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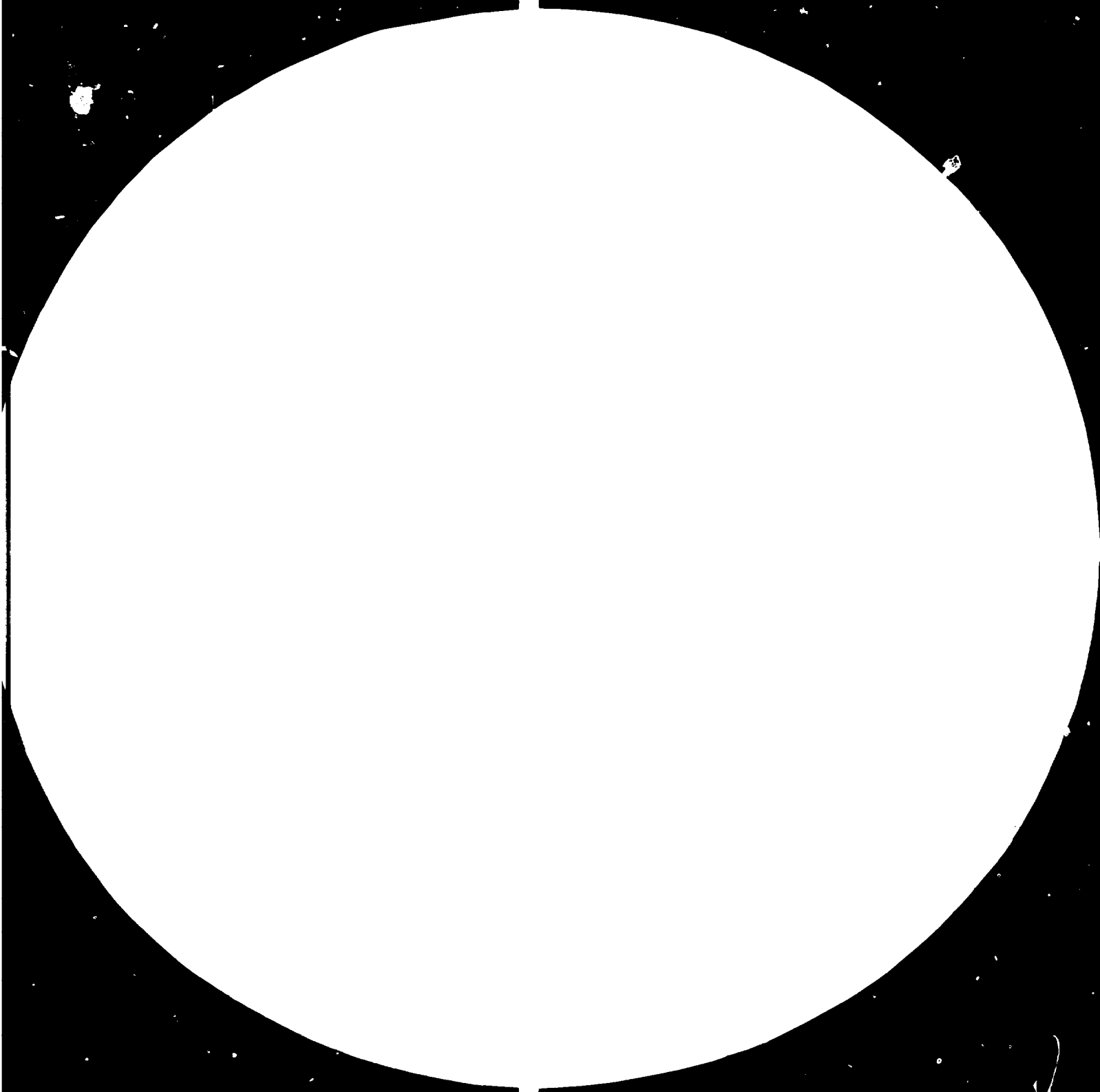
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TECHNOLOGICAL INFORMATION EXCHANGE SYSTEM (TIES)

Pilot Exercise

TIES. Guidelines for Technology Transfer Payment Evaluation\*

prepared by  
the secretariat of UNIDO

103323

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Introduction

This pilot exercise has a twofold purpose namely:-

1. to review the present evaluation methods used by selected registries;
2. to assess the value of various UNIDO developed principles which could be applied in the payment evaluation exercise.

Therefore each participating registry is requested to report on their present technology payment evaluation and assessment methods used and to report on the usefulness of the application of the UNIDO developed principles through an analysis of a random sample of 50 contracts. Part I of these guidelines will describe in detail the UNIDO principles involved while Part II will give an illustration of the use of this method on a random sample of 24 contracts. Part III will describe the uniform outline of the report which is expected to be prepared by the registry.

