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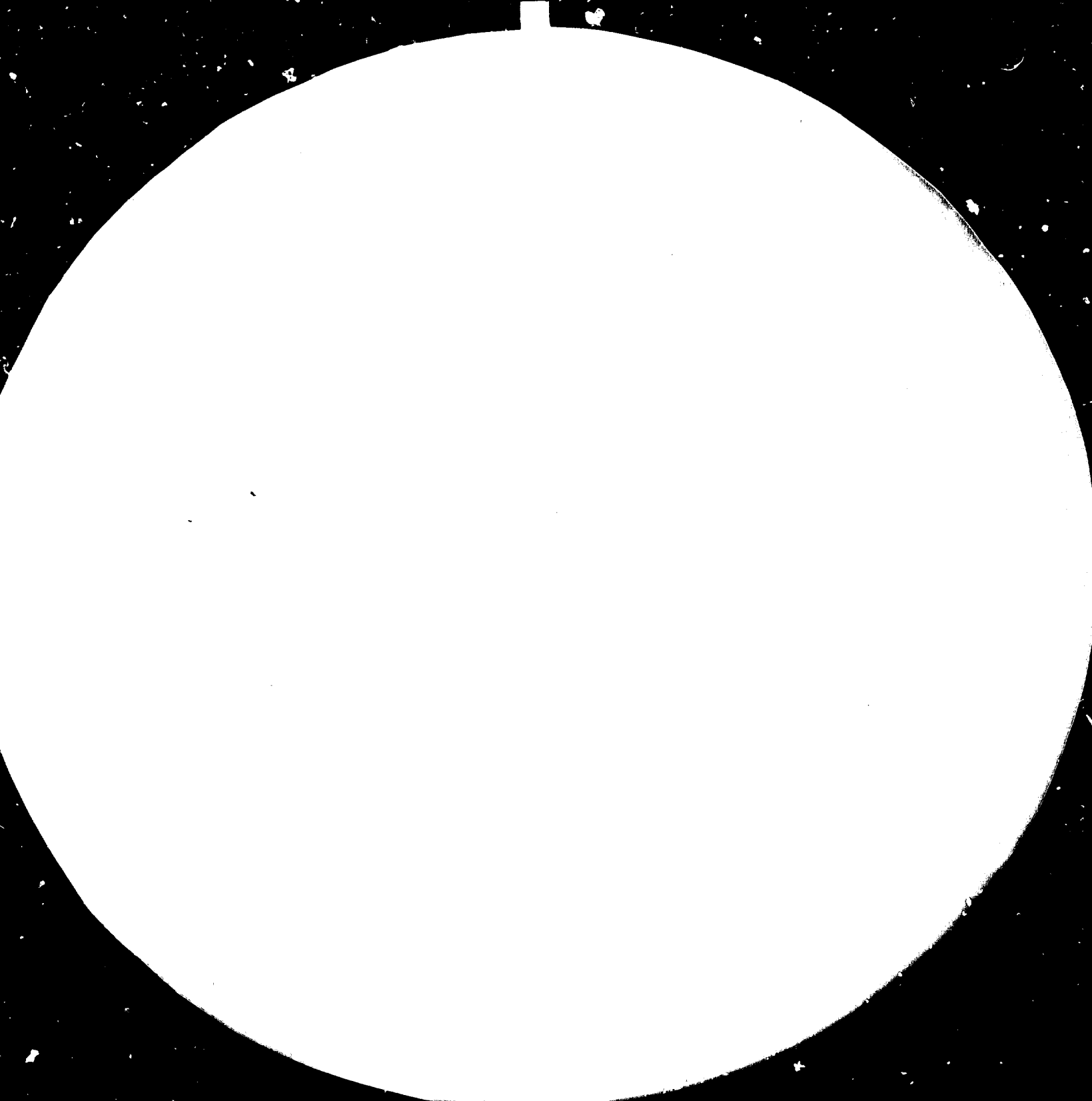
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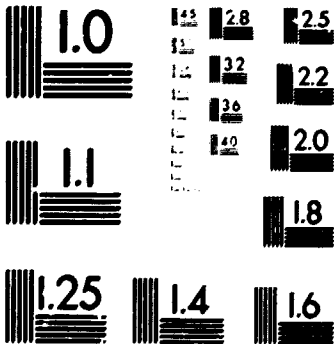
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EVALUATION OF TECHNOLOGY PAYMENTS*

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PREFACE

This document is the result of various in depth studies commissioned by UNIDO on the subject of technology payment evaluation which have been critically reviewed by the New Delhi (1982) and Caracas (1983) meetings of heads of technology transfer registries. In this presentation of the various evaluation methods for technology transfer payment evaluation, specific attention has been given to agreements where the licensor has equity participation in the recipient enterprise, to the renewal of contracts and to service fees as recommended by the TIES Caracas meeting. It is expected that the document, after careful review by the technology transfer registries, will be published as a major UNIDO document.

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INTRODUCTION

As a consequence of the realignment of economic forces in the post-war period, the transfer of science-based technology has become a viable instrument for the accelerated development of enterprises and of countries. Transnational movements of technology, particularly those developed by the industrialised countries, has benefitted both the suppliers and users of technology, although a far greater benefit appears, thus far, to have accrued to the suppliers.

Developing country enterprises are increasingly attracted to the acquisition of mature technologies and to partnership with advanced country firms so as to quickly attain efficient operating levels which, in part, may only be achieved by penetrating export markets in which the licensor organisation has stature and influence. At the level of the technology-receptient the feasibility of attaining immediate financial goals is most often the commanding determinant in the selection of technology and partner. The equitability of technology costs, and the constraints placed on the use of technology, are generally peripheral to issues of short-term profitability and growth. In this respect, there may be few substantive differences to the attitudes of developed and developing country enterprises.

However, the transfer of technology poses complex problems and issues to the governments of developing countries and arise from social and economic factors. From the viewpoint of benefit, the acquisition of technology, and partnership with with foreign enterprises, promises the feasibility of attaining self-sufficiency in strategic materials and services, the generation of national employment, the conservation of foreign exchange reserves, the efficient management of scarce resources, the expansion of the capital base of the country, the bolstering of tax revenues, etc. Further, in the perspective of the long-term, the acquisition of technology exhibits 'spread effects': it develops highly

skilled manpower, creates entrepreneurship and confidence in national capabilities, etc.

On the side of liability, however, national enterprises, because of their lack of expertise and experience, are prone to accepting licensing and joint venture arrangements whose cost is often not commensurate with the quality and effectiveness of the technologies which are eventually transferred or to the contribution they make to the social and economic objectives of the host country.

In order to achieve selectivity and economy in the acquisition of technology, and to reinforce the complementary effects of technology transfer, developing country governments have tended to 'intervene' in the processes of enterprise formation and technology licensing, which in the market-economy industrialised countries are almost wholly within the right and domain of the parties to the transaction. Intervention has generally been structural in character, although institutions, such as public sector agencies and parastatals are sometimes created to acquire technologies whose utilisation is not governed by the profit motive so much as the achievement of national strategic objectives, such as infrastructure development, etc. Structural intervention, in general practice, attempts to mould a proposed transaction with minimum change in the scope and direction of an enterprise's planned activities and realises that business goals, such as profit, market-share and growth are fundamental to entrepreneurship.

Structural intervention in many developing countries, with plans for rapid industrialisation, has generally involved the creation of one or more governmental institutions whose purpose is to formally evaluate and approve all privately proposed agreements (with expatriates) on the transfer of technology and/or on venture formation in the context of a national developmental policy. Approval has the effect that the provisions of the agreement become binding and the national enterprise can then legally transfer fees and profits in the currency of the contracts and under its

terms.

Such intervention agencies - which, for convenience, will be referred to as 'registries' in this Monograph - have generally faced major problems in trying to evolve objective guidelines for the approval of compensation arrangements made in private contracts. Often, for lack of awareness of the concepts that lie behind technology pricing, registries have typically set up arbitrary norms, such as fixed upper limit royalty rates, for the routine evaluation of technology agreements, whose effect is, many times, contravened through contractual provisions for the payment of lumpsum fees, higher equity ownership of the licensor in joint venture enterprises, compensatory coverage through overpriced supplies of components from the licensor, etc. Further, through lack of objectivity, assessments become subjective, widely variant from evaluator to evaluator, and tend to displease, in the results, the licensee and the licensor who may be otherwise engaging in a worthwhile transaction.

This Monograph has been written in the light of the experience of developing countries in regulating compensation payments and the efforts made by UNIDO to evolve viable methodology. Fortunately, the methods outlined in this document make it feasible to test, on generalised quantitative terms, the efficacy of the overall compensation management process of the registry, and to compare, within limits, the appraisal standards of other developing countries. The Monograph is, thus, basically addressed to the registries of developing countries who, by policy, wish to, or do, regulate compensation payments. In UNIDO methodology, royalty, and similar payments, are viewed as 'devices' which, in essential part, distribute the gain of the licensee enterprise amongst its three claimants: the licensor, the owners of the enterprise, and the government of the host country (tax revenues). The methodology uses a concept of 'intrinsic enterprise profit' and proceeds to determine how a particular royalty rate quantitatively divides the

gain among the claimants, the claim of the licensor being the most significant. The methodology is adaptable to the case where the licensor is also part owner of the licensee enterprise (as, for example, in the case of the joint venture). It will be later seen that while 'intrinsic profit' is an analytic construct, it is obtained by using data that is present in conventional accounting statements such as the profit-and-loss account and the balance sheet.

Unido methodology, however, is not oriented to the use of numerical parameters as final tools for decision making at the level of the registry. Fundamentally, the purpose of such exercise is to give the registry a rational approach to the consideration of compensation payments and to sway it away from earlier practices of of upper limit royalties and of 'bidding down' royalties in a Sunday-market type of exercise which, often (as will be later explained), disregard the fact that low royalties do not always, or necessarily, bring advantage to the national economy. The income-distribution parameters suggested in this Monograph will basically provide a means for the better exercise of judgement on the question as to whether the technology to which they apply is contributive to developmental goals and strategies, and whether the division of enterprise income lies within, or outside, the range of regulatory experience.

Fundamental to the methodology is the determination of a statistically relevant 'reference level' of income distribution in the historical/contemporary context. The division of income which is evaluated during regulatory exercise is first judged in its own right (whether the distribution is equitable considering *all features of the specific technology arrangement*) and then reviewed in the context of the reference level or range. Final acceptance of the compensation provisions of the agreement then rests on the decision of the registry as whether deviations from normal ranges is acceptable in the context of the overall benefits.

No effort is made in this Monograph to relate payments

to the quality and value of rights transferred through agreements, the protection given to licensees through process warranties, the disadvantages flowing from the application of constraints to the use of technology, etc. These aspects are generally held to be non-quantifiable. The enterprise, and based thereon, the registry, will have to subjectively determine whether the quantum of compensation (seen as an absolute amount) can be borne by it. That is, the evaluations suggested in this Monograph determine how the profit or income of the enterprise becomes distributed between the licensor and the enterprise at particular levels of technology cost and enterprise profit.

For the appreciation of the detailed considerations that must be made in the acceptance of the contractual provisions of the agreement, the reader is referred to the UNIDO publication 'Guidelines for Evaluation of Transfer of Technology Agreements', United Nations, New York, 1979 (which will be referred to in this document as the 'Guidelines').

This Monograph, while addressed to the registries, will be of some use to potential licensees who are evaluating alternate proposals or who wish to negotiate payments with licensors from the viewpoint of income distribution.

The ability of registries to utilise the methods presented here depend, to a significant extent, on the quality of numerical data they can formally obtain from licensee enterprises and on the quality of the information system maintained by the registry.

Countries which are proposing to establish registries may be able to devise, from the very beginning, an adequate information system and to introduce rules and regulations which would make it obligatory on enterprises to submit the type of data (essentially forecast data) required for such analysis. Enterprises will have normally evolved such data at the stage of their final feasibility study. The regulatory system in some developing countries (e.g. Nigeria, Philippines) already has access to such data.

For the analysis of technology payments involved in ventures

where the licensor has equity, it will become necessary for registries to evaluate somewhat complex formulae (merely convenient expressions for arithmetical computations which are routinely carried out by company analysts). As the efficacy of the recommended methods depend on the ability of the registry to computerise its current and historical data - in order to obtain the aforesaid reference levels - it should be easy enough to obtain an evaluation of the expressions through the computer,

PAYMENTS IN THE TRANSFER OF TECHNOLOGY PROCESS

Most technologies licensed into developing countries, today, are science-based mature technologies leading to the processing, assembly or manufacture of goods. However, the term 'technology' is also applied to transfers of expertise, such as engineering and management services, and to the acquisition of franchise rights and computer programs.

Technology is acquired in several modes. One common form is through the 'joint venture' wherein there is not only the transfer of knowhow from the licensor but also funds. The licensor becomes a partner in the establishment and the management of the licensee enterprise.

'Straight-licensing' is another, and important, form of transfer in which the licensor only assists the enterprise in incorporating the licensed technology into enterprise-owned physical facilities but has no hand in the way the owners exploit the technology. The third form of transfer is through the 'turnkey project', in which the licensor, in association with engineering and construction firms, hands over a completed and working plant to its owners without disclosing, to them, the principles underlying the technology employed. This latter form of 'transfer' is generally discouraged by the governments of developing countries except for large and complex projects, since the transfer communicates very little of technical capabilities to licensee personnel. No attention is given to it in this Monograph.

In the typical technology transaction, applying both to the joint venture and the straight license, the technology-receptient will compensate the technology supplier for the acquisition of various 'rights', 'grants' and 'services'. Rights are 'licenses' - the right to use and exploit a trademark or patent owned by the licensor in the 'territory' of the licensee; to use the knowhow developed and protected by the licensor for various approved purposes, etc. 'Grants'

are generally supportive of 'rights'; for example, the willingness of the licensor to let the licensee be an exclusive user of the technology in the licensed territory, etc. Services could be in the nature of plant design, factory construction, export-market development, training of personnel, etc.

