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SELECTED ISSUES RELATED TO EVALUATION OF [illegible] IN ENGINEERING AND CONSULTANCY AGREEMENTS BY NATIONAL TECHNOLOGY REGISTRIES

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* The views expressed are those of the author and do not necessarily reflect the views of UNIDO.

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1. Introduction and Purpose

The issue of payment evaluation has been a subject of long term concern among TIES members, as reflected in reports of several TIES meetings, most notably the 10th meeting held in Cairo in December 1985, which considered a paper entitled 'Payments in engineering and consultancy agreements' in which were contained basic considerations regarding the nature of such payments, their main components, level of payments, and suggestion as to further research in this field.

Following the 10th meeting, UNIDO Secretariat, in collaboration with TIES members, collected some empirical data on specific payments in engineering contracts, and attempted at arriving out relationship between those payments and the value of the individual projects.

Results of those surveys as well as earlier documentation available at UNIDO are to the extent possible incorporated in the present material.

The single, dominant purpose of the present paper is to provide the technological regulatory agencies in developing countries with the practical tool for assessment and evaluation of payments in engineering and consultancy agreement, their relative importance to the size and the effectiveness of particular project or investment and suggestions as to overall approach to this specific form of transfer of know-how and technology.

The present paper consists of 3 main parts which can be characterized as follows:

a) the scope and nature of evaluation by technology transfer registries of engineering and consultancy agreement (E + C)

b) overview of possible contractual arrangements for engineering and consultancy agreements and specific payment forms

c) evaluation of empirical data and suggestion as to the evaluation approach towards these payments.

The material, which draws heavily on information and documentation available at UNIDO, incorporates as well practical experience of the work of one of the registry members of the TIES system, which dealt extensively with acquisition of engineering services and in addition supervised also activities abroad of the domestic engineering and consultancy firms.

This way, it is felt, the prepared material will offer a balanced view as to desired extent of the intervention of the registry, between the objectives of a given undertaking and objectives of the overall technological policies of the country.

2. The Nature of the Evaluation Exercise by the National Registries in Respect to Payments

The terms of reference of the individual registries will vary from country to country but in essence its most common denominator will be the collection of data and agreements in the broadly defined field of technology transfer and, in most registries, evaluation and contractual provisions from the point of view whether payments are within reason and, which is often even more important, how conditions of contract will affect the implementation of the project, including its effectiveness.

With the evolvement of coherent national technological policies in the developing countries, the former approach to the evaluation becomes less important (though still significant), while latter one is acquiring importance as through such evaluation it is possible to influence the cost of project implementation and achieve a degree of disaggregation of the contract, and thus gain access to the insight of the technology.

It is believed that the above described distinction warrants attention of the technology registries in the developing countries, as it will enable them to gradually move from formal evaluation into indepth study and understanding of the individual project, thus providing an opportunity to develop much needed technical and technological skills.

From the point of view of the size of the project, the fees and payments made under engineering or consultancy agreements are in principle in-significant.

Empirical data collected by UNIDO showed that in the case of large projects (between 100 and 400 million dollars) the combined engineering and technical assistance fees amounted to between 3.2 and 5.3 per cent while in medium size project (of value between 10 and 40 million dollars), they amounted between 1.8 and 10 per cent. The share in small project up to 5 million dollars was between 4.5 and 16.6 per cent.

Taking into account the size of the project and value of the engineering and technical fees, one can make a calculation of the median percentage payment relation of those payments per 1 million dollars of project value and in this way attempt at establishment of a benchmark for checking the payments in comparable contracts.

As all empirical data came from the chemical industry's field[1/], it is believed that this way of obtaining figures may provide a certain orientation for the registries. The arrived median figures are: for large project 0.02 per cent, for medium size project 0.12 per cent and for small project 2.71 per cent which means that for 1 million dollar of large scale projects, the cost of engineering and technical assistance will amount to 200 dollars, etc.

1/ In all 19 individual projects where analysed.

If similar calculation can be made out of significantly larger amount of past projects, they should enable the registries to establish such benchmarks for different industrial sectors, as to the cost of engineering in relation to the size of the project.

The collected data provided also an interesting correlation between the size of the project and the cost of engineering, also in this sense they may orient the registry's work into the area of small projects, where the cost of engineering is relatively high, hence it may require more attention.

Much more complex task is expected by the registry when it pays a greater attention to the effect of contractual conditions of engineering agreements on the overall implementation and performance of the project.

