and energy
- SMEs: policies, networking and basic technical support
- Innovation, productivity and quality for international competitiveness
- Industrial information, investment and technology promotion
- Rural industrial development

* The Yaoundé Declaration, adopted at the Fifth General Conference of UNIDO in 1993, calls on UNIDO to give special attention to LDCs that face particular constraints on their resources and infrastructure, and to accord priority to the industrialization of Africa and the objectives of the second Industrial Development Decade for Africa (IDDA).

These six themes plus the concentration on LDCs and Africa constitute the fundamental thrust of the Organization for the period 1996–1997. They focus the application of UNIDO's services in the context of the overall development objectives as indicated in figure 1. The main activities foreseen for each thrust area, and the services required for each one, are summarized in annex 1.

Closely related to the major thrust areas, UNIDO's response to requests depends on its sub-sectoral prioritization. The sectoral focus accommodates the

Box 2

Integrated services

A comprehensive response to the complexities of the late 1990s requires an integrated approach to industrial development bringing several services to bear on problems at the same time. The broader the goal, the greater the variety of services. The overall objective of industrial and technological growth, for example, calls for close interaction between:

- Supply of specialized industrial information and statistical support
- Development of a climate conducive to mobilization of new investment
- Training and development of human resources for industry
- Achievement of competitive technological and quality standards in industrial products and manufacture
- Achievement of sustainable development in various sectors, including use of environmentally friendly, low-waste and low-energy technologies

The goal of equitable development through industrial growth similarly depends on the interplay of several elements ranging from policies and institutional measures to promote new investments (particularly through small, medium and micro-enterprises), dispersal of industry to less developed regions, development of entrepreneurship, building technological and managerial capability, provision of credit, technology and marketing expertise, and a range of services for advancing the role of women in and through industrial development.

Given the potential for complementarity and synergy between specialized support services, UNIDO offers them as integrated packages, geared to the immediate problems to be solved and the context of the country or region involved. For example, enterprise restructuring and rehabilitation requires interlinking the use of competitive, environmentally suitable technologies, and improving quality standards. Sectoral support for sustainable development will often involve environmental considerations, as well as use of cleaner technologies and technological processes as an essential element of sustainable industrial growth.

The ability to effect combinations of several industrial services in order to tackle the wide-ranging problems of industrial growth is a major asset in a large multidisciplinary organization like UNIDO. Its integrated approach to industrial development enables the functions and services it carries out to interact in order to provide solutions to problems posed by the needs of industrialization in particular country situations and in various industrial sub-sectors.

Box 3

Geographical priorities

Priority is given to LDCs and Africa.

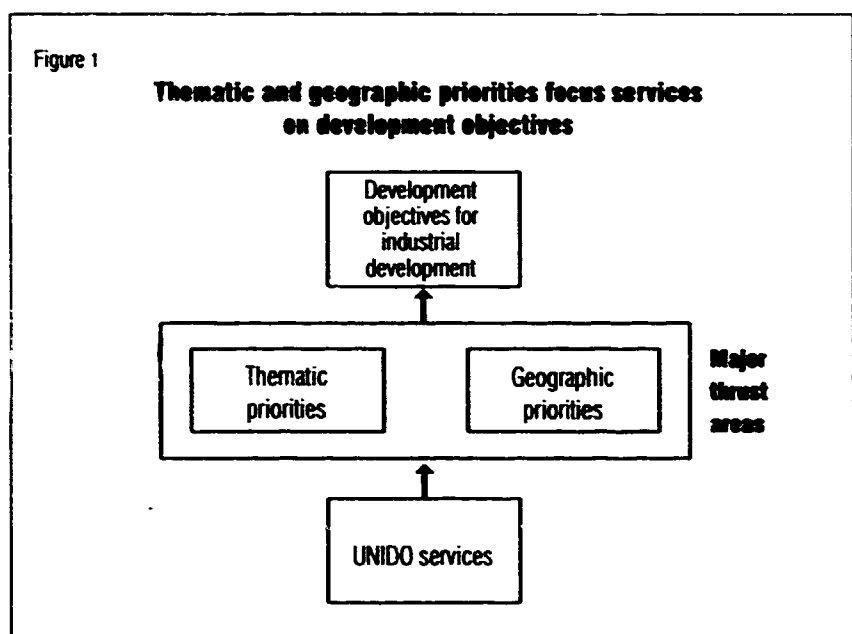
UNIDO's objective is to develop integrated industrial programmes for each LDC, reflecting its own national priorities. Such programmes typically feature initiatives to create an appropriate climate for new investment—both domestic and foreign. They also develop national entrepreneurship and institutional, financial, technological and marketing support for small-, medium and micro-scale industrial enterprises and industrial services for rural industrial development.

UNIDO's priority theme for Africa and LDCs—*Linking Industry with Agriculture*—concentrates on four aspects: analytical activities and industrial policy advice, agro-processing (food, leather, wood, natural fibres and other materials), agricultural equipment, fertilizers and pesticides. Policy advice includes initiatives to enhance private sector development, promote foreign direct investment and develop human resources. Agro-processing concentrates on adding value to agricultural products as a stimulus to agricultural production and income. Integrated programmes are developed for manufacture of agricultural machinery in selected countries, covering product design, assistance with mechanical engineering and production aspects, human resource development, promotional policies, distribution arrangements and repair and maintenance. UNIDO's aim with respect to fertilizers and pesticides is to bring about their cost-efficient availability in LDCs and African countries.

need to maintain a broad knowledge of technical, economic and organizational issues of industrial development in key sub-sectors. It is this critical mass of experience and expertise that enables governments to call on UNIDO for programme and development work and to provide upstream advisory services. This capacity is also necessary for management of technical cooperation projects, where it complements the highly specialized inputs of external experts and consulting firms. UNIDO's activities are, nevertheless, regularly reviewed at sub-sector level and assigned a high or low priority or no priority.

Services for sub-sectors with high priority, because of their overall importance to developing countries in terms of employment potential, local resource processing, technological innovation and other criteria, benefit directly from UNIDO's core staff expertise. UNIDO possesses unique experience and capability, and significant competitive advantage over other international bodies in those areas. As a multidisciplinary organization, it also retains senior technical personnel experienced in the high priority sub-sectors, who work closely with several policy experts, economists and business specialists. UNIDO can therefore provide a wide range of specialized technical services not available from other international bodies. Moreover, they are geared to developing countries at differing levels of industrial development.

Sub-sectors with lower priority are addressed at the level of horizontal (cross-sectoral) issues such as human resource development (HRD), the environment and investment promotion. For such work, specialized expertise is drawn on



from outside the Organization when required. Annex 2 shows the priority assigned to sub-sectors for the period 1996-1997.

The above system of priorities automatically gives preference to particular services required in areas of major thrust and high sub-sectoral priority. Sub-sectors such as agro-processing and agro-based industries, including manufacture of food products, receive top priority in most African countries and LDCs. In most developing countries, services in many industrial sub-sectors can be offered in the context of policies and networking for SMEs, e.g., textiles and apparel, leather products, wood, glass, cement, paper and paper products, basic industrial chemicals, fertilizers and pesticides, agricultural and transport equipment, metal and woodworking machinery, and fabricated metal products. Export-oriented production can be developed in the same sub-sectors in the context of innovation, productivity, and quality for international competitiveness.

In the more industrialized developing countries, support services at the sub-sectoral level largely concentrate on developing increased competitiveness through information on new and competitive technologies, promotion of enterprise-to-enterprise relationships and development and certification of quality standards for various locally manufactured products.

The overall approach is to deliver services above all to countries having greatest need—LDCs and the African region generally—to develop the human resources required for successful industrialization, to promote and develop the small and medium-scale sectors as the nucleus of employment and social progress, and to solve industry-related problems having significant environmental content. Lower priority, therefore, is accorded to technical assistance and services to large-

scale industry, except in the context of restructuring or privatization of state-owned enterprises.

Financing of UNIDO services

UNIDO is an executing agency, not a funding one. Nevertheless, as befits an international organization whose core funding comes from governments, it provides many services free of charge. Participants in investment forums, technology markets, and most UNIDO-sponsored meetings and symposia pay only their own expenses. Many newsletters and other non-sales publications, reports and documents are distributed free of charge (see list, p. 73).

The Organization's own regular budget, however, cannot support projects to assist developing countries that entail significant costs. Beneficiary governments and, increasingly, private firms use their own funds to pay for services that UNIDO supplies, essentially, at cost. With the help of UNIDO's own funds-management experts, project funding may be available from other sources. The four most frequently accessed are: (a) funding organizations within the United Nations (UN) system (UNDP and others); (b) donor and beneficiary governments; (c) the industrial sector; and (d) development finance institutions.

The main funding sources for industrial projects are:

- *United Nations Development Programme (UNDP)*—Despite declines in voluntary contributions, UNDP remains a major source of funding for UN projects in LDCs and large middle-income countries with strong industrial development programmes of their own, such as China and India. UNDP funds help support inter-agency projects carried out by UNIDO in conjunction with ILO, FAO, UNESCO, WHO and others.
- *Other UN system funds*—Funds for industrial projects are available in the context of special needs such as: (a) post-emergency assistance (with UNHCR); (b) crop substitution and alternative economic activities in narcotic-plant-producing countries (UNDCP); and (c) for adding value to minerals and agricultural raw materials (Common Fund for Commodities). UNIDO is a designated executing agency for law-enforcement and other drug-control projects funded by UNDCP.
- *Industrial Development Fund (IDF)*—Voluntary contributions pledged biannually by governments and intergovernmental institutions fall into three categories: general purpose (unrestricted), special purpose (earmarked by donors for certain uses) and tied special purpose (with bidding restricted to the donor country). A total of some \$30 million was available for the year 1995. The IDF is used preferentially for development of SMEs, HRD, environmentally sustainable industrial development, technology cooperation, and information dissemination and exchange.
- *Self-financed trust funds*—Self-financed trust funds facilitate provision of services directly to industrial enterprises, which can be both the beneficiaries or service buyers. The mechanism is particularly favoured by companies seeking UNIDO's skills and experience. These may be tailored to cover any or all aspects of a project: obtaining and monitoring expert services, organizing training, procuring equipment, planning and project management.

- *Third-party trust funds*—Similar to self-financed trust funds, third-party trust funds mobilize financing available from international development finance institutions such as the World Bank and from regional institutions such as the African Development Bank, the Asian Development Bank, the European Bank of Reconstruction and Development, and the Inter-American Development Bank. The trust funds are established jointly between the client, the financing institution and UNIDO on the basis of grants made available to governmental or other organizations. Similar arrangements are foreseen with selected subregional and national development banks and some commercial banks.
- *Agreements and protocols*—Environment-related and chemical safety projects may also be funded under the Montreal Protocol on Substances that Deplete the Ozone Layer, the Global Environment Facility, Capacity 21 and the Basel Convention (see below).
- *Multilateral Fund (MF) for the Implementation of the Montreal Protocol*—This fund is available primarily to deal with environmental programmes. UNIDO became a major implementing agency under MF in 1992, and is expected to implement a significantly increasing number of projects using such funds in the next few years.
- *Global Environment Facility (GEF)*—This source is available for projects to prevent global warming, to protect international waters, to preserve biological diversity and to prevent depletion of the ozone layer.
- *Capacity 21*—This capacity-building programme supports Agenda 21 of the Rio Declaration on Environment and Development. UNIDO may review national development plans and assist in the formulation of national Agenda 21 and associated strategies. It may assess national capacity to implement Agenda 21 and national development plans, formulate capacity-building programmes and assist in their implementation.
- *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*—This source supports projects for the management and proper disposal of hazardous waste.

Procedures for processing requests for UNIDO services

The delivery of most UNIDO services requires project formulation and prior approval by the government of the country concerned. Users of UNIDO resources, whether they are clients within the government itself, institutions, other organizations or private sector associations and enterprises, may request services either through the appropriate government office or through the Organization's field offices (UNIDO country directors) or the offices of the United Nations resident coordinators. Requests may also be forwarded directly to UNIDO Headquarters through the office of the Managing Director, Country Strategy and Programme Development Division, or directly to the managing director of the implementing division concerned.

Each request is rapidly processed. Steps include assessment for relevance and priority, project design, project approval, funds mobilization, project

implementation and evaluation. Following initial assessment, the division or branch concerned sets up special teams, depending on the services required, to manage the project through to implementation and post-project evaluation.

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UNIDO Services

- **Industrial policies and private sector development**
- **Operational support for sectoral development**
- **Investment promotion**
- **Technology for competitiveness**
- **Environment and energy**
- **Human resource development**
- **Women in industrial development**
- **Enterprise restructuring and privatization**
- **Small- and medium-scale industry and rural industrial development**
- **Quality, standardization and metrology**
- **Industrial information**
- **Industrial statistics**

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Industrial Policies and Private Sector Development

Market mechanisms are both a source of growth and a means to efficient allocation of resources. Consensus on their effectiveness has paved the way for far-reaching economic reforms not only in developing countries but also in countries in transition. In industrial policy terms, this is reflected in increased emphasis on market orientation and private sector development. The role of the state is increasingly one of selective intervention, focused especially on developing a conducive investment environment, ensuring fair play of market forces and promoting a process of industrialization compatible with social development and environmental protection. In both groups of countries, extensive privatization programmes have been framed either to reduce budget deficits through outright or partial divestiture, or to let market mechanisms steer industrial restructuring consistent with underlying comparative advantages. UNIDO support services focus primarily on aspects of industrial policies and procedures designed to promote increased private sector development. Support services for *Enterprise Restructuring and Privatization* are dealt with in a separate section (see page 46).

Prospects and constraints

While microeconomic reforms have been successful in several countries, the response from industrial enterprises in many others has been less than adequate. Macroeconomic stability itself has proven to be a necessary, but not a sufficient condition for industrialization. There remains, therefore, considerable scope for industrial policies that create the necessary prerequisites and environment for reactivating the industrial sector. Preconditions for successful industrial policy implementation are the same as those for encouraging long-term capital formation, namely economic and political stability. But long-term vision, strategies and policies, with active participation of governments, the private sector and non-governmental organizations are fundamental, particularly in early and critical stages of industrialization.

National strategies

Elements of national industrial strategies, which may be implicit or explicit, include: macroeconomic and legal frameworks for developing the industrial sector, particularly the mobilization of new industrial investment; implementation of privatization programmes; related industrial, trade, taxation and investment policies; and supporting administrative and regulatory procedures. An enabling environment also calls for strategies covering HRD, technology acquisition and development, standardization and quality improvement, and increased productivity and competitiveness.

It is also necessary to provide or improve the institutional infrastructure, such as that for promoting new investment, for financial and technological support to SMEs, and for rural and industrial development. Governments invest in the physical infrastructure such as industrial parks, incubators and export processing zones. They support industry associations and chambers of commerce, and they encourage organizations providing specialized industrial services such as technical consultancy, product design and quality standardization.

In the context of liberalized trade regimes and other features of economic reform programmes, national strategy also increasingly includes mechanisms to ensure competitive technological processes, effective technology transfer, inflow of foreign direct investment and technology, availability of skilled and specialized human resources, and use of competitive production and marketing practices.

UNIDO services

UNIDO's services with respect to industrial policies support creation of market-based competitive economic systems. The services feature advice and assistance to adjust the role of governments to ensuring adequate competition, promoting new investment, achieving quality standards, meeting environmental and social requirements and enabling more active participation of the private sector in the industrialization process, including in policy formulation and institutional support. UNIDO advises governments on industrial strategies and policies; it assists in the restructuring and strengthening of ministries of industry and related authorities; it establishes information systems and organizes seminars on the respective roles of governments, institutions and private industry. UNIDO also undertakes policy analyses, reviews, projections and scenario analyses and, on the basis of resource surveys, recommends resource management programmes. High priority is given to industrial development plans and programmes for less developed or disadvantaged regions and for decentralization of industry. UNIDO also advises on the creation of governmental bodies for regional development.

Services in support of private sector development are targeted on the needs of both governments and industry. UNIDO directly assists in the establishment of industrial estates, technology parks and export processing zones. Assistance strengthens chambers of commerce and industry, manufacturers' associations and other NGOs in the services they render to industry. UNIDO helps set up mechanisms for consultations between institutions and the government, and for cooperation between industry and research, scientific and educational institutions. UNIDO can also develop or strengthen the capacity of consulting firms and non-profit institutions to render industry-related services.

In all cases, UNIDO's support concentrates on enhancing competitiveness and innovation, on increasing the transparency of markets, and on developing appropriate regulatory frameworks. Support to the enterprise sector, except in specific well-defined cases, is largely indirect and available to all, and promotes new entries.

UNIDO instruments

The main strategy instruments and mechanisms in support of industrial policy are high-level advisory services, institution-building, workshops and studies and direct project assistance. Policy advice is particularly useful in areas of private sector development. The advice itself ranges from specific policy recommendations (see Zimbabwe example, box 4) to industrial policy inputs on trade, investment or fiscal matters, including the enabling legal and regulatory environments. Policy advice is also provided at various stages of privatization (see also *Enterprise Restructuring and Privatization*, p. 46).

Box 4

Examples of UNIDO policy support

- **Advice.** In Zimbabwe, UNIDO industrial economists helped revise a draft industrial policy statement. Inputs emphasized fair distribution of growth across industry and measures to stimulate linkages between firms through backward and forward integration and cooperation.
- **Technical cooperation.** UNIDO worked with Albania's Ministry of Industry, Mineral Resources and Energy to assess staff resources and propose a restructuring plan commensurate with the Ministry's new role in a market economy. UNIDO also provided related training, workshops and study tours.
- **Awareness building.** In Algeria, a workshop on industrial restructuring in the context of policy reforms focused on long-term issues of industrial growth, prerequisites for successful privatization, privatization instruments, institutional set-up, and the government-industry interface for formulating industrial policy.

Establishing or strengthening organizations such as chambers of commerce and industry and professional associations calls for inputs such as drafting statutes and elaborating organizational charts and related working procedures. UNIDO proposes clearly-delineated mandates, offers appropriate staff training, and networking with other chambers or federations. UNIDO also strengthens these organizations' capabilities for providing advisory and support services of various types to industrial enterprises.

To support export processing zones, industrial estates, technology parks and other dedicated centres, UNIDO advises on policy guidelines and provides assistance in pre-feasibility studies, management, operations, and with establishing legal and organizational frameworks.

Main priorities **Highest priority** is accorded to industrial development programmes for less developed or disadvantaged regions, and for decentralization and dispersal of industry. Advisory services on industrial policies and strategies feature primarily regional development policies, drafting of national policy statements, investment policies, quality and productivity, planning, pre- and post-privatization services, and transitional strategies.

Top priority in restructuring and strengthening of ministries and related bodies is given to defining objectives, setting up organizational structures with new functions, and drafting terms of reference. Priority is also given to development of industrial estates, industrial and technology parks, and export processing zones.

Priority in restructuring and strengthening chambers of commerce and industry, industrial associations etc. relates to defining their objectives, drafting statutes, designing organizational structures, and elaborating work procedures, programmes and methods of self-financing. These bodies are also assisted with training programmes.

Operational Support for Sectoral Development

Nationally, industrial strategy focuses increasingly on how specific industries can be competitive and environmentally friendly, and how they can grow along sustainable development paths in particular country situations. UNIDO's specialized capability for this stems from the wide-ranging technological support the Organization provides for the priority sub-sectors, i.e. the manufacturing industries of prime importance to developing countries. In addition to a pool of competent and knowledgeable technical specialists it maintains in priority areas, UNIDO also fields and monitors a network of international experts with specialized or interdisciplinary skills and experience. Between them they provide a wide range of technical support services at the sub-sectoral level. UNIDO's most experienced senior staff are also available to governments, their industrial organizations and financial institutions to diagnose problems in the main sub-sectors and to make unbiased recommendations.