Compensation to licensors will comprise of royalties and fees. These, in turn, may be payments which are made over a period of time ('running' royalties, for example), in installments, fixed downpayments or combinations of these. In the agreement, every form of compensation (royalty, fee, etc) and every compensation amount will be for some "consideration" expressed in the agreement (a right, a grant, etc). Sometimes, however, the compensation will cover a totality of rights, grants and services. For establishing the accountability of the licensor, it is generally preferable to identify the consideration for which the payment is made; that is, to establish a break-up of transfer of technology costs.

Compensation for licenses and grants, on the one hand, and for services, on the other, have to be differentiated. Services are generally available from competing professional organisations who are essentially 'expert users of information' which is otherwise available in the public domain, rather than creators of knowledge and owners of 'intellectual property'. It is possible to float a tender for the delivery of a specified set of services, obtain bids, and choose the most competent supplier. Sometimes, the client may be able to hire individual professionals and carry out the task at hand at a lower cost than the most competent bid.

The supplier of services does not have any control over the knowledge and information which he has transferred to the client because such is legally unprotected. The status of a supplier, with respect to his client, is hardly different from that of a supplier of goods. In contrast, the creators of industrial knowledge and owners of industrial

(or intellectual) property -trademarks, patents, copyright - have this control through specific national laws and international conventions or through judicial interpretation in case-law (in the case of knowhow). Consequently, the licensee is only a user of this knowledge and he can only use it within the limits prescribed in the agreement. Industrial property, unless it is transferred outright, is generally 'leased'. The licensee has lease rights, and from the point of view of the licensor, makes, through royalty, a lease or rental payment for the use of such rights.

Since, unless specifically created by the licensor, there cannot be more than one owner of such knowledge -technology- say, the manufacturing technology of the Mercedes engine, it is not possible to tender for such technology in the 'open market'. The price (lease payment) of such technology will be 'what the market can bear'. However, at most times, several distinct routes or forms of technology can lead to the same product (for instance, a process to manufacture graphite electrodes or drycells). In these cases, the competitive situation can lower the cost of otherwise monopolized technologies.

It will be difficult, if not impossible for a licensee to assess the true cost of technology, noting that technology is generally a 'package' comprising of technical knowledge, trademark and patent rights, licensor training of licensee personnel, etc. One possible approximation would be to determining what it would cost the licensee to develop (or for some agency to develop) such knowledge and market position. Even so, it would not be possible to assess what should be the corresponding lease rate. Consequently, the licensee will be best guided by considering as to what cost (royalties) his project can bear and yet yield expected levels of profit.

The next Section probes further into this situation and suggests an approach. At this stage, however, some caveats may be in order.

Most of the discussion that follows is in respect of royalty payments. Although the term 'royalty' is strictly applicable only to the transfer of rights-of-use of industrial property (see Guidelines), the approach suggested in this Monograph can be extended to any periodic payment made in the use of technology. This will facilitate analysis of the situation when the payment only refers to the use of technical assistance from the licensor or when there is only one composite periodic fee for a variety of licensor inputs and transfers of rights.

Assessments made through the methods suggested in this Monograph must be viewed as composite indicators. Different licensees require different levels of support and involvement from the licensor. Further, some licensees may want privileged status as 'exclusive' licensees, etc. The methodology that follows does not make any allowances for the differences in the needs of licensees. Only the flow of funds to the licensor is concentrated upon.

In following the forthcoming analysis, it should be noted that lumpsum royalties, and running royalties, can be converted from one into the other so long as the rights of the licensee are defined in terms of a time period. Where a time period is not specified, one must be assumed.

CONCEPT OF INCOME-SHARING:THE STRAIGHT LICENSING AGREEMENT

The objective of this and the next few sections of this Monograph is to formulate and discuss a method, more properly an analytical tool, developed at UNIDO and evaluated at the field level, of viewing royalty and any similar retitive fee as an 'income-sharing device'. Earlier approaches to the evaluation of royalty, which, indeed, has led to the present method, are discussed in the Guidelines.

In order to simplify discussion and to maintain focus, certain assumptions will be made to illustrate the concept of income-sharing. It is assumed, for now, that: (a) the licensee is considering the potential of entering into a license agreement with an expatriate licensor for the aquisition of rights to the use of a well-known trademark on a proposed range of goods (b) the licensee enterprise is already making and marketting products very similar to those which will be marketted under the licensed trademark (c) the licensee is an independent organisation, unrelated to the licensor in terms of equity investments from the latter (d) there are no other agreements between the two parties and (e) the government of the host country will allow a licensee to pay royalties for the use of foreign trademarks. The question that is addressed here is : how can the licensee assess that the compensation required to be paid to the licensor as ,say, a running royalty, is an equitable payment?It is assumed in proceeding further, that the potential licensee has completed his feasibility studies and finds his project will be profitable provided the royalty payments he will have to make are 'equitable'.

Clearly the use of the trademark must be expected to bring some additional gain to the licensee enterprise for it to be of value.Since the enterprise is already in business, the use of the trademark will bring it incremental gain in

the sense that the enterprise may be already obtaining, through the use of its own assets and business acumen, some base level of gain over and above the costs it incurs. Consequently, on licensing the trademark, the overall gain of the enterprise may be viewed as constituted of two components: (A) that arising from its assets and efficiencies and (B) that following from the use of the trademark. The use of the trademark is expected to fetch additional revenues from such contributions as the early market acceptance of the trademarked product, higher product prices, larger share of the market, etc.

In a straight-forward case such as this, gain-component B might be considered the 'incremental gain' directly conferred by the use of the trademark on the enterprise's products.

This gain (gain B) , however, will need to be shared between the transacting parties. Not all of it can be the contribution flowing from licensor's input. Division takes place because the licensee enterprise has cooperated in acting as the vehicle for the use of the trademark. It has opened up the national market to the licensor, etc. Consequently, the overall gain of the enterprise would be constituted of Contribution A together with the two sub-components of gain-component B.

It can be seen that even if the licensee enterprise was wholly dependent on the trademark for the sale of all of its products, overall gain will accrue from the inputs of both the licensor and licensee. Compensation to the licensor should, therefore, arise from the sharing of the overall gain of the enterprise. In commercial terms, the sharing or division will take place on some form of 'net enterprise income' or profit.

To be acceptable the division of income must appear reasonable to the licensee - and, of course, to the registry.

It is obvious that this concept of gain or income-sharing can apply to all transfers of industrial property rights and for combinations of such rights. Transfer of important rights, such as knowhow or composite rights can be expected to yield the licensor a larger share of the gain of the enterprise. At some point, the license can be expected to lapse. At this point the income otherwise flowing to the licensor will accrue to the accounts of the enterprise and enlarge its income.

Where the licensor incurs out-of-pocket costs or extraneous overheads in transferring rights, for example, approving vendor equipment, then the compensation to the licensor will be a sum of the income-sharing component and the inspection cost borne by him.

Royalty Payment in the Form of Profit Division

The easiest and most direct way by which income can be shared between licensor and the licensee is by the division of the accounted profit of the enterprise earned during the period of contract validity. Some of the main difficulties to the direct division of profit are the following:

(a) if through licensee defaults the enterprise does not make a profit during the expected period of the contract, then the licensor does not realise his expected level of income

(b) where profits are earned, the method licensee adopts to report profits may not be acceptable to the licensor

(c) the licensor would need to have access to licensee's books to determine the validity and accuracy of profit reporting which often poses problems, and

(d) if the licensee reports profits but the profit is

partly derived from other of his operations (not involving use of licensor's inputs), the apportioning of profit becomes very much more problematic.

The adoption of profit-sharing, however, is eminently possible when the licensor and licensee are engaged in a joint venture and there is direct licensor involvement in venture management.

Sales Royalty Payments and Income Division

The system of royalty payments based on sales income is adopted when profit or profit-division formula are difficult to establish. Sales-based royalties are also common when licensors apply a standard rate of royalty to all licensees as happens with franchises. Sales-based royalties have the advantage in that firms usually report sales in their published accounting statements. Further, reporting of sales and sales audits may be statutory requirements from the viewpoint of the collection of sales taxes, etc. Licensors are sometimes able to independently assess licensee's sales from a knowledge of the capacities of equipment in use, the purchase of components from the licensor, etc.

Sales royalty can be viewed as an income-sharing device by the use of the following conceptual construction of the payment received by the licensor as a result of the sales (and potential profit) realised by the licensee (for more details , see Guidelines):

$$\begin{aligned} \text{Sales Royalty} &= \frac{\text{Payment to LOR for rights of use}}{\text{Sales value of LEE's products}} \\ &= \frac{\text{Licensor's profit}}{\text{Sales value of LEE's products}} \\ &= \frac{\text{LOR's profit}}{\text{LEE's Profit on sales}} \times \frac{\text{LEE's Profit on sales}}{\text{Sales value of LEE's products}} \end{aligned}$$

where:

LOR and LEE represent Licensor and Licensee, respectively.

Using mnemonics:

Sales Royalty Rate = LSEP X POSExpression I

where:

LSEP is to be read as 'Licensor's Share of Enterprise Profit' and POS as 'Profit on Sales' (of enterprise).

What Expression I says is that sales royalty rate expresses the share of the licensor in the profit which the enterprise realises on sales.

If the following, for example, were to apply to an enterprise on the licensing of some right:

Sales royalty rate(on use of right) = 3%
Estimated profit of enterprise on sales = 8%

Then from Expression I:

$$\begin{aligned} \text{LSEP} &= \frac{\text{Sales royalty rate}}{\text{POS}} \\ &= \frac{3/100}{8/100} \\ &= 37.5\% \end{aligned}$$

The licensee will have to ask of himself, and judge, whether a flow of 37.5% of the profit of the enterprise to the licensor - the division of income resulting from the 3% royalty rate - is a fair compensation to the licensor considering the benefits conferred on the enterprise through the use of the licensor's rights. It may be, for example, too large for the use of a trademark in the national territory, but might be marginally acceptable if the transferred

right covered the use of important knowhow on computer design.

The method illustrates that whereas previously the licensee would have had to judge whether a 3% royalty rate was acceptable on the basis of some conjecture, he can now make that judgement on an index of reference - the near 40% outflow of annual profit to the licensor. Similarly, the national registry using the method would have to ask of itself whether a flow of 40% of the enterprises profit as foreign exchange is a worthwhile cost considering national access to important knowhow.

While there is much merit in the above form of investigation, the use of Expression I has some disadvantages:

- (i) the term 'profit' is not defined
- (ii) the method is applicable only if the royalty rate is stated in terms of sales, and
- (iii) the method does not permit the consideration of payments over a period of time.

For the registry, the method requires that some form of investigation be made of the profitability that can be expected from the sales of a particular range of products. An independent check would be very difficult to make.

Only two elements of information are required from the licensee for the registry to assess and judge the fairness of income distribution between the enterprise and the licensor - the royalty rate (on sales) asked for by the potential licensor and licensee's estimate of sales-based profitability. In providing such information to the registry, the licensee will not be parting with confidential data of the enterprise.

The UNIDO METHOD: CASE OF STRAIGHT LICENSING

UNIDO has worked on a refinement of the above approach. The refinement, which will be referred to as the UNIDO Method, is best illustrated using the form of data that is readily understood by business people. For the purpose of developing the concept behind the method, it would be convenient to assume the following:

(a) the licensor and licensee are unrelated organisations and the licensor does not have a stake in the capital of the company being analysed

(b) the royalty (it could be on any basis) is to be paid by the enterprise for the transfer of some right of use

(c) the enterprise has the obligation to pay royalties that are due at the end of each year and that this obligation holds only for a period of five years from the commencement of industrial operations

(d) the enterprise will retain the right-of-use transacted - that is, the right granted by the licensor - after the termination of the agreement

(e) the enterprise continues its operations after the end of the fifth year, and

(f) neither the enterprise nor the licensor is liable to national taxes on royalties paid or received.

It will be observed from Table I that in Year 6, all basic conditions remain the same as they were in the previous year, except that no royalties are due to the licensor.

The royalty obligation has ceased. The consequence of this is that the profits-before-tax (PBT) of the enterprise has increased from 50 currency units in the fifth year to 54 units in the sixth, or by 4 units.

This is not a real increase. It can be viewed that in the

TABLE 1. 'INTRINSIC PROFIT' OF ENTERPRISE

Basis: Currency Units

	<u>Yr. 1</u>	<u>Yr. 2</u>	<u>Yrs. 3-5</u>	<u>Year 6</u>
1. Net sales value	100	100	100	100
2. Cost of production (excl. royalty)	46	46	46	46
3. Royalty payable to licensor	4	4	4	-
4. Total cost of production	50	50	50	46
5. Profits before Income-tax	50	50	50	54 ('intrinsic profit')

previous year (Year 5) the profit of the enterprise was also 54 units but that from it a payment of 4 units was made to the licensor as royalty. In other words, Table I shows that when royalty obligations cease, the 'intrinsic profit' of the enterprise - in the example case 54 units - shows up.

In any of the royalty-bearing years, then, the licensor's share, or component, of the enterprise's intrinsic profit (LSIP) was :

$$\text{LSIP} = \frac{4}{54}$$

or, algebraically,

$$\text{LSIP} = \frac{R}{\text{PBT}_R + R} \quad \dots \text{Expression II}$$

where PBT_R is the profit-before-tax amount in the royalty-bearing year, and R is the absolute amount of royalty payable to the licensor.

The enterprise's share of the profit(ESIP) is then:

$$\begin{aligned} \text{ESIP} &= 1 - \text{LSIP} \\ &= \frac{\text{PBT}_R}{\text{PBT}_R + R} \quad \dots \text{Expression III} \end{aligned}$$

If the numerator and denominator of Expression II are divided by R, one obtains, :

$$\text{LSIP} = \frac{1}{1 + \frac{\text{PBT}_R}{R}} \quad \dots \text{Expression IV}$$

Unlike Expression I, Expression III clearly defines the term 'profit' as being the conventional accounting profit as determined on a pre-tax basis. Similarly, R is fully defined as the absolute amount of royalty paid and does not need to be defined in terms of sales, etc.

The term 'intrinsic profit' is, of course, of conceptual construction and is unknown to conventional accounting. In conventional accounting, PBT is always calculated after allowance for royalty. The accountant will treat royalty similar to the way he treats interest cost.