The quality, scope, and timely delivery of the performing of consultancy and engineering services may have profound effect on the overall performance of the project and therefore it is suggested that nonwithstanding the importance of payment as such, the nature, scope, duties and responsibilities of engineers and consultants are looked into very carefully.

The registry in the process of "breakdown" of those responsibilities will in effect disaggregate the engineering or consultancy package, thus gaining valuable insight into their performance, with the possibility of gradual replacement of foreign parties by domestic expertise. In this sense it is therefore suggested that formal payment evaluation is, if possible, followed by detailed "breakdown" of the individual contracts.

III. Overview of Basic Components and Forms of Contracting of Engineering and Consultancy Work

In principle, the engineering and consultancy services for each project may regard one or all of the typical stages: the opportunity stage, the feasibility stage and the implementation stage. The following activities may be carried out in those stages:

Opportunity stage

Survey of existing economic factors
Survey of industrial activities that developed under similar conditions in other countries
Projections of economic structure
Analysis of the technical-economic potentials of specific industrial branches
Regional plan
The opportunity study summarizing results and conclusions of the individual surveys and projections

Feasibility stage

Market study
Technological requirement study
Financial study (capital structure, source of funds)
Regional economic study
Location study
Timing alternatives
Comprehensive feasibility report
Preparation of post-investment audit report, i.e. the final analysis of actual cost and production data as compared with planned date

Implementation stage

Preparation of the implementation programme
Preparation of general layout and design
Cost estimates
Estimate of time necessary for project implementation
Detailed engineering of project, including preparation of designs, specification and contract documents
Tendering for machinery and construction work
Supervision of the execution of the project, reception and commissioning of the plant and its operation for an intial period

Within this scope of the implementation stage, one may identify the so-called project execution phase and operational phase with the following major activities covered in engineering or consultancy agreement:

Project execution phase

- project engineering (basic and detailed engineering, product engineering, organization and management, information systems;

- procurement supervision
- construction supervision
- installation and start-up supervision (including personnel training)

Operational phase

- technical and management trouble-shooting
- quality control and maintenance systems
- improvement of operating efficiency
- quality control and maintenance systems
- product design and product development
- set-up management information systems
- expansion programmes.

The activities described under various implementation stages may be partially performed either by the investor (owner) or by employed consultant whose services may be classified in general terms as follows:

a. Design and engineering services. Design and engineering services are the "classical" consulting services for the establishment of an industrial plant and may include opportunity and feasibility studies, plant design, preparation of tender documents for equipment and civil engineering, evaluation of bids, supervision of erection and start-up as well as assistance in the initial operation;

b. Technological services. Technological services are concerned with the exploration and examination of natural resources and raw materials, evaluation and improvement of production methods, establishment of industrial plant regulations and codes, including construction standards and safety facilities.

c. Economic services. The economic services of consultants may cover surveys of specific industries, formulation of investment opportunities, project analyses and identification of sources of financing;

d. Management services. Management services include the review and evaluation of the objectives and goals of a particular project, management surveys, production planning and control schemes at the plant level, management and personnel planning and electronic data processing;

e. Training programmes. Consultants frequently train the local labour force so that the latter may take over and operate the plant when the consultants' assignments are completed. The consultants may set up and administer the local training centres and in-plant training programmes for engineers and technicians and give advice on along-term training plan;

f. Coordination services. Coordination services include bringing together the various functions involved in aproject-financial, managerial, marketing and technical functions.

Though it is very difficult to make a clear cut distinction between engineering and consultancy, it is generally understood that the latter comprises pre-investment phase as well as an advisory service rendered during project execution and operational stage. On the other hand, the engineering is principally carried out in the form of drawings, designs, calculations, specifications performed at the time of pre-investment and throughout the project execution phase.

The technical assistance is generally meant to cover the services rendered in connection with the actual transfer of technology. In average, technical assistance is usually given by the supplier of technology or general contractors and not by E + C supplier, this type of arrangement is usually kept separate from E + C contracts.

Finally, with the advent of the broad application of mini and personal computers, one may add a new type of activity provided by the consultants and that is agreements for the supply of the computer software and in the form of custom made or standard software.

For the purpose of maintaining of overall clarity among variety of engineering and consultancy arrangements, the following is the basic divisions from the point of view of the technological content of the individual project:

a) Engineering contract sensu stricto, that is provision of basic and detailed engineering for the project
b) Auxiliary engineering services provided during project implementation that is procurement, construction, installation, erection and start up.
c) technical service related to either pre-investment or operational phases of the given project.