Sustainable industrial development depends on a successful combination of many elements—from capital investment and application of technology to development of human skills and use of management systems for competitive quality production. Together they increase output, make manufacturing more efficient, and minimize its impact on the environment. Practical technological assistance and essential industrial services for competitive and sustainable production have to focus, therefore, on the level of particular industrial sub-sectors. First-hand knowledge of technology, production and economies of manufacturing industrial goods and commodities, including the impact on them of the newer generic technologies, is thus fundamental. Such knowledge, coupled with experience in applying it in developing country environments, is an essential prerequisite for developing policies, helping enterprises with production and marketing, and providing services in a sustainable and economically viable manner. Policies, strategies and other support for industrial development, particularly technological assistance and enhancement of human skills, must be rooted in the prospects, constraints and needs of entrepreneurs and their enterprises expressed at the sub-sector level. Effective sub-sectoral support is, therefore, the linch-pin of services for industrial development, drawing on other services as needed, and providing them with a practical focus for their own interventions.

Prospects and constraints

Trade liberalization and globalization of industrial production offers new opportunities for efficient producers. Failure to modernize, however, exposes them to price competition and loss of markets for products that ignore technical standards, environmental criteria and quality demands. Both impact adversely on wage levels and profits. Small- and medium-scale industry in developing countries particularly needs to modernize by acquiring and absorbing labour-saving, energy-efficient and environmentally sound technologies, and by introducing modern quality-oriented management systems. A key task for governments in addressing the needs of industrial sub-sectors is to design strategies and to provide or supplement industrial support systems for small- and medium-sized firms at each sub-sector level. Support ranges from introduction

of quality standards to training, from technology support to access to credit, finance, market intelligence and specific support for export-oriented production.

National strategies

With the private sector taking over the primary role in industrial development, governments are concentrating on creating enabling environments consistent with competitiveness and sustainability. This means adopting conducive sectoral and sub-sectoral policies, and providing institutional support in terms of access to industrial information on appropriate technologies, and a technological infrastructure that enhances the local capability to absorb and adapt technologies and to apply modern management methods.

In developing countries, strategies capitalize on the opportunities presented by raw materials and markets, while recognizing the constraints of the industrial environment and those markets. Increasingly they acknowledge also a growing number of international conventions and agreements, such as Agenda 21, the Montreal Protocol, the Basel Convention on hazardous wastes and toxic chemicals, and the United Nations Framework Convention on Climate Change. Compliance with such agreements calls for policy changes and, frequently, outside assistance in effecting them.

UNIDO services

A wide range of technological and other support services to enhance competitiveness and sustainability can be provided for the industries of special interest to developing countries. Interventions are specific, address particular time-bound needs of enterprises and sub-sectors, and provide the basis for comprehensive policy responses and institutional measures. UNIDO services therefore feature innovative tailor-made solutions that respond to changes in national environments and world markets.

Programmes address the specific requirements of industries at the sub-sector level, enhancing their abilities in process and product engineering, broadening their technology choice, and strengthening their technology acquisition and absorption capacity. Emphasis is on clean, low-waste, low-energy technologies and modern quality management systems required for competitive structures and environmentally sustainable industrial production. The programmes respond also to demands for services to assist in obtaining ISO 9000 certification of specific production units.

In three major industrial sectors—agro-industries, chemicals and engineering—UNIDO's own experts cover food, leather, wood, textiles, pharmaceuticals, rubber and plastics, petrochemicals, agro-chemicals, pulp and paper, non-metallic minerals, cement and other building materials, engineering goods, electronics and metallurgy. The services for each sector and sub-sector feature transfer of technology, training and other means of developing human resources, provision of expertise in production, engineering design and quality control systems, harmonizing codes and standards, and advising on integrated programmes for improving the quality of manufacture. Special services are provided to the chemicals and engineering industries in connection with the Montreal Protocol. In the elimination of ozone-depleting substances (ODS) under the Montreal Protocol, UNIDO advises on the replacement of chlorofluorocarbon (CFC)-based

products and manufacturing processes used in domestic, industrial and commercial refrigeration and air-conditioning, in cleaning solvents in electronic and mechanical industries and in fire-extinguishing systems.

Agro-based industries As agro-based industries are the most important industrial sector in many developing countries, their development significantly influences economic growth, employment opportunities in rural areas and integration of women into economic development. UNIDO services concentrate on food manufacturing, leather and leather processing, textiles and garments, wood processing and wood products. They help develop the competitiveness of high value-added agro-industrial products in domestic and international markets. They also modernize and rehabilitate production through improved technology, modern management methods, better trained personnel and quality management and marketing. Export-oriented industries, e.g. the leather, textile and food industries, receive specialized assistance with regard to new eco-labelling trends and ISO 9000 certification. In line with UNIDO's commitment to environmental sustainability, the introduction of cleaner technologies, rational use of natural resources and pollution abatement are an integral part of technical assistance to the sector.

In *food products*, emphasis is on improving technical efficiency of manufacture, quality management, identification of new agro-business opportunities, transfer of appropriate technologies, and technical upgrading of production capability and of research and training institutions. For *leather and leather products*, regional programmes improve hides, skins and semi-finished leather, introduce new product designs, develop support industries, and design and install tannery waste treatment systems. The approach includes pilot and industrial-scale demonstrations of leather preservation and processing methods, conversion of solid waste into saleable by-products, and strict process control. In the *textile and garment industry*, technical assistance covers fibre raw materials, and textile processing from spinning and weaving to dyeing, printing, finishing and garment manufacture. Assistance concentrates on optimizing wet processing of textiles and use of computer-aided design and manufacturing (CAD-CAM) techniques in the garment industry. For *wood processing and wood products*, the services focus on establishing new wood-based industries, improving productivity of existing enterprises and raising quality of manufactured products (mainly furniture and joinery items) to meet export standards.

Chemical industries Quality, cost-efficiency and environmental and energy aspects of the chemical industry are central to UNIDO's services for the chemicals sector, which covers petroleum refining and petrochemicals, pharmaceuticals, agro-chemicals, pulp and paper, building materials and mineral-based industries. These services feature an integrated approach to industrial safety in production and address issues connected with industry's responsibility to the consumer. Environmental protection is addressed mainly through technological solutions and capacity-building, taking into consideration official legal instruments. Assistance improves the efficiency of raw material usage, helps the management of chemical waste and minimizing it at source, and raises energy efficiency. The programmes provide technical services for process optimization, process and technology selection, product development, improvement of product quality, and assistance in the adoption of modern clean technology, including ODS-phase-out technologies. Special projects deal with in-factory audits to reduce waste at source,

treatment of industrial waste waters, and setting up appropriate waste-treatment procedures, including safe handling of hazardous toxic wastes.

For *petrochemicals*, UNIDO technical services help select, adapt and transfer know-how and technology, and develop human resources for petroleum processing, production of intermediates, polymers, resins, and synthetic and natural rubber, and for processing products using petrochemicals. Technical experts advise and assist in operation and maintenance of petrochemical plants, transfer and adaptation of technologies, and research programmes for product diversification and development.

In *pharmaceuticals*, emphasis is on product safety and quality through introduction of good manufacturing practice and quality management techniques for the most important drugs, including essential drugs. UNIDO experts assist in pilot-scale organochemical synthesis and fermentation for production of pharmaceutical chemicals, antibiotics and enzymes. They advise on: quality assurance, production control of pharmaceuticals, biological and modern biotechnology products; planning, management and R and D; establishment of manufacturing facilities; restructuring; establishment of joint ventures; and setting up of pharmaceutical consulting engineering units and professional associations; industrial-scale use of medicinal and aromatic plants; processing of non-wood forest products; and drug-abuse control through crop substitution programmes.

In *agro-chemicals*, UNIDO strengthens national capacity to promote risk reduction in their development and production. This is done through data collection, development of user- and environment-friendly, balanced fertilizers (including inorganic and organic types), bio-botanical pesticides, quality control and quality assurance. A broad-based approach, i.e. covering related chemical and allied industries and the needs of small- and medium-scale industries, is taken to improving plant safety, and the health and environment aspects of pesticide production and formulation.

Assistance to the *edible salt industry* improves processing and packaging aspects, including the iodization of salt required for national programmes to eliminate iodine-deficiency disorders.

In *pulp and paper production*, UNIDO focuses on improving existing mills and transferring appropriate technologies. Special features are use of indigenous, non-wood fibrous raw materials, introduction of clean technologies (e.g. chlorine replacements for bleaching), pollution abatement, water and energy conservation, recycling of waste paper, and waste minimization.

In *building materials*, the focus is on promoting use of indigenous resources and locally suitable production of low-cost housing. Assistance is geared to ensuring, on a country-by-country basis, the availability of a full range of affordable, locally made building materials of adequate quality and quantity, and suitable for use by the local construction sector.

Support to the *non-metallic mineral sector* embraces all processing stages—from mining to end use—and features optimum resource management and

minimization (including recycling) of wastes and pollutants in all production stages. Effective energy management is promoted in ceramics, glass and cement and other large raw materials processing industries with a high energy consumption by means of energy audits, good housekeeping and process optimization. In *cement and lime*, emphasis is on increasing capacity utilization, improving efficiency and maintenance, developing human resources to achieve self-sufficiency, and upgrading plant operational practices, all with a focus on energy conservation and pollution abatement. Advisory services support establishment or rehabilitation and expansion of cement plants, transfer of technology to promote cleaner production techniques, pollution abatement and waste digestion in cement kilns. UNIDO also provides training in new cement technology and cleaner production techniques.

Engineering industries

Cleaner technologies, efficient use of energy, quality management and computer application in industry characterize UNIDO's services to the engineering and metallurgical industries sector. The sub-sectors covered include agricultural machinery, transportation, packaging, metalworking/metal forming, machine tools, electronics and telecommunication equipment as well as various areas of the metallurgical industry. Assistance encompasses product and process development, product design and prototyping, production, maintenance and repair. To achieve cost efficiency of production and quicker response to changes in market demand, UNIDO advises on the application of computer techniques in production planning, design and manufacturing. Advisory services in quality management and application of ISO 9000 standards at the enterprise level aim at increasing the competitiveness of the sector. In support of environmental conventions and standards, UNIDO assists in eliminating the use of ODS in various sub-sectors and advises policy makers and manufacturers on measures to avoid or reduce emissions from road and air traffic.

In *agricultural machinery*, UNIDO gives priority to promoting sustainable agricultural and rural development, with a particular focus on African countries, through capacity-building in mechanical engineering and metal forming for the production of agricultural machinery, parts and rural equipment. For *electrical and mechanical equipment production* (including machine-tool manufacture and production of engineering goods and components), UNIDO assesses and assists in improving manufacturing facilities, and technology selection and implementation. Emphasis is on application of tooling, machining and fabrication techniques, heat treatment and automation systems in the context of technological upgrading of manufacture, development of management information systems, and planning for computer-integrated manufacture.

For the *metallurgical industries*, technical support and services include techno-economic studies, the strengthening and upgrading of local technological capability and assessing and dealing with environmental and energy considerations. Priority is given to environmental impact and energy conservation. In the iron and steel industry, where stricter quality demands have led to the application of sophisticated operational control systems, UNIDO provides technical support in dealing with solid, gas and water wastes. Assistance relates to avoidance of environmental degradation from mineral processing operations, gold mining/extraction, lead recycling from batteries, environmental monitoring of steel plants, aluminium smelting, and copper refining.

A crucial field of technological support increases efficiency in various industrial branches through *application of computer techniques*. They include computer-aided production planning and scheduling, CAD-CAM, computer-numerically controlled machining, and artificial intelligence and expert systems. Assistance covers the extension of such techniques in most fields of industry, particularly at the level of SMEs.

In *packaging*, UNIDO studies future demand, analyses alternative packaging systems for specific products, and provides information on suppliers of packaging materials and equipment for specific packaging systems. Information on packaging standards, laws and regulations in accordance with international standards, and the requirements of the Montreal Protocol, is also available. Technical assistance covers manufacture of appropriate packaging materials, quality control, measurement of porosity and other parameters, compatibility of packaged products and materials, engineering of packaging systems and machinery design, and substitution of ozone-depleting aerosol propellants and CFCs. UNIDO also advises on recycling of packaging material and eco-labelling for packaging products.

UNIDO instruments

UNIDO's capacity for response at the industrial sub-sector level comprises the Organization's specialized capability over a wide range of technological services, concentrating increasingly on environmental and energy issues in various sub-sectors.

Technical experts

A pool of some 60 in-house technical specialists in the priority sub-sectors are supported by the knowledge and experience of a network of several hundred international experts. The sub-sectoral support activities also draw from, and integrate, in-house expertise for the UNIDO services focused on environment and energy, technology management, HRD, enterprise restructuring and privatization, SMEs, institutional support and private sector development.

Studies and reports

At the sub-sectoral level, UNIDO also undertakes state-of-the-art analytical studies and assessments of production and technological trends in various sub-sectors. Such studies and reports are utilized in the formulation, implementation and appraisal of country-specific sub-sectoral programmes and projects, reflecting global developments and trends in countries at various stages of industrial and technological development.

Main priorities

Priority within each of the sub-sectors is given to the special needs of SMEs, increasing industrial productivity and competitiveness, and to environmental and energy considerations. To optimize use of both donor funding and UNIDO's own staff, activities are increasingly organized under a comprehensive approach (see leather example, box 5) targeted at private sector development in several countries.

Box 5

**The programme approach:
more value for the donor's dollar**

Africa is resource rich and cash poor: the best help is therefore to provide technology and training and allow the people of Africa to do the rest. But in an era of shrinking aid budgets this is no longer straightforward. Aid fund managers are under increasing pressure to show effectiveness, or better, actual value for their taxpayers' money. And, given the history of ineffectiveness of much African assistance over past decades, there is growing reluctance to fund even the most promising proposals. Enter: the programme approach.

Standard technical cooperation projects solve problems with services that input expertise, equipment and training—but usually in isolation from related problems or opportunities in the sector or surrounding countries. In contrast, the programme approach focuses on problems common to a single sector in several countries: it solves them by working upstream and downstream as well as with the main issues. Inevitably multidisciplinary, the programme may require that more than one agency participate. Such was the case with the joint UNIDO/FAO/ITC leather programme for East Africa.

As far back as 1984, the UNIDO System of Consultations—the UN's North-South dialogue for governments, companies and labour representatives at industry branch level—recognized both the deteriorating position of Africa's leather industry and its unexploited potential. The resulting programme (now in its seventh year) set up a regional pilot scheme to demonstrate practical improvements in processing of hides and skins, from butchering and flaying to conservation, grading and collection. The integrated approach featured coordinated national projects in eight countries—Ethiopia, Kenya, Malawi, Somalia, Sudan, United Republic of Tanzania, Zambia and Zimbabwe. The programme individually increased the leather sector's contribution to each national economy, and collectively enhanced East Africa's position in world leather and leather products markets. Today, some firms in most of these countries can meet international standards in all classes of manufacture. Many of their formerly loss-making tanneries and footwear plants are now in the black. And exports are rising. With continuing help, the year 2000 could see most raw material converted to finished leather and all finished leather into finished products for export.

The programme trained flencers in proper flaying methods and introduced new techniques for preserving and grading hides and skins. A rehabilitation component supplied tanneries with technical expertise of international experts and European leather institutes, and equipment from well-known machinery suppliers. All three participating UN agencies could provide further expertise directly. The programme featured a strong technical training component, including special courses for women. It spearheaded a systematic approach to pollution prevention throughout the tannery industry. And it boosted marketing efforts through joint exhibits at trade fairs.

Another programme component created or strengthened leather industry associations and set up a *revolving fund* financed by companies receiving technical assistance from their national or regional project. The fund provides ongoing benefits and enables further progress as firms repay—in local currency, and on concessionary terms—the cost of machinery and assistance they received for plant rehabilitation. Kenyan companies, for example, used the fund to finance a new Training and Production Centre for the Shoe Industry.

Because of its technical and geographic breadth, the programme approach can combine the resources of several donors, often over periods of several years. Seven countries contributed to the approximately \$12.5 million budget for the first phase of the East Africa leather programme: Austria, Finland, France, Germany, Italy, Netherlands and Switzerland.

Investment Promotion

Promotion of foreign investment and alternative forms of foreign participation continues to be the most sought-after external input for industrialization of developing countries. The international setting for investment and technology flows is becoming increasingly complex. Globalization of markets, communications and production, increased market orientation of government policies, liberalization of international trade (especially following the Uruguay Round Agreements), emphasis on exports and competitiveness, emergence of regional groupings and privatization of public enterprises and institutions all constitute major developments with a wide-ranging impact. The mechanisms of foreign investment and foreign participation are also taking a variety of forms such as joint ventures and strategic alliances, non-affiliate licensing arrangements, buy-back agreements, joint research or marketing, pre-competitive research arrangements, build-operate-transfer (BOT) agreements and other forms of enterprise-to-enterprise relationships.

Prospects and constraints

In recent years, total investment flows to developing countries increased significantly. Most foreign direct investment was concentrated in countries in East and South-East Asia, and certain countries in Latin America. Only limited investment flows went to Africa and the LDCs. Developing countries now compete for foreign investment with measures to liberalize their economies, and offers of fiscal and other incentives. Nevertheless foreign participation remains severely constrained by the absence of conducive investment climates, matching domestic investments, managerial skills, technical personnel, institutions for standardization and quality control, protection of intellectual property rights, and adequate infrastructure for electricity, telecommunications and transport. There is also a need to look at investment and technology flows together, within an integrated perspective.

National strategies

Developing countries seek to attract foreign investment and promote technological participation, in part, by dismantling the regulatory functions on foreign investment and technology inflow that characterized many of their earlier policies. They are setting up national investment promotion agencies and adapting technology regulation bodies. As a support they arrange training and advisory services in project preparation, negotiations for acquisition of technology, and promotion of investment and technological linkages through investment forums and other mechanisms.

UNIDO services

UNIDO's services for promoting investment are linked with those for transferring technology (see *Technology for Competitiveness*, p. 28) through its Investment and Technology Partnership Initiative (see box 6).

UNIDO assists governments to formulate and assess policies and strategies relating to investment promotion and technology transfer through information on recent sectoral and technological trends at the global level. It reviews major

Box 6

Investment and Technology Partnership Initiative

Although foreign investment and technology acquisition now take place within liberal regimes in most developing countries, functioning national capacities and good performance are essential to reaping their full benefit. Neither the national interest nor the interest of local and foreign partners will be served if the flows do not result in viable and cost-effective production.

Through its Investment and Technology Partnership Initiative, UNIDO proposes to developing countries the adoption of a three- to five-year national investment and technology partnership programme. The programme brings together the government, private companies and national institutions in an interrelated set of activities that enhance the effectiveness of incoming investment and technology. It can benefit from a range of UNIDO services that reflect the Organization's long experience in supporting the various phases of the investment and technology induction cycles. Such services can be integrated into a package matching the specific requirements of each different country adopting such an initiative.