It should be noted that PBT_R is not independent of R; if, for some reason, it becomes necessary to test the influence of a change in R, then the revised PBT_R will have to be calculated and used in Expressions II and IV.

For illustration of the UNIDO Method, let it be supposed that the following was applicable during a particular year of the royalty-bearing period

Net sales value of goods sold	=	\$155,000
Royalty payable to licensor for enterprise's operations in that year	=	\$ 5425
Profit before tax (PBT_R)	=	\$ 45,000

Then, from Expression II:

$$\begin{aligned} \text{LSIP} &= R / (PBT_R + R) \\ &= 5425 / (45000 + 5425) \\ &= 0.1076 \text{ or } 10.76\% \end{aligned}$$

The computation shows that the intrinsic profit of the enterprise is $\$ (45000 + 5425) = \$ 50,425$ and that 10.76% of this amount was the share of the licensor for the benefit derived by the enterprise through use of transferred rights.

The licensee and the registry might accept such a pattern of sharing.

For the use of Expressions II & IV it is not necessary to know of the situation in the post-royalty period. Whenever the

expressions are evaluated, the value of PBT_R used must relate to the royalty (R) that was payable in the year in which the PBT_R was realised. The subscript 'R' is used in the expression for PBT to denote that royalty has been paid in the year of its evaluation.

The payment of \$5425 on a sales of \$155000 represents a royalty rate (on sales) of 3.5%. If the licensee wishes to determine what would have been the sharing if the royalty payment had been \$6975 (corresponding to a royalty of 4.5% on sales), PBT_R will have to be recalculated. Since the intrinsic profit of the enterprise is unchanged by the royalty paid, the intrinsic profit continues to be \$50,425. If the test royalty is \$6975, then the new PBT_R will be: $\$(50,425 - 6975) = \43450 . The new test LSIP will , therefore, be:

$$\begin{aligned} \text{LSIP} &= 6975 / (6975 + 43450) \\ &= 13.83\% \end{aligned}$$

The UNIDO Method defines that the 'income' which is distributed or shared is the quantity ($PBT_R + R$), the intrinsic profit of the enterprise.

It is to be noted that, normally, ($PBT_R + R$) would be distributed among the licensor, the owners of the enterprise and the government (taxing authority). A fuller discussion of this aspect follows shortly.

A national registry office, in examining the division, would not normally differentiate between what the government obtains as revenue and what the owners of the enterprise earn. Its objective would be to optimise the retention of the intrinsic profit within the country. Hence the licensor's share is the critical determinant.

Since intrinsic profit is one of conceptual construction and LSIP does not measure the distribution of any income that is conventionally understood, LSIP is best treated as an 'income-sharing coefficient', an indicator of income sharing.

Impact of Profitability on LSIP

The profitability of the business in above example can be readily related to sales (or to other parameters, such as fixed investment, if known). Sales-based profitability in the example business is $(\$45000 / \$155000) \times 100 = 29.03\%$. LSIP is calculated at a low of 10.76%, which may be quite acceptable to the licensee or the registry.

If, instead, the profits of the business had been lower (say, due to high raw materials cost), at \$5000, sales-based profitability will reduce to: $(\$5000 / \$155000) \times 100 = 3.23\%$.

LSIP would then work out to:

$$\begin{aligned} \text{LSIP} &= (\$5425) / (\$ 5000 + \$5425) \\ &= 52.04\% \end{aligned}$$

That is, over 50% of the intrinsic profit of the enterprise will flow to the licensor.

This is an important result. It will be observed that whenever business profitability is low or falls, the licensor's share of the income of the business will increase. It is to be remembered that in both of the cases evaluated, the sales royalty has remained unaltered at 3.5%.

It follows that if royalty rates claimed by licensors are accepted without consideration of the profitability of the business, merely because the royalties asked for are low, a disproportionate flow of income to the licensor can take place. Often high rates of royalty on businesses that are inherently profitable can cause less damage to the national economy than low rates of royalty on businesses that are poorly profitable. It will be recognised that in the context of developing countries, enterprises typically go through a period of low profitability after commencing business.

Table 2 has been developed to illustrate these effects. The Reference Case and Case I of Table 2 are similar in profitability. As can be expected, the higher royalty in Case I

TABLE 2. IMPACT OF PROFITABILITY ON LSIP RATES

Unit: Dollars

	<u>Reference Case</u>	<u>Case I</u>	<u>Case II</u>
1. Sales income	155,000	155,000	155,000
2. PBT_R	45000	45000	35000
3. Sales royalty rate	3.5%	4.5%	3.5%
4. Royalty(R)	5425	6975	5425
5. Profitability on sales	29.03%	29.03%	22.58%
6. LSIP,%	10.76	13.42	13.42

increases the licensor's share of income. Between the Reference Case and Case II, LSIP is higher in Case II because of the lower rate of profitability in Case II although the royalty rate is the same for the two cases. Between Cases I and II it will be observed that LSIP is identical although the royalty rate for Case I is higher. This arises from the poorer profitability in Case II.

Impact of Taxation on the Distribution of Intrinsic Profit of the Enterprise

While 'intrinsic profit' of the licensee enterprise has been treated as a concept, it is quite a real entity when it is considered in the context of national taxation. The diagram below illustrates how this intrinsic income is finally distributed among its claimants. It is assumed, for purposes of illustration, that the corporate tax rate applicable in the national economy involved is 30%:

The data of the Reference Case in Table 2 is taken for the example.

$$\begin{aligned} \text{Intrinsic Profit of Enterprise} &= \text{PBT}_R + R \\ &(\$45000 + \$5425) \\ &\$50425 \end{aligned}$$

LOR Income	Govt. Revenue	Enterprise Retention:
	30% of PBT	\$50425 - (flows to LOR and GOVT.)
\$5425	0.3 X \$45000 \$13,500	\$31500

The higher the tax rate, the lower, of course, is the income which can be retained by the enterprise. However, the corporate tax rate has no influence on the income of the licensor in the

case of straight-licensing.

The feasibility of using PBT values in Expressions II and IV is fortuitous . The profit-after-tax (PAT) situation of an enterprise cannot provide any information on distribution. It should be recognised that PAT belongs wholly to the owners/ shareholders of the enterprise. The licensor (unless he is a part owner of the enterprise as in the case of the joint-venture) does not obtain any part of the after-tax income of the enterprise. Neither is the Government a recipient of a share in PAT having taken its share at the PBT-income level.

In certain circumstances the registry may only have access to PAT data. It is feasible to derive $LSIP_{PBT}$, the form used in reviewing technology payments in straight-licensing agreements, from post -tax data, provided the applicable corporate tax rate is known or can be conjectured.

$PAT = (PBT - PBT \times TR)$ where TR is the corporate tax rate. If this is substituted in Expression II, one obtains:

$$LSIP_{PBT} = \frac{R(1-TR)}{(PAT)_R + R(1-TR)}$$

where PAT_R is the profit-after-tax of an enterprise during the royalty-bearing period.

The use of PAT data for evaluations of $LSIP_{PBT}$ is not recommended for general practice.

In concluding this section, it may be useful to point out that by using PBT data , it is possible for registries to compare $LSIP$ rates for particular technologies in different countries. This aspect is treated later .

The Use of 'Net Present Values' in Estimations of LSIP

Table I was devised to compare the working of an enterprise during the royalty-bearing period with that in the post-royalty period. The constancy of numbers in the table would certainly not be representative of actual performance data.

In order to use Expression II effectively, it is necessary to adopt a procedure which will unify variations in data over the period of the licensing arrangement. The 'net present value' (NPV) technique, which is routinely employed in corporate financial analysis, can be applied to the situation under enquiry.

An example is worked out in Table 3 to illustrate the application of the technique. Appendix A provides the rationale for NPV determinations. Further coverage of the technique is available in the Guidelines.

It needs to be repeated that for the use of the UNIDO Method, profits earned beyond the royalty-bearing period (Year 6 and subsequent in Table 3) are not useful inputs.

LSIP Rates and Absolute Levels of Enterprise Profit

Basically there is almost always a built-in conflict between the policy of a registry and the business objectives of an enterprise in viewing income flows.

In the following example, the licensee and the registry are viewed as comparing two (otherwise acceptable) technology offers A and B from two different licensors. For a conservative registry, Technology A would be preferable since LSIP is lower, and because a low LSIP indicates that a smaller proportion of the income of the enterprise will flow out as foreign exchange to the licensor.

TABLE 3. INCOME-SHARE DETERMINATION USING DISCOUNT FACTORS

Unit: Dollars

	<u>Royalty-bearing Period</u>				
	<u>Year-1</u>	<u>Year-2</u>	<u>Year-3</u>	<u>Year-4</u>	<u>Year-5</u>
Net sales value	1200	1400	1800	2500	4000
Royalty @ 3% of sales (undiscounted)*	36	42	54	75	120
Profits before tax (undiscounted), PBT _R	(150)	0	450	600	1300
Discount factor @ 10%	0.909	0.826	0.751	0.683	0.621
PV of discounted royalty referred to year 'zero'	32.7	34.7	40.6	51.2	74.5
PV of PBT _R	(136.4)	0	337.9	409.8	807.3
NPV of Royalty(R)233.7.....				
NPV of PBT _R1418.6.....				
$\text{LSIP} = \frac{R}{\text{PBT}_R + R} = \frac{233.7}{1418.6 + 233.7}$ $= 0.1414, \text{ or } 14.14\%$					

() indicates loss

* - royalty is assumed as paid at end of year

PV = present value

NPV = net present value

PBT_R = profit before tax during royalty-bearing period

LSIP = Licensor Share of (Enterprise's) Intrinsic Profit

	<u>Technology A</u>	<u>Technology B</u>
1. Sales Income	200	250
2. Production costs (excluding royalty)	80	90
3. Royalty (NPV)	20	40
4. PBT_R (NPV)	100	120
5. LSIP, %	16.7	25.0
6. Post-royalty PBT (if conditions are the same as in the last year of the license period)	120	160

The licensee, on the other hand, may only look at the absolute level of enterprise income (PBT). In the example Technology B would be preferable to him. He will look to the post-royalty period, a period of little interest to the registry from the viewpoint of flows of funds to the licensor.

Utility of LSIP Rates and the Reference LSIP Level

The LSIP rate for a proposed licensing agreement may not always be a useful indicator for the acceptance of technology fees. Knowing, for instance, that the LSIP for a proposed licensing offer is 15% does not permit a decision on its acceptability. It is certainly a far better tool than working with a 'high-low' framework of acceptable royalty rates. LSIP, at least, permits an exercise of judgement in terms of the income distribution that will be effected between the licensor and the enterprise.

The LSIP rate, can, however, be a meaningful tool for the evaluation of competitive investment opportunities or competing technology offers at the enterprise level.

In Table 4 the enterprise is viewed as facing two alternative proposals for which licensing offers have been received: A and B. It will be readily seen that opportunity B is quite attractive from the viewpoint of licensor-licensee income distribution than is the Case with A, although in the latter case the royalty rate is lower. The analysis made here will not be any different than with the use of formal methods of studying project feasibility.

At the level of the national registry, however, it is possible for LSIP to become a far more important indicator. The LSIP concept appears to be most suited to the national registry from the viewpoint of monitoring technology payments at the national aggregate level in the context of a reference level.

It is the observation that if performance data of enterprises actually operating in developing countries is examined - see Tables 5 to 9 - that LSIP rates fluctuate around an average or mean rate, although some LSIP's are very high and others quite low. The Tables relate to studies made by individual developing countries, using data as available from random samples of enterprises. The data apply to firms both in, and outside, the joint venture

TABLE 4. USE OF LSIP FOR APPRAISAL OF ALTERNATIVES

<u>Data</u>	<u>Investment A</u>	<u>Investment B</u>
1. Royalty rate on sales, %	2	5
2. Potential sales value (3rd year of operations), \$	2000,000	400,000
3. PBT, \$	80,000	100,000
4. Investment, \$	600,000	700,000
<u>Computation</u>		
5. Royalty payable (3rd year) \$	40,000	20,000
6. LSIP, %	33.3	16.7
7. PBT / R	2.0	5.0
8. PBT on investment, %	13.3	14.3
9. LSIP @ same level of PBT, %:		
(a) \$80,000	33.3	20.0
(b) \$100,000	28.6	16.7
10. LSIP @ same level of royalty, %		
(a) 2%	33.3	7.4
(b) 5%	55.6	16.7

TABLE 5. LSIP and TTF VALUES (COUNTRY A)

Business of Enterprise	Contractual		National Currency Units			
	Royalty Rate, %	Sales Value	R	PBT _R	TTF	LSIP _S %
Franchise	2.0	63	1.5	12.2	8.1	11.0
Const- ruction	0.75	201	0.75	39.0	25.9	3.7
Food						
Projected	0.93	1458	13.5	5.5	0.4	71.2
Historical (4yrs)	1.0	708	7.2	10.7	1.4	40.8
Garments (3 yrs)	1.05	101	1.1	0.9	0.8	35.6
Consumer goods						
-projected	2.0	1682	34.2	309	9.0	9.9
-historical (4 yrs)	3.3	558	18.5	69	3.7	21.2
Drugs						
-projected	4.8	1248	59.6	180	3.0	24.8
-historical	5.5	430	24.1	58	2.4	29.3
Electronics	1.5	195	2.9	32	10.9	8.4
Automotive	2.0	331	6.6	14	2.1	31.4
Drugs	3.0	43	1.3	6	4.3	18.9
Food	3.0	454	13.6	35	2.6	28.0
Food	2.0	265	5.3	20	3.8	21.0
Chemicals	5.0	0.5	.024	.5	21.2	4.5
Electrical	2.0	58	1.16	8.1	7.0	12.6
Equipment	2.0	8.3	0.17	0.8	4.9	17.1
Electronic	0.85	1176	10	90	9.1	9.9
Drugs	3.7	48	1.8	14.5	7.9	11.1
Misc	2.0	58	1.2	1.4	2.6	45.4
Equipment	4.0	9	0.36	1.4	4.0	20.0
Electronic (4 yrs)	2.3	220	5.1	7.8	12.8	39.5

TABLE 5. (CONTD).