Each of the above "categories" developed specific contractual and pricing methods, and its technical significance is also different.

The technology registries are therefore urged to take a different approach to such agreements on account of varying technological input of each of those agreements.

In order to provide the registry with comprehensive characteristics of various engineering services, the following comprehensive glossary of terms is proposed:

Engineering basic, conceptual, process and detailed

In the preparation of contracts, considerable importance should be attached to the meanings of the concepts presented with the aim of defining them and breaking them down as effectively as possible. To these activities in the field of engineering and design, there

correspond clear-cut stages in the execution of a project. Accordingly, they may be easily quantified in terms both of national and foreign currency and also the number of man-hours expended on them by an engineering consultancy firm.

Basic engineering

This essentially includes both conceptual and process engineering. It is obvious that these last two forms of engineering are both "basic" in the sense that they are prerequisites for progress in the remaining areas of a project; namely, detailed engineering, the purchase of equipment, its assembly and installation and finally the actual start-up of the facility.

Conceptual engineering

This defines the group of physico-chemical operations which make it possible to achieve the objective of transforming the raw material into the desired products. It also identified the liquid and gaseous flows which make up this process, and quantifies their mass and thermal changes. Similarly, it determines and confirms the basic design, the conditions and characteristics of the soil in the area where the plant is to be erected and the safety factors which are to be observed. It selects the alternative combinations of raw materials and the alternative combinations of plants and processes. It establishes the type of process macro-units, selecting and defining the operational layout. It is involved in setting up pilot-plant installation, carrying out field tests and the preparation of laboratory analyses.

Its specific products include, among others:

(a) The mater[illegible]s and thermal balance of a process;

(b) The thermodynamic and empiric correlations, equations, and factors which help determine the dimensions of equipment (e.g. the enthalph-temperature correlations of a liquid flow);

(c) Occasionally, more fundamental products such as the indication of the quantitative, kinetic behaviour of a chemical reaction when selecting the dimensions of a reactor.

Process engineering

This establishes the characteristics of all of the equipment and facilities required for the performance of the physico-chemical operations of a plant.

The following are among the products of process engineering:

(a) Acquisition of information pertinent to the design of the process;

(b) Specification of raw materials, finished products, and by-products, including their commercial characteristics;

(c) Specification of the auxiliary chemical products required by the process, and also the catalysts and intermediate products;

(d) Design of methods for the elimination of noise;

(e) Description of the interrelationships between different processing units;

(f) Design and choice of size of the basic equipment units making up a process system (e.g. furnaces, reactors, vessels, heat-exchangers etc.);

(g) Determination of the personnel required for the operation of the plant;

(h) Determination of the kinds of control systems and the extent of their automation;

(i) Determination of the laboratory techniques and analyses to be used with raw materials, products of the process and intermediate products;

(j) Determination, in the light of the particular features of the process, of the safety requirements for personnel and equipment;

(k) Identification of the sources of pollution in the process and their treatment;

(l) Establishment of operational guidelines, including a description of the process and its variables, emergency procedures and procedures for the normal starting and stopping of the unit, to serve as a basis for the preparation in final form, during the detailed engineering phase, of the plant-operating manuals.

The tools used in process engineering are the following:

Block diagram. Block diagrams show the interrelationships between the process macro-units and their principal load and product flows. Occasionally these diagrams also illustrate the basic physico-chemical operations that occur within a particular process unit. They are normally used in integrated production complexes, such as refineries and petrochemical plants.

Flag diagram (operational). This kind of diagram represents the basic behaviour of the main liquid and gaseous flows within the plant. The flag indicates the numerical value of the flow, the temperature, pressure, or any other important parameter. Flag diagrams are used to record operating conditions in special field tests.

Process-flow diagram. The process-flow diagram presents figures already determined by the principal designer of the process or associated with the contractual guarantees covering the process. It may also give alternative figures for two or more modes of operation (e.g., a higher and lower density level or a more and

less thermally demanding operation). The process-flow diagram differs from the flag diagram only in operational terms.

Tubing and instrumentation diagram. This diagram provides a graphic representation of the principal and secondary process flows associated with the equipment units making up the plant. Among other things, this diagram

Indicates in detail the associated instrumentation
Indicates the shut position of the control valves in the event of a malfunction involving the working medium
Indicates the insulation requirements for vessels, piping and other equipment items
Identifies the equipment units in alphanumeric form
Indicates the diameter and calibre of tubing, valves, and accessories along with their material and any special installation requirements (e.g. minimum required distances)
Presents operational danger signals
Indicates the tubing and equipment used in start-up, shut-down and emergency procedures

The purpose of the tubing and instrumentation diagram is to present a graphic view of the elements composing the process engineering of a plant.