When a government decides to promote such partnership agreements, UNIDO can assist by detailed assessments of the national situation, by proposing integrated services to suit the specific requirements, and by identifying the financial resources required for implementation. For impact and sustainability, implementation itself would generally call for a major national effort whose content reflected perceived needs, size of markets and potential opportunities. UNIDO assistance, although of a catalytic nature, could take the form of:

- Technology monitoring
- Identification of investment or technology transfer opportunities
- Formulation and/or screening of investment proposals
- Identification and/or screening of available technologies
- Promotion of proposals and identification of partners (through the UNIDO network of IPS offices)
- Holding of Investsmarts and Techsmarts
- Assistance in negotiation of investment projects and technological transactions
- Pre-investment studies and feasibility studies
- Identification and/or mobilization of financial resources
- Project implementation including introduction of technology or its absorption
- Technology management

The point of departure under the Initiative is that activities such as those listed above are not undertaken at random or in isolation. Instead, they form an integrated programme oriented to specific results. Under the Initiative, UNIDO can provide the government with assessed information on trends in the international arena and advice on how to integrate investment and technology strategies and policies. It can diagnose major constraints and problem areas requiring assistance, analyse a country's investment climate and assess its technology systems. At institutional level, UNIDO may help establish or strengthen a national investment promotion agency, set up or upgrade a database of investment opportunities and national investors, and strengthen the capability of national institutions to undertake pre-investment and feasibility studies. There may also be a case for setting up a UNIDO Investment Promotion Service office. To build up capacity to render technology promotion and management services, UNIDO may help to establish or strengthen a national consultancy and advisory agency, and to strengthen national institutions to train technology transfer negotiators and to evaluate technology. The national Initiative may call on UNIDO to help companies and promoters identify opportunities for investment promotion and technology transfer, formulate or screen project profiles, promote the proposals and identify potential partners and negotiate investment projects and technology transactions.

constraints and problem areas, and assesses national investment climates and the technological needs of particular industrial sub-sectors. UNIDO also provides advice on how to integrate and promote investment and technology inflow in required fields.

At the institution level, UNIDO assists in building up national capacity to identify, formulate, analyse, appraise and promote investment projects, by providing assistance in establishing or strengthening national investment promotion agencies, establishing or upgrading databases on investment opportunities and national investors, and strengthening the capability of national institutions to conduct pre-investment studies and feasibility studies. The establishment of a UNIDO Investment Promotion Service (IPS) office may also be proposed.

At the enterprise level, UNIDO assists entrepreneurs and promoters in developing countries by identifying opportunities for investment and/or technology transfer, formulating/screening project profiles and proposals, promoting proposals and identifying partners, negotiating investment projects and technology transactions, preparing pre-investment studies and feasibility studies, identifying or mobilizing financial resources, and assisting with the implementation phase.

UNIDO instruments

UNIDO's investment and technology cooperation activities aim at bringing developing countries within the mainstream of industrial and technological cooperation. The main mechanisms are networks, forums for entrepreneurs, training programmes, publications and software.

Networks and databanks

A network of IPS offices covers Athens, Istanbul, Milan, Paris, Seoul, Tokyo, Warsaw, Washington and Zurich. In addition, two International Centres for Industrial Cooperation provide similar services in Beijing and Moscow. Their role is to establish contacts with firms in the host country that are interested in business partnerships in developing countries. They inform these firms about business conditions, potential business partnership opportunities, and sectors of interest. They also assist potential partners to make contact and negotiate the agreements for project implementation.

UNIDO's World Investment Network Service (WINS) is a global electronic network linking investment promotion agencies in developing countries, UNIDO headquarters and IPS offices. Through WINS, project proposals from entrepreneurs in developing countries can be offered to a large number of potential partners in both developed and developing countries in a cost-effective manner, without delay. As part of the network, on-line information on country data, investment climate and financial institutions is being developed.

Forums

Techmarts are business forums held in different countries, where SMEs can find, offer, negotiate and eventually buy and sell technology suitable for their operations. Techmarts' unique setting for the conclusion of practical business arrangements feature comprehensive, indexed compendiums of the technologies offered and those requested. Expert legal advice on technology acquisition, business meetings, plant visits and seminars are essential components of each event.

Invesmarts are investment forums that initiate direct contacts between companies in a developing country and potential foreign partners to discuss pre-identified investment projects. Negotiations take place in individual business meetings between potential partners who have expressed interest in the projects presented.

- Advisory services UNIDO provides counselling and impartial advice to governments, institutions and enterprises on the principal aspects relating to investment and technology flows, including negotiation and implementation phases. UNIDO can assist negotiators in evaluating proposals and selecting suppliers, appraising technological alternatives and drafting agreements.
- Training Three training programmes strengthen national capacity to draw up and negotiate investment deals and technology transfer agreements. A training programme on investment project preparation and appraisal addresses specific issues of investment project appraisal and assists national promoters (private sector and public institutions) in rational investment decision-making. A programme on technology transfer negotiations strengthens capacities to evaluate technology in connection with the acquisition process and enhances capability to negotiate and acquire technology. The Delegates Training Programme places representatives from developing countries (drawn from investment promotion bureaux, ministries of industry or the private sector) in UNIDO IPS offices, thereby providing on-the-job training in investment promotion techniques.
- Publications and software The *Manual for the Preparation of Industrial Feasibility Studies* * helps improve the quality of investment proposals and standardize industrial feasibility studies. The *Manual* is available in 18 languages.

Based on the *Manual*, the UNIDO Computer Model for Feasibility Analysis and Reporting (COMFAR) software package facilitates and accelerates the work of financial analysts and industrial economists. It permits the user to simulate the short- and long-term financial and economic situation of industrial and investment-related projects.

The Project Profile Screening and Pre-appraisal Information System (PROPSPIN) software facilitates preparation, screening and analysis of industrial investment projects. PROPSPIN helps sponsors in developing countries and their foreign financial and technical partners to formulate an investment project, to analyse the effect of changes in selected parameters and prepare two or more scenarios on different assumptions regarding the project's prospects.

The 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. Country publications providing comprehensive analyses and information on the industrial investment environment and opportunities are prepared by the *Industrial Information service* (see p. 62).

* A second edition of the *Manual* was published in 1991

Main priorities The main priority of UNIDO's investment promotion service is to promote new investment and alternative forms of financial and technological participation between firms in developing countries or economies in transition and those in industrialized countries.

Technology for Competitiveness

In a globalized world economy, technology-based goods and services account for the fastest growing share of output. Resource-based competition is increasingly being supplanted by sustained competitiveness based on skilful interplay of innovation capability, strategic asset management and organization networking. Competition today requires comprehensive strategies changing both technology itself and the "architecture" of the business, rather than simply finding the lowest production cost with a given technology. The new pattern for competitiveness is no longer one of imitation. It is to innovate prevailing patterns to create product differentiation in the eyes of the customer.

Technology is now at the core of competitive strategies of successful industrial firms. The new and rapidly evolving generic technologies, such as biotechnology, new materials and information technologies, offer many opportunities and challenges for broad competitive strategies. They engender entirely new products, services, markets and businesses. Their impact is trans-sectoral, drastically improving competitiveness of products, processes and services of firms in a large number of traditional industrial sub-sectors. New materials improve product specifications and lower production costs in engineering and chemical industries; biotechnologies save energy and raw materials in chemicals, pharmaceutical and food processing. The pervasive applications of information technologies allow companies in all industrial sectors to re-engineer critical processes, improve overall efficiency and raise productivity across functional areas. Access to information is now a key to competitiveness.

The competitiveness of firms in the medium- and long-term reflects their ability to learn continuously and to build—at a lower cost and more rapidly than competitors—the core capability that enables them to generate: (a) new products and services; and (b) relationships and other dynamic competitive advantages that competitors cannot easily imitate or even foresee. Adequate management of those core capabilities and ensuing innovation processes—characterized as technology management—are themselves crucial core capabilities. Through technology management, the interdependence between technological innovations and other types of organizational innovation (related also to structure, systems, strategy, finance and management aspects) can be suitably integrated.

Prospects and constraints

Globalization threatens the competitiveness of the majority of industrial companies in developing countries and countries in transition. At the same time, these countries are failing to utilize fully opportunities for renewing their industrial profiles through creation of new companies based on new and generic technologies. Most of their enterprises, particularly SMEs, lack the internal capability to make adequate and continuous use of technology for sustained competitiveness. Their dearth of technological innovation capability also hampers the effectiveness of restructuring processes aimed at adjusting to the changing global economic context.

Lack of competitive strategies based on innovation makes companies adopt reactive measures that are primarily based on short-term interests and can result in reduced competitiveness and insecurity over a longer period.

National strategies In developing countries where there has been considerable industrial development in recent years, it was selective intervention by governments that set up innovation-enabling environments and that strengthened the institutional infrastructure for supporting technological innovations at plant level including access to international technology flows. Such intervention also supports enterprise development, particularly through intra- and inter-firm learning processes and services for the creation of new technology-based enterprises. Firms in these countries also take advantage of the international cooperation made possible by globalization and free-trade processes.

In most developing countries, such technological innovation policies have still to be made explicit and integrated with industrial development policies. Creation of enabling environments for technological innovation at plant level is at best focused on strengthening the supply side, i.e. the innovation system agents, and through science and technology policies. One recent development, however, is the initiative taken by chambers of commerce and industrial associations in requesting assistance in designing technological and industrial development policy proposals for presentation to governments. At subregional and regional levels, elaboration, implementation and evaluation of technology policies are still at an early stage.

UNIDO services UNIDO's technology services focus on designing and implementing integrated strategies that: (a) make demand for technology at plant and cluster levels conscious and explicit; (b) strengthen, integrate and promote innovation and technology flows; and (c) support the processes that create and develop new technology-based enterprises (see also box 7).

Making technology demand explicit, i.e. defining (in terms of sustainable competitiveness) technological innovation needs, requires accelerated development of strategic and technology management capabilities. For plants or clusters, this includes technological diagnosis of their competitive position, evolution of their technological strategy, development of a portfolio of technological projects, and drawing up technological and service innovation guidelines. Measures to promote innovation and technology flows include support for technology management centres, revitalization and establishment of new R and D centres and UNIDO's own technology publications and Intechmarts. Such efforts combine with a range of initiatives to stimulate creation of new technology-based enterprises, e.g. science parks, incubators, university-industry linkages, mobilization of venture capital, and promotion of technology transfer.

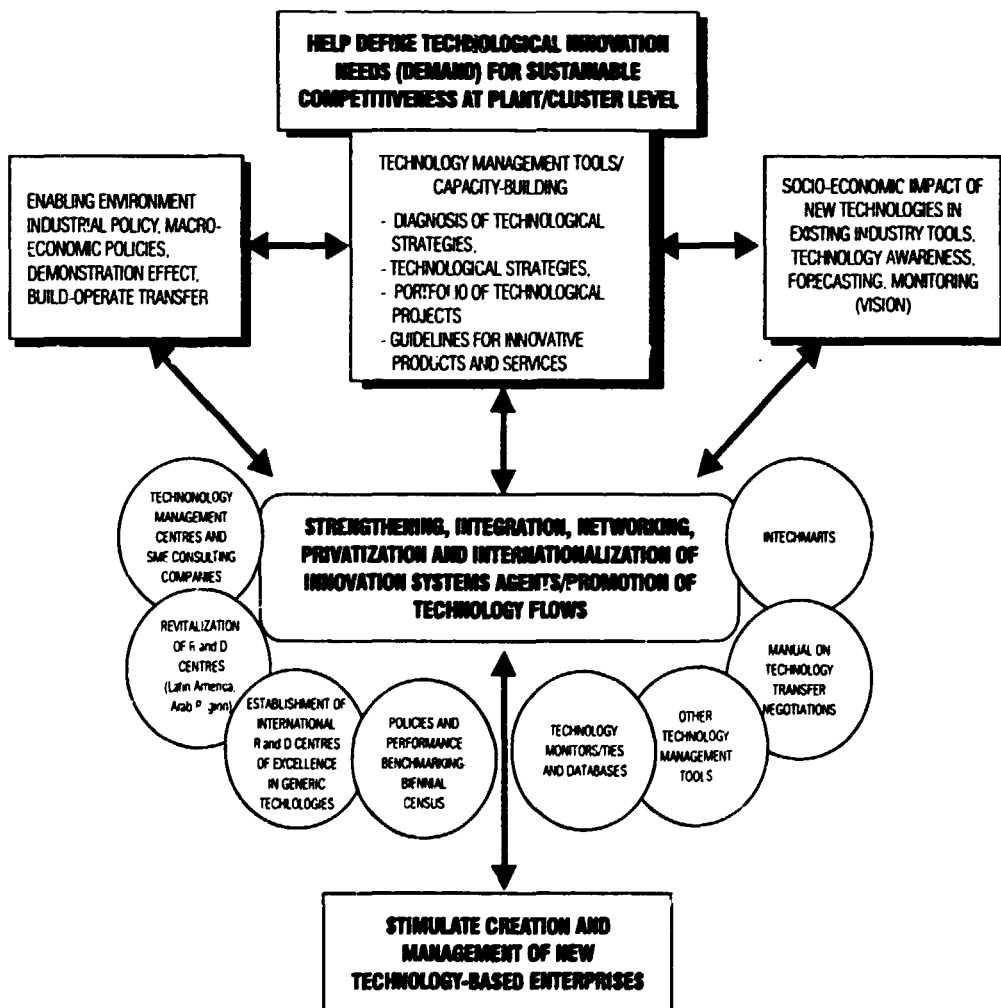
With this strategy focus, UNIDO can join forces with governments, national infrastructure institutes, financial agents, industrial associations and international partners to implement integrated regional, subregional or national programmes. Their combined knowledge, expertise, information tools and other services offer a global perspective for parameters and concepts related to technology for competitiveness.

Advice on policies and strategies covers the key elements in the use of technology for competitiveness. The issues covered include: building up domestic technological capabilities

Box 7

Strategy focus for technology services

Three UNIDO service areas help developing countries focus on technology as the basis of competitive strategies at the firm level. Together they define technological information needs, strengthen innovation systems agents and promote technology flows, and stimulate creation and management of new technology-based enterprises. Factors directly promoting the latter include science parks, university-industry linkages, entrepreneurship development, incubators, venture capital (joint ventures, strategic business alliances, technology transfer) and innovative credit and fiscal schemes. Significant action may also be required at the level of research excellence, design of curricula and other aspects of human resource development, investment promotion, small-scale enterprise development, and other supporting services for innovation.



including investment in human capital; strengthening national and regional innovation systems; managing technological change effectively, including technology monitoring, acquiring foreign technology efficiently, improving, upgrading and developing technology, and the role of new and advanced technologies.

Assessment of national innovation systems

UNIDO can initiate assessments of national innovation systems with recommendations on enabling environments conducive to innovation in the private sector and for wider diffusion of technologies. Advice may cover: identification of support services and innovation schemes required to promote entrepreneurial motivation in technology-based industries; creation of outreach-consultation projects to link universities with industries; and promotion of business incubators, science parks and funding mechanisms for business innovation.

Development of technological infrastructure and information diffusion

UNIDO assists in creating and strengthening R and D institutions and their linkages to other innovation system agents and enterprises. It also promotes collaborative activities such as joint research projects. UNIDO can also assist in the commercialization of R and D results and revitalization of R and D institutes. UNIDO's INTIB programme (see *Industrial Information service*, p. 62) offers information and documentation on alternative technology sources in 20 industrial sectors. It also provides advisory services on information policy and design, training needs and opportunities in the information field.

Technology acquisition and transfer

UNIDO assists institutions and enterprises in building up and/or strengthening capacities to handle technology transfer operations and the establishment of joint ventures. Its tools include advisory services, training programmes, technical documentation and studies and guidelines. The Organization's experience and know-how in this field are consolidated in a *Manual on Technology Transfer Negotiations*, which is a comprehensive assessment of the range of issues faced by technology buyers in the various phases of the technology transfer process. UNIDO also keeps track of build-operate-transfer arrangements and strategic alliances and can assist in the development and implementation of such schemes.

Technology forecasting and monitoring

UNIDO keeps advanced technologies under review and directs special attention to a group of generic ones having an increasing impact on the nature of industrialization and the competitive situation of developing countries. These are: genetic engineering and biotechnology, microelectronics, informatics and telecommunications, new materials, new energy technologies, and marine industrial technologies. Trends and advances are monitored and evaluated in relation to the needs and opportunities of developing countries. UNIDO also helps develop national and regional capabilities for the monitoring and evaluation of new technologies; it promotes cooperation between developing countries in monitoring; and prepares corresponding policy recommendations.

New and generic technologies

UNIDO sensitizes policy makers, entrepreneurs, scientists and technologists concerning the formulation of policies and the building up of technological strengths that will enable them to take advantage of the new and advanced technologies including advanced manufacturing systems. In biotechnology, UNIDO provides comprehensive advisory services on biosafety, intellectual property rights, licensing and Strategic Business Alliances (SBAs), including regulatory frameworks for promoting production of biotechnology industrial products. In informatics, support is provided for indigenous production of software, up-

grading knowledge of advanced software tools and promotion and adaptation of software packages to requirements of SMEs. In telecommunications, UNIDO identifies opportunities for local manufacture of telecommunications equipment, undertakes feasibility studies and guides software firms seeking to enter the telecommunications software industry.

Service instruments

UNIDO supports developing country efforts to develop and implement policies and strategies that promote technology as a core element of competitiveness through seminars, advisory missions and technical cooperation projects, publications and promotion of centres of excellence.

Centres of excellence and networks

International and regional networks and centres of excellence enable cooperation to be mobilized between individuals and institutions at the cutting edge of particular technologies. Examples already promoted by UNIDO are the International Centre for Genetic Engineering and Biotechnology (ICGEB) located both in New Delhi, India, and in Trieste, Italy, the International Centre for Science and High Technology (ICS) in Trieste and the Centre for the Application of Solar Energy, in Perth, Australia.

Publications

Through its Technology Trends and Monitor series, UNIDO keeps developing countries informed of developments and trends in areas of new and advanced technologies and promotes their commercial application as a means to improving international competitiveness.

Main priorities

The main priorities in UNIDO's programme on technology for competitiveness are: (1) advice and benchmarking of technology policies and strategies; (2) revitalizing agents of innovation by increasing their effectiveness in working with industrial manufacturing enterprises, to enhance companies' technology management capability and build up their sustained competitiveness; and (3) creation of new technology-based enterprises.

Environment and Energy

With the adoption of Agenda 21 at the United Nations Conference on Environment and Development (UNCED), held at Rio de Janeiro, in 1992, environmental issues became an urgent priority for governments and the UN system alike. Within the United Nations, UNIDO has the responsibility to ensure that cleaner industrialization is at the centre of the development agenda. The industry-related aspects of Agenda 21 include not only the water, air and solid waste pollution emanating from industrial operations, but also industry's contribution to tackling environmental issues of global concern, namely protection of the ozone layer from attack by chlorofluorocarbons (CFCs) and other ozone-depleting substances (ODS), and the impact of energy consumption on global warming. Practical action in each area has to be taken at the sub-sector (i.e. industry-branch) level, in the context of national and regional priorities.

Prospects and constraints

Among key challenges of the twenty-first century will be energy management, water resource management and use of cleaner technologies. Today, these concerns are embodied in concepts of ecologically sustainable industrial development (ESID). ESID requires that environmental dimensions are brought into all planning, policies and expenditures relating to industry—integrating environmental goals with those of industrial development without sacrificing industrial growth on which developing countries' socio-economic development as a whole depends.

Sustainable industrial development in this sense depends significantly on the proper application of technology. For developing countries it means building the technical and scientific capacity to acquire, develop, absorb and apply such technologies. Developing countries also have only limited capacity to implement international environmental conventions and protocols, for example to eliminate ODS through product substitution and redesign of production processes.

Developing country manufacturers, like their industrialized country counterparts, must also economize on their use of energy. This is not only out of economic self-interest, but also from a global-warming perspective. By the year 2020, developing countries' share of global commercial energy consumption will reach 40 per cent, up from 25 per cent currently. The tripling of energy supplies this calls for will present major financial, institutional and environmental challenges. Energy imports already impose heavy burdens on foreign exchange resources; developing alternative, domestic energy sources will demand large capital investment. If unchecked, energy production and use itself generates significant environmental degradation and pollution, especially in urban areas.

National strategies

In response to these challenges, developing countries are adopting and coordinating environmental and energy-related policies, strategies and guidelines. Their companies are acquiring know-how and technologies for cleaner production and improving efficiency in the generation and use of energy. Nationally,

Box 8

Phasing out ODS — with UNIDO, pollution-prevention pays

The Cairo-based company ADVECHEMS was one of those directly affected by Egypt's 1991 programme to comply with the Montreal Protocol. Its polystyrene board extrusion plant in Sadat City accounted for 27 per cent (197 tons) of the country's use of chlorofluorocarbon CFC-11 gas for foam blowing. The conversion cost, even with UNIDO's help, would eventually run to over \$900,000—almost as much as the plant had cost to build two years earlier. How to pay for it?