Business of Enterprise	Royalty Rate, %	Sales Value	R	PBT _R	TTF	LSIP _S %
Drugs	4.1	202	8.3	37	4.4	18.5
Drugs	0.08	1454	1.12	375	335	0.30*
Consumer goods						
-projected	0.36	10110	37	124	3.4	22.7
-historical	0.06	5752	3.7	79	21.3	4.5
Electronics	1.8	291	5.2	14.6	2.8	26.1
Drugs	3.3	100	3.3	7.3	2.2	31.3

Notes:

- (a) Sales, PBT_R and R are NPV values. See note (f).
- (b) Unless otherwise stated the period of the royalty agreement 5 years
- (c) 10% discount rate used for calculations
- (d) Data rounded off
- (e) * All company product sales reported; only some are royalty-bearing
- (f) Source data drawn from company's projections.

TABLE 6. LSIP AND TTF VALUES (COUNTRY B)

Business of Enterprise	Effective Royalty Rate, % **	Contractual Period, Yrs	Profit Rate on sales %	TTF	LSIP _S %
Garments	5.05	3	3.7*	0.7	57.7
Garments	2.08	3	8.9	4.3	18.9
Garments	0.76	5	3.7*	4.9	16.9
Paints	7.69	7	3.2*	0.4	70.6
Cosmetics	5.00	5	4.9*	1.0	50.5
Plastic products	1.07	3	3.2*	3.0	24.9
Plastic Products	6.43	5	11.9	1.9	35.0
Metals	5.53	10	23.2	5.1	16.4
Electrical	7.78	5	27.4	3.5	22.1
Auto parts	5.90	7	3.2	0.6	64.7
Electrical	2.56	5	3.6	1.4	41.5
Electrical	3.52	5	18.6	5.1	16.4
Electrical	3.65	10	22.5	6.2	14.0
Electrical§	0.13	2	6.8*	52.2	0.13
Chemical Engineering	2.63	10	13.7	5.2	16.2
Metals§	0.33	1	3.0	9.1	9.8

Notes:

(1) ** Contractual royalty rate with adjustment for downpayments

(2) * - Company's projections are generally used, except where asterisked, in which case, average sectoral rate used.

(3) §- All of the listing is for straight-licensing agreements, except where the symbol is shown, in which case, the contract covers only technical assistance services.

TABLE 7. TTF AND LSIP FACTORS (COUNTRY C)

<u>Business of Enterprise</u>	<u>Effective Royalty Rate,%*</u>	<u>Period Years</u>	<u>Profit Rate,%**</u>	<u>TTF</u>	<u>LSIP_S %</u>
<u>CATEGORY A</u>					
2.Equipment	3.6	6	15.0	4.1	19.6
5.Mechanical	4.9	5	5.1	1.0	49.0
6.Equipment	7.1	5	4.5	0.6	60.0
7.Electrical	9.8	5	10.9	1.1	48.0
<u>CATEGORY B</u>					
3.Electrical	7.0	5	7.7	1.1	47.6
4.Machinery	7.1	5	7.2	1.0	50.0
5.Mechanical	6.7	5	7.2	1.1	47.6
8.Mechanical	4.3	5	7.2	1.7	37.0
9.Mechanical	5.5	5	9.7	1.8	35.7
10.Mechanical	12.6	5	11.0	0.9	52.6
12.Mechanical	5.1	5	10.5	2.1	32.3
13.Equipment	10.7	5	7.4	0.7	58.8
14.Mechanical	6.2	5	13.0	2.1	32.3
15.Mechanical	4.0	5	9.7	2.4	29.4
16.Chemicals	6.0	5	13.0	2.1	32.3
17.Mechanical	5.6	5	10.0	1.8	35.7
18.Equipment	5.3	5	12.0	2.3	30.3
19.Machinery	8.9	5	9.0	1.0	50.0

TABLE 7. TTF AND LSIP FACTORS (COUNTRY C) -CONTD=

Business of Enterprise	Effective Royalty Rate,%*	Period Years	Profit Rate,%**	TTF	LSIP _S %
20.Mechanical	4.1	5	10.5	2.5	28.6
21.Mechanical	14.8	5	10.0	0.7	58.8
22.Equipment	4.7	5	9.4	2.0	33.3
23.Equipment	7.1	5	7.5	1.1	47.6
24.Mechanical	11.3	5	7.4	0.7	58.8
25.Electrical	0.9	5	12.0	12.8	7.2

CATEGORY C

1.Mechanical	2.4	5	9.7	4.0	20.0
2.Mechanical	8.6	5	9.7	1.1	47.6
3.Mechanical	7.3	8(+5)	9.7	1.3	43.5
4. Machinery	3.9	10	9.0	2.3	30.3
5.Metallurgy	15.1	5	7.0	0.6	62.5
6.Machinery	9.6	5	9.0	0.9	52.6
7.Metaalurgy	5.6	5	8.0	1.6	38.5
8.Equipment	2.7°	5	9.0	3.3	23.3
9.Equipment	9.3	5	9.0	1.0	50.0
10.Mechanical	2.5	5	5.0	2.1	32.2
11.Machine Tool	16.1	10	8.0	0.5	66.7
12.Machine Tool	6.8	10	8.0	1.2	45.4
13.Ceramics	4.0	7	8.0	2.0	33.3
14.Machine Tool	2.1°	10	8.0	3.9	20.4
15.Machinery	10.8	10	11.0	1.0	50.0

TABLE 7. TTF AND LSIP FACTORS (COUNTRY C) -CONTD.

Business of Enterprise	Effective Royalty Rate,%*	Period Years	Profit Rate,%**	TTF	LSIP _S %
16.Machine Tool	2.5°	10	10.0	4.0	20.0
17.Electrical	7.0°	5	7.0	1.3	40.0
18.Electrical	3.1	5	7.0	2.2	31.3
19.Electrical	2.2°	5	7.0	3.2	23.8
20.Electrical	1.5°	5	7.0	4.8	17.2

Notes:

1. CATEGORY A: Historical Data.PBT data available
 2. CATEGORY B: Projected Performance;Government-approved projections.
 3. CATEGORY C: Historical Data.PBT data not available.Known sectoral profitability data has been employed.
- * Royalty rate is on net sales values adjusted for down payment
 ** - calculated on sales
 ° - Effective royalty rate lower than approved contractual rate, probably due to losses during reporting period.
- All data pertain to straight-licensing agreements. Data on enterprises with foreign equity is presented in Table 8.In order to enable cross-checks with original data, serial number identification is maintained. Serial numbers missing in the above Table are presented in Table 8.

TABLE 8. LSIP_S AND LSIP_{JV} FACTORS (COUNTRY C)

Ser. No.	Sector	For. Eq. %, *	Eff. Roy. Rate **	Profit Rate % **	Period Years	TTF	LSEP _S %	LSEP _{JV} %
<u>Category A</u>								
1.	A	3.2	2.2	8.9	8	4.0	20.0	21.1
3.	B	25.0	1.7	15.0	10	3.0	24.8	33.2
4.	B	25.0	2.0	9.0	5	4.6	18.0	27.2
8.	D	24.0	6.0	22.8	5	3.8	21.0	29.5
9.	E	31.4	0.2	10.4	10	48.6	2.0	15.9
10.	C	40.0	1.0	4.2	7	3.3	23.0	36.9
11.	C	40.0	1.2	12.5	5	10.6	8.6	25.0
<u>CATEGORY B</u>								
1.	E	26.0	4.3	10.7	5	2.5	28.5	36.9
2.	E	39.0	3.2	8.5	5	2.6	27.8	40.5
6.	E	35.0	3.8	7.6	5	2.0	33.3	43.8
7.	E	40.0	14.3	13.0	5	0.9	52.6	61.1
11.	E	39.0	5.1	10.5	5	2.1	32.3	44.1

Notes:

1. Sectors: A-Metals; B-Equipment; C-Machinery; D-Consumer Goods; E-Mechanica
2. *-Foreign Equity Holding as Percentage
3. ** - on Sales

4. Categories A and B are defined in Table 7.
5. $LSEP_{JV}$ is the 'joint venture income share coefficient'; See Page It is calculated from Expression IX of Appendix B. (TR = 0.55)
6. In order to enable cross-checks with original data, serial number identification is maintained. Serial numbers missing from above Table are presented in Table 7.
7. For Collaborations represented by Serial Numbers 3 and '1 of Category A and Serial Numbers 6 and 11 of Category B, the effective rate of royalty are lower than the contractual rate. This may be due to delayed production or loss of profits during the period of the license agreement.

mode. Significantly, the LSIP rates are reported on enterprises prior to the use of the LSIP method to the regulation of technology payments. Wide variation occurs because of the clubbing together of various industries, different reporting periods and because of inconsistent source data. In some cases PBT evaluations have been made on the basis of sectoral profit rates.

In Table 9 below, the variation of national LSIP rates is presented using relatively simple statistical tools.

($LSIP_{JV}$ is the share of the licensor in the case of the joint-venture enterprise, a subject discussed later. The 'S' subscript to LSIP is to distinguish it from the joint venture coefficient).

TABLE 9. VARIATION OF LSIP AMONG COUNTRIES

Country	No. of Enterprises in Sample	LSIP _S			
		M, %	S.D. %		
A	24	21.79	15.69		
	16	29.73	21.13		
C-CAT. A	7	44.15	17.25		
-CAT. B	20	40.30	13.12		
-CAT. C	20	37.43	14.63		
		LSIP _S		LSIP _{JV}	
		M	S.D	M	S.D
C-CAT A.	7	16.7	8.35	26.97	7.13
-CAT B	5	34.90	10.17	45.28	9.31

M - Mean of sample

S.D. - Standard Deviation

CAT. - Category as shown in Tables 7&8

LSIP_S - Licensor share of Intrinsic Profit of Enterprise through licensing arrangements

LSIP_{JV} - Licensor share of Intrinsic Profit of Enterprise through equity participation and licensing arrangements

It will be seen that while there is considerable spread, as expected, in the values of the share coefficient, it is still possible to visualise, on the basis of such statistical evidence, a 'Reference Level' LSIP_s for each country reflecting its technological and sectoral policies. Consequently, it should be possible to manage technological payments with respect to a prevailing, or targettable, Reference Level LSIP. With such a position, a registry will first review proposed payments in the particular context of a licensing arrangement, and then compare its indicative LSIP with the Reference Level to determine its general acceptability. The Reference Level LSIP, in itself, reflects the prevailing bargaining position of the country with respect to its traditional licensors. Variations in LSIP must be expected. The LSIP for a three-year agreement will be higher than for a five-year agreement for a straight-licensing agreement since a licensor generally formulates his fees on the basis of the absolute income he will earn during the life of the agreement (see next section).

Since LSIP and TTF are ratios and independent of the corporate tax rate of a country, inter-country comparison of Reference Level LSIP's becomes possible. However, because of its poorer bargaining position, preference to the development of particular sectors of its economy, urgency of technology induction, etc the Reference Level LSIP of a country can be substantially higher than that of its peers.

Forms of Payment

There are four forms of royalty payment commonly encountered in transfer of technology agreements:

(1) the 'running royalty' payment, expressed in terms of sales value, product unit, etc (see Guidelines), with the indication of the finite time period over which they are applicable

(2) the lumpsum payment

(3) the downpayment, combined with a running royalty payment, and

(4) payment in a fixed number of installments

Using the NPV technique , it is possible to directly compare all of such payments with each other. (See Guidelines). Alternately, as will be shown, it is possible to renegotiate, with the understanding of the licensor, the conversion of one form of payments into another.

While comparison and inter-conversion are possible, licensors will have a strong preference for a particular form from the viewpoint of reducing risk exposure or because of their licensing policy. Equally, licensees may prefer one form, again, to reduce risk exposure.

Running royalties are preferred by the licensor when:

(1) it is a matter of licensing policy. For example, franchises are usually offered at a fixed royalty rate in order to prevent inter-licensee competition.

(2) when the 'most favoured nation ' clause is present in agreements, again to avoid inter-firm differences.

(3) when trademarks (and very often, patents) are licensed

Licensees, themselves, may prefer running royalties in order to obtain licensor involvement in the ups and downs of the licensee's business or to phase out payments over a time period.

The three other forms of payment are variations of 'downpayment' and may be considered as a group, noting obvious differences. Traditional reasons for downpayments are the following:

(a) downpayment is a transfer cost representing the specific costs borne by the licensor to prepare a 'technology package' for the licensee. Costs could arise from preparing drawings, specifications lists, operating manuals, on-site training of personnel, etc

(b) downpayment acts as a surety; in case licensee defaults on term royalties, the licensee delays business operations, fails to go into operation after receipt of knowhow or undergoes liquidation, the licensor reduces the risk of having surrendered valuable technology

(c) downpayment is an advance collection of minimum royalties on forecasted operations of the licensee

(d) the licensor is of the opinion that he will be unable to verify licensee's accounts and thus prefers a one-time transfer of technology

(e) the licensed product will be 'sold' internally in the enterprise and detailed sales/production records may not be maintained for such sales.

The economic, legal and regulatory environments of the country of the licensee may also influence the collection of downpayments:

(a) stability of national currency or that of exchange rates

(b) regulatory policies of the host country (at one time, for example, the Government of India preferred lumpsum payments rather than term royalties since the former indicated the total charge on foreign exchange reserves)

(c) different levels of taxation apply to lumpsum and running royalties, etc

(d) in the acquisition of technology by public enterprises lumpsum payments avoid the situation of licensors inspecting accounts.

(e) when technology cost must be known in advance for future-intended capitalisation of fees into equity or when technology cost is to be counter-traded against product

(f) when regulatory agencies rigorously stipulate maximum royalty rates.

Licensors will tend to price technology independent of the mode in which it will be paid. For e.g. the following table illustrates that any of the combinations of payment terms shown are equivalent to a gross receipt of \$300,000. Choice would be determined by the licensing environment of the technology-receiving country. The fee amount, itself, will be the expected share of the licensor in the profit of the enterprise (consider the reasoning in Tables 10 and 11). It is assumed, in the following, each product unit will be sold for \$50.