Equipment-layout diagram. This kind of diagram, which is in effect a floor plan of the plant, indicates the relative position of the equipment units, the distances and differences in level between them, and the space available for equipment maintenance. In addition, it shows the disposition of the work benches, the pipe runs, and the location of the safety and fire-prevention equipment.

Detailed engineering

The task of detailed engineering is to work up the basic specifications of the elements in a plant and to interpret and restate in more specific language the characteristics which are the concern of mechanical, electrical, instrumentation, civil and industrial engineering. In turn, each of these special areas has the following role within the overall context of detailed engineering.

Mechanical engineering

Determines critical flow levels and overload (pressure and temperature) effects.

Describes the safety features required and specifies in detail (for their purchase) the fire-prevention system.

Specifies, on the basis of a service balance-sheet, the consumption and production of basic services in accordance with the equipment to be installed (which it also specifies) and shares responsibility for guaranteeing basic services.

Confirms the basic metallurgical characteristics of the equipment, proposing alternative metallurgical techniques when required and the same for instrumentation.

Specifies the internal coatings required to combat corrosion

Is substantially involved in the design and dimensioning of all the pipe systems, valves and instruments of the plant.

Electrical engineering

Specifies the operating and safety conditions of the electrical equipment

Sets the normal and maximum electrical loads and accordingly, the power to be installed.

Specifies the power systems for lighting, control and critical operations.

Instrumentation engineering

Verifies and determines the operating conditions of the instruments.

Specifies the characteristics of the instruments to be installed (reset, proportional, pneumatic, electronic etc.)

designs and calculates valves and sensors

Specifies the characteristics of cut-off valves (manual and automatic) along with thelocation of alarm systems.

Advises on the location of instruments on equipment units or control panels

Civil engineering

Prepares the preliminary plan for the general location and distribution of the plants, including roads and social infrastructure.

Determines the acceptable factors of differential settling (subsidence)

Describes equipment and structures subject to vibration, buckling or special stresses

Specifies the hydraulics of the auxiliary services and also drains, sewer systems and industrial services.

IV. Contract Pricing of E + C Services and Payment Schedule

It is necessary to keep in mind that there is a great variety of forms of remuneration for E + C services as a result of the existence of variety of contractual forms, nature of concluded agreements, and scope of services provided.

The choice of the most convenient method of payments and type of the contract shall depend on the project nature and its characteristics, relative bargaining positions of parties, and nature of services contracted.

For the purpose of the clarity, the following are characteristics of the major pricing methods that may occur in E + C contracts[1/].

1. Pricing methods in engineering contracts

1.1 Fee based on a percentage of net construction cost

Under this method the fee for engineering is expressed as a percentage of the net construction cost. Generally this percentage ranges from 2<to<15<per<cent, depending on the size of the project and its complexity in the technical and engineering sense. This type of contract has the advantage that the client pays and the supplier of services receives compensation in direct proportion to the work performed. This method is also convenient for the evaluation of payments as it allows comparisons with similar projects executed in the past. The principle disadvantage is that the client does not know the exact cost of the engineering work when he signs the contract, and therefore does not know the extent of his obligations. It may also happen that the supplier deliberately inflates the cost of work in order to increase his own fee proportionately.

1.2 'Lump-sum fee based on a percentage of the estimated construction cost

The E+C fee may be arrived at on the basis of a percentage of the estimated construction cost, which is then considered to be an unchangeable lump-sum, irrespective of variations between the actual and estimated constructon costs. This form of contract has the advantage that the cost of engineering work is known definitely in advance. Its disadvantage, however, is that errors in the estimated cost are reflected in the E+C fee. Furthermore, each change order on the construction contract indicates the necessity for a corresponding change in the E+C contract.

1.3 Cost plus fixed fee

Under the preceding types of contract the fee covers the supplier's normal costs and operating expenses connected with the work and his profit. The cost-plus-fixed-fee type of contract provides a fee for profit only, since all engineering costs of the project, including

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1/ Based on "Payments in engineering and consultancy agreements", 10th TIES meeting, Cairo, 8-13 December 1985.

overhead expenses, are reimbursed by the client. The fee is based on the estimated constructon cost and remains fixed, regardless of any variation between the estimated and actual costs. This type of contract has many disadvantages when the scope of E+C services cannot be accurately determined in advance, as in the case of alteration work and projects. The disadvantages lie in the multiplicity of accounting records necessary to determine the supplier's true costs and in the difficulty in segregating costs when more than one project is being simultaneously handled by the E+C firm.