Egypt, fortunately, meets the provisions of article 5 of the Montreal Protocol: it is a recognized developing country, its consumption of ozone-depleting substances (ODSs) is less than 0.3 kg/head/year, and the company itself exports less than 70 per cent of its annual production. Such criteria qualify Egypt's ODS consumers for financial assistance from the Protocol's Multilateral Fund. The Government thus put the problem to UNIDO, one of four agencies authorized to implement projects financed by the Multilateral Fund.

At UNIDO's request, the Fund authorized preliminary assistance to determine the precise needs of the situation, to advise ADVECHEMS on an alternative technology and a CFC-free blowing agent appropriate to the local operating conditions. UNIDO's experts also estimated the costs of the changes, formulating them in a detailed project document for submission to the Multilateral Fund's Executive Committee. Its submission proposed switching to the hydrochlorofluorocarbon blend HCFC 142b/HCFC 22 for the blowing agent, widely used by counterparts in Europe.

Including approval time, subsequent project implementation took less than 12 months. An Italian firm, the original equipment supplier, modified the plant to work with the new blowing agent. New on-site chemical storage facilities were installed. UNIDO also arranged new contracts with a chemicals firm to supply the blowing agent. The result was a reduction in Egypt's use of ODS by 183 tons annually. It meant not only that ADVECHEMS complied with national regulations: the company also gained access to the most up-to-date technology on the market at the time. Its technology upgrade maintained international competitiveness, retrained its operators, and introduced safety components similar firms often lack.

they are implementing cross-sectoral programmes to phase out consumption and production of ODS used in refrigerants, foams, solvents, aerosols, halons and methyl bromide sectors.

International conventions, protocols and policy instruments also form the basis of national strategy. Current ones include the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the London Guidelines for the Exchange of Information on Chemicals in International Trade, the United Nations Framework Convention on Climate Change (reduction of greenhouse gas emissions), the Convention on Biological Diversity, and the Montreal Protocol on Substances that Deplete the Ozone Layer.

UNIDO services UNIDO helps governments integrate ESID concepts at the policy level, build up national capacity to acquire cleaner technologies, and implement the Montreal Protocol on elimination of ODS (see example, box 8). Energy-related services to government and industry focus on conserving energy in industrial activities.

Environmental policies and programmes To assist developing countries in integrating environmental considerations into their industrial policies and strategies, UNIDO identifies the set of policies and supportive measures that are needed for industry to meet agreed development and environmental goals at the least social cost. The work identifies industrial policies and regulations that actually discourage cleaner production, and proposes formulation of alternative, proactive policies that would promote it instead.

Capacity-building plays a decisive role in subsequent realization of the new policies and strategies. Four areas receive priority: (a) collection and analysis of industrial and environmental information; (b) identification and correction of failures in industrial policy that contribute to environmental degradation; (c) review of existing institutions and their ability to implement a strategy for ESID; and (d) formulation of regional environmental management plans and carrying out of waste-reduction and environmental compliance audits and environmental impact assessments, all of which serve as technical support for environment policy.

Cleaner production techniques and technologies In the context of Agenda 21, industrial growth that does not compromise the environment depends on production processes that are cleaner, more energy- and resource-efficient, and less wasteful. UNIDO promotes that goal through improved and optimized process technology, rather than applying remedial, end-of-pipe measures. Emphasis is on transfer of cleaner technologies; building up local capabilities to identify possibilities for cleaner production; conducting waste audit and waste minimization studies; and assisting in the transfer of cleaner technologies.

In cooperation with the United Nations Environment Programme (UNEP), UNIDO promotes and supports national cleaner production centres (NCPCs). Their role is a coordinating and catalytic one: providing technical information and advice on cleaner production; demonstrating cleaner production techniques and technologies; and training industry and government professionals.

To support the work of NCPCs and the efforts of governments and industry generally, UNIDO cooperates with the World Bank and UNEP to prepare sub-sector-specific guidelines on pollution prevention and abatement.

Elimination of ODS In late 1992, UNIDO became one of the four implementing agencies of the Multilateral Fund for the implementation of the Montreal Protocol. This allowed the Organization to provide, within the Fund's framework, support services at the plant level with respect to industrial products such as solvents, foams, refrigerants, halons, aerosols and methyl bromide. Assistance involves a wide range of technical tasks: assessing options such as retrofitting, maintenance, recovery and recycling; training at all levels; providing a basis for relevant investment projects; institution-building; policy incentives and regulatory frameworks. Figure 2 shows UNIDO's growing share of the total multilateral effort to eliminate ODS.

Energy supply and conservation Energy-related activities address two issues: (a) provision of adequate, environmentally-sound energy supplies where their dearth is a barrier to development; and (b) response to local, regional and global environmental concerns arising from increasing energy consumption, particularly fossil fuels. UNIDO's approach

is to support initiatives at the policy, institutional and enterprise levels that increase efficiency of power generation and energy end-use, while providing a foundation for widespread introduction of renewable energy technologies in the future.

At the policy level, UNIDO works with energy ministries, utilities and energy export authorities to raise awareness of more energy-efficient technologies and of innovative ways to finance more efficient power-generation capacity. Cleaner coal technologies, access to gas supplies and modern refinery technologies are promoted in this respect. UNIDO advises on technology choices and the selection of components for clean coal technology (e.g. integrated gasification combined-cycle power-generating technology or pressurized fluidized-bed combined-cycle power-generating technology, such as circulating fluidized-bed combustion). Advice also covers optimizing the use of oil and gas reserves.

UNIDO's advisory services to governments also help prepare national programmes for introducing alternative sources of energy (such as solar energy, hydropower, wind energy and biomass), particularly in rural areas. Use of renewable energy technologies such as biomass, solar, wind, hydropower, hydrogen fuel systems and sources of marine energy are promoted through industry associations and extension institutes. Local manufacture of related equipment is also supported.

Also at the sub-sector level, energy-saving technologies are introduced and demonstrated, and energy audits undertaken to identify areas of energy saving.

UNIDO instruments

UNIDO has technical expertise and long experience in coordinating and conducting large-scale, complex projects, and in providing governments with unbiased recommendations. Its technical officers formulate projects and carry them through to the stage where sources of finance can be secured.

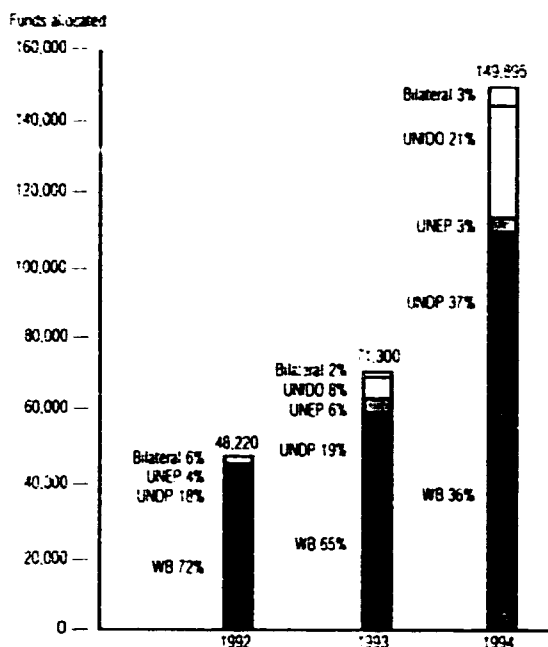
Training kit

To create permanent awareness and to strengthen human and institutional capability to respond to ESID issues, a self-learning training course is available in kit form. Its main component, a manual with distinct learning units, covers: the need for ESID, its definition, cleaner production, analytical tools for identifying cleaner production opportunities, economic techniques for cleaner production, the role of governments in environmental management, how to obtain information about cleaner production, and how to incorporate environmental considerations into project design. The kit also contains two floppy disks, three booklets, a learning recall tape and a video cassette with seven short films. The course is an introductory one that can be supplemented with one of the sector- or subject-oriented courses offered by UNIDO. It is expected to play a crucial role in building national capacities for the implementation of Agenda 21.

Technical expertise

Eleven specialists in areas of environmental policy, economics and technology complement UNIDO's in-house technical expertise in key industrial sectors.

Figure 2
Allocation of multilateral funding for the implementation of the Montreal Protocol (Thousands of US dollars)



Source: COWIconsult

The latecomer in Multilateral Fund implementation.
 UNIDO catches up with UNDP and the World Bank (WB)

Main priorities Priority is given to promoting a preventive approach to pollution, including cleaner production, waste minimization and conservation of natural resources and energy. Emphasis is on assisting policy makers in translating international environmental conventions into appropriate industrial policies and strategies at the national level. Building human and institutional capacities receives special attention along with assistance to small- and medium-scale industries.

Human Resource Development

In keeping with UN-wide approaches, UNIDO conceives that human resource development (HRD) as 'intersectoral and interactive endeavours to sustain human resourcefulness.' Thus it endeavours to shift attitudes and thinking of human resources simply as a factor of production. For governments, this means creating and modernizing HRD institutions, expanding their capacity to assess needs, and mount training programmes, including, especially in LDCs, training for entrepreneurship development. For industrial companies and enterprises, investing in people is as important as investing in equipment and factories. The tasks are generally shared: the State provides schools, universities, vocational and specialized training facilities; employers provide in-plant training and technical upgrading. The process of self-learning of the individual is also a vital element.

The national objective should be a critical mass of well-trained women and men on which the country and its industry can build competitiveness. The ability to build core knowledge and skills rapidly and efficiently is the key to innovations targeted at market opportunities, new products and services, new alliances and other comparative advantages that competitors cannot easily match. Both highly competitive countries and successful enterprises therefore regard HRD as a priority investment.

Prospects and constraints

In many developing countries, a serious dearth of well-trained industrial personnel at managerial, professional and technical levels hampers both industrial restructuring and technological change. Lack of entrepreneurial and managerial skills inhibits development of the private sector, acquisition and use of competitive technologies, and achievement of quality standards needed to compete in national and international markets. Unless clear linkages are established between education systems, science and technology development and industrial applications, these countries will continue to face such constraints. The need for new skills for industry means an increasing demand for parallel improvements in basic education and science and technology systems.

Identifying and assessing the knowledge and core skills that a country needs to cope with changing technological and competitive requirements is complex. It requires substantive groundwork prior to defining medium- and long-term training requirements and strategies for self-sustained growth of human resources. Scientific, job-related training alone is often insufficient to develop the workforce.

National strategies

Both developing countries and countries with transition economies are endeavouring to develop an industrial culture by building up a critical mass of skilled human resources needed for sustained industrial development. Through a variety of measures, they promote synergies between educational and training systems and industry. Interventions range from revising and expanding curricula in technical institutions (so they cover new skills such as computer and electronic applications) to providing specialized training facilities such as design engineering. Training and institutional support programmes, such as

entrepreneurship development, feature in job creation schemes and measures to mainstream women and marginalized groups, especially in rural areas. Such programmes enhance the competitiveness of SMEs in both urban and rural areas by improving technical skills and managerial competencies. They also address technology management aspects particularly with regard to environmental issues.

UNIDO services

HRD is a key issue cutting across all programmes. UNIDO offers a demand-oriented, integrated HRD programme in three primary areas, interlocking at three levels of support intervention: (a) policy advice based on analysis and assessment of requirements; (b) institutional capacity-building; and (c) training programmes at sub-sector levels and in specialized fields.

Policy advice

Analytical reviews and advice cover formulation of policies, strategies and programmes to develop human resource skills for sustainable industrial development, both for industry as a whole and for particular sub-sectors. Human resource requirements of various categories and at different levels of specialization are assessed in relation to projected growth in various sub-sectors and the need to achieve competitiveness. Policy aspects include integration of technical education and specialized training with science and technology, and industry's specific needs for a workforce with requisite skills for responding to rapid technology changes. The human resource categories covered are: entrepreneurs and managers, technologists, specialists in design engineering, packaging and quality control, and R and D personnel, as well as more broad-based skill categories such as computer-based information specialists and technicians.

At the policy level, UNIDO also helps coordinate HRD-related policies and strategies with programmes for structural adjustment, enterprise restructuring, advancement of technological capacities and skill development in relation to ecological and social concerns.

Institutional capacity-building

To strengthen national capacity at the institutional level, UNIDO trains trainers and other change agents, strengthens consultancy services and helps adapt innovative learning systems to integrate special and marginalized population groups. Emphasis is on entrepreneurial development and technological and management capability of local enterprises, including technology transfer through inter-company strategic alliances. Special attention goes to the environment, quality standards and information issues. The programme includes creation and modernization of HRD institutions, expansion of existing institutional capacity for assessing needs and undertaking training programmes. In cooperation with industry, UNIDO promotes greater use of existing training institutions and related facilities thus improving their performance level so they can design and conduct HRD programmes that respond to the needs of a variety of target groups, in particular women and young people.

Training programmes

UNIDO assists institutions in developing and promoting catalytic learning systems, i.e. learning methods such as training of trainers and other HRD mechanisms that ensure not only a multiplier effect but which are also sustainable. They should also initiate and promote a process of continuous self-propelled learning. These methods shift the emphasis from direct instruction to facilitative learning. They encourage personal initiative and apply to personnel at all levels of an enterprise.

A range of training programmes for HRD is designed primarily to enhance the effectiveness of groups of enterprises and entrepreneurs in selected industrial sectors and with respect to specialized themes. A major priority is implementation of training programmes for entrepreneurs, particularly women, which cover training and support in business methods, including finalization of business plans. Such training assists both existing and new entrepreneurs in setting up micro-, small- and medium-scale business enterprises. Training programmes are provided for managers and key personnel of SMEs in: management and marketing techniques; technology acquisition; technological adaptation and innovation; achievement of quality standards; and management and development of external linkages in technology and in marketing and distribution. Special attention is given to enabling women and the 15-24 age group to respond to industrial and technological changes. The design and implementation of such training programmes is taken over by national trainers after short gestation periods.

UNIDO instruments

UNIDO's instruments in support of HRD services feature thematic and industrial sectoral analysis, studies of labour market changes and reforms, meetings and consultations with industry associations, selection of trainers and local experts on business methods, organization of training workshops and seminars, and follow-up of training programmes.

Communications networks

The HRD communications network promotes coordination and sharing of experience and know-how on industry-related issues and innovative training activities. Participants are government departments, private sector bodies such as associations of industrialists and entrepreneurs, chambers of commerce and industry associations, and bilateral and non-governmental organizations. The network facilitates UNIDO's own coordination with activities of other international organizations, particularly ILO and UNESCO, and between industrialized and developing countries.

HRD model and database

An HRD analytical model and database links labour supply and demand in the context of sustainable industrial development. The analytical model simultaneously considers social, economic and industrial components, thus facilitating the identification of constraints on HRD interventions in a given situation, and options for overcoming them. UNIDO taps into specialized databases available internal and external to identify prevailing patterns relevant to HRD concerns in country groups in each developing region. The findings facilitate development of integrated HRD action plans including policies, strategies and programmes, for and within each country group.

Publications and audio-visual support

Publications include guidelines for institutionalizing linkage mechanisms and networks between the educational, training and R and D systems to enhance technological applications for industry. The service also issues serialized case-studies and interactive models for integrating groups of entrepreneurs, managers and technicians through HRD systems. A periodical, *Human Resource Interface*, describes UNIDO's HRD activities.

An audio-visual package comprises technical reports, lessons learned and recommendations for replicating schemes for empowering women and facilitating re-entry of special target groups (e.g. displaced or dislocated persons).

Main priorities The main priorities in UNIDO's HRD service relate to: (a) entrepreneurial development, particularly for young people and women; (b) strengthening of strategic management of business knowledge; (c) technical capability for achieving increased competitiveness in the SME sector; and (d) provision of training and technological support to micro-enterprises among disadvantaged groups and in less developed areas.

Box 9

LDC Development starts with human resources

Poverty is not just worse in least developed countries (LDCs), it is different. In LDCs, poverty is endemic, a reflection of pervasive underlying weaknesses of economic, institutional and ultimately human capacity. One remedy is simple, but daunting: upgrading people at all levels—government, entrepreneurs, company management, and artisans. Human resource development for industrialization thus heads the priority list of the Industrial Action Programme (IAP) for LDCs. Jointly agreed by UNIDO and LDC Ministers in 1991, the IAP provides a framework for UNIDO activities and LDCs' own industrial development strategies. Some examples:

At policy level, UNIDO is working with the Government of Botswana on a programme for workforce development and planning for industry, and with Ethiopia on capacity-building in human resource development. Chad, Equatorial Guinea, Mali and Zaire called for UNIDO assistance on HRD related to their private sector development. At institution level, UNIDO's technical support for local promoters in Mali included training in preparation of projects for submission to financial institutions when applying for loans, and in identifying and evaluating appropriate technologies.

Increasingly, the UNIDO approach is sector-specific and benefits from experience of similar problems elsewhere. Thus, entrepreneurial training for women in food processing in Gambia, Viet Nam and other countries builds on the Organization's work in the United Republic of Tanzania. Working with Tanzania's Small Industries Development Organization, UNIDO experts trained trainers in the technology and business aspects of nine foodstuffs commonly sold in different parts of the country. The trainers themselves subsequently led pilot training courses for some 120 rural women, converting them from casual producers of processed foods into full-time business women. Enhanced technical knowledge, greater entrepreneurial awareness and practised management skills raises the women's productivity, helps them understand and meet quality standards, and enables them to introduce minimum marketing measures such as packaging and labelling. The on-the-job training approach allows the women themselves to continue their work during training and to apply their knowledge to practical problems under their trainers' guidance.

The sector approach can be high-tech, for example the upgrading of Bhutanese essential oil scientists in the United Kingdom, or multi-country, as with a group of projects focused on regional promotion and reactivation of the cultural and traditional textile industry in West Africa.

Integrated sectoral projects are to feature more strongly in the IAP in future. This reflects an adjusted conceptual approach to UNIDO's assistance to the world's 48 poorest countries, based on reassessment of the patterns of industrial development in the light of existing natural resources and potential human skills. UNIDO will help build up national strategies concentrating on, among other things, promotion and strengthening of local entrepreneurship and state governance to support industrialization, and on human resource development with emphasis on managerial development. UNIDO will particularly promote and assist industries that maximize use of local natural resources (especially agricultural resources) based on training and maximum utilization of local skilled personnel (especially technical and managerial skills).

Women in Industrial Development

Equitable development calls for women as well as men to share the benefits of change. Ensuring they do in a world subject to far-reaching political, economic and socio-cultural transformation, requires attention to their position and awareness of their potential contribution as full actors for development and as agents of change. In terms of industrial development, this means attention by policy- and decision-makers to the short- and long-term impact on women both of technological developments and their application to industry, and of new policies and institutional arrangements relating to economic and industrial development. Given the goal of equitable development through industrial development, it is vital to develop mechanisms and programmes that enhance the role and participation of women in the rapidly changing industrial environment. Measures to promote gender-sensitive industrial development in both rural and urban settings also help alleviate poverty and meet other socio-economic objectives.

Prospects and constraints

Although opportunities and problems faced by women in industry differ widely from region to region, in many developing countries they are already helped by policy and legal measures introduced to address the obstacles restricting their full participation in economic activities. Nevertheless, because of the specific and complex array of factors involved, translating *de jure* equality into *de facto* equality at the operational level requires integrated, coordinated plans of action. The SME and micro-industrial sectors are recognized opportunities for women entrepreneurs, for example, but normative changes in prevailing attitudes, strategies and policies are required besides the creation of a more supportive environment.