Product volume- number of units	Period of payment(yrs)	Royalty rate asked by licensor
A. 10,000	10	\$300,000 for 100,000 units of \$5,000,000 sales value = 6 % royalty on sales
B. 7000	7	\$300,000 for 49000 units of \$ 2,450,000 sales value = 12% royalty on sales
C. 20,000	10	\$300,000 for 200,000 units of \$10,000,000 value = 3% royalty on sales
D. Any	Immediate	\$ 300,000 lumpsum royalty.

In Case B of the above table, if the licensor or licensee felt that a regulatory agency may be unwilling to approve a 12% royalty rate , it can be easily modified to a downpayment of \$130,000 and a royalty rate of 7% over 7 years without diminishing licensor's expected income of \$300,000. The licensor might claim that the downpayment would be in "consideration" of 'technical services to be rendered' and the 7% royalty payment for the 'use of knowhow'.

The division between the upfront payment and the term payment will, of course, be influenced by the tax postures of the countries of the licensor and the licensee. That is, how the incomes of the licensor will be treated by the tax authorities in both the countries. If taxation on lumpsum royalties is higher than on term royalties, then term royalties may be preferred. However, taxation economics will determine to what extent the licensor can arbitrarily divide high and low-taxed fees.

Since the utility of the LSIP technique is greatly facilitated by the ability to unify data by the discounting technique (that is, all payments being reduced to a single present value figure), the nature of the expenditure does not matter. Thus, a downpayment made in three annual installments or a running royalty payment made over 7 years will result in a single present value figure that can be plugged into Expression II for LSIP.

TECHNOLOGY TURNOVER FACTOR(TTF)

Expression IV (see page 20) for LSIP reads as follows:

$$\text{LSIP} = \frac{1}{1 + \frac{\text{PBT}_R}{R}} \quad \dots \text{Expression IV}$$

UNIDO has introduced the term 'technology turnover Factor' (TTF) for the expression PBT_R / R . If this substitution is made, the above expression reduces to:

$$\text{LSIP} = \frac{1}{1 + \text{TTF}} \quad \dots \text{Expression V}$$

$TTF = PBT_R/R$ can be viewed as providing, simultaneously:

- (1) an indication of the profit generated by an enterprise per unit of payment made for technology
- (2) an indication of the division of generated profits to outgoing funds of the enterprise, and
- (3) a ratio of the firm's gain in national currency units per unit of foreign exchange expense incurred on technology.

It is obvious from Expression V that as TTF increases, LSIP falls. In other words, a high TTF factor would be beneficial to the national economy. The range of TTF in the developing country can be gauged from a review of Tables 5 to 9. Average TTF seems to hover between 3 to 5. Like the Reference Level LSIP, there can also be a Reference Level TTF.

Expression V for TTF is strictly valid only when there is a direct and close relationship between PBT_R and R; that is, it is valid only when all of the profit of the enterprise can be wholly attributed to the effects of a licensed technology. TTF would be a good indicator of 'technology turnover' (units of profit per unit of technology cost), for example, when the operations of a single product company, utilising a single set of licenses, is studied. Validity will be maintained when it is possible to directly determine the profit of a firm on a particular licensed-product line in a multi-product company.

In these cases, TTF provides little guidance. Since it is mathematically related to LSIP, the latter can be directly gauged against the national average LSIP.

However, recognising that a high TTF can bring about an economically favorable division of income between licensor and licensee, the concept behind TTF can be useful for situations when there is no direct correspondence between profit generated and technology payments.

Two situations would be of interest to the national registry:

(a) when an agreement comes in for renewal whose terms are somewhat different than was the original situation, and

(b) when a registry wishes to review proposed technology payments of a multi-product company in whose business-mix there may be unlicensed products.

In these cases the focus of investigation shifts to TTF and the way it has performed, or is likely to perform, over a period of time.

Renewal of Agreements

Let it be supposed that an agreement is submitted by an enterprise to the registry for renewal. In support of renewal the company provides basic data listed under Situation A in Table 10. Let it be assumed, further, that the enterprise could have, in other circumstances, supplied the data listed under Situation B. In all cases it will be seen that the royalty rate remains the same at 10% of sales. The registry's evaluation LSIP and TTF are shown in the Table.

TABLE 10. TTF AND THE LICENSE RENEWAL SITUATION

Currency units where applicable

	Historical Situation	<u>Renewal Situation Alternatives</u>	
		A	B
<u>DATA</u>			
Term of Agmt.	5yrs	5 yrs	5 yrs
Av. annual sales	100	200	200
Royalty rate on sales, %	10	10	10
PBT _R (NPV)	40	70	90
<u>EVALUATION</u>			
R (NPV)	10	20	20
LSIP, %	20.0	22.2	18.2
TTF	4.0	3.5	4.5

It will be observed that LSIP is not much of a guide in this situation as it may be well within the Reference Level and its variation.

TTF, however, provides a different interpretation. In Situation A, $TTF (=PBT_R/R)$ is lower than it has been in the historical situation: the enterprise will be generating less PBT per unit of expense on technology than it has done in the past. In Situation B, however, more profit is will be generated per unit of technology expense than previously. The latter situation may be of greater relevance to the registry.

TTF in the Case of a Multi-product Company

Let it be supposed that Table 11 represents, in elementary form, the 'consolidated' performance of a multi-product company over a 8-year period, the data for the three years representing the typical history of the company:

TABLE 11. HISTORICAL PERFORMANCE OF COMPANY XYZ

	Currency units where applicable		
	Year 3	Year 5	Year 8
<u>Data</u>			
Sales income	4000	4600	8400
Royalty paid(R)	10	11.10	13.50
PBT _R	400	500	700
<u>Calculated Criteria</u>			
TTF	40	45	51.8
LSIP, %	2.4	2.2	1.9

The company now proposes to enter into a license to agree

ment for a new product and it submits, as required, the above historical data along with forecast data (PBT,royalty fee,sales) on the proposed new line.

As can be expected it is not possible for the registry to 'verify' new PBT data since the company's accounts are consolidated.It can be assumed, for this exercise, that the new data shows LSIP = 20% (TTF=4),otherwise acceptable to the registry.

The 'calculated' results above show the past actual behavior of TTF and LSIP of the company.

TTF is very high, and expectedly, LSIP very low, because many of the products may not be manufactured under active licenses. That is, the PBT generated does not have a 'balancing' technology fee. Thus, calculated TTF and LSIP values will not be useful criteria for comparison with national Reference Levels.The registry may therefore have to depend on the growth of TTF for its decision.The historical performance of the company shows a steady growth of the ratio of profits to technology expense, ie TTF.Hence if other licensing considerations are supportive, the proposed new agreement may be acceptable.

Licensee Utilisation of the LSIP Concept

The typical licensee, with or without the assistance of prospective licensors, will have generally established the feasibility of his project, subject to the consideration that technology costs will not be much higher than assumed in the project. Cost of technology is, at most times, not a major cost considering total project investment. However, technology cost has a major impact at the level of enterprise revenue. Business profitability must be considered, of course, along with other aspects of technology selection: (1) economic scale of production (2) early start and stabilisation of operations (3) early market acceptance of product (4) adequate long-term licensor support (5) assurance of technology performance through product/process guarantees and (6) a forecasted level of income to the owners of the enterprise .

Technology cost, independent of whether it appears as a lumpsum or term liability, will affect profit-generation. However, the performance of the project will be viewed by the licensee in terms of :

- (a) profit-generation in the short-term royalty-bearing period
- (b) profit-generation in the long term, post-royalty period.

In the post-royalty period, enterprise income that had hitherto flowed to the licensor will accrue to the enterprise (although, as will bbe shown shortly, the licensee as 'owner' does have the advantage of all that income).

In the royalty-bearing period of the license agreement, however, enterprise income ('intrinsic profit') is shared. If the period of shared income is short, the long-term profits will guide licensee's decision on technology/licensor selection. On the other hand, if the income-sharing period was long (requiring agreement renewals, etc), it is apparent that division of income should be an important component

of the decision-making process. Even if the royalty-bearing period was a short one compared to the 'life' of the project, income division considerations are important if dips in project profitability are expected. The latter, as has been shown earlier, increases the licensor's share of enterprise gain. Sharing of income will also be important to the licensee if there is national policy to conserve foreign exchange expense. It is to be noted $R / (PBT_R + R)$, which is LSIP, is the ratio of the foreign exchange expense per unit of gain of the enterprise in national currency units.

The LSIP calculation, at the enterprise level, is essentially a short-cut to standard financial analysis.

The LSIP concept is also useful to the enterprise - again, as a short-cut approach - to the selection of technology alternatives. This aspect has been discussed earlier.

That the owner/share-holder does not recoup all of the income that flowed to the licensor in the royalty-bearing period is illustrated in the following example:

	<u>Royalty Period</u>	<u>Post-Royalty Period</u> <u>Currency Units</u>
Sales Value	400	400
Royalty @5% of Sales	20	Nil
PBT	100	120
Tax @ 50%	50	60
Profits after tax (Owners's income)	50	60

REGISTRY LEVEL UTILISATION OF THE LSIP AND TTF FACTORS

Developing countries have the need to balance growth with development. When enterprises earn profits they contribute to the overall growth product of the country. Hence, on this account, acquisition of technologies which contribute to large profits will be favourable. On the other hand, if high profits were to arise from activities which conspicuously consumed scarce resources (like foreign exchange and domestic capital) or whose contribution would be peripheral to the needs of society, they will impede long-term growth. Consequently developing countries, through accent on development, attempt to curb or control inappropriate activities.

Generally, developmental objectives are achieved, in the area of technology imports, by controlling the 'cost' of technology. For activities that are beneficial to long-term growth, a high technology cost may be acceptable. For activities of peripheral value, the reverse will be the case.

Eventually, this posture means that for desirable technologies the licensor, for a period of time, will be allowed to take a significant level of an enterprise's income as his remuneration. On the other hand, for technologies of peripheral contribution the share of the licensor in the income of the enterprise will be curtailed.

Since the LSIP coefficient measures in quantitative terms, the distribution of the gain of the enterprise between the licensor and the licensee, the use of it, along with profit data, can permit the registry to achieve the balance the country desires between profit growth and its distribution.

In this context, this Section reviews how the registry can use LSIP and TTF coefficients in the following areas of its activity:

- (1) at the stage of 'negotiation' with the licensee (who submits to the registry a proposed licensing agreement

for consideration and approval)

(2) for routine and special evaluations of proposed agreements in the context of policies relating to income division between licensor and licensee

(3) for the assessment and monitoring of technology transfer costs at the national aggregate level, and

(4) for inter-registry exchanges at the bi- and multi-lateral levels.

While the subject will be discussed in more detail later, the completeness with which a registry can carry out investigations on payments depends on the support it has from the provisions of national legislation on technology transfer; in particular, the right to obtain disclosure of quantitative information from the potential licensee enterprise. Use of information will depend on the quality of the information system developed by the registry.

For the ensuing discussion it will be assumed that the registry will be able to obtain forecast data from the enterprise (and possibly, historical data), particularly on sales value, profit-before-tax estimates and royalty rates/fees.

Previous discussion has shown that the form in which licensor receives compensation for technology rights is virtually immaterial to the evaluation of income division. Consequently, all types of licensing agreements can be treated by the UNIDO method.

I. LSIP Considerations at the Negotiation Stage

The registry , typically, has a dual function in regulating the transfer of technology: (a) strengthening the hand of the licensee so that he is in a position to acquire technology at the lowest possible cost, consistent with the expectations of technology performance and business goals and (b) ensuring that the acquired technology is in line with national policy objectives.

In effect, the registry acts as a shadow negotiator with

the licensor.

The registry can generally do little in the way of enabling a licensee to select licensors and technology and will, most times, interface with the licensee after such selection has been made. However, the registry may be in a position to assist the licensee in sharpening his awareness of the income division that is inherent in the royalty rate. Nevertheless, from the licensee's point of view (as explained earlier), the absolute level of profit, particularly in the post-royalty period, is likely to be his guiding criterion. There is, essentially, an element of conflict in this situation which every registry will need to resolve.

National Reference Level LSIP and TTF will generally be the confidential information of a registry. Consequently, it cannot be source of assistance to the licensee to bargain with the licensor.

However, the implication of income division in a proposed royalty rate may assist the licensee to negotiate favorable terms with the licensor with respect to the financial liability of the licensor in the event the technology fails to perform as understood or warranted.

Financial Liability of Licensor

Theoretically, at least, if a proposed royalty rate is equivalent to a income division Licensor:Licensee of 40:60, the licensor's liability, in any value-quantifiable deficiency should also be 40:60 (over the royalty-bearing period of the licensing agreement or beyond, as circumstances dictate). In illustration, if a licensee enterprise suffered, till correction was made (by him or the licensor), a loss amounting to \$100,000 as a result of lower unit price realisation, due to defaulting product quality (quality poorer than warrantied in the agreement), then the licensor's financial liability should be \$40,000.

against future royalties, etc).

This counterbalance is logical since in a licensing agreement

both parties accept the normal risks of business, risk division being the ratio of income division.

However, a similar argument cannot, in general, be extended to certain special warranties needed by the licensee, such as process performance warranties or patent infringement warranties. Specific warranties provided by the licensor form the very foundation of the business and the selection of the licensor. Considerations relating to them will lie outside the terms of a normal business arrangement.

II. LSIP Coefficients and TTF in the Evaluation of Technology Payments.

UNIDO methodology enables the registry to carry out three types of evaluations on a candidate agreement bearing on the compensation payable to licensors:

- (1) estimation of the division of gain of the enterprise

between licensor and licensee in the specific context of the transaction and the objectives/needs of the licensee

(2) evaluation of the cost of technology in terms of profit generation per unit of technology cost, or alternatively, the profit generated by the enterprise (contribution to GDP) per unit of foreign exchange expense on technology - via TTF, and

(3) comparison of the particular division of income with a policy-oriented Acceptance Level.

The LSIP methodology concentrates on the division of income between licensor and licensee rather than on the absolute cost of technology, or the term of the license agreement, although the latter are estimated or calculated in the process of establishing the LSIP rate. This permits uniformity in the treatment of all agreements.