1.4 Cost plus fixed fee with a guaranteed ceiling

Under this form of contract the supplier is reimbursed for the actual costs of work performed provided that the total amount does not exceed the maximum limit established in the contract. If this should occur the supplier is held responsible for the excess and receives no compensation over the guaranteed ceiling cost. As compared with the ordinary cost-plus types of contracts, this form removes some of the uncertainties concerning the total cost to the client. As compared to the lump-sum type of contract, it has the advantage that the client receives the benefit of the saving if the actual cost of the work should be less than that estimated when the contract was signed.

1.5 Fixed Fee

In certain circumstances, usually when engineering company will provide only detailed engineering, supplier will establish a fixed fee (lumpsum) for the carried work. From the point of view of recipient company, such method may be found useful in this sense that he knows in advance his expenditure, while from the end of engineering company particularly in case of providing given detailed engineering for the first time, the engineering company may under estimate or over estimate his fixed fee.

2. Pricing methods in consultancy agreements

2.1 Personnel fees based on a time rate

This is the most typical form of payment in consultancy agreements. The fee is based on the time devoted by the consultant of services for the client. Under this arrangement a tariff providing for monthly, weekly, daily or hourly rates is established for each category of personnel. When the extent of such services cannot be accurately determined in advance, a minimum retainer is usually provided to cover the availability of the consultant whether he is called on for services or not. The major advantage of this pricing method lies in the simplicity of its application. However the time rates do not provide sufficient incentives for the effective performance of the consultancy work which should be oriented towards reaching planned objectives.

2.2 Lump-sum

This method of pricing is frequently used in investigations and studies when the scope of assignments to be undertaken, as well as the duration of services, can be clearly and full defined. The parties which apply this method decide on a lump-sum in consideration of the consultant's total obligations, with expenses either included or not included. It shall be pointed out however that time rates are frequently used in arriving at the lump sum in the course of preparing bids and negotiating contracts.

3. Compensation of E+C services in other types of agreements

3.1 Broader scope contracts

The broader scope contracts, like turnkey contracts, cover a full range of services leading to the implementation of an industrial project. Usually a project is executed on behalf of the investor by the contractor, with varying degrees of participation by domestic entities.

Since the total value of the E+C services does not as a rule exceed 10<per<cent of the total cost of the project, they are normally compensated for under the pricing formulae used in a broader scope contract. Without going into details we may distinguish between lump-sum and cost reimbursable payment arrangements. 2/ Under the lump-sum method the payments for E+C services may not even be specified separately. Under the second method, they appear in the cost specifications presented by the supplier of services to the client for the purpose of their reimbursement by the same.

3.2 Compensation for auxiliary consultancy services in licensing and technical assistance contracts

Consultancy services are often indispensable for the effective transmission of technology provided under, for example, licensing agreements. As to the compensation for such services, two principal approaches may be identified. Under the first one it is generally assumed that such services are fully covered by the basic payment formulae stipulated in the contract, i.e. lump-sum, royalty or a combination of both. Alternatively, the contract may contain provisions for additional remuneration for consultancy services following the principle of the cost-reimbursable method. In the latter case the question of adequate definition of cost is of crucial importance and we shall deal with this question in the next sections.

2/ For more detailed analysis of payments for the supply of engineering and construction of industrial plants see "Technology Payments", UNIDO (forthcoming).

4. The structure of cost for E+C services

The key issue in the course of contract evaluation, negotiation and approval is the definition of "fair" price for the goods and services offered by the supplier. With respect to E+C services this problem may be resolved while looking into various cost elements associated with the rendering of such services from the client's perspective. Below we shall consider following cost elements associated with the international rendering of E+C services:

- personnel fees
- subsistance allowances
- travel expenditures
- other out-of-pocket expenses

For the sake of simplicity we have neglected the material component in the present analysis (use of equipment, materials, etc.) in view of the fact that E+C is predominantly viewed as an intellectual service.

4.1 Personnel costs

Personnel costs are simply expressed in the form of hourly, weekly or monthly rates. However in order to arrive at such rates it is necessary to consider the following sub-elements:

- direct payroll cost
- indirect overhead cost
- net fee or profit.