A new and unfortunate trend is that women already employed by industry are often the first victims of global trends in trade, technology transfer and production organization that erode the traditional comparative advantages enjoyed by developing countries. Technological innovation (for example, informatics technologies) and competition from other labour markets significantly reduce the importance of labour-intensive production, rendering typically female occupations (e.g. low-skilled assembly jobs) redundant. Changes in organizational structure are creating more complex and demanding jobs, which integrate production, quality control and maintenance tasks demanding a high level of responsibility and qualifications from multi-skilled workers. Women, given their multiple roles in society, find it hard to keep pace. Governments may help, but they often require outside assistance: policy advice and strategies, institution-building, interventions at the sub-sectoral level, and HRD expertise.

National strategies

Governments in many developing countries are subject to pressure from the international community to enhance benefits for women from the industrialization process. Women's organizations want governments to assist women to participate on an equal basis in decision-making at the workplace, and to give women entrepreneurs equal access to inputs such as bank credit that are essential for their businesses. Several countries do recognize that the develop-

ment of small-scale and micro-industry activities is a special opportunity for women, and they assist women entrepreneurs to participate more effectively in non-traditional, productive businesses and sectors with significant potential.

UNIDO services

The main thrust of UNIDO's services is to assist women to meet the challenges of industrial restructuring, technological change and the economic reforms most developing countries are undergoing. UNIDO promotes the advancement of women in the development process partly through mainstreaming. This recognizes women as full actors and equal partners in the target groups of UNIDO's own activities and programmes, which are oriented to address the needs and problems of both women and men. In addition, UNIDO offers four specific services that remove constraints impeding women from participating fully in the mainstream of development.

Capacity-building and development of skills

Developing women's skills as an integral element of industrial HRD facilitates their access and mobility within systems of education, training and technology, and within occupations in industry itself. UNIDO promotes multi-skill training in higher management and technology fields to enable women to keep pace with changes in the industrialization process. It develops training programmes to enhance the nature and extent of participation of women at decision-making and middle management levels in development finance institutions and industrial companies. These programmes feature industrial project preparation, evaluation, financing and investment promotion. Other training packages support entrepreneurship programmes for women running small and micro-enterprises in different industrial sub-sectors. A new programme featuring training of women entrepreneurs and managers, and training of trainers, in the context of industrial modernization aims to increase participation of women in the industrial SME sector of countries making the transition to market economies.

Support for women entrepreneurs in SMEs and micro-enterprises

UNIDO provides counselling and advisory services on policy measures to governments and industrial support institutions (chambers of commerce, training institutions, manufacturers' associations and others) as well as support services for women entrepreneurs. This includes strengthening and creating women's professional networks and associations (see China example, box 10). The Organization seeks linkages and interaction with development finance institutions and the banking system to facilitate and negotiate innovative credit arrangements adapted to women's needs. For women entrepreneurs operating small-scale businesses that use low-cost technology, which at times is hazardous to health or the environment, UNIDO assistance improves production techniques and introduces environmentally sustainable and energy-efficient technologies.

Appropriate technologies for agro-industry

Pilot projects in African countries combine a focus on the broader objectives of poverty alleviation, upgrading of living conditions and employment generation with the primary objective of developing, testing and introducing appropriate food-processing technologies and equipment.

Women and the environment

Recognizing the vital role women play in environmental management and development (principle 20 of the Rio Declaration), UNIDO addresses the industrial

Box 10

Programme closes gender gap in China's management training

The growth of township and village enterprises (TVEs) ranks as one of China's spectacular economic successes. Nevertheless, many remain poorly managed. Industrial TVEs themselves are also an important gateway for rural women to take industrial jobs—and for some to become managers and entrepreneurs. Rural women as a group, however, are missing out on the management training they would need for a role commensurate with their potential. This is despite the efforts of a myriad of Training Centres for the Township Industry all over China and the concern of a nation-wide non-governmental organization, the All China Women's Federation (ACWF).

Determined to seek a more active role in supporting and assisting rural women to advance in industry, ACWF wants its own training institutions, with UNIDO help, to provide the management and business skills women managers and entrepreneurs currently lack. UNIDO assists by strengthening ACWF institutions and upgrading its instructors' training skills through training-of-trainers programmes.

Their joint programme began in May 1994 with a needs assessment workshop for a sample selection of women managing directors and chief executives. Each had a minimum of three years on the job and at least junior middle school education. Experts from a school of accountancy and business in Singapore who led the workshop found their overriding concern was how to manage a total business entity as China moves to a market economy—a vastly different task from simply running a plant that manufactured industrial goods for a planned economy. In that context, the experts and participants together identified five areas for subsequent training of ACWF trainers: marketing management and international marketing, strategic management and business strategy, human resource management, finance and accounting, and training skills and modern training methods.

ACWF selected trainers for the next stage with at least three years' university education, a minimum of three years' relevant experience, good human interactive skills, and the ability to conceptualize and analyse. Their task: to pilot-test five training modules in training workshops in Beijing and surrounding provincial centres led by the international experts. They also benefited from lectures by national experts from the Academy of Social Sciences, the Ministry of Agriculture and the Consulting Centre of the China Enterprise Management Association. In addition the trainees spent a week in Singapore with further lectures at the accountancy and business school and visits to six Singapore companies.

The UNIDO-ACWF programme is continuing with a second phase featuring further institution-building within ACWF itself and completion of the model training package for use by later generations of ACWF trainers. ACWF's China College for Women Administrators will become the Centre for Women Entrepreneurial Training. UNIDO and ACWF, together, will further refine the training methodology with case-studies, lecture games and group exercises based on the specific business environment for China's township industry. Training content will also put more emphasis on gender-specific problems.

development aspects of the issue. For example, technical cooperation projects on manufacturing non-timber products from tropical rain forests are designed so that women also benefit from the marketing of such products. Use of new and renewable sources of energy are promoted and information disseminated, particularly use of solar energy in food processing, and clean technologies in other manufacturing activities.

UNIDO instruments

The main instruments supporting UNIDO's service to promote the integration of women in industrial development are policy advice and other forms of technical cooperation, capacity-building and R and D.

Technical cooperation Policy advice is offered to government departments, intergovernmental organizations, institutions and NGOs in dealing with constraints on women's roles at various decision-making levels. Emphasis is on providing women with equal opportunities in education and employment, development of policies and strategies for diversifying women's employment, and training to enhance their access to higher level positions and to new and non-traditional occupations, particularly in technical fields. Assistance is also provided in key areas for women in industry (i.e. small- and medium-scale industries, agro-industry, HRD, industrial planning, and environment and energy).

Capacity-building and development of skills Women are helped to gain increased access to industrial training institutions through changes in institutional mechanisms and procedures designed to avoid a negative bias against women's access to such institutions.

Research and analyses Studies assess the impact of changes in skill requirements particularly for women, as a result of technological innovations and developments in various industrial sub-sectors. UNIDO also develops appropriate reference files, guides and a database on women in industry to assist women throughout the programme and project cycles.

Main priorities

Though women are actively involved in traditional and/or informal production activities in rural areas, many of them use primitive and time-consuming technologies. At the level of the small-scale and informal sector, it is important to bring to women the benefits of improved technologies in order to open up new opportunities for entrepreneurship and to increase their productivity and competitiveness. UNIDO provides support for women at the level of newly emerging skills and technologies in the formal sector by monitoring and anticipating the impact of technological changes in skill requirements on women's employment potential.

Enterprise Restructuring and Privatization

Greater competition calls for greater corporate efficiency—higher productivity and better quality in the factory, better marketing and distribution outside it. For private and publicly-owned firms in both developing countries and countries in transition to market economies, rapid efficiency increases are vital. Following decades of protection they are vulnerable. Because of liberalized trade, they face increasing price and quality competition from imports; because of liberalized technology and investment import regimes they must compete with local producers who are quickest to take advantage of latest technologies, modern management systems and international marketing arrangements. Such companies, often entire industrial sub-sectors at a time, need help if they are to survive. While unwilling to bail out ailing firms, governments do recognize their own role, responsibilities and the national interest in providing solutions. Restructuring, rehabilitation and, where appropriate, privatization may require external inputs. These inputs must also be consistent with market principles in the longer term.

Prospects and constraints

Following the example of the most successful economies, developing countries increasingly rely on markets to allocate resources and integrate their economies in world trade. A direct consequence is that their companies are forced by an increasingly competitive environment to adapt in order to compete—nationally as well as internationally. The difficulties they experience in adapting reflect a wide range of problems: poor initial planning of production capacity, obsolete technology and equipment, inadequate management and management systems, outdated marketing and overstaffing. The result is poor performance in all categories, low capacity-utilization and financial losses. Failure to respond to increasing competition also means downward pressure on profits and wages. In the private sector, the end-result is closure, job losses and reduced national capacity to provide employment. In the public sector, it may also mean closure, or, where feasible, divestiture.

As markets in developing countries become more competitive, and those in erstwhile planned economies more market oriented, the number of enterprises needing rehabilitation and restructuring assistance increases rapidly. In transition economies, the number of vulnerable medium-size and large firms is already in the thousands. In developing countries, there are fewer, but their economic impact is correspondingly greater. In both cases, the financial constraints on governments in bringing about change are compounded by lack of experience in designing and implementing strategies for restructuring, rehabilitation and/or privatization. In most countries, organized industry (e.g. chambers of commerce and industry, manufacturer's associations) is also unable to advise on the numerous aspects of sector and company restructuring required for modernization and effective competitiveness.

National strategies

While governments debate the extent to which the national interest can be left to the interplay of market forces, there is common ground on the need for marketization—subjecting enterprises to the same market-driven conditions re-

Box 11

Who restructures?

UNIDO has undertaken enterprise restructuring activities in a number of developing countries and transition economies, including Poland, Tunisia, Uganda, United Republic of Tanzania, Viet Nam, and Zambia. The Organization has provided technical assistance at various levels, from industrial policy guidance on overall restructuring and privatization to assistance in strengthening the capabilities of human resources and agencies that oversee restructuring and privatization, and in conducting diagnostics and implementing the business plan or the privatization process. Technical assistance projects have also started recently in such countries as Romania and Uzbekistan. Several central Asian countries have also indicated their interest in utilizing UNIDO services in industrial restructuring.

regardless of their ownership. In this context, improvement in efficiency derives from restructuring (based on economic and market considerations) and the possibility, where relevant, of privatization. The two activities are related; often a combination of both is required. In some countries, privatization precedes restructuring, which is considered best effected by private owners. In others, privatization may not be possible without some prior restructuring. This applies particularly where there are major financial or environmental liabilities, or significant redundancy issues are associated with privatizing particular enterprises.

While some governments support privatization and application of free market forces as an essential principle of good allocation of national resources, others see some publicly-owned firms remaining in State hands for a continuing period. Either way, restructuring is often a must for them—either to surmount short-term problems, or to become efficient in the long term.

UNIDO services

UNIDO integrates its services for assisting with problems of enterprise restructuring or rehabilitation and privatization (or marketization) with those in support of *Quality, Standardization and Metrology* (see p. 57). Activities may be focused: (a) at the policy level to remove obstacles to industrial development, to facilitate economic reform, or to prepare for privatization; (b) at the institution or organized industry level to set up or strengthen mechanisms to address restructuring and privatization issues; or (c) at the enterprise level to bring about modernization, economic viability and/or competitiveness—either prior to privatization or after it (see examples, box 11 above).

Because of differences in the needs of different groups of countries, the Organization tailors its services to provide appropriate assistance to: (a) LDCs—lacking in basic prerequisites for rapid improvement in competitiveness; (b) transitional economies—showing greater development, but lacking basic legal and policy frameworks; (c) LDC economies in transition—combining the problems of the first two; and (d) other developing countries—enjoying an infrastructure that supports productivity and competitiveness increases, and having available a pool of well-trained people (see also box 12).

Box 12

Privatization of industry requires industrial expertise

Recognition that the market can allocate scarce resources more efficiently than governments is one of the most significant changes in economic development in recent years. And while considerable privatization of state-owned enterprises has taken place since 1987, there continues to be substantial potential for privatization and restructuring in developing countries and transition economies—especially where state-ownership means economic liabilities and adds to the economic burden on their respective countries. In market-oriented developing countries, where private companies already exist, privatization mostly takes the form of acquisition of ownership by local private-sector enterprises or groups; outright ownership transfer of manufacturing operations (except for mining) to foreign companies is relatively rare. In the transition economies, absence of market institutions and a local private sector call for other approaches—mass privatization programmes, sale to foreign enterprises, or transfer to workers. In all cases, restructuring of enterprises may be essential to achieve increased efficiency and competitive capability prior to privatization.

UNIDO assists countries in both the above groups. Poland requested activities relating to privatization policies, including development of a work plan. Similar work was undertaken in Angola, Ethiopia and Sudan. In Zambia, UNIDO drafted legislation for the privatization programme. Assistance at the policy and strategy levels is also provided through workshops either to review economic policies (in eastern Europe and the former Soviet Union), or addressing privatization issues directly (Côte d'Ivoire, Czech Republic, Nepal, Russian Federation, Turkey, United Republic of Tanzania and Uzbekistan). Studies and diagnostic assessments relating to privatization, including a major review of privatization in developing countries, and comparative evaluation of selected enterprise-level privatization in several countries or regions were also undertaken.

At the institutional level, UNIDO assists through capacity-building for privatization, particularly in training—including diagnosing training needs, preparing training plans, and providing various types of direct training assistance. Such assistance was requested by Angola, Egypt, Ethiopia, Poland, and Sudan. In Albania, the institutional setting was reviewed, recommendations made on the organizational structure for privatization, and a plan provided for training assistance. The Government was also advised how to strengthen the various ministries dealing with enterprises in Albania, and how to evaluate and restructure the largest state-owned enterprises. Elsewhere assistance with enterprise-level privatization included techno-economic assessments in support of privatization where technical knowledge of the industry or sector is an essential factor. Thus, Ecuador and Peru turned to UNIDO for the design of their industrial strategies to privatize chemical, pulp and paper, tomato processing, palm-oil processing, fertilizer and metallurgical operations. In the case of larger enterprises, UNIDO contributes experts to ensure the technical feasibility of the strategy, devise innovative sale schemes, act as an intermediary between the government and specialized firms such as investment bankers, and ensure that government policies and interests are accurately considered in the different contracts. UNIDO may also help devise and implement an appropriate safety net for redundant workers and other groups affected by the privatization process, and in general act as a day-to-day adviser in the complex and very often unexpected situations that may arise.

Restructuring An integrated multidisciplinary approach concentrates on those industrial sectors and sub-sectors where UNIDO offers technical expertise. Restructuring usually involves four activities: (a) diagnosis of the enterprise and its environment; (b) development of a restructuring strategy to improve its efficiency; (c) preparation of a business plan; and (d) business plan implementation—mobilization of resources and investments for technological innovation, enterprise revamping, altering the product mix and other changes.

At macro-industry policy level, the focus is on removing obstacles to industrial development to facilitate market-oriented reform and transformation. UNIDO helps streamline and strengthen institutions, creating new ones where appropriate, in order to provide industrial services required for growth. At sub-sector level, model approaches are developed and adapted for similar and related enterprises. Enterprises and individual production plants are assisted with removal of critical bottlenecks and measures to raise operational efficiency, productivity and competitiveness.

Privatization As a focal point for the industrial aspects and issues of marketization, UNIDO supports and backstops the entire range of privatization-related activities required by LDCs and the transition economies of central Asia (see also box 12). This provides comprehensive technical support for the national and international organizations involved, including strategies for phased privatization, analysis of sectors and enterprises to be privatized, assessment of alternative methods of privatization, assistance in selecting the enterprise, promotion of bidding processes, and monitoring the results. UNIDO also acts as the primary adviser to governments, bringing in specialist expertise as needed.

UNIDO assistance can be more selective in the more industrialized developing countries having market-oriented institutions such as stock exchanges, and where local entrepreneurs are in a position to purchase the assets of state-owned undertakings. Typically it concentrates on enterprise-level activities such as privatization strategies, valuation and promotion. Such enterprises may also require varying degrees of assessment and restructuring.

UNIDO instruments UNIDO's ability to field multidisciplinary teams drawn from several service areas ensures objectivity, breadth of coverage in relation to the whole range of problems facing the client, and close relationships with counterparts. The main instruments drawn together by the service are policy studies and forums, technical cooperation, investment promotion and funds mobilization.

Policy studies and forums Policy and survey studies (country-specific opportunity studies or pre-diagnostic surveys, see also *Industrial Information*, p. 62) and policy forums are undertaken to diagnose sector-specific problems and compare rehabilitation project experience. These are the basis for improving the policy environment for industry and exploring mechanisms and arrangements for international cooperation.

Technical cooperation Technical cooperation at national and regional levels reflects UNIDO's long experience in managing both large-scale and SME projects that encompass a wide variety of activities (see also *Small- and Medium-scale Industry and Rural Industrial Development*, p. 51). The Organization's traditional technical cooperation

covers a comprehensive and integrated range of programmes and activities involving direct assistance to enterprises, for privatization, restructuring, investment promotion, environmental issues and specific sectoral and industrial specialization.

Investment promotion Investment promotion secures financial resources and investment partners (see also *Investment Promotion*, p. 23). When formulating business plans, UNIDO links restructuring with opportunities for investment in restructured and modernized enterprises that offer sound economic prospects. UNIDO Investment Promotion Service offices assist in locating potential foreign investors in enterprises which have been restructured or which need restructuring.

Funds mobilization UNIDO cooperates closely with financial institutions, donor governments, UNDP, other UN organizations, the World Bank, and other multilateral development banks, as well as national financing institutions. Privatization projects may be financed through development bank loans to governments or donor country aid funds channelled to UNIDO through trust fund arrangements.

Main priorities A focused and selective approach to requests for enterprise restructuring and privatization concentrates largely on enterprises in transition economies; such services can also be provided in selected developing countries.

Small- and Medium-scale Industry and Rural Industrial Development

The development of small- and medium-scale enterprises (SMEs),¹ an essential element in the growth strategy of most economies, holds particular significance for developing countries. Operations of SMEs comprise a wide and diverse range of economic activities, from fast-growing small manufacturing or service enterprises using modern equipment to micro-enterprises straddling the formal and informal sectors in urban and rural areas. Together, SMEs not only contribute significantly to improved living standards, they also bring about substantial local capital formation and achieve high levels of productivity and capability. SMEs can be major contributors to increased industrial output and employment and serve as a vital mechanism for entrepreneurial, technological and managerial growth. Through SMEs, whole sectors of industry can increase their competitiveness and export capability. From a planning standpoint, SMEs are increasingly recognized as the principal means for achieving equitable and sustainable industrial growth and ensuring industrial diversification and dispersal.

For rural development (see box 13), the role of small and, especially, micro-enterprises in rural industry is gaining increasing attention. Industrialization of non-urban areas is a growing priority, both to reduce migration to urban and metropolitan regions and to expand the employment and income base—thereby alleviating poverty in the rural regions of developing countries. Rural industries, especially industrial micro-enterprises, are also seen as a vital link in the chain of national industrial growth. Through forward and backward integration, their production, marketing and commercial activities link with agriculture and service sectors in rural areas and with SMEs in urban areas. Their growth and viability serves to narrow inequalities of opportunity and development between rural and urban areas. Rural industries are thus increasingly recognized as a key instrument for sustainable economic and social development. Almost 1 billion people in 114 developing countries live in poverty in rural areas—some 36 per cent of their entire rural populations. In LDCs, almost 70 per cent of the rural population live in poverty.