Enterprise-level LSIP will be examined in the contexts of what advantage the particular technology brings to the licensee (product quality, investment reduction, export rights, etc), the protection given by the licensor to the licensee (process guarantees, patent infringement warranties, etc) and the contributive value of the technology to the economy (value-addition, employment generation, etc).

Without an additional yardstick, the acceptance of enterprise-level LSIP will be an exercise of judgement on the reasonability of income-sharing.

Averaging the cost of technology, in general, by averaging the LSIPs of all agreements approved over a period of time, using statistical methods, provides the registry with an additional tool. Enterprise-level LSIPs will be compared with a mean, or Reference Level, LSIP and its statistical variability. This will bring in greater objectivity to technology cost approvals.

For instance, Reference Level LSIP might be 22% with a float of +/- 6% - covering 80% of all agreements. On this basis, it might be the set policy of the registry that

an agreement whose LSIP is above 30% or below 15% (the Acceptance Levels) should go through special approval procedures

Detail examinations will, however, be required for reviewing payment arrangements in complex agreements.

Low level LSIPs are not always favorable to development. Cosmetic and other low-technology franchises, because of their high profitability, will yield low LSIPs at quite high levels of royalty.

Since TTF and LSIP are quantitatively inter-related, the use of Reference Level LSIP automatically indicates the applicable TTF level. However, as an economy develops, and multiproduct companies emerge, the determination of enterprise-level LSIP will become more difficult. At this point of time, Reference Level TTFs, applying to multi-product companies will become more relevant.

Since, in practice, the determination of LSIP, at the enterprise or average level, involves the making of assumptions, LSIP methodology merely presents a quantitative support to the basic evaluatory processes of the registry. It should, at all times, be recognized, that licensing agreements are highly individual in character and often give inadequate expression to many understandings that exist between the transacting parties.

III. Assessment and Monitoring of Technology Costs at the National Aggregate Level

As the experience of a registry grows, it will be possible for it to reduce the cost of technology per unit of profit that is generated by enterprises. Reference Level LSIP is a coefficient whose downward movement will be indicative of the growing efficacy of the registry. More particularly, if Reference Level LSIPs can be established at the industry level, it might be possible to more closely monitor the

influence of imported technologies. It should be expected, for example, that for high-technology industries (communications, pharmaceuticals, etc) Reference Level LSIP will tend to stay stable and high, while in low-technology or 'sunset' industries, it should be substantially lower and diminish.

Thus, by annually assessing Reference Level LSIPs and TTFs, it will be possible for a registry to monitor the efficacy of its policy instruments.

IV. Inter-Registry Comparison of Technology Costs Through LSIP and TTF Coefficients

One of the basic problems faced by national registries is the widely differing pattern of payments that are made by developing countries for what are, apparently, closely-resembling technologies. Often, the same licensor is able to negotiate (through the licensee) different royalty rates for identical technology with different registries. A part of the explanation for this phenomenon is a composite of the following: (a) different currency exchange rates between countries and the currency standard used by the licensor (b) the degree of tariff protection given by countries to nationally-produced products. A high-tariff protection rate may attract a high royalty rate since its cost can generally be passed on to the consumers (c) organizational structure of the enterprises to which the technology is licensed - in some countries, recipients of technology are mainly joint-ventures. To them the licensor may apply a lower royalty rate since he has a greater assurance of receiving income (d) the relationship between the countries of the licensor and licensee. If a country receives a predominant part of its financial aid from a particular country, then licensors from that country may be able to apply a high royalty rate since competitive third country technologies cannot easily penetrate.

Royalty rates are also determined by the development policies

of a country. An export-oriented economy may show a higher Reference Level LSIP (ie. may permit a larger flow of fees to attract technologies) than an economy managed for the development of small-scale industries. Likewise, a developing country with a fairly sophisticated industrial economy may show a lower Reference Level LSIP (because of lower dependence on imported technology) than an emerging industrial economy heavily reliant on technology inflows.

In such context, if developing countries have good bi- or multilateral understandings, exchange of information on country Reference Level LSIP and TTF coefficients can be of great value. It should be noted that both LSIP and TTF are ratios and are therefore independent on the currencies in which transactions are carried out, the discount rates used by the registries for obtaining present value figures and the corporate tax rate. If, for example, the Reference Level LSIP of Country A is 28% and that of Country B, 15%, the direct implication is that Country A permits higher flow of income to licensors as a result of its development policies. Consequently, the same technology is likely to be licensed at a higher royalty rate in Country A than in Country B. However, country-level LSIP's may not provide the perspective and interpretation that sectoral rates can.

Concept of Income-sharing in the Joint Venture

A joint venture is typically formed (incorporated) in the developing country by the licensor participating in the equity capital of the national enterprise. Various forces and interests bring about this association, discussion of which lies outside the scope of this document. Likewise, principles relating to the proportioning of equity between the partners will also not be discussed.

When the licensor has equity investment in an enterprise he obtains two (or more) streams of income from the working of the enterprise. Of concern here are: (1) the compensation -royalty- he receives for licensing technology to the enterprise (just as he would if he were merely licensing technology to the enterprise) and (2) his share in the after-tax profits of the enterprise, determined by his share in its equity. It is the general claim of licensors that the two income streams are independent of each other and entail different levels of risk and control in the transfer of assets. Payments for technology will cease when the contractual period relating to the payment of license fees lapses. After that, and so long as the licensor has equity in the enterprise, he will continue to participate in the division of after-tax profit.

The government of the host country usually has the first claim to the profits of the enterprise and collects it as taxes. The residual profit, which is the after tax profit of the enterprise, will be distributed among the owners of the enterprise - the licensor partner and the national owners of the enterprise (national share holders). Usually, not all of the after-tax profit of the enterprise will be distributed. Some part will be retained for acquiring new assets, etc. The profit which is actually distributed is termed 'dividends'. In the forthcoming analysis of payments, it is assumed that all of the after-tax profit of the enterprise is distributed.

It is feasible to develop an income-sharing coefficient, similar to the LSIP for the straight-licensing arrangement, making allowance for the licensor's share in the after-tax profit of the enterprise.

Two coefficients can be developed, based on the consideration of whether the sharing is to be determined on the pre- or post-tax profit of the joint venture. The value, and the implications of the coefficient, will vary with the profit base used. Choice will depend on the data base of the analyst - whether he has uniform access to pre- or post-tax data. For reasons that will be shortly explained, the registry will best be served by the use of the pre-tax coefficient. The national partner can also benefit by the use of the latter coefficient.

To obtain an algebraic formulation of the pre-tax coefficient - which will be given the mnemonic $(LSIP)_{JV}$ - it is, again, useful to consider a numerical illustration. The term FVP will be used to represent the Foreign National Partner, and likewise, NVP for the National Venture Partner. For the purpose of analysis, the following will be assumed: (i) the FVP has a 30% equity in the share capital of the enterprise (ii) the corporate tax rate is 60% (c) no national taxes are applicable to the payment, or the receipt, of royalty fees and dividends and (d) all of the profit of the enterprise is distributed to claimants - the government of the host country, FVP and NVP.

Table 12 presents an illustration of the profit sheet of a proposed joint venture enterprise as visualised by the foreign venture partner prior to defining his royalty fees.

Table 12. Foreign Partner's Potential Model for Assessing Applicable Royalty Rates.

	<u>Currency Units</u>
1. Estimated annual sales of enterprise	2000
2. Estimated cost of production (excluding royalty cost)	1700
3. Total costs	1700
4 Profits before tax(PBT)	300

If the licensor (FVP) wished to obtain 10% of the profits-before-tax of the enterprise as his remuneration (income-share) for the licensing of technology, the applicable royalty rate would be:

$$0.10 \times 300 = 30 \text{ currency units.}$$

(As a sales-based royalty rate, this would amount to $(30/2000) \times 100 = 1.5\%$ on sales value. Sales-based profitability in the above case is 13.5%).

Assuming that the licensor's estimates of sales and costs are met, and the applicable royalty realised, the following would represent the enterprise's formal statement of accounts: Table 13

Reconstruction of Table 12. Formal Accounts

	<u>Currency Units</u>
1. Annual sales value	2000
2. Cost of production (excluding royalty fees)	1700
3. Royalty expense	30
4. Total costs	1730
5. Profits-before-tax (PBT _R)	270
6. Tax @ 60% (0.6 X 270)	162
7. Profits-after-tax (PAT _R)	108

Since it has been assumed that the Foreign Venture Partner has a 30% equity in the enterprise, he would receive, together with the royalty payment of 30 units, a flow from profits = $0.30 \times 108 = 32.4$ units - or a total receipt of 62.4 units during the royalty-bearing period of the agreement. PBT_R

and PAT_R represent profits during the royalty-bearing period.

If the income-sharing concept applied to the straight-licensing case earlier is applied here (see Appendix B for derivation), Expressions VI and IX would represent the income-share coefficient as applicable to the joint venture:

$$(LSIP)_{JV} = \frac{R + (EF)_{FVP} (PBT_R)(1-TR)}{(PBT_R + R)} \quad \dots \text{Expression VI}$$

or, alternatively:

$$(LSIP)_{JV} = (LSIP)_S (1 + (EF)_{FVP} (TTF)(1-TR)) \quad \dots \text{Expression IX}$$

where to recount:

$(LSIP)_{JV}$ = share of the FVP in the 'intrinsic profit' of the enterprise

$(LSIP)_S$ = the straight-licensing coefficient defined by Expression IV

R = absolute amount of royalty paid to FVP

PBT_R = the profits-before-tax of the enterprise during the royalty-bearing period of the licensing agreement

TR = Corporate Tax Rate

TTF = 'technology turnover factor', PBT_R/R , and

EF_{FVP} = the equity fraction owned by the FVP in the enterprise.

In Expression IX, it will be noted that the component

$$(1 + (EF)_{FVP} (TTF)(1-TR))$$

represents the additional share the FVP receives through holding equity in the enterprise. That is the increment over $LSIP_S$, the straight-licensing coefficient. For example, if the data of Table 3 applied to a joint venture in which the FVP held 40% equity and the corporate tax rate was 55%, then $LSIP_{JV}$ would be 0.1414, the $LSIP_S$, plus the fraction:

$$(0.1414)(0.4)(6.07)(0.55)$$

= 0.1888, or a consolidated 0.3302, or 33.02% of the intrinsic profit of the enterprise. The number '6.07' is = $1418.6/233.7$.

It will be noted that although again the term 'intrinsic profit of the enterprise' appears in the concept of income-sharing, , its evaluation is through the use of well-defined accounting terms present in company financial statements.

As in the case of straight-licensing, the intrinsic profit of the enterprise , which is $PBT_R + R$, is shared by three claimants- the FVP, the NVP and the Government of the host country; the share of the FVP enhanced by his holding of equity in the enterprise..

Division of Enterprise Income Among Claimants

The shares of the licensee/NVP and the Government in the intrinsic profit of the enterprise , during the royalty-bearing period, are given by the following two Expressions (see Appendix B for their derivation):

$$\text{Share of NVP} = \frac{(\text{EF})_{\text{NVP}} (\text{PBT}_R) (1-\text{TR})}{(\text{PBT}_R + R)} \quad \dots \text{Expression VII}$$

where $(\text{EF})_{\text{NVP}}$ = Share of the NVP in the equity of the enterprise

$$\text{Share of Government} = \frac{(\text{PBT}_R) (\text{TR})}{(\text{PBT}_R + R)} \quad \dots \text{Expression VIII}$$

It should be noted that for practical use of the expressions, including Expression VI, PBT_R and R would be summations of 'present values' (Appendix A).

Using a set of data illustrating the performance of an enterprise in a particular year, which will be referred to as the 'Standard Case', Table 14 explores the impact of various changes on the distribution of its intrinsic profit. Particulars of the Standard Case are.

1. Annual sales value (S)	2000 currency units
2. Basic cost of production	1700 units
3. Royalty expense (R) @1.5%S	30 units
4. PBT_R	270 units
5. Tax rate (TR)	60%
6. FVP's equity holding	30%
7. Sales-based profitability (on PBT_R)	13.5%

Table 14 demonstrates two significant effects:

(i) the proportion of intrinsic profit flowing to the government as tax, during the royalty-bearing period of the agreement, is unaffected by the division of equity between the foreign and national venture partners (see

Table 14. Distribution of Intrinsic Profit Among Claimants
in a Joint Venture

Fraction of Profit Flowing to:

	<u>FVP</u>	<u>NVP</u>	<u>GOVT</u>
1. STANDARD CASE	0.208	0.252	0.540
2. As in (1) but for post-royalty period	0.120	0.280	0.600
3. As in (1) but 20% tax rate (lower tax rate)	0.320	0.500	0.180
4. As in (1) but licensor equity =0.8 (higher equity)	0.390	0.070	0.540
5. As in (1) but royalty of 5% (higher royalty)	0.410	0.190	0.400
6. As in (1) but licensor has has no equity (straight-licensing)	0.100	0.360	0.540
7. As in (1) but zero tax rate	0.370	0.630	0
8. As in (1) but profitability doubled (higher profitability)	0.170	0.260	0.570

cases 1,4, and 6 of Table 14), and

(ii) raising or lowering the royalty rate basically affects the distribution of income between the government and the FVP. Expectedly, a higher royalty rate diminishes the government's share of income.

The advantage of Expression VI is that it becomes possible to reduce all types of joint venture arrangements (different royalty rates and equity division) to a consideration of a single coefficient. The feasibility of doing this helps in overcoming certain problems met with by developing country registries . This is revealed below.

Royalty Rate Vs. Equity Holding

From the point of view of the principles underlying joint venture formation and technology licensing, it is theoretically possible for a potential national venture partner to negotiate (with the potential foreign venture partner) the sharing in the equity of the joint venture distinct from that of technology licensing (royalty rates). However, for a variety of reasons, not all of which can be discussed here, the partners will inter-relate the two issues.