The direct payroll cost may in principle be determined by taking the salary levels of the various categories of personnel. It should be borne in mind that the salary levels for the time spent on foreign assignments are usually higher (on the average 50<to<100<per<cent) than those applied in the home country. Indirect overhead costs cover social security, taxes, insurance, annual bonuses and incentive payments, holiday and severance pay as well as the general administrative expenses to the extent that these are not included as a direct cost. The overhead expenses are usually calculated as a percentage of the direct payroll cost and vary from 50<to<100<per<cent and in some instances even ~~??????~~ higher. For example in Poland those cost will be in the average level of 66%, while in other countries, particularly western Europe in the range of even up to 120%.

The net fee represents the profit to the supplier of services. The E+C firms generally calculate the net fee as a percentage of the direct payroll plus overhead costs (between 25<and<50<per<cent). If such services are rendered by the manufacturing firm the "lcst" value added serves as a basis for calculating the fee.

4.2 Travel, subsistence and other out-of-pocket experses

In international contracts these elements may constitute a substantial share of the total cost of E+C services. The first and second elements are self-explanatory, whereas the third one covers such items as visas, communications, printing of the reports, etc.

5. The concept of the "full cost" for E+C services under different contract types and pricing methods

In principle all the cost elements mentioned above should be considered in order to arrive at the "full cost" for E+C services. However, there are essential differences in calculating the cost under different contractual arrangements and pricing methods.

Let us take personnel costs as a useful example. In the broader scope cost-reimbursable contracts whether weekly or monthly rates, also cover the profit to the supplier of services. On the other hand, under the "cost plus fee" formulae the personnel cost used for calculation should exclude the profit component as the latter is added percentagewise over and above the cost.

The personnel costs for consulting under transfer of technology agreements can be interpreted in a different way. It shall be assumed that these services are covered by the basic pricing formulae (royalty, lump-sum) and the client reimburses only those additional costs which are directly linked to their provision. An alternative approach, obviously preferred by the suppliers, requires the remuneration of consultancy services to be made separately from technology payments.

Even such standard cost elements as subsistence allowances ought to be carefully screened as to whether they are applicable to a given category of contract and pricing method. For example, clients often provide free housing for their expatriate personnel and under these circumstances it is clear that subsistence allowances should be adjusted accordingly.

The adequate formulation and interpretation of the "full cost" formulae used in a given contract has to be seen as the crucial aspect for contract evaluation as it may contribute to the elimination of repetitive remuneration of some cost elements which may result in excessive payments for E+C services.

6. Payments Schedules

The schedule of payment within E + C contracts varies from one kind of contract to another. However, we may distinguish the following basic schedules.

6.1 Engineering Fees

In case of provisions of the detailed engineering the usual patterns of payment will be as follows:

5 - 15% up-front fee or advance payments.
85 - 70% according to agreed schedule based upon delivery of documentation.
10 - 15% retention money paid after acceptance of the plant/or job by the investor.

6.2 Personnel Costs

These are either expressed in terms of monthly or daily rate and usually are paid 80% in advance with the rest settled after performace of a specific job.

In certain circumstances 100% of monthly/daily rate can be paid directly to the consulting/engineering company.

The so-called out-of-pocket expenses are usually settled periodically for example, once a week or once a month on a basis of statement of expenses or bills submitted by the expatriate personnel.

The cost of accommodation is either paid directly by the investor according to the agreed standard accommodation or in certain circumstances by the expatriate personnel.

As regard to pre-payment of travel expenses here again either way may be used and depends on specific arrangements between investor and engineering or consultancy company.

6.3 Consultancy Fee

These fees may be based either on lumpsum or daily fixed fee and the schedule will in principle, include certain amount up to 25% of retention money paid upon acceptance of the report or job carried by the consultants or results achieved in view of his/theirs recommendations.

The bulk of payments is usually paid at the moment of delivery, sometimes spread over a period of time depending on the nature of the tasks performed or time required to carry out those tasks.

V. The Possibilities of Disaggregation of Engineering/Consultancy Package

The issue of disagregation of technology packages is considered often as very crucial for the attaining by developing countries of relative technological independence.

It is considerating that the ability of disaggregation of such packages and enables the receiving party to gain insight into "working" of technology and eliminate some if not all of following negative effects:

- solution inappropriate to the characteristics of the economic develcoment
- extremely high cost
- limited possibilities of choosing between different solutions and alternatives
- the supplanting of local production
- the under utilization of local scientific and technological resources
- political and economical decisions, conditions by technological solutions imposed from the outside
- many unsatisfied needs because of the inadequency of the imported (in package form) technological solutions.