It is of course understood that all information contained in the report will be treated as highly confidential and none of its content will be used for publication without the approval of the registries concerned.

Part I

I. Evaluation Procedures for Financial Compensation to Licensors  
(UNIDO Method)

1. Traditionally the establishment of allowable royalty rates has been without the use of objective or analytic 'yard stick' but has been principally based on experience. UNIDO has, through extensive study, designed a method which attempts to bridge this apparent gap in proper contract evaluation management. The concept is based on the fact that royalty can be regarded as an expression which measures the distribution of a profit attributed to introduction of technology between the licensor (LOR) and the licensee (LEE). This concept has been treated extensively in the Development and Transfer of Technology Series No. 12 - Guidelines for Evaluation of Transfer of Technology Agreements, ID.233 however its essential form is recapitulated here.

If one assumes that the amount paid to the licensor by licence is a function of the sales volume and that the amount of royalty paid to the licensor is the profit of the licensor which it receives by licensing the technology to the licensee, then the following expression can be introduced.

$$\text{Royalty on Sales } (R_s) = \frac{\text{Profit of Licensor } (P_{lor})}{\text{Net sales value (NSV)}} \quad \text{Eqn I}$$

or

$$R_s = \frac{P_{lor}}{\text{Profit of LEE } (P_{lee})} \times \frac{\text{Profit of LEE } (P_{lee})}{\text{NSV}} \quad \text{Eqn II}$$

or

$$R_s = \text{LSEP} \times P_{lee}^{OS} \quad \text{Eqn III a}$$

where LSEP = Licensor's share Enterprise's profit  
or  $P_{lee}^{OS}$  = Licensees profit on sales

or

$$P_{lee}^{OS} = \frac{R_s}{\text{LSEP}} \quad \text{Eqn III b}$$

For example, if we know that in the cement industry profit sales ( $P_{lee}^{OS}$ ) is about 16% and a licensor of cement technology was to apply a royalty of 4% on sales ( $R_s$ ) then  $\text{LSEP} = \frac{4}{16} = 25\%$ .

If however, in the steel industry, profit on sales was about 8%, then at a 4% royalty LSEP would be 50%. Because of the poorer profitability of the steel industry, the licensor gets a much higher share of the profit.

The usefulness of this method is that a registry can calculate LSEP for any royalty demanded by the licensor without any particular assistance from the licensee.

There are disadvantages to the method:

- (a) it is approximate since we are only able to apply information that is available on the industry as a whole and not for a particular contract;
- (b) profit is loosely defined. The 'profit' for the cement industry may not carry the same 'profit' definition as for the steel industry;
- (c) for a new industry ( $P_{lee OS}$ ) will not be available;
- (d) no provision is made for the variation of profits with time. Profit ( $P_{lee OS}$ ) for some undefined year has to be used. Aggregation of profits of several years is not possible;
- (e) licensee has no responsibility to supply information.

2. Where a registry is in the position to obtain forecasts on absolute levels of sales and profits, a more powerful tool of analysis becomes applicable. The easiest way to describe this tool of analysis is to appreciate the following simple illustrative construction of a firm's profit.

Example:	<u>Cash flow</u>	<u>Contract Period</u>					<u>Post Contract</u>	
	Year	0	1	2	3	4	5	6
Net sales value (NSV)			100	100	100	100	100	100
Cost of goods sold + SGA excluding royalty			46	46	46	46	46	46
Royalty			4	4	4	4	4	Nil
Total cost of sales			50	50	50	50	50	46
Net Profit Before			50	50	50	50	50	54
Tax (NPBT)								

The following definitions will be used in the context of the above example.

Net sales = Gross sales - returns + allowances

Cost of goods sold = cost of manufacturing which include:

1. direct labour
2. direct material
3. other costs (overhead expenses, interests, etc.)

SGA = Sales and General Administrative Expenses

In the above example, royalty is paid at 4% on net sales value over a five year period and no extension of the license agreement is foreseen. It can be observed from the cash flow sheet that the licensor's share of the enterprises profit (LSEP) in any of the first five years is:



$$LSEP = \frac{4}{54}$$

Where '54' is the sum of the royalty paid to the licensor and the enterprise profit. From the cash flowsheet, it can be observed that in year 6, '54' represents the enterprise profit after the period of royalty obligation is over. The above calculation can be derived in the following way:

$$\begin{aligned} LSEP &= \frac{\text{Royalty payment to LOR}}{\text{NPBT} + \text{Royalty payment to LOR}} = \frac{R}{\text{NPBT} + R} \\ &= \frac{1}{1 + \frac{\text{NPBT}}{R}} = \frac{1}{1 + \text{TTF}} \end{aligned} \quad \text{Eqn IV}$$

Where NPBT = net profit before tax  
R = payment to licensor  
TTF = technology turnover factor.