Prospects and constraints

The capacity of SMEs to upgrade through a process of continuous learning depends on their own strategies, organization and capabilities, and on the immediate business environment and the way local systems of production and distribution are organized. In many developing countries, the immediate environment for SMEs is both weakly organized and inadequately supportive. They are enmeshed in outdated modes of production, and lack access to resources—market information, technical know-how, skills and finance—to enable them to respond to opportunities and changes. They often do not have efficient linkages with buyers, suppliers and other producers, and also lack effective mechanisms to influence public policies. Insufficient access to resources, poor linkages with other firms and inadequate supportive regulatory and incentive frameworks

¹ The definition of SMEs varies from country to country and changes with time. Usually, small enterprises may be considered as having maximum total assets of up to \$150,000 and employing up to 50 workers, while medium enterprises can be considered as those having total assets of up to \$1 million with a maximum of 250 workers, though output or turnover can also be used as a criterion. The definition, however, must be applied flexibly primarily to distinguish such enterprises from those of large enterprises.

mean that, collectively, SMEs do not benefit from the kind of synergy that encourages growth and continuous upgrading in larger firms. Individually they are neither able to improve their environment nor to mobilize the resources and develop the linkages needed to support continuous upgrading of products, markets and processes.

Nevertheless, in the new globally competitive environment, SMEs can, and in some countries do, perform equally, if not more competitively, compared to larger enterprises. They respond quicker to market changes and opportunities, develop specialized product niches, and absorb technological innovations more rapidly. At the same time, SMEs demonstrate considerable resilience and rapid response to changes in markets and technological processes and in developing specialized products and capability. In the best cases, this results in the emergence of dynamic clusters of SMEs, linked through networks across different industrial sub-sectors and even across national borders. Such SME clusters in developing as well as industrialized countries act as subcontractors and serve as suppliers of specialized products (including high-tech products) and services.

National strategies

New strategies now emerging support SMEs' potential for contributing to industrial growth and competitiveness. These strategies improve the immediate business environment, the organization of the systems of production and distribution, and foster linkages and networks—between producers, buyers, suppliers, technical and financial services, institutions and government agencies.

A vital element is development or strengthening of networks between SMEs and the private and public institutions that specialize in improving SMEs' access to services in areas of management, marketing, technology, training and finance. Such public and private bodies should be highly professional, rapid in their decision-making and able to sustain themselves on a fee-for-services basis. Small business organizations and sectoral resource centres often play a coordinating role in the organization of these networks. SME associations also organize joint services and facilities, alongside their main role of representing SMEs' interests in policy and regulatory matters.

Government strategies improve the business and institutional environment first by establishing a supportive regulatory environment for SMEs. Frameworks of policies and incentives promote new investment, provide access to technological information and encourage inter-enterprise linkages, partnerships and associations. Registration and other regulatory requirements of starting and operating a business are streamlined and simplified. Secondly, Governments provide institutional support for organization of decentralized networks of technical and financial services and development of small business organizations and sectoral resource centres. Some national authorities, guided by private sector bodies and associations, implement institutional productivity-support programmes to link SMEs in networks giving them access to information, markets, sources of supply and technical and financial services.

UNIDO services

UNIDO's SME services help developing countries develop and implement innovative and sustainable approaches to promote and support a dynamic and efficient SME sector. Their goal is greater SME contributions to the competitive-

ness, productivity and growth of production systems in urban and rural areas. UNIDO emphasizes the policy and institutional environment needed to help new SMEs start up and existing ones to develop, produce and market competitive products efficiently. The whole environment should assist both groups to continuously improve their product and process technologies, and to upgrade the managerial and technical skills of their personnel. The application of SME services to rural industrialization are described separately (see box 13).

Strategies and policies to
support SMEs

In cooperation with industry associations, technical bodies and financial institutions, UNIDO assists governments to establish a policy and institutional environment for promoting the SME sector. Specifically, the Organization assesses the potential contribution of SMEs to developing competitive production systems. It also helps formulate national strategies and policies to encourage and support SMEs in particular country situations. UNIDO provides institutional, financial and technological support for start up and continuous upgrading of SMEs. It organizes joint programmes to help new and existing SMEs to develop, produce and market competitive products.

Institutions and services to
support the SME sector

To help SMEs continuously upgrade their products and process technologies, personnel skills and linkages with markets and supply sources, UNIDO strengthens their access to networks of training, financial and technical services. This may involve creation or strengthening of institutions such as SME development agencies, small business organizations, industrial and SME associations, chambers of commerce and industry, and human-resource and technology-development institutions. Such institutions are networked to provide demand-driven services in areas of enterprise start-up, market promotion, management, technology acquisition and development, skills upgrading, quality management and financing.

Efficient private management consultancy networks are built up to provide services in areas of business strategy, industrial organization and management. UNIDO also helps organize and manage business incubation programmes, networking them with national and international technical and financial services to help them in their formative years.

Industrial partnership and
subcontracting

To strengthen partnerships and subcontracting, both with larger firms and among SMEs, UNIDO helps determine policy frameworks, regulations, incentives and programmes that encourage and support such relationships. It assists in setting up and developing subcontracting and partnership exchanges (SPXs) that act as clearing-houses for industrial subcontracting and outsourcing, and for partnership inquiries and opportunities. UNIDO also helps link SMEs across national borders, and provides specific methodologies and procedures for SPXs supplemented by computer programmes for management of their databases.

Investment partnerships between SMEs and foreign enterprises are promoted through UNIDO's *Investment Promotion* service (see page 23); SMEs' access to global sources of technology and marketing information is assisted by UNIDO's *Industrial Information* service (see page 62).

Integrated development of
sub-sectoral clusters of
SMEs

To improve specialization and cooperation between sub-sectoral clusters of SMEs, a number of services upgrade product quality, production efficiency and

(continued on page 56)

Box 13

Rural Industrial Development

Rural industrial development is gaining in priority, both as an instrument to reduce internal migration to urban and metropolitan regions, and to alleviate poverty *per se* through expansion of employment and the income base.

Prospects and constraints

The scope for industrial activities in rural areas is vast, ranging from trading, production and maintenance of agricultural hand tools and equipment to primary processing of agricultural products, and fabrication of handicrafts. It includes carpentry, milling, tailoring and weaving, and linkages with rural house construction and physical infrastructure development. Linkages with agriculture are such that an expanding farm sector can boost non-farm activities by 50 to 80 per cent. Nevertheless, non-farm activities in rural areas still account for only a small share of total rural employment: 10 to 20 per cent in Africa, 20 to 30 per cent in Asia and Latin America.

Adding value to local materials, rural industry increases demand and retains income in areas where these materials are produced. For instance, with agricultural outputs for food processing and other agro-based industry, primary processing cuts weight, bulk and losses, raises quality standards, and reduces transport costs. Links with urban SMEs create a supply of primary process materials for secondary processing and packaging for national markets or in some cases international ones. The rural economy can also be a market for industrial goods. Given additional skills and access to a minimum of credit, rural industrial enterprises can develop niche markets by catering to local tastes and meeting local technical requirements for such items as simple hand tools, agricultural implements, and low-cost construction hardware.

However, to use such opportunities as an effective means of socio-economic transformation,

industrial growth must be properly integrated with the national industrial structure. It is also necessary to provide effective packages of policies and institutional support to promote rural industries through training, institutional facilities for credit and technology advice, common service facilities, external linkages, and infrastructure.

National strategies

Industrial policies in developing countries are geared primarily to urban regions and so far have had limited impact on living standards of the rural poor. While the importance of rural industrial development is increasingly being recognized, comparatively little attention has been given in most of these countries to the development of industrial support systems for rural industries. Missing still are promotional policies and institutional support for credit, technology and marketing, and industrial extension services to meet the needs of rural industrial enterprises.

The social benefits of pro-active rural industrial development can be far-reaching. Decentralization and dispersal of industries to rural regions increases farm incomes through commercializing their produce as industrial inputs, and also provides complementary and alternative non-farm income-earning opportunities for other target groups such as landless labour and women. It increases the supply of low-cost goods affordable by the poor, reduces the burden on women through availability of appropriate equipment and enhances equity through reduced unemployment and underemployment. It also promotes entrepreneurship.

UNIDO services

A key policy goal is improved living standards for rural populations, especially the rural poor, through expansion of industrial production and services. UNIDO's services particularly promote establishment of small and micro-enterprises and improvement of their competitiveness. Such enterprises typically require only small amounts of start-up capital, create jobs using labour-intensive technologies and offer opportunities for entrepreneurial initiative, including

opportunities for women entrepreneurs. Specifically UNIDO provides: (a) advice to policy makers; and (b) helps build up national institutions to improve management and production skills of rural small and micro-enterprises with a view to their growth and diversification.

Advice to policy makers—Advice features how to simplify administrative, taxation and other regulations that work to the disadvantage of small and micro-enterprises, including elimination of bias in the application of their discretionary elements. Also covered are introduction of fiscal support measures (tax and fee reductions, exemptions etc.), and integration of rural industrial development policies with policies for other sectors, including those for redistribution of assets (e.g. land reform) and environmental management.

Developing national capability to improve management and production skills of rural and small enterprises—Promotional institutions are strengthened by enhancing their capacity to collect, analyse and disseminate business environment data to rural and small enterprises; their business advisory services to entrepreneurs are improved through ideas for growth and investment; they are also helped to train, promote, adapt and upgrade rural small-scale industries that produce simple hand tools and farm equipment used by local farmers.

Linkages are created by networking technical institutions, NGOs and rural entrepreneur associations with a view to channelling financial resources and providing business and technical training. Such networks can arrange collective business and technical services through appropriate facilities and centres in rural areas. Entrepreneur self-help groups are helped to facilitate procurement of inputs and marketing of products. Linkages also enable business arrangements with other industries, including technical, management and financial support.

National capacity to support rural industry development can be enhanced by introducing innovative financing systems and industrial services for rural industry and strengthening training and related institutions to raise

the capacity of the rural poor and landless labour to participate in competitive industrial employment. Such institutions need to respond to immediate needs of rural entrepreneurs and workers in rural micro- and small-scale industries through new and adjusted training programmes. They should also train rural entrepreneurs to reduce the environmental impact of production, and to manage depletable and renewable resources. Arrangements may also be made to introduce into rural primary and secondary school curricula simple, practical concepts of relevant technologies and industrial management.

In most countries, the work of national R and D centres can be refocused on energy-efficient products and production technologies, and the dissemination and propagation of such technologies through advice and training for rural entrepreneurs and workers.

UNIDO instruments

The main instruments of UNIDO services to promote rural industry development are policy reviews, integrated inter- and cross-sectoral programmes and service packages, investment studies, and common service and physical facilities. Policy reviews feature promotion of competitive, growth-oriented rural industries as an instrument of socio-economic development. Service packages assist national institutions to develop regionally distinct industries that respond to local demand. Physical facilities such as rural industrial service centres and rural industrial estates are designed for collective self-help management.

Main priorities

The principal priorities with respect to rural industrial development are the needs of target populations and area-based promotion of rural enterprises and entrepreneurs, particularly women. Provision of business advisory services and institutional support for credit, technology and marketing includes extension services for small-scale and micro-enterprises in rural areas.

distribution. They also develop managerial and technical skills, strengthen access to technical and financial institutions and services, and build linkages with markets and sources of supply. Capacities of SME associations are built up at the sub-sector level; strategies and action programmes are formulated to support SME upgrading, inter-enterprise specialization and cooperation. Resource centres are set up in each cluster for development and implementation of the strategies. UNIDO strengthens the capacities of resource centres and networks of associated local institutions. It also assists SMEs in the cluster using the successful firms as a resource. The best firms provide examples of market development, product design and quality, inter-firm specialization, technological and skill upgrading, common production and/or purchasing agreements and services.

Capabilities of institutions, in particular the cluster-based SME associations, are strengthened with a view to organizing cooperation with local and national governments on the policy and regulatory environment, for example in the fields of technology, investment, infrastructure, taxes, training and finance.

UNIDO instruments

UNIDO's programmes in support of SME development feature two instruments: an SME network and a publications programme.

SME network

UNIDO's SME research network supports development, implementation and continuous upgrading of the whole SME programme. It includes an advisory group and a worldwide network of institutions from developing and industrialized countries that organize exchange of information on best practices in industrial SME promotion. The network advises on action-oriented research and specialized workshops on specific topics of general interest relating to SMEs. It focuses particularly on the design of more efficient approaches to support SME dynamism and efficiency and the processes of learning and upgrading. In the area of training, the network contributes to development and implementation of training workshops. It also provides technical assistance to introduce more innovative and efficient approaches to support SME dynamism and efficiency in developing countries.

Publications

A regular newsletter, a series of working papers and other documentation cover issues related to the process of learning and upgrading of SMEs in developing countries.

Main priorities

Programmes for development of SMEs are essentially country-specific. Integrated programmes for SME development are being evolved with UNIDO assistance at the national level, both with representatives of government and of associations and with industrial and business enterprises.

Quality, Standardization and Metrology

A new approach to the organization of the firm is changing the fundamental rules of competitive global manufacturing. At the centre of this development is the leading role assigned to product quality and quality control. Identified with successful Asian manufacturers whose ever-higher levels of product and service quality are now a major competitive advantage, the approach is rapidly gaining adherents among manufacturers around the globe. Developing countries are also recognizing that quality and its related disciplines figure prominently in strategic national objectives, and that it can help to achieve social and economic progress.

Of prime importance for quality and improvement efforts are metrology and standards. Industrial metrology serves to maintain essential systems of accurate measurements to support production of quality goods and services. Covering activities such as careful calibration of machinery and laboratory instruments, it greatly aids quality improvement efforts. National and international standards are sets of requirements to be satisfied by a material, process, product, procedure, test method and/or physical, functional performance, or performance characteristic. Their increasing role is evident in the rapid acceptance of today's most important quality standard (and the fastest growing standard of all time), the ISO 9000 series.

But while the role of quality has clearly emerged as a critical variable influencing enterprise competitiveness, the world's most competitive firms are going beyond quality. For them increased quality is merely one aspect of an approach that stresses continual improvement of all aspects of the production process. Increased product quality—along with a simultaneous stream of advances in productivity, flexibility, and cost performance—flows from dynamic and continual improvement of the overall organization.

Prospects and constraints

The ISO 9000 series is a set of international standards that prescribe acceptable methods of designing, implementing and assessing quality management and assurance systems, in effect standardizing a general approach to quality systems at the enterprise level. Its use is essential for business with the European Union, where firms that are certified as having met this standard can preferentially compete. The series provides firms with definitions of what constitutes quality, and gives them clear guidelines for setting up quality systems. Where firms have little or no experience with quality and improvement, ISO 9000 provides a solid foundation for subsequent improvement efforts and for convincing enterprise managers of the need for changes in order to obtain certification.

Today, ISO 9000-driven quality improvements are increasingly seen as one feature of continuous improvement demanded by the competitive environment. Moreover, they can only take place within a managerial and organizational system that channels all the resources of the firm towards improving products and processes. It is the task of top management to oversee implementation of sys-

tems of total quality management (TQM), and ensure that they are continually improved. In addition, all quality and improvement programmes must be aimed at increasing customer satisfaction. Comprehensive programmes of TQM or continuous improvement are therefore necessary to help managers achieve these capabilities.

In practice, much confusion remains in the minds of enterprise managers concerning such improvement programmes. Absence of clear quality improvement procedures may even aggravate the waste of effort and financial resources in many enterprises. Lack of adequate performance measures means that managers often overlook positive results from improvement efforts. While certain outcomes of improved quality may be difficult to measure (e.g. the impact of more satisfied customers), there are many techniques available that can be used to present demonstrable evidence of progress in quality and process improvement. Without such measures, managers may even reject quality and improvement programmes.

National strategies

In the current global drive to improve quality and production efficiency, successful firms are rewarded with increased market shares. Recognizing this, governments are working hand in hand with organized industry (chambers of commerce and industry, manufacturers' associations etc.) to raise awareness of quality requirements and to arrange for national institutions to certify those who meet. Rapid rises in applications for ISO 9000 certification in many developing countries reflect the growing demand for services in support of better quality and improvement. Emerging from this process are new forms of industrial partnership and horizontal integration—as well as new types of financing and accounting tools.

New approaches are needed to integrate the results of quality improvement (crucial for customer satisfaction) with measures of efficiency and profitability (a main concern of managers). Such measures will allow managers to quicken the pace of modernization based on existing resources.

UNIDO services

UNIDO's programmes on quality standardization and metrology feature an integrated approach to continuous quality and process improvement (see box 14). They combine a system of quality improvement with a set of management tools that identify deviations from established goals, and maximize use of existing methods by measuring their effectiveness. They build on ISO 9000 as a catalyst for generating sustained increases in enterprise performance, by promoting it along with TQM and continuous improvement.

Four UNIDO services combine to take the company quality approach beyond ISO 9000. They also support the establishment of ISO 9000 certification bodies, set up productivity and quality centres, and rehabilitate metrology laboratories.

Beyond ISO 9000

While adherence to ISO 9000 is now necessary for firms to enter foreign markets, it is not sufficient to guarantee sustained success. An ISO 9000 certificate neither guarantees product quality nor the capabilities of managers. To achieve sustainable market performance, enterprises must go beyond ISO 9000 and

implement comprehensive systems that generate continuous improvements in quality, cost and flexibility. Increased quality then becomes a by-product of an approach that stresses continual improvement at all the stages of the production process. The crucial issue determining competitive success is the ability of managers to create a production system that channels all the resources of their enterprise towards improving products and processes.

UNIDO's ISO 9000++ programme responds to the above with components for strengthening continuous improvement capabilities: implementation of TQM in enterprises, application of statistical process control, preparation for ISO 9000 certification, ISO 9000 diagnostics at plant level, assessment methodologies for product certification, continuous operational performance evaluation, computerized production and business performance evaluation, and strengthening strategic planning and decision-making capabilities.

The service strengthens institutions by: building up capacity at the level of industry associations, R and D institutions, consulting companies etc., assisting enterprises in implementing quality systems, and through management and control based on ISO 9000. It assists groups of enterprises with cost-effective implementation of procedures required for ISO 9000 certification; and it helps individual enterprises implement TQM and continuous improvement programmes. The service also assesses conditions for ISO 9000 certification and helps implement corrective actions.

Assessment and support
for ISO 9000 accreditation
and certification bodies

Although ISO 9000 certification increasingly represents a commonly accepted seal of approval for firms to act as subcontractors or to export to large parts of the world, only a tiny share of the total certificates are issued in developing countries. The reason: accreditation and certificates in developing countries do not yet have the credibility to be accepted around the world. Yet without mutual recognition of accreditation bodies, standards such as ISO 9000 will be counter-productive—emerging as significant non-tariff barriers to trade in coming years.

UNIDO helps governments set up national accreditation bodies for ISO 9000 certification of local enterprises. Working on behalf of selected groups of enterprises seeking ISO 9000 certification, the first step is to assist in selecting the national certification body. The selected institution is then strengthened and supported through assessment (by international experts) of the ISO 9000 procedures applying to the selected enterprises. National teams are formed and the required procedures and paperwork introduced. The institution is then matched with assessment bodies from developed countries for the purpose of mutual recognition.

Centres for productivity and
quality

To establish centres for productivity and quality, and permanent centres dedicated to training managers and technicians in the application of improvement practices such as statistical process control,^{*} UNIDO works with universities, technical institutions and industry associations. The centres are staffed full- or part-time by people with plant-level experience in applying methods of quality

^{*} For a detailed review of UNIDO's use of continuous improvement techniques in an industrial development context, see *Beyond Quality: An Agenda for Improving Manufacturing Capabilities in Developing Countries* (London: Edward Elgar Publishing Ltd., 1995).

control and continuous improvement. Training sessions and seminars include quality and improvement of professionals from multinational firms as well as their national counterparts. While government support is required in the start-up phase, such centres are conceived as self-financing within three years, using funds from trade and industry associations and chambers of commerce, and fees paid by individual firms.

Rehabilitation of metrology laboratories

Through rehabilitation, metrology laboratories are upgraded and provided with credible capacity at regional, national and sectoral levels to provide traceability in measurements, at any level and with confidence to domestic and foreign customers. UNIDO assistance evaluates existing structures and available facilities, identifies major changes to be undertaken by national institutions to overcome discrepancies, and implements the required actions.