UNIDO Secretariat dealt fairly extensive with the issue of disagregation of technology packages in various sectors and as a result of those activities jointly with JUNAC published extensive document entitled "Basic technological disagregation modele-the petro-chemical industry, ID/202".

While the BTDM (Basic Technological Disaggregations Model) provides for comprehensive disaggregation of implementation stage of a turnkey petro-chemical project, for the purpose of the present paper we will use only the portions applicable to E + C contracts referring the technology registries to the basic document as a need arises.

It is further suggested, that while present views as to use of BTDM for E + C contracts apply fully to the petro-chemical industry, yet per analogiam exercises should produce methodology applicable to other industrial sectors.

The choice of implementation stage of the project was based on the intensity of the project development and greatest use of the technology throughout all of the project.

Disaggregation of implementation phase shall result into following stages:

a) studies for implementation phase
b) choice of process technology
c) basic engineering
d) detailed engineering
e) purchasing services
f) construction and assembly
g) acceptance and start-up

From the point of view of the technology registries - and the investor - the basic criteria for disaggregation will be to decide which activities could be done locally and which by use of foreign contractors.

UNIDO publication mentioned above provides comprehensive man-work for the use of BTDM which is not reproduced here and which should enable the registry to carry out its disaggregation work.

In order however, to familiarize technology registries with the forms which can be used for detailed disaggregation of E + C contract, the following forms are reproduced in the Annex 1 to the present paper, corresponding to the above categories of disaggregation of the implementation (main seven stages).

It should be also mentioned that though disaggregation is valid and desired concept, yet it may under circumstances create problems to the recipient company in terms of scope of guarantees provided by the supplier of technology or by engineering company.

It has been proven over and over again that technology/ turnkey/ engineering suppliers tend to limit their guarantees and the responsibility in proportions to the depth of the disaggregation of the package.

The idea of solution would be naturally to work out this disaggregation jointly with E + C contractors, thus fully retaining their responsibilities and guarantees.

As such situations - though occuring - are not always possible a careful balance should be achieved between the depth of disaggregation and scope of guarantees secured.

In these countries where strong engineering domestic sources are available, and basic industrial structures do exist, it is possible to carry out full fledged disaggregation of such packages, where however lack of professional skills is common, disaggregation should be carried out carefully, limited to certain elements only as to not affect the balance between "breaking down" of the package and scope of guarantees required.

One more thought should be also spelled out in this connection and that is the relation between the price of the package and the degree of disaggregation.

Available data suggest that by disaggregation the package (by either technological package sensu stricto or E + C package), one may considerably lower the cost (at least in terms of saving foreign exchange) on account of some of services being executed by local companies.

VI. Certain Conclusions Arising out of Empirical Data

The empirical data collected from among TIES members relate in principle, to the following types of fees in E + C contracts:

- cost of personnel fees
- cost of various engineering services, though available only in aggregated form.

Out of available data it was possible to figure that in 1985 the average personnel daily fees were as follows:

a) under-graduate or inexperienced junior graduate personnel usually doing erection jobs — US$231

b) graduated technical personnel supervising erection and start-up — US$329

c) senior engineers — US$461

The arrived above figures represented the total cost to the investors (reimbursement of salaries of expatriate personnel, cost of social security, overhead and profit) excluding in most cases the cost of accommodation and out-of-pocket expenses (if any).

The above data collected from the chemical projects implemented in Portugal should be supplemented by data from other countries where they were available.

In Philippines (services related to modernization of cement plant) the corresponding daily fees were as follows:

- junior engineer — US$337
- supervising engineer — US$378
- senior engineer — US$453

Data available from Nigeria (various steel projects) offer on average daily fees ranging from US$327 up to US$862 in case of suppliers from West Germany and between US$185-315 in case of the suppliers from USSR.

In case of PRC expatriate personnel supervising a plant erection was paid on average daily fee of US$315. From the same country an interesting data were collected as to the specific type of consultancy fees and namely:

- software engineer US$8,500 a month
- hardware engineer US$8,100 a month
- processing supervisor US$10,065 per month
- seismologist US$9,500 per month
- surveyor (geology) US$8.400 per month
- driller (skilled worker) US$8,400 per month

The above rates may be used for comparable study by the evaluation work by the registry.

In the "Chemical Engineering" issue of April 1985 results of the survey of chemical engineers salaries in USA were published. It was found that while median annual salary in 1983 was US$40,000 (US$41,000 for men and US$29,825 for women), they have grown to US$41,000 in 1984 (US$42,500 for men and US$30,930 for women). It was also possible to found out that the peak salaries are achieved by the professionals with 20-28 years of experiences.