Government regulations on royalty rates, its attitude to control of ventures or its approaches to the capitalisation of technology/services (see later), etc often result in the partners' viewing the flow of income to the FVP as a composite of profits and royalties and of its optimisation. Thus, the national venture partner may often be in a position to 'trade off' profits against royalty fees and vice versa; for example, to reduce royalty rate by giving the FVP the chance to obtain a higher level of equity holding, and thus, to a higher proportion of after-tax profits. In illustration, the NVP may have two choices:

(1) a 2% royalty on sales for 5 years with the FVP holding 35% of the equity, or

(2) a 5% royalty for 4 years with the FVP's equity holding at 25%.

Other situations are also met with by registries and entrepreneurs. The FVP may, for instance, want to capitalise his technical service fees into forming (all or part) of his equity. At the same time, a royalty may be also be charged on know-how which, for all practical purposes, is the same as the 'technical services' which has been capitalised. Consequently, for the same input , he obtains both royalty and profits.

Expression VI for $LSIP_{JV}$ has the advantage that it treats profit and technology fee flows to the FVP as a composite. Detailed cashflow analysis of a project will lead to the same conclusions as from the use of the Expression.

Before proceeding further, it should be noted that the equity holding of the FVP has a direct bearing on the "control" he can legally exercise over the technical, managerial and financial decisions of the enterprise. It would be unusual for 'control' to be traded-off against technology fees. All of the discussion in this Section pertains to changes that can be made between ownership and technology fees without affecting control. Thus, if the FVP has, by negotiation, the right of majority control, the methodology of this Section can only consider a trade-off between fees and equity holding so long as the FVP's share in the equity remains above 51%. Thus, a comparison is feasible between the two cases:

- (i) FVP holding 60% equity and a royalty rate on sales for 5 years, and
- (ii) FVP holding 51% of equity and applying a 5.5% royalty rate on sales for 5 years (or a different period).

By simple programming on a hand-held computer it will be possible to make rapid analysis of alternate situations using Expressions VI to VIII .

For purposes of illustration, the choice between equity holding and technology fees presented above is analysed with respect to sample data of an enterprise. It is assumed that the following apply to the enterprise

in a mature period of its operation:

- | | |
|--|---------------------|
| 1. Annual sales value | 2000 currency units |
| 2. Basic cost of production
(excluding royalty) | 1700 units |
| 3. Basic profit level | 300 units |
| 4. Tax rate | 60% |

(Control will lie with licensor)FVP.

The calculated results are presented in Table 15.

It will be seen that, in this particular case, the national venture partner's position will be indifferent to the alternatives. They are virtually the same to him provided he can raise the extra equity funds for a 49% control in the enterprise. However, for a conservative registry Alternative A may be attractive because a lower fraction of enterprise income will flow to the licensor-FVP.

Enterprise-level Utilisation of the LSIP_{JV} Coefficient

The involvement of the national venture partner (NVP) in detailed negotiations with the foreign venture partner (FVP) over royalty rates and equity fractions will depend very much on who will hold the majority equity in the joint venture company. If the FVP will have a clear majority, the national venture partner's role will, essentially, be restricted to the negotiation of royalty fees. This is for the reason that till the royalty payment period is over, the amount of profit shared between the partners will be lower than what will prevail in the post-royalty period. Even so, the NVP may have little scope for manoeuvrability since it is not him alone, but the board of the joint venture company (controlled by the FVP), which will negotiate the technology agreement. Further, cash flow analysis will reveal to the NVP (as does Table 15) that modest counter-exchanges between royalty fees and equity ownership will not have a material effect on the absolute level of income he will derive from the enterprise over the royalty period.

Table 15. Royalty Rate and Ownership Holding

<u>Alternative I</u>		<u>Alternative II</u>	
<u>Royalty Rate</u>	<u>FVP Equity</u>	<u>Royalty Rate</u>	<u>FVP Equity</u>
3.5%	0.6	5.5%	0.51

Percentage Sharing of
Intrinsic Profit:

FVP	0.417	0.495
NVP	0.123	0.124
Govt.	0.460	0.380

Absolute
Distribution of
Enterprise Income:

		<u>Currency Units</u>
FVP	125.2	149
NVP	36.8	37
Govt	138.0	114

FVP = Foreign Venture Partner
NVP = National Venture Partner

When the foreign partner has a minority position, the involvement of the national partner in discussions will be greater. The FVP, because of lack of adequate voting power in the decisions of the enterprise may try to minimise, through high royalty fees, the possible impact of enterprise decisions which may be adverse to him. Also, to further reduce risk, the FVP may be prone to capitalising knowhow services, etc into equity; thus, blurring the lines that divide royalties from profits. Consequently, in negotiations there can be major counter-exchanges between technology fees and the cash equity the FVP will bring to the enterprise.

It is in such situations that the concept of $LSIP_{JV}$ will be useful. Analysis may show, to take an extreme example, a 30% equity owner obtaining an unintended, or unacceptable, 60% of the intrinsic profit of the enterprise.

Registry Level Utilisation of Income Share Coefficients

There is a distinct trend among developing countries to legislate in favor of the NVP holding a majority position in national joint ventures, even though it is realised that operational control may effectively lie with the FVP. Such postures arise from strategic and political considerations rather than a policy to divide incomes.

With only minority positions available, FVPs can be expected to 'trade' extensively between equity holding percentages and technology fees, since a higher or lower equity holding in a minority position does not raise or lower the voice of the FVP in the management of enterprises. Consequently, developing country registries are concerned as to how a 'package' of equity holding and royalty fees can be effectively evaluated.

Since the $LSIP_{JV}$ coefficient is an index of the composite remuneration received by the FVP through profits and royalties, it is possible - similar to the situation with $LSIP_S$ for straight-licensing arrangements - for a registry to administer joint venture formations using Reference Level $LSIP_{JV}$'s. The $LSIP_{JV}$ methodology is useful in that it enables the calculations of the income distribution among the three claimants, the FVP, NVP and the government. It

should be recognised that since the tax rate is a factor that determines the joint venture coefficient, values of the latter cannot be compared between countries without the use of a common tax rate.

As may be expected, the $LSIP_{JV}$ coefficient (which, it may be recognised, still refers to the 'intrinsic profit' of the enterprise, $PBT_R + R$) will be higher than the $LSIP_S$ coefficient for the same royalty payment. The factor $(1 + (EF)_{FVP} (TTF)(1 - Tk))$ of Expression IX indicates how much higher it will be. In Tables 8 and 9 the coefficients have been evaluated, for some joint venture cases, for Developing Country C.

It will be noted that $LSIP_S$ can be uniformly extended to all cases of licensing, whether in the joint venture mode or not, although a better perspective will be provided by looking at $LSIP_S$ for the 'category' of joint ventures.

In many developing countries, the registry concerned with technology payments will be a separate organisation from that administering joint venture arrangements (e.g. Egypt). Again, in some countries (e.g. Nigeria, Philippines) joint venture arrangements (equity holdings, financial control, management, etc) may be accepted in advance of the process which administers technology payments. Consequently, depending on the administration system adopted by the developing country for technology management, it may or may not be feasible to comprehensively associate equity relationships with technology payments.

Therefore, in some administrative systems, the LSIP indicator will be the sole index for judgement.

It should be noted that, basically, only four elements of information are required to obtain the impact of technology payments: the equity holdings of the partners, the applicable (or standard) tax rate, the discounted values of forecast PBT and royalty payments. Higher analytical clarity is possible if information on sales income is available. The share-profitability relationship carries over to the joint venture.

It will be observed from Expression IX that the higher the TTF of the enterprise, the higher is the share of the income in the hands of the licensor. Thus, a high TTF benefits, in the particular case of the joint-venture, both the licensor-FVP and the developing country

TECHNICAL SERVICE FEES

'Technical services' is a collective term that is applied to three types of services associated with the transfer of proprietary rights: (1) design and engineering assistance (2) technical assistance and (3) 'holding hands' assistance from the licensor during the early years of an enterprise's life. Unlike fees paid for the acquisition of technological rights, fees for technical services can be considered divisible and related to its components. Their acquisition is optional to the licensee.

Engineering assistance relates to the design of a production facility to meet client's requirements. Its output is largely drawings, specifications, lists of required hardware supplies, geared to convert licensed knowhow into its physical embodiment. It is an expert service with much of the knowledge gained through experience but otherwise in the public domain.

'Technical assistance' is the assistance obtained during the time a project is 'put together' and till it becomes operational. It comprises of services such as preparing tenders, selecting bids, ordering equipment, inspecting supplies, shipping, etc. It is a pre-operational service. Its work is, again, of an expert nature with knowledge that is employed in the public domain. Consequently, it can be obtained from competing suppliers provided the buyer is able to clearly state his requirements.

In its correct sense, 'technical service' involves its supplier in providing technical support to the technology-aquirer from the time a project becomes operational to the time when the licensee can independently manage all technical operations of a manufacturing facility. Technical service is a series of inter-connected services (quality control, trouble-shooting, maintenance, field-level customer services, etc) closely allied to 'knowhow' but without its legal protection. However, unlike engineering or technical assistance, it can seldom be furnished by third parties. It

is different from knowhow in that a 'competent' licensee (like advanced country licensees) can practice the knowhow without the assistance of the knowhow licensor.

Because of the nature of the service just discussed, it is general practice to treat compensation for it similar to that for knowhow: its supplier can obtain a share of the profit of the enterprise. But unlike the situation in the licensing of knowhow, a technical service agreement can be terminated, by prearrangement, at the sole option of the acquirer. The period over which profit is shared is determinable by the acquirer. Cost of technical services will be dependent on the needs of the licensee - its lifetime - and thus can be higher or lower than the price of knowhow. The cost of the knowhow license, then, is the reference level for the pricing of technical services.

In the case of engineering services, the cost of the service is a composite of the time skilled personnel will spend on the project and the mark-up that will be applied on skill-level costs (the logged cost), depending on the reputation of the engineering firm. Logged costs will depend on where the engineering work will be carried out, what level of communication is required between the client and supplier, the type of utilities employed (ie computers), etc. Usually, man-hour rates for drawings, preparing specifications, field-level assistance are pre-established along with norms for telecommunications and computer time. The client will have the right to inspect log books and approve debits. Besides these internal checks, external checks are feasible, such as engineering costs to total project costs.

For example, in a chemical plant, customized engineering would play a larger part than in a conventional cement or textile plants which are assemblies of standardised equipment. Consequently, it might be alright to accept a 20% share for engineering in the project cost of a chemical plant than in the case of cement or textile plant.

Technical assistance is a low level service compared to

engineering services or 'holding hands' technical services. As such its measurement is straight-forwardly in terms of man-days, and estimates of actual out-of-pocket costs. The technical assistance package would be a summary of the estimated man-days to be spent on each element of service and the gross overhead rate the services organisation will apply on logged time.

It will be apparent from the discussion that except for long-duration technical services, first dealt with, it would not be rational to extend the income-sharing concept to the others.

However, one of the complex problems in costing services arises when the licensor of knowhow is the supplier of the above services and is a part-owner of the licensee enterprise.

It is not rare for the licensor to 'capitalise' such services into equity in a joint-venture, while obtaining a separate stream of income from knowhow, patent and trademark licenses. To the lay licensee, capitalisation is often attractive as it defers payments and makes the licensor/partner potentially dependent on the enterprise being able to generate net income. Again, as expressed earlier, it is often possible for the licensor to capitalise a technology element, such as technical assistance into equity, and supply it, under other terminology, say, management services, under the umbrella of a running payment.

Although it would not be conceptually correct, it may nonetheless be worthwhile to test what the effect of aggregating such incomes has on $LSIP_{JV}$. For this purpose, of course, it would be necessary to examine a reliable a long-term forecast and obtain the LSIP value over that period.

THE INFORMATION SYSTEM 1)

In order for a governmental agency to effectively use the methodology of this Monograph, there are three general conditions:

(a) it should be empowered to call for a certain amount of definable information and data from enterprises which are otherwise obligated to submit licensing agreements for evaluation and approval

(b) it should be in a position to maintain an effective data base of approved agreements, including enterprise information and evaluatory data, and

(c) it should be guided by a policy which permits a flexible view to be taken of royalty rates and licensor remuneration; that is, the policy should not set arbitrary limits to royalties and fees which defeat the perspective of the income-sharing concept.

In UNIDO methodology, the income share of the licensor, or of the foreign venture partner, is examined in the context of the qualitative and quantitative gains of the licensee and their relevance in the national developmental perspective. As such, the determinations of income shares is not an absolute exercise, unmindful of the broad and specific objectives of licensing arrangements. Consequently, while a registry may be organised to compartmentally examine the economic aspects of a licensing arrangement, the evaluation of technology compensations must be seen in its collective sense, as intimately related, and not alien to the legal rights of the licensee and the quality of the technology acquired.

UNIDO methodology requires the registry to avail of and evaluate a company's forecast data, the data applicable, at least, over the period of the licensing agreement. While the income-share concept is fundamentally linked to the profitability of enterprises, it may not be feasible in many countries to have enterprises divulge their cost data. Consequently, sales-based profitability has been recommended as a workable substitute. On this basis, the minimum information that will be required by a registry are:

1) See also ID/WG.429/1 and ID/WG.429/2 on Registry Information Systems.

(i) sales values

(ii) the fixed and annual royalties/ fees payable to the licensor over the licensing period, and

(iii) the profit-before-tax of the enterprise, for the intended licensed product, corresponding to forecasted sales.

Where the enterprise will be in the joint-venture mode, the equity holding of the foreign partner will be an essential input; while information on the degree of capitalisation (present and future) will be of significant evaluatory value. Since tax incentives are common in developing countries, the enterprise can be expected to use a 'standard' tax rate for income-share determinations. For the evaluation of applications submitted for renewal or for diversification, historical sales and profits will be required.

In the recommended methodology, the income share of the licensor (or foreign partner) is specifically evaluated in the context of statistically-relevant Reference Value LSIP's. Consequently, the registry must have a data base of approved agreements, which provides access to the aggregate income share index in the historical/contemporary perspectives. The quality of this data base is of utmost significance; the greater the subdivision of data, the more efficacious the evaluation. Data (LSIP and profitability) segregation by technology elements (trademarks, patents, knowhow, etc), region, industry sector, association (i.e. joint venture) and historical period will be most useful. Computerisation of the data-base will certainly help in analysis and is to be encouraged.