UNIDO instruments

Two software packages measure the short- and medium-term difference between planned and actual performance and the medium- and long-term accumulated performance.

Software packages

BEST (Business Environment Strategic Tool Kit) is a set of user-friendly software modules designed both to teach entrepreneurs production planning and to support strategic decisions. The main modules are operation management assistance, strategic management assistance, investment assistance and product monitoring assistance. BEST is not a traditional accounting system—but rather a comprehensive operational tool for managers. Operating indicators are used to monitor performance, productivity and utilization of facilities.

FIT (Financial Improvement Tool Kit) supports management in operational and strategic decision-making. A group of key indicators are calculated and their evolution over time displayed. The indicators are selected to strategically position the business and to point to potential operational problem areas. FIT can analyse an entire enterprise, or specific strategic business units (well-defined products or services that are targeted at specific market segments) within an enterprise.

The two tools together provide entrepreneurs with an insight into their enterprise's operational performance. They present results graphically, comparing planned monthly performance versus actual performance.

Main priorities

Assessment and support for ISO 9000 accreditation and certification bodies are required by developing countries at each level of development. Quality-related services that go beyond ISO 9000 are of interest mainly in Asian, Latin American and Caribbean countries where ISO 9000 certification is already established. Interest in centres for production and quality comes similarly from Latin America. Rehabilitation of metrology laboratories is carried out mainly in Africa and Latin America.

Box 14

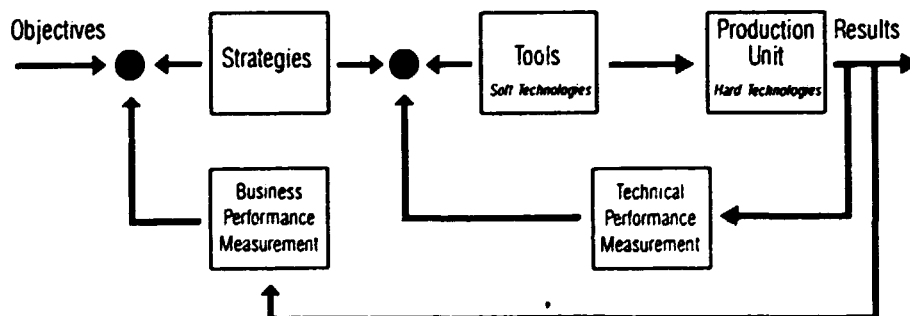
**Continuous improvement quality systems central
to company reorganization for global competitiveness**

In tomorrow's world, increasing customer satisfaction through quality improvement, and profitability through greater corporate efficiency, will be crucial even for small and medium-scale companies. UNIDO's integrated methodology in this connection offers a systems approach to quality improvement and a set of management tools for monitoring effectiveness of business strategies. Together they enable managers to quicken the pace of modernization using the resources they already have, i.e. not requiring major investment in additional plant and equipment whose acquisition can be problematic for many developing-country operations. They constitute, therefore, a highly appropriate technology for industrial development.

In the systems approach, a company and its production are represented as a sequence comprising its overall strategy, its action tools and the manufacturing unit (see fig.3 below). The sequence is also part of two loops. An inner quality loop feeds back data for technical performance measurement thus ensuring compliance with specifications (i.e. customer satisfaction). An outer management loop is responsible for operational performance of the enterprise—it defines objectives and strategies, and ensures they are supported by accurate data. Both loops feed back the results of company activities for comparison with stated goals and objectives. Corrective action then reduces the gaps between objectives and actual results. In typical systems, company objectives cover technical standards and other specifications, particular consumer requirements and the company's own management plans. Strategies include actions with respect to target markets, relative quality performance and other success factors. Action tools may involve total quality management, statistical process control (SPC), ISO 9000 methodologies, added-value analyses, feasibility studies, product complexity analyses, diagnostic surveys, product design (e.g. CAD/CAM) and HRD systems.

Among the action tools for the quality loop, UNIDO's own SPC software package, *UNIDO-on-SITE* (statistical improvement tools for enterprises), is a set of software adapted from established systems to developing-country operating conditions. In the management loop, two UNIDO software packages, *BEST* (Business Environment Strategic Toolkit) and *FIT* (Financial Improvement Toolkit), build on established accounting techniques. Using the same data as traditional accounting practice, *BEST* and *FIT* enable managers to look not only at the past, but also at the present and at trends for the future.

Figure 3



Industrial Information

The ability to take advantage of resources, changing technology and new market opportunities puts a premium on access to information and know-how. In today's competitive environment, the information necessary for continuous upgrading and adapting of production, and for promoting goods and services, can be crucial to survival. Companies and enterprises of all sizes require access to up-to-date information, both raw data and assessed technical and economic information. They must equip themselves not only to acquire such information, but also to handle it internally. Nationally, information is needed for a broad spectrum of areas—on technologies, equipment and machinery, raw materials, spare parts, patents, environmental protection, investment, technology transfer, economic conditions in other countries, market trends and export opportunities.

Experience in newly industrialized countries shows that access to reliable technical information can be instrumental in allowing manufacturers to leap whole periods of technological development and adopt state-of-the-art systems directly—without needing to undertake a painful and costly development phase. Up-to-date economic information and analysis of global economic trends and the prevailing industrial situation in other countries is likewise indispensable—and the gateway to identifying industrial needs, opportunities, constraints and priorities of the country or region concerned. Economic analysis provides the basis for formulating and effectively implementing appropriate industrial projects by both public and private entities. Its absence hampers growth and a common understanding of major industrial development issues, including the evolution of meaningful dialogue between the major participants in the industrial development process.

Prospects and constraints

Dramatic advances in the information industry in recent years, particularly the rapid growth of electronic networking, are revolutionizing access and delivery of the world's knowledge resources. While these changes have their own significance for developing countries, major gaps remain in both the quality of information concerning industry in those countries and the relevance to them of global technical and economic trends.

Access to networks and to other new information technology products potentially improves the position of developing countries—providing data and information to assist strategic planning, market access and technology acquisition. As an instrument of South-South cooperation, networks also improve diffusion and effective absorption of internationally available technological and organizational innovations. However, while industrialized countries are increasingly capitalizing on these communications advances, the situation remains unsatisfactory in many developing countries, particularly in the LDCs. Although a number of developing countries are now establishing national networks, particularly in the Asia-Pacific region and in Latin America, there is a serious risk that the gap between most developing and developed countries will widen significantly unless immediate steps are taken to develop these information systems

and capabilities. In practical terms this means new equipment and software, access to international networks, and developing the human skills to take advantage of the rapidly globalizing knowledge base.

With respect to the information itself, major gaps remain throughout the spectrum of economic information concerning developing countries. In particular, there is a serious dearth of industry-specific country information and analysis—both what is happening within national borders, and reliable assessments of the implications of trends such as the emergence of trading blocs, the consequences of international agreements, and the realignment of global industry following patterns of comparative advantage. The information gap on industrial trends and prospects for major manufacturing sub-sectors in developing countries seriously hampers not only national planning, but also the promotion of foreign investment and technical cooperation.

National strategies

Aware of their shortcomings in the information area, some developing countries are moving ahead with national information systems. Government planning departments base their industrialization policies and perspectives on internal and external studies taking into account national constraints and priorities. At the same time, they are putting in place national information systems through which both state-owned and private industry can benefit from access to global knowledge. At the most sophisticated level, large countries are served by satellite-linked regional information centres offering general public access. Some governments have converted their agencies that were previously responsible for controlling technology imports into information service offices. Others have assisted organized industry, such as chambers of commerce and industry, to build up their own information services. In each case it is necessary to extend or adapt developments in information technology to particular country situations. Through UNIDO the new services may be linked to comprehensive industrial databases around the world.

UNIDO services

As part of the Organization's services as an international centre for industrial development, UNIDO monitors global economic, political and technological developments as they unfold, assessing their quantitative and qualitative impacts on different regions and countries. To assist formulation of region- and country-specific responses, key issues are assessed: new technological breakthroughs, location of industry, environmental impact, linkages between industrial sectors, population growth, the demand for skilled and unskilled labour, unemployment, and poverty. In addition, UNIDO's Industrial and Technological Information Bank (INTIB) offers alternative approaches and services to enhance the national and regional information capabilities of developing countries to meet their needs for industrial technology and market information. This gives access to UNIDO's own databases, to technology-based databases around the world, and—in the economic information sphere—to UNIDO's own surveys and reviews of the current state of and future prospects for industry in developing countries.

Global analyses and industrial development reviews

Policy-oriented studies and research on industrial and socio-economic development analyse critical long-term industrialization issues at the global level.

Box 15

Industrial development — global studies . . .

Finding reliable information on the manufacturing sector in developing countries can be a major problem for researchers. Yet, valid data and assessed information on industry in those countries can be crucial for a decision to invest or set up any kind of long-term business relationship there. An independent source of reliable information is also essential for policy makers and planners in government charged with adjusting—in both the short and long term—the legislative and physical environment in which industry operates. UNIDO's annual *Industrial Development Global Report* and its *Industrial Development Review* series (see box 16) fill the gap. Together they provide a unique and comprehensive analysis of the state of world industry at global and national levels.

The *Global Report* is an annual look at the state of trends in world industry from the standpoint of their impact on developing countries. The focus is on data and assessed information considered essential for policy makers and planners in industry and government. Prepared by leading authorities in their fields and presented in three parts, each report begins with world economic trends and key influences on industry. It follows up major issues of the year, such as major changes in the global trade regime, impact of regional economic groupings on developing countries' industrial prospects, and issues affecting their competitiveness. It also reviews policy initiatives that affect industry or industry's contribution to solving social problems or the development of other economic sectors. The report looks at trends and prospects on a regional basis, distinguishing between developed market economies, countries in transition to market economies, and six groups of developing economies—from tropical Africa to East and South-East Asia. Part three of the report presents developing countries in terms of unique data from the UNIDO statistical database. Trend diagrams display each country's annual past and future GDP, per capita GDP and MVA growth rates, the share of manufacturing in GDP and the industrial production index over a 20-year period, and the trends in industrial structural change.

Techno-economic trends are monitored and assessed for their implications for different regions and countries at different levels of development. Such services are also available to follow up worldwide industrial policy issues, and undertake comparative industrial policy studies for dissemination to UNIDO Member States. Comprehensive industrial surveys at the country and regional levels are prepared as an information service for governments, other agencies, and the international business community. They analyse the economic structure and industrial development performance of particular countries or regions, and focus on the prospects for key industrial branches. Their overall aim is to foster cooperation in investment, trade and technical assistance. The reviews aim at fostering international industrial cooperation in the fields of investment, trade and technical assistance. Analyses of industrial policy and development are also undertaken.

Industrial technology and
market information
networks

UNIDO assesses the relevance and possibilities for developing industrial technology and market information networks in particular countries based on the potential of existing institutions and the need for training, hardware and software. The service provides an opportunity to update and upgrade the knowledge

Box 16

... and investment-oriented national industrial reviews

Designed for investors, planners, industrial policy makers and anyone concerned with project development and implementation in the industrial field, each UNIDO *Industrial Development Review* provides an in-depth survey of a single country's industrial framework, government economic policy, and national industrial performance—the essential background information, often found nowhere else at industry level, for investment and other planning and cooperation decisions. Separate sections are devoted to the macroeconomic and industrial policy environment, the manufacturing sector and profiles of the main 20 to 30 industrial sub-sectors. Discussion of the policy environment focuses on recent economic trends, economic reforms and their results and further outlook. Analysis of the manufacturing sector looks at its growth and industrial changes, employment, productivity trends, public sector performance and privatization, international trade, foreign investment, performance of small-scale industry, industrial financing, investment in technology and human resource development, and environmental issues. Standard annexes report the country's industrial statistics and key contact points for investors.

Preparation of the reviews may be initiated by the government of the country concerned or by private sector organizations such as banks and other finance institutions—sometimes also with funds for translation costs to issue local language editions. The reviews may also be linked with investment promotion activities and seminars bringing together industrial players from the public and private sector.

of both government officials and selected end-users in the area of industrial technology and market information. It may also build up the capability of INTIB National Focal Points (see below) to provide information services to local industrial enterprises.

Industrial information
services for SMEs

Industrial information services for SMEs are required in both developed countries, where a substantial level of industrialization has been achieved, and in economies in transition. UNIDO identifies specific information needs, particularly of those industrial end-users undertaking development and modernization programmes, e.g. who require access to advanced information resources and technologies. The service typically develops the capabilities of selected national information centres to advise and train SME managers and professionals themselves. It may also advise SMEs on establishing their own information units and on familiarizing professionals and specialists with the information resources available in their own country, particularly those offered by regional networks of chambers of commerce.

Comprehensive national information systems

Establishment of full-fledged and comprehensive national information systems and networks in a country facilitates access to industrial and market information for improving production, industrial investment, export and decision-making processes. It also gives access to international databases and worldwide information systems. For long-term viability, financial support from the private sector is often necessary for maintaining the institutional mechanism.

UNIDO instruments

Three mechanisms support the industrial studies and information services: the INTIB network, an international information referral system and a publications programme.

Industrial and Technological Information Bank

INTIB is the hub of a worldwide network of industry-related information centres or services in more than 80 countries. Its national and regional focal points are local sources of information on specialized know-how and local markets geared to the information needs of SMEs. Drawing on its own resources and the Organization's in-house expertise, INTIB provides a wide range of information on production trends and technological developments in various fields. It advises on the availability and suitability of alternative technologies and their acquisition in developing countries, including environmentally sound technologies for specific industrial areas.

INTIB also maintains a database on technological opportunities (technology offers and specific demands) built up as a by-product of Techmarts (see p. 25) organized in various countries.

Information Referral System

An International Information Referral System is based on inventories of specialized sources of information in countries prepared to handle industrial information inquiries. Information is also collected on the types of inquiry the source can handle (for example, inquiries on raw materials, equipment, manufactured products, technologies and engineering methods and services), and on the sort of replies it can provide and their cost. Collated into national directories (also issued in print form), they comprise a global referral database. When inquiries are received at UNIDO headquarters or at a focal point in a Member State, they are matched through the Referral System, and several sources of information are supplied in response.

Publications

Published as the *Industrial Development Review* series, comprehensive industrial surveys analyse the economic structure, the role and impact of industrial policy, the industrial development performance of particular countries or regions, and the prospects for their key industrial branches. Depending on their scope, the reviews are either co-published as sales publications or distributed free of charge.

UNIDO's annual *Global Report* assesses the changing global economic environment in which industrial development takes place. It analyses policy implications for developing countries and articulates major global economic issues. It also focuses on region-specific impacts of such issues with respect to 10 specific regions of the world defined for this purpose. A statistical annex provides data on key economic indicators as well as detailed information on 28 industrial branches in some 130 countries.

The *Survey of World Industries* covers nine industrial sectors, six of which are in-depth surveys. The focus of each is the world market structure (recent trends and current conditions such as information on production, consumption, international trade etc.), technological trends, environmental and energy issues and future perspectives.

Through a series of awareness bulletins, UNIDO sensitizes industry and governments to the need for and requirements of technology monitoring and assessment. It assists in the establishment or strengthening of mechanisms to monitor and assess emerging technologies. Five awareness bulletins cover microelectronics, biotechnology and genetic engineering, advances in new materials technology, high-tech spin-offs, and environmentally friendly technologies.

Main priorities

Industrial studies focus primarily on middle-income developing countries and LDCs. Information services to governments and industry are geared to the needs of small- and medium-scale firms.

Industrial Statistics

The nature of statistical services has changed dramatically since the 1980s. First, cheaper, and therefore more accessible, computing means opportunities to increase the effectiveness and flexibility of statistical operations. Second, the context in which data are produced has fundamentally changed. The era of the market-driven economy, trade liberalization and closer integration into the global economy requires different data from those traditionally sought—for example on investment opportunities, rates of capacity utilization, skill levels, trends in individual markets and so on. Third, the composition of data suppliers and data users is being altered. Statisticians previously collected data from state-run firms that had to respond. To elicit data from the new population of private firms statisticians have to entice them to respond. Similarly, the main users of data used to be the organs of the planned economy. Today, statisticians have to go out of their way to fulfil a variety of information requests from a wider variety of customers. Finally, underlying all these changes is the fact that information is a perishable commodity in a market-driven economy. If users are to respond to market forces quickly, they must have ready access to up-to-date information.

Recent developments within the UN system also have important implications. As of 1994, the UN Statistical Commission transferred to UNIDO responsibility for collecting and disseminating the industrial statistics of the developing countries and transition economies—work previously carried out by the UN Statistical Commission. Meanwhile, the International Standard Industrial Classification (ISIC) system underwent a major revision, the third in the nearly 50 years since the standard was first adopted. Although industrialized countries expect to make the transformation in 1995-1996, few developing countries are in a position to do so. The international comparability of industrial statistics thus hinges particularly on external assistance in this process.

Prospects and constraints

Of the approximately 130 developing countries providing UNIDO with industrial data, relatively few (46 in 1992) compile data for individual industries. Surveys indicate a number of common flaws: inaccuracies resulting from the lack of systematic procedures for error-checking and inadequate safeguards to preserve data integrity; high levels of non-response due to failure to locate (deficient registry) or to reach some firms (insufficient means), especially small enterprises in rural areas, or their refusal to answer the questions when reached; errors of measurement due to poorly designed survey instruments (questionnaires, enumeration manuals) or respondents' inability to deliver accurate information; incomplete coverage of industries and regions of the country (especially rural areas).

Developing countries also suffer from inordinate delays in the provision of data to users. Sometimes, the results of censuses or surveys are never published or made available to users outside the statistical office. Sometimes there is a failure to identify potential data users and determine their requirements. A significant number of countries believe the cost of collecting and disseminating industrial statistics is higher than it need be.

Many of the same problems occur in transition economies. While their data processing is faster and more accurate, some are in worse shape than developing countries with respect to international standardization of their statistics (e.g. classifications, definitions, methods of measurements).

National strategies

Comparatively few developing countries have made industrial statistics into the vital source of information enjoyed by government and non-government users in industrialized countries. Indeed, until recently their governments took the view that industrial statistics were relevant only to their own constituency. There were few users outside of government; little effort was made to make the data comprehensible or available to non-governmental users. Even today, the majority of developing countries are struggling to implement privatization and market reform programmes and have yet to address the information requirements of the fledgling private sector. There is growing awareness, however, that industrial statistics have a significant role in overall strategy and that links between those who collect data and those using them must be strengthened. Coupled with greater emphasis on collecting new types of data needed by manufacturers and other private firms, and the need for more effective data dissemination, the basis of UNIDO's work with governments is to develop truly supportive national industrial statistics programmes.

UNIDO services

UNIDO's National Industrial Statistics Programme (NISP) for industrial data and business statistics places highest priority on users' information needs and their ability to access data quickly and easily. Emphasis is on turning statistics into information for decision makers in private industry, i.e. serving an audience which includes private industrialists, policy makers and potential investors (domestic and foreign)—in addition to traditional users such as government officials and government statisticians. The service may also propose an enhanced role for ministries of industry as the institutional setting most appropriate for collection, analysis and dissemination of industrial data. Having a direct interest in the final product, industry ministries are motivated to ensure the success of the overall operation.

National industrial statistics support

NISP aims to improve host countries' capabilities to collect, process, use and disseminate industrial statistics. Through a holistic process of diagnosis and introduction of new procedures, equipment and software, it introduces sound statistical routines in combination with extensive use of microcomputers. Employed to establish or to overhaul industrial statistics operations, the approach relies on a package of methodologies, procedures and tools featuring the development of sample questionnaires, statistical coding manuals, instructions, testing procedures and training programmes. UNIDO experts provide on-site assistance in implementing the NISP operations, and help officials adapt and tailor them to their own industrial statistical system. NISP projects are typically implemented over a period of 12 to 18 months to ensure sustainability of the system and procedures without further assistance from outside experts.