The ratio NPBT/R can be considered a potent indicator of the multiplier effect of a royalty payment. One could name this ratio the 'technology turnover factor (TTF) on the basis that it measures the effective use of the technology by the licensor: the profit 'turnover' for every payment of royalty to the licensee.

In our example the TTF would be  $50/4 = 12.5$ .

3. In assessing a royalty contract which would be in effect over a given period of time the concepts derived alone would have to be evaluated for each year. However, a value of, say, LESP for each year would not provide a comprehensive view of the viability of the contract since it would consist of as many figures as there are years in the period under consideration and they could all be different. Therefore a single figure, the net present value (NPV) is used. This encompasses all years and gives their cumulative present value taking the opportunity cost of capital (interest) into consideration. The concept of NPV in its simplest form is basically saying that \$ 100 which will be earned a year from now is worth only \$ 91 today because at 10% interest \$ 91 today would bring \$ 100 a year from now. This in assessing the cash flow of a number of years in a given period, each year's receipts and disbursements are discounted to present value using the relevant interest rate.

Annex I gives a step by step procedure for the calculation of LSEP and TTF (discounted).

The advantages of this method are:

- a. the analysis is specific to the client (licensee) and his expectation of profit;
- b. profit is very clearly defined. It is a profit that is always reported in a company's balance sheet;
- c. the profit definition removes anomalies of tax treatment between industries in a country and between countries;
- d. as will be illustrated below, it is possible to 'consolidate' the profits of various years (of the royalty-bearing period) which may involve profit variations, including negative profit;
- e. no data on sales value is required;
- f. because of clarity of definitions, computerization of data and calculations is possible.

The disadvantages of the method are:

- a. client's projections of profits must be relied upon;
- b. the registry must be in a position to compel disclosure of PBT data.

4. In conclusion it can be said that the UNIDO developed evaluation method is centered around the concepts of LSEP and TTF. In part II, on the basis of examples the advantages of using these concepts for the evaluation of contracts is elaborated.

Part II LSEP and TTF as management tools

(1) As described in part I, LSEP and TTF can be calculated for each contract under evaluation. The value of these two factors can best be described by an example. LSEP and TTF have been calculated for a sample of 24 contracts (annex II).

From this table the following conclusions can be drawn:

- i. Weighted on NSV so as to bring large and small firms under a common framework of comparison, the average LSEP is about 19 and the corresponding TTF, 4.
- ii. Statistical analysis shows that with 90% certainty the range of LSEP is between 27 and 16.
- iii. The correlation coefficient of Royalty rate and LSEP is 0.007 showing virtually no relationship between the two factors.
- iv. Some of the contracts which are concluded with a low royalty rate are accompanied with high LSEP's.

(2) From the above can be concluded that:

- i. registry intervention based on royalty rates, can in some cases, be contrary to the domestic enterprise interest;
- ii. contracts with a LSEP greater than 27 and smaller than 16 should be looked into in more detail during the evaluation process;
- iii. LSEP and TTF can be used as 'yardsticks' as to decide whether intervention of a registry through a closer examination of the contract is necessary.

(3) It could therefore be recommended that:

- i. both LSEP and TTF be calculated on a regular basis and when computerized will enable the registry to monitor the contract after approval.

Part III.

1. From each registry would be required a report which includes
  - (a) introduction on present evaluation method used
  - (b) calculation of LSEP and TTF factors (discounted) for a selection of 50 contracts.\*
  - (c) statistical analysis of the results obtained like weighted mean LSEP, TTF, correlation R and LSEP, etc.
  - (d) analysis of results obtained.
  - (e) conclusion and recommendations.
  
2. It is understood that the report will be treated in total confidentiality and none of the contents will be made available to other persons that the participation registries without the prior concept of the registry concerned.

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\* Please note that wherever feasible actual data should be used to calculate LSEP and TTF, and if such data is not available, projected data should be used.

## ANNEX I

Step by Step Procedure for Calculation of LSEP and TTF (discounted)Step I.

Determine the net sales value for each year under consideration.

$$S_1, S_2, S_3, \dots S_i, \dots S_n$$

Where  $S_1$  = net sales value of the first year

$S_2$  = net sales value of the second year

$S_i$  = net sales value of the year i

$S_n$  = net sales value of the last year of validity of the contract.