Some developing country registries which have experimented with LSIP determinations have the suspicion that enterprises may 'tailor' their data to meet regulatory criteria. Consequently, they opine that income-sharing criteria may not be any more valid than straight-forward royalty-rate approvals. It is submitted that with the income-sharing methodology closely interlinked to sectoral profitabilities, to sales based profitabilities, TTF and other inter-dependencies, data manipulation will show up internal

inconsistencies in submitted data, of easy detection. In illustration, if a sales-based projection was the only requirement, any forecast with reasonable growth rates can be held viable. However, if sales and asset-based profitabilities were to be simultaneous submissions, manipulation will tend to show up detectable data inconsistency with sectoral rates, with asset growth rates, etc. The methodology of this Monograph will not circumvent manipulation, but it will make it more difficult.

While, admittedly, the licensee enterprise will not accept the coefficients as sole or dominant criteria in decision making, and will base its decisions on detailed cashflow and profitability forecasts, it cannot, in the context of the developing country disregard national policies bearing on the division of income, as highlighted by limits generally set on what share a foreign enterprise can obtain in the equity of joint venture enterprises, independent of the profitability of the national entity.

The methodology of this Monograph carries far greater significance to technology transfer registries who are charged with the routine evaluation and acceptance of technology payments. By being able to reduce technology payments to simple coefficients, and in the case of the LSIP_{JV} coefficient to view, in a composite index, the impact of flows of profits and fees, it becomes feasible to set the evaluatory exercises in a policy framework which incorporates quantitative guidelines, not dissimilar to postures taken with respect to foreign ownership of enterprises engaged in 'priority' and 'non-priority' sectors and industries.

Through the use of the coefficients, the developing country agency is put in a position, first, to examine at the level of the enterprise, the acceptability of income division on qualitative scale of judgement, and second, to consider the division in the light of a Reference Level which represents, a statistically-relevant index of income-division in the contemporary and historical experience. The aforesaid studies made by developing country registries clearly indicated that such a relevant Reference Level does indeed exist even though technology fee payments had not been approved in the context of an income-sharing parameter.

The income-sharing methodology clearly shows the inadequacy of review when royalty rates are accepted without considering the profitability of enterprises. Even at a low rate, when profitability is poor, the proportion of income flow to

CONCLUSIONS

The principal objective of this Monograph has been to present straight-forward and simple methodology for the evaluation and analysis of payments in the technology transfer process in the environment of developing countries. It will assist final users of technology as well as national agencies carrying the mandate to regulate and administer technology payments. Confidence in the methodology arises from the 'field tests' which have been carried out by national agencies of some developing countries, using contemporary data of licensee enterprises.

The methods seek to represent, through the income-share coefficients, $LSIP_S$ and $LSIP_{JV}$, the division that will take place when royalties and technology fees are viewed in the context of the 'intrinsic' gain or profit of the enterprise resulting from the use of technology. $LSIP_S$ and $LSIP_{JV}$ represent the share of the licensor organisation, and provide a measure of the transfer of scarce financial resources from the developing country. The $LSIP_S$ coefficient is applicable to all types of enterprises receiving expatriate technology, while $LSIP_{JV}$ is particular to the income-share of the licensor when he is part-owner of the licensee enterprise (joint-venture).

Through interpreting royalty payments and fees as income-sharing devices, the licensee enterprise is put in a position to judge, from a subjective scale of values, the equitability of the $LSIP_S$ and $LSIP_{JV}$ coefficients. In other words, the technology receiving enterprise will have to judge whether the share of the licensor, at say, 60% of the calculated intrinsic income of the enterprise ($LSIP_S$ value), during the royalty period, is equitable considering the benefits accruing over its commercial life. The posture taken in this Monograph is that such a judgement is far better than acceptances of arbitrarily stated royalty rates in the national context of international practice.

the licensor can be very high, contrary to the principles underlying regulation.

This Monograph presents methodology and does not make any recommendations whatsoever on what would be a suitable upper-limit LSIP or the permissible range of the enterprise-level LSIP in comparison to the Reference Level LSIP. It is only recommended that for attention to special cases, the policy-makers specify indicator coefficients (upper and lower levels). In other words, the Monograph tries to separate evaluation from analysis.

It is, however, the implication of the methodology that the conventional framework of upper/normal levels of royalty rates adopted by some registries for the administration of technology agreements can actually defeat the purpose of regulation. The use of incentive royalty rates to achieve speedy development of particular sectors of the economy is viable and not inconsistent with reviews of the income-sharing parameter, particularly in projects of high profitability.

This Monograph has made efforts to distinguish between decisions that will be based on absolute flows of income and those on the sharing of income; and has highlighted the conflicts that can arise in the context of technology induction. The LSIP coefficient, it is pointed out, measures the value of a ratio termed by UNIDO as the Technology Turnover Factor, PBT_R/R . It is shown that the higher the turnover factor - that is, the higher the profit generated per unit of expense on technology - the lower will be the LSIP coefficient, a generally desirable direction. However, a decision made on a high Technology Turnover Factor (TTF) - or a lower LSIP - should be made in the context of the absolute flow of profit generated by the enterprise, as this is a direct contribution to the GDP. This, of course, underlines the conflict between growth and development in the management of technology. Attention has also been drawn to the fact that TTF can

also be viewed in the context of profit generation per unit of foreign exchange expense, another facet of the development exercise.

Finally, by focussing on income sharing this Monograph does not pay adequate heed to the feasibility of the licensee project, the quality of the technology licensed, the type of protection given to the licensee through process performance warranties, the kind of liabilities accepted by the licensor in terms of licensed patents and trademarks, the degree of 'holding hands' support given by the licensor to the licensee, etc. Likewise, adequate attention has not been paid to the value addition that will take place at the level of the national economy, the transfer of skills to national personnel, the contributions to the foreign exchange reserves of the country, etc. These would be essential considerations in determining whether a technology proposal, in the first place, would be welcome or not.

APPENDIX A

THE PRESENT VALUE OR DISCOUNTING TECHNIQUE

The concepts of Present Value (PV) and Net Present Value (NPV), which are routinely employed in the financial analysis of projects, involving incomes and expenditures, can be extended to the evaluation and comparison of royalty payments, independent of the form in which royalty is expressed: running royalties, lumpsum and downpayments, and combinations of lumpsum and running royalties.

The Present Value (PV) of a future receipt of money is less than its future nominal value. One hundred dollars received now (Present Value) is worth more than \$100 received in a year's time (Nominal Value) because it could be invested in the meanwhile to earn a return (interest, yield, etc) by banking it or investing it in stock or bonds. That is, \$100 invested today at 10% interest or yield rate will be worth \$110 at the end of the year. Hence the Present Value (PV) of \$110 received a year from now is \$100. Similarly, \$242 received two years from now has a PV of \$200. The \$200 Present Value is the 'discounted income' corresponding to a future income (or expenditure) of \$ 242 at a 10% discount rate applied over two years.

Thus, an enterprise making royalty payments will view a payment of \$200, today, just the same as making a payment of \$242 at the end of two years. Consequently, there is a Present Value to every royalty payment made at any other point of time.

The PV of a future income (or expenditure) at a discount rate, D, is obtained from the 'compound interest' formula:

$$PV = 1 / (1 + D)^N \times (\text{Future Income})$$

where N is the number of years "from now" in which the future income is received.

At a 10% discount rate, the Discount Factor, $1/(1+D)^N$,

for $N = 1, 2, 3 \dots$ years is 0.9091, 0.8264, 0.7513, etc.

Consequently, a flow of incomes in future years can be reduced to their PV's. When the PV's are summed, we obtain the Net Present Value of the future stream of incomes (or expenditures such as royalty).

To effectively employ the discounting technique, certain assumptions and estimates have to be made. The future flow of income, or expenditures, must be known or estimated. Second, a suitable discount rate or factor must be applied. Discount Rate, while related to the interest rate, is not the interest rate. It represents the weighted cost of raising corporate finance (through bond issues, the raising of equity capital, long and short-term loans from banks, etc). In Table 3, a discount rate of 10% has been applied. The suitable discount rate for each country will be established by financial institutions.

APPENDIX B. DERIVATION OF LSIP JV
-INCOME-SHARING IN THE JOINT-VENTURE

Table A provides an illustration of the possible income profile if an enterprise as a foreign venture partner (FVP) may look upon it before considering what would be the applicable royalty:

Table A. Notional View of Enterprise Performance

Annual sales Value	2000 currency units
Estimated cost of production	1700 units
Total costs	1700 units
Profits before tax	300 units
Tax @ 60%	240 units
After-tax profit of firm	60 units

In order to apply the proper royalty rate, the FVP will consider what would be an acceptable liability on part of the enterprise. Let it be assumed that the enterprise will part with 10% of its PBT for the technology to be transferred. The applicable annual royalty fee will be then: $0.10 \times 300 \text{ units} = 30 \text{ units}$. This will 'translate' to :

(a) an annual royalty rate = $(30/2000) \times 100 = 1.5\%$ on sales

(b) the FVP will have $30/60 \times 100 = 50\%$ of the after-tax profit of the firm.

The PBT and PAT figures given above are notional figures. At a 1.5% royalty rate, the conventional accounting profits of the enterprise will be as given in Table B below:

Table B. Conventional Presentation of Performance

Annual sales value	2000 currency units
Cost of production (less royalty)	1700 units
Royalty @ 1.5% sales	30 units
Total costs	1730 units
Profits before tax (PBT)	270 units
Tax @ 60%	108 units
Profits after tax (PAT)	108 units

The 'intrinsic profit' of the enterprise is, as per the definition of this Monograph (also see Table 1), 300 units, the profit-before-tax figure of Table A.

Algebraically, the intrinsic profit is $PBT_R + R$, where: PBT_R is the PBT paid during the royalty-period of the technology license, and R is the absolute amount of royalty paid in the year on sales.

The FVP receives, therefore, the following fraction of the enterprise's PBT as royalty income:

$$\frac{R}{PBT_R + R}$$

If the FVP had a share of 30% in the equity capital of the enterprise, he would receive, in addition, the following income:

$$0.30 \times 108 \text{ units} = 32.4 \text{ units, or algebraically,}$$

$$(EF)_{FVP} (PAT_R)$$

$$\text{which in terms of } PBT_R = (EF)_{FVP} (PBT_R)(1-TR)$$

where:

EF_{FVP} = equity fraction held by the FVP

TR = corporate tax rate

The FVP's additional share in the intrinsic profit of the

enterprise is:

$$= \frac{(EF)_{FVP} (PBT_R) (1-TR)}{PBT_R + R}$$

Consequently, the licensor receives, compositely, the following income, comprising of royalty receipts and share of after-tax profit, expressed as a share of the intrinsic profit of the enterprise:

$$LSIP_{JV} = \frac{R + (EF)_{FVP} (PBT_R) (1-TR)}{(PBT_R + R)} \quad \dots \text{Expression VI}$$

The national venture partner (NVP), who has, in the above example, 70% of the equity of the enterprise, receives, over royalty-bearing period of the license, only a share of the after-tax profit. His component of the after-tax profit, expressed as a fraction of the intrinsic profit of the enterprise is as follows:

$$\text{Share of NVP} = \frac{(EF)_{NVP} (PBT_R) (1-TR)}{(PBT_R + R)} \quad \dots \text{Expression VII}$$

where $(EF)_{NVP}$ is the share of the NVP in the equity capital of the enterprise = $(1-EF_{FVP})$

The third claimant to the intrinsic profit of the enterprise is the government of the host country. Its income is by way of corporate tax. Consequently,

$$\text{Share of the Government} = \frac{(PBT_R) (TR)}{PBT_R + R} \quad \dots \text{Expression VIII}$$

For the practical use of the above Expressions, PBT and R would be summations of net present values.

If the numerator and the denominator of Expression VI are each divided by R, the following expression emerges:

$$LSIP_{JV} = \frac{\frac{1 + (EF)_{FVP} (PBT_R) (1-TR)}{R}}{\frac{(PBT_R + R)}{R}}$$

In the numerator, PBT_R/R , can be substituted by TTF. The denominator is $1/LSIP_S$, the coefficient applicable to straight-licensing agreements. If the substitutions are made:

$$LSIP_{JV} = LSIP_S (1 + (EF)_{FVP} (PBT_R) (1-TR)) \dots$$

...Expression IX

This Expression is easier to use. Table 8 is an illustration of its usage.

Equivalent expressions for the shares or the NVP and the Government are:

For the NVP

$$= (LSIP)_S (EF)_{NVP} (TTF) (1-TR) \dots \text{Expression XI}$$

For the Government:

$$(LSIP)_S (TTF)(TR) \dots \text{Expression XII.}$$

GLOSSARY OF TERMS

D	Discount Rate, in percent, used in formula for calculating present values
EF	Equity Fraction. EF_{FVP} and EF_{NVP} are equity fractions held by the Foreign Venture Partner and the National Venture Partner in a joint-venture project
ESIP	Enterprise Share of Intrinsic Profit = (1-LSIP)
FVP	Foreign Venture Partner
IP	Intrinsic Profit ($PBT_R + R$)
JV	Joint Venture, used as subscript
LEE	Licensee
LOR	Licensor
LSEP	Licensor Share of Enterprise Profit used in Expression i only
LSIP	Licensor Share of Intrinsic Profit
$LSIP_S$	Licensor Share of Intrinsic Profit (of the enterprise) in a straight-licensing agreement. Subscript S is for emphasis and distinction from $LSIP_{JV}$
$LSIP_{JV}$	Licensor Share of Intrinsic Profit in a joint venture arrangement
$LSIP_{PBT}$	Licensor Share of Intrinsic Profit, LSIP, emphasised as applicable to the pre-tax profit
M	Mean Value
N	Number of years in Present Value Formula
NPV	Net Present Value
NVP	National Venture Partner
PBT	Profit-Before Tax
PAT_R	Profit-after-tax during the royalty obligation period

PBT _R	of a licensing agreement Profit-before-tax during the royalty-obligation period of a licensing agreement
POS	Profit-on-Sales used in Expression I only
PV	Present Value
R	Royalty payable in absolute amount
S	Subscriber for Straight-Licensing
S.D.	Standard Deviation
TR	Corporate Tax Rate



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