All procedures are compatible with the recommendations of the UN World Industrial Census Programme and thus assist user countries to fulfil their responsibilities within the UN system to collect and disseminate national industrial statistics.

UNIDO instruments Every application is supported by UNIDO's own PC software, NISP Plus.

NISP Plus Comprising a series of compatible programmes using commercial application packages (such as dBase and Clipper), NISP Plus covers statistical operations from data collection to dissemination. It features facilities for printing questionnaires, maintaining a registry of firms and keying in raw data. It provides analytical routines such as conversion from actual to constant prices, and derivations of production and productivity indices. NISP Plus also provides camera-ready tables for publication. The software supports both English and French language implementations.

Periodicals The *International Yearbook of Industrial Statistics* contains internationally comparable data on manufacturing value added, employment, wages and salaries, capital formation and number of establishments for 120 countries and areas. National data on the industrial sector are an important source of information or analyses relating to trade negotiations and the resolution of trade disputes, formulation of international investment and joint venture strategies (from both investor and recipient perspectives), international marketing, and formulation of technical assistance programmes.

Main priorities In principle offered to all Member States, NISP services are taken up primarily by countries with emerging or rudimentary industrial bases. Priority is also given to countries actively pursuing elements of market reform—whose success depends on good information concerning market conditions.

———— Networks and Information Sources ————

UNIDO services call on a range of networks, databases, newsletters and periodicals. Those described below are available or can be accessed by UNIDO service users.

Networks

- BINAS** Biosafety Information Network and Advisory Service is a technical assistance service, data resource and decision support environment in the field of biotechnology regulations.
- HRD communications network** A communications network for human resource development that promotes coordination, sharing of experience and innovative training approaches, and links government departments and non-governmental organizations.
- INTIBNET** A network connecting over 600 focal points and nodes to UNIDO's Industrial and Technological Information Bank (INTIB).
- IPS** Investment Promotion Service offices are located in Athens, Istanbul, Milan, Paris, Seoul, Tokyo, Warsaw, Washington and Zurich. Other locations are under negotiation with the governments. The offices are channels for local businesses to receive information and make contacts with potential partners in developing countries. They also assist with subsequent negotiations.
- Regional Network on Pesticides for Asia and the Pacific (RENPAF)** Dealing with issues of pesticide quality, safety during production, packaging, storage, distribution, use, waste management and the impact of pesticides on the environment, RENPAF collects data on pesticide demand and supply using coordinators in Bangkok and New Delhi. A common database, maintained with ESCAP, covers imports and local manufacturing of formulated pesticides and technical grades, formulation types, formulated pesticides for non-agricultural use, retail prices and crops.
- WINS** The World Investment Network Service is a global electronic network comprising investment promotion agencies in developing countries, IPS offices (see above), and UNIDO headquarters. WINS makes quickly available project proposals from entrepreneurs in developing countries to industrial partners in developed and other developing countries. Interconnection with INTIB (see page 66) provides technological backup. On-line information on country data, investment climates and financial institutions is being developed.

Databases

- Commodity Balance Statistics Database (COMBAL) Available on tape or PC diskette, the Commodity Balance Statistics Database covers domestic production, imports, exports, and apparent consumption of 123 manufactured products in 161 countries and regions.
- Contract drafting and negotiations (under development) An expert system comprising a knowledge base, software and an advisory and training service that provides clauses and contractual structures for draft contracts relating to different types of agreements, industrial sectors and legal systems of different countries. The system facilitates negotiations, reduces the time and cost of contract drafting, and improves the quality of contracts.
- IDA The Industrial Development Abstracts database is the main source of information on UNIDO's technical cooperation, studies and other industrialization activities over the years. The database contains over 20,000 fully indexed abstracts of UNIDO documentation, including major studies and reports, reports resulting from UNIDO's technical assistance activities, reports and proceedings of expert working groups, workshops and seminars, and publications in series.
- Industrial Statistics Database (INDSTAT) The world's single source of general industrial statistics offering global coverage is compiled in collaboration with OECD. Available in two formats (diskettes for PC users, tapes for mainframe processing), two databases offer different disaggregation levels, country coverage and degrees of partial processing. Data at the 4-digit ISIC level cover 63 countries and areas, and 81 industrial sectors; the 3-digit level database covers 28 sectors in 160 countries.
- Information Resource Management System (IRMS) The Information Resource Management System is a generalized database system for holding and processing specialized bibliographic data on institutions, projects, experts and consultants, meetings, training, information sources, descriptions of technologies, industrial processes and waste streams and environment audits, and other bibliographic information. Three application areas cover energy and environment, materials and technology demand and supply: (a) the Referral Database on Energy and the Environment component (REED) is the core of UNIDO's energy and environment information programme and its institutional memory for industry-related environment and energy efficiency activities; (b) Micro-METADEX ^{PLUS}™ contains information from three of the world's leading materials databases METADEX, the Materials Business File and Engineered Materials Abstracts; and (c) a technology supply database contains technology offers and requests and joint venture opportunities compiled in connection with Techmart activities.
- TCDC-INRES (Training and Expertise) TCDC-INRES is a computerized information referral system that supports technical cooperation among developing countries through collection, processing and dissemination of information on training and expertise capacities in developing countries that can be made available to other countries. Developed and maintained by UNDP, the database can be accessed through UNIDO, which is

also responsible for data collection and inputs concerning industrial support institutions.

External databases Access through INTIB to non-UNIDO bibliographic and directory-type databases includes the Environmental and Energy Efficient Technology Clearinghouse, an on-line service under development by the Environmental Protection Agency, the Department of Energy and the Agency for International Aid, all in the US. The service gives access to consultants, technology vendors, technology options, US Government contacts, information products, and information on other clearing-houses' databases.

Through INTIB, developing-country inquirers may also gain access to the other UNIDO databases listed in this section.

Newsletters and periodicals

Advances in Materials
Technology Monitor

Issued quarterly (in English), the *Monitor* covers advanced materials (alloys, composites, ceramics, plastics) with articles and news for developing-country specialists and policy makers on recent developments, market trends, publications and coming events. (Subject to a handling fee for developed-country readers.)

BINAS News

Published jointly by UNIDO and the International Centre for Genetic Engineering and Biotechnology, *BINAS News* deals with global issues pertaining to biotechnology regulation. It draws attention to significant forthcoming events and provides technical information to BINAS network users (see above).

Environmental Technology
Monitor

A quarterly publication that covers country reports, legislation, market trends, news and events, patents, publications, research, software products, standards, technology updates, and training. (Availability subject to a handling fee.)

Genetic Engineering and
Biotechnology Monitor

Issued quarterly (in English), the *Monitor* contains articles and news for developing-country specialists and policy makers on policy, national developments, research, applications, patents and intellectual property issues and bio-informatics. (Subject to a handling fee.)

Industrial Development
Global Report

Published annually in English, French and Spanish, the *Industrial Development Global Report* provides a conceptual framework for monitoring rapidly changing world economic and technological developments, analyses their implications for industrialization in diverse groups of developing countries and suggests specific regional policy responses.

INTIBNET

A quarterly newsletter in English for INTIB National Focal Points. (Controlled circulation.)

— **Networks and
Information sources** —

- International Yearbook of Industrial Statistics An annual publication based on the UNIDO Industrial Statistics Databases (see above) that replaces the *UN Industrial Statistics Yearbook, Volume 1*. Covering more than 120 countries and areas, it provides up-to-date statistical indicators to facilitate international comparisons relating to the manufacturing sector.
- Marine Industrial Technology Monitor issued quarterly (in English), each issue deals with a technological area relevant to the exploration and industrial exploitation of the sea. (Availability subject to a handling fee.)
- Microelectronics Monitor Issued quarterly (in English), the *Monitor* covers microelectronics, informatics and telecommunications technology, with articles and news for developing-country specialists and policy makers on new developments, market trends and company news, legislation and standardization, socio-economic implications, applications, software, national news, robotics and factory automation, and recent publications. (Subject to a handling fee for developed-country readers.)
- TIES Newsletter Issued quarterly (in English), the *TIES Newsletter* contains news of developments in technology acquisition, legislation, and national technology transfer and promotion offices worldwide.
- UNIDO Annual Report An annual review of recent trends in industrial development and its prospects, the main areas of UNIDO support, UNIDO's regional activities and internal management issues.
- The Year in Review A concise illustrated presentation (issued in English, French and Spanish) of UNIDO's annual record featuring policy and service priorities, activity highlights and structural refinements.
- UNIDO Investment Service News An informal newsletter for business clients of UNIDO Investment Promotion Service offices around the world that provides information on agreements brokered by the offices as an illustration of their work. The newsletter also covers relevant agreements and joint activities of international organizations, news of new IPS offices and related field activities, publications and forthcoming events.
- UNIDOlinks A newsletter that is issued monthly in six languages, (Arabic, Chinese, English, French, Russian and Spanish). A controlled circulation publication, *UNIDOlinks* carries short features on UNIDO publications and software, industrial opportunities (information on resources sought by entrepreneurs in developing countries and resources available to them from industrial firms or organizations throughout the world), UNIDO studies and reports, and a calendar of forthcoming UNIDO events.

UNIDO Matters

A newsletter issued bimonthly (English, French and Spanish) that highlights the latest developments in UNIDO activities. News and short features seek to promote and illustrate the crucial role of industrial development in socio-economic development to key audiences: governments, including parliamentarians and ministries of trade and industry, international organizations and UN agencies, donor and funding agencies, industrial and manufacturers' associations, industrial services and institutions, technological and industrial information focal points, investment promotion agencies, NGOs and UN information centres.

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Contacts for further information

Requests for specific services may be addressed directly either to UNIDO headquarters, care of the Managing Director, Country Strategy and Programme Development Division, or to the nearest UNIDO country director (see annex 3). The office of the local UN resident coordinator or UNDP resident representative also represents UNIDO in countries without a UNIDO country director.

Further information on each service may also be obtained from the managing directors and programme directors responsible for the appropriate major programmes as follows:

Managing Director

Country Strategy and Programme Development Division

Tel: (+43) 1 21131 3879 Fax: (+43) 1 21131 6825

- Africa Programme, including IDDA
- Arab Countries Programme
- Asia and the Pacific Programme
- Europe and Newly Independent States (NIS) Programme
- Latin America and the Caribbean Programme
- Quality Assurance
- Integration of Women in Industrial Development
- Least Developed Countries

Managing Director

Mobilization and Management of Financial Resources Division

Tel: (+43) 1 21131 4811 Fax: (+43) 1 21131 6812

- UN System Funds
- Government Funds
- Development Finance Institutions
- Industrial Sector Funds
- Evaluation

Managing Director

Information and Research Division

Tel: (+43) 1 21131 3403 Fax: (+43) 1 213156

- Industrial Information
- Industrial Statistics
- Studies and Research
- Industrial Development Reviews
- Public Information and Information Products

Managing Director
Human Resource, Enterprise and Private Sector Development
Tel: (+43) 1 21131 5578 Fax: (+43) 1 21131 6841

- Human Resource Development
- Enterprise Development and Restructuring
- Small- and Medium-Scale Industry
- Institutional Support and Private Sector Development

Managing Director
Industrial Sectors and Environment Division
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- Agro-based Industries
- Chemical Industries
- Engineering and Metallurgical Industries
- Environment and Energy

Managing Director
Investment and Technology Promotion Division
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- Investment Promotion
- Feasibility Studies
- Technology Promotion
- Technology Acquisition
- Industrial Cooperation and Consultations Service
(including ECDC/TCDC)

Managing Director
Operational Support Services Division
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- Project Personnel and Fellowship Service
- Purchase and Contracts

Managing Director
Division of Administration
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- Financial Services
- Financial Management of Technical Cooperation
- Personnel Services
- Recruitment Section

Annex 1

Services for major thrust areas

Programmatic theme	Components	UNIDO services
<ul style="list-style-type: none"> Strategies, policies and institution-building for global economic integration 	<ul style="list-style-type: none"> Industrial strategy and policy advice Advisory and institutional support services addressing implications of global and regional agreements 	<ul style="list-style-type: none"> Industrial policies and private sector development Enterprise restructuring and privatization Investment promotion Technology for competitiveness Industrial information
<ul style="list-style-type: none"> Environment and energy 	<ul style="list-style-type: none"> ESID strategies Clean and safe production <ul style="list-style-type: none"> National cleaner production centres Hazardous waste management Water management Leather and tanning industry Environmentally sound management of toxic chemicals Implementation of international conventions Environmentally sound use of energy 	<ul style="list-style-type: none"> Environment and energy Operational support for sectoral industrial development Technology for competitiveness Industrial policies and private sector development Human resource development Investment promotion Industrial information Industrial statistics
<ul style="list-style-type: none"> Small and medium enterprises: policies, networking and basic technical support 	<ul style="list-style-type: none"> Policy analysis and advice SME support systems and institutions Networking of SMEs Basic technical support for enterprise upgrading 	<ul style="list-style-type: none"> Small- and medium-scale industry and rural industry development Industrial policies and private sector development Human resource development Women in industrial development Technology for competitiveness Industrial information Investment promotion Operational support for sectoral industrial development Quality, standardization and metrology
<ul style="list-style-type: none"> Innovation, productivity and quality for international competitiveness 	<ul style="list-style-type: none"> Quality management Enterprise restructuring and rehabilitation Research and development for industrial innovation 	<ul style="list-style-type: none"> Enterprise restructuring and privatization Quality, standardization and metrology Operational support for sectoral industrial development Industrial statistics Industrial information Human resource development Technology for competitiveness Investment promotion

Programmatic theme	Components	UNIDO services
<ul style="list-style-type: none"> Industrial information, investment and technology promotion 	<ul style="list-style-type: none"> Technological and investment information Investment promotion Technology promotion 	<ul style="list-style-type: none"> Industrial statistics Industrial information Technology for competitiveness Investment promotion Environment and energy
<ul style="list-style-type: none"> Rural industrial development 	<ul style="list-style-type: none"> Regional development Agro-processing Building materials and low-cost housing 	<ul style="list-style-type: none"> Small- and medium-scale industry and rural industrial development Industrial policies and private sector development Investment promotion Human resource development Women in industrial development Environment and energy Operational support for sectoral industrial development Technology for competitiveness
<ul style="list-style-type: none"> Africa and LDCs: linking industry with agriculture 	<ul style="list-style-type: none"> Analytical activities and industrial policy advice Agro-processing Agricultural equipment Fertilizers and pesticides 	<ul style="list-style-type: none"> Industrial information Human resource development Small- and medium-scale industry and rural industrial development Industrial policies and private sector development Operational support for sectoral industrial development Technology for competitiveness Investment promotion

Annex 2

Sub-sector priorities 1996-1997

Sub-sectors	Highest priority	Also covered
Agro-industries		
• Food products	Meat processing Dairy products including baby food Fruits and vegetables Fish and seafood Vegetables and fats Grain production Sugar refining Other food products (starch, glucose, tea, spices and extracts)	Baked products Cocoa and confectionery Animal feed
• Leather and leather products	Tanneries and leather finishing (including effluents and waste treatment) Leather and leather products Footwear	
• Textile and garment industry	Spinning, weaving and textile finishing Wearing apparel Finished textile products Rugs and carpets manufacture	Knitting, cordage, rope and twine Other textiles (embroidery, nets and sanitary items)
• Wood processing and wood products	Sawmills, planing and other wood mills (including structural wooden products) Wood, furniture and fixtures	Other wood and cork products Wooden and cane containers
Chemical industries		
• Petrochemicals	Basic industrial chemicals Synthetic resins, plastic materials and man-made fibres	Miscellaneous petroleum and coal products, paints, varnishes and lacquers Tyres and tubes Rubber products Plastic products Printing, publishing and allied industries
• Pharmaceuticals	Manufacture of drugs and medicines	
• Agro-chemicals	Fertilizers and pesticides	
• Pulp and paper	Pulp, paper, and paperboard Containers and boxes of paper and paperboard Other pulp and paper articles	

Sub-sectors	Highest priority	Also covered
<ul style="list-style-type: none"> Building materials and mineral-based industries 	Cement, lime and plaster Glass and glass products	Manufacture of structural clay products Pottery, china and earthenware
Engineering industries		
<ul style="list-style-type: none"> Agricultural machinery 	Agricultural machinery and equipment	
<ul style="list-style-type: none"> Electrical and mechanical equipment 	Metal and woodworking machinery Railroad equipment Motor vehicles (including parts and accessories) Motorcycles and bicycles Fabricated metal products (excluding heavy industry)	Special industrial machinery and equipment * Office, computing and accounting machines (excluding software support) Electrical industry machinery and apparatus * Radio, television and communication equipment and apparatus * Electrical and household appliances * Shipbuilding and repair * Transport equipment Professional and scientific, and measuring and controlling, equipment Cutlery, hand tools and general hardware, structural metal products Engines and turbines * Metal furniture and fittings
<ul style="list-style-type: none"> Metallurgical industries 	Iron and steel basic industries Non-ferrous metal basic industries	

* Excluding spare parts, accessories and maintenance systems.

Annex 3

Contact Addresses

Outside its headquarters, UNIDO may be contacted in most developing and NIS countries through the offices of the Resident Coordinator of the United Nations system's operational activities for development, or through the Resident Representative/Regional Representative of UNDP. Many UNDP offices (see list below) accommodate a UNIDO field officer at the level of UNIDO Country Director, National Director, National Programme Officer and/or Junior Programme Officer. Specific requests concerning investment and industrial cooperation at the company level can be addressed to the UNIDO Investment Promotion Services offices and the UNIDO Centres for International Industrial Cooperation. UNIDO also maintains liaison offices in Geneva and New York.

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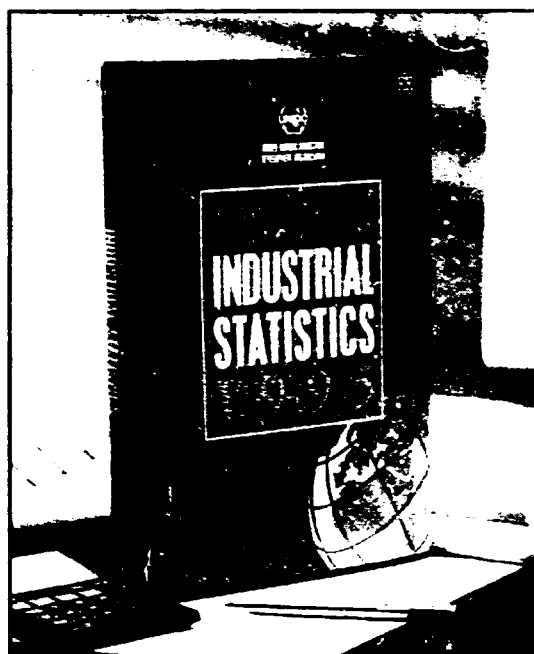
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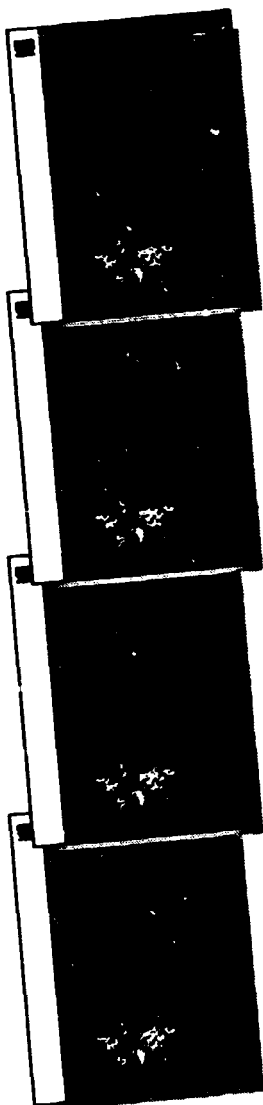
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