Step II

Determine the cost of production for each year under consideration.

$$C_1, C_2, C_3, \dots C_i, \dots C_n$$

Step III

Determine the amount paid to licensor for each year under consideration.

$$R_1, R_2, R_3, \dots R_i, \dots R_n$$

Step IV

Determine the net profit before tax for each year under consideration.

$$NPBT_1 = S_1 - C_1 - R_1$$

$$NPBT_2 = S_2 - C_2 - R_2$$

$$NPBT_3 = S_3 - C_3 - R_3$$

$$\begin{array}{cccc} \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \end{array}$$

$$NPBT_i = S_i - C_i - R_i$$

$$\begin{array}{cccc} \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \end{array}$$

$$NPBT_n = S_n - C_n - R_n$$

Step V

Select the discount factor  $j$  as used by the registry. If no discount factor established by registry use prime lending rate. For example, if prime lending rate 20%,  $j$  equals to .2

Step VI

Determine the total amount paid to licensor, over the validity period of the contract; at its net present value.

$$NPV_R = \frac{R_1}{(1+j)^1} + \frac{R_2}{(1+j)^2} + \frac{R_3}{(1+j)^3} + \frac{R_i}{(1+j)^i} + \frac{R_n}{(1+j)^n}$$

Where  $j$  = discount factor

$i$  = year under consideration

$n$  = last year under consideration

$NPV_n$  = net present value of royalty paid

Step VII

Determine the accumulated net profit before tax of the enterprise over the validity period of the contract.

$$NPV_{NPBT} = \frac{NPBT_1}{(1+j)^1} + \frac{NPBT_2}{(1+j)^2} + \frac{NPBT_3}{(1+j)^3} + \dots + \frac{NPBT_1}{(1+j)^1} + \dots + \frac{NPBT_n}{(1+j)^n}$$

Where  $NPV_{NPBT}$  = net present value of net profit before tax

Step VIII

Determine the average discounted TTF factor over the validity period of the contract.

$$TTF = \frac{NPV_R}{NPV_{NPBT}}$$

Step IX

Determine the average discounted LSEP factor over the validity by period of the contract.

$$LSEP = \frac{1}{1 + TTF}$$

TABLE AA  
Calculation of TTF and LSEP in 24 (at random) Agreements

NPV 5 years unless otherwise noted \*

<u>Activity</u> **	<u>NSV</u>	<u>Rate ROS</u>	<u>NPBT</u>	<u>R</u>	<u>NPBT</u> <u>R</u>	<u>LSEP</u>
Franchise (proj) ***	63	2.0%	12.15	1.26	9.64	9.4
Construction(proj)	201	0.75%	38-04	1.51	25.19	4.0
Food (proj)	1.458	0.925%	5.46	13.50	0.40	71.4
(hist)(4 years) ****	708	1.00%	10.72	7.08	1.51	39.8
Garments (3 years)	101	1.05%	0.86	1.07	0.80	55.6
Consumer goods (proj)	1.682	2.0%	309	35.64	9.18	9.8
(hist)	558	3.3%	69	18.41	3.74	21.1
Pharmaceuticals (proj)	1.248	4.77%	180.20	59.53	3.02	24.9
(hist) ***	430	5.50%	58.18	23.65	2.46	28.9
Electronic	195	1.5%	31.94	2.92	10.93	8.5
Automotive	331	2.00%	14.48	6.62	2.18	31.4
Pharmaceuticals	43	3.00%	5.52	1.29	4.27	23.4
Food (hist) (3 years)	454	3.00%	34.96	13.62	2.57	28.01
Food	265	2.00%	19.98	5.30	3.76	21.00
Chemical	0.49	5.00%	0.52	0.02	26.00	3.7
Electrical goods	58	2.00%	8.07	1.16	6.91	12.6
Equipment	8.3	2.00%	0.81	0.167	4.85	17.1
Electronic	1176	0.85%	90.42	9.99	9.05	10.0
Pharmaceuticals	48	3.7%	7.98	1.77	4.50	18.2
Misc.	58	2.0%	1.387	1.16	195.68	0.5
Equipment	9	4.0%	1.43	0.35	3.97	20.1
Electronic	220	2.3%	7.77	5.06	1.53	39.5
Pharmaceuticals	202	4.1%	36.61	8.28	4.42	18.5
Pharmaceuticals (hist)	1454	0.08%	375.0	1.16	3.234	0.31
(proj)	5049	0.37%	1055	18.68	56.47	1.7
Consumer goods (hist)	5752	0.06%	78.59	3.45	22.77	4.2
(proj)	10110	0.36%	124.64	36.40	3.42	22.6
Electronics	291	1.78%	14.59	5.18	2.81	26.2
Pharmaceuticals (hist)	100	3.29%	7.26	3.30	2.20	31.3

\* Discount factor  $j = 0.1$

\*\* Activity describes main industrial classification of contract under evaluation

\*\*\* Proj means that royalty and profit are based on projected values

\*\*\*\* Hist means that royalty and profit are based on historical or real values