By comparison the data from the "Chemical Engineering" study with the daily fees survey available from Portugal, one can make an estimation of the overhead and level of profit made by the suppliers for the services cost of expatriate staff.

The same article reviewed and rated the median salary (supervisor and non-supervisor positions) in 1984 in different industrial sectors. The table is reproduced below.

Engineering discipline	Median Supervisor Salary	Median non-Supervisor salary	Supervisor differentiated percentage
Petroleum	61,850	37,600	85
R + D	52,400	40,950	28
Computer	50,800	35,600	43
Design consultancy + engineering	49,550	35,400	40
Electronic equipment	48,100	33,100	45
Aerospace	47,900	35,250	36
Chemical	47,800	36,700	31
Metal industries	44,550	32,100	39
Electric equipment	43,950	32,200	37
Mechanical industries	41,650	30,150	38
Constructions	40,150	29,750	35

Source: Chemical Engineering/April 1985 p. 102

All presented factual data may assist in evaluation of reasonable personnel fees and may assist in assessment of net affect of disaggregation of E + C package into varying services.

The empirical data available at UNIDO on the cost of engineering (excluding personnel cost) are much more scarse and relate only to 19 cases in chemical field. Basic findings are reproduced in the following table:

Breakdown (%) of the components of engineering services in relation to the total value of the project.

Description	Value of the project US$ Mln.	Size	E + C services in % to total value of project					
			Licence	Basic Engineering	Technical Assistance	Training	Licence + Basic Engineering	Total
Chemical and metallugical complex	359.2	L	0.45	3.3	1.5	0.10	3.75	5.35

General description	Investment value USD '85 (in mln. of USD)	Size[1]	Inputs (as ratio to project investment)					
			License	Basic eng.	Assis-tance	Training	License+ Basic eng.	Total
Chemical-metallurgical complex	359.2	L	0.45	3.3	1.5	0.10	3.75	5.35
Non-ferrous metal smelter and refinery	135.2[2]	L	1.6	1.8	1.4	0.3	3.4	5.1
		L	2.4	1.5	1.4	0.3	3.9	5.6
Iron and purification (with recovery of Nferrous metals and pelletizing	122.2	L	0.8	3.5	1.8	0.2	4.3	6.3
Nitrogen-based fertilizer unit	191.9	L	3.0		1.5/2.0		3.0	5/4.5
Two (inorgamic acid) chemical plants, gas type, with heat recovery of similar capacity but in two different sites of the same country	18.0	M	0.8	3.9	4.8	-	4.7	9.5
	20.5	M	0.4	3.2	3.2	-	3.6	6.8
Rewamping and process modification in a nitrogen based fertiliser plant	9.8	M	1.5	3.6	6.2		5.1	11.3
Organic Intermediates	16.4	M	2.7	10.0	Included in general provision		12.7	12.7
NF Metal recovery + Electro deposition	35.3	M	3.5		1.8	-	3.5	5.3
Heavy (inorganic acid) chemical plant	17.2	M	4.0		2.7		4.0	6.7
Syntetic fiber plant, rewamping	22.1	M		5.5	2.0		5.5	7.5
Mineral fibers	9.4	M	4.9			-	-	4.9
Organic Intermediates	8.2	M	0.8					0.8

General description	Investment value USD '85 (in mln. of USD)	Size[1]	Inputs (as ratio to project investment)					
			License	Basic eng.	Assis-tance	Training	License+ Basic eng.	Total
Inorganic chemical producing plant	4.6	S	2.4	4.0	12.6	-	6.4	19.0
Ore dressing pilot plant	1.3	S	-	4.7	2.5	2.3	4.7	9.5
Refining kiln for basic non-ferrous metals with rewamping of existing plant	2.5	S	7.3		0.5	-	7.3	7.8
Textile plant unit	0.5	S			3.8			3.8
Lime kiln	3.9	S	7.2		1.5	-	7.2	8.7

1) L = large projects, M = Medium sized projects, S = Small projects

2) Only part covered by scope i.e. 45 per cent of total investment

The value of the collected data enables to establish certain relationship between the size of the project and cost of engineering and by calculations of E + C cost at 1 million $ value of investment arrive at median figures which eventually may serve as benchmark for the registry evaluation.

It is urged therefore that the registries will carry out analysis of past projects in order to establish orientation benchmarks for different industrial sectors. As the cost of engineering may vary substantially with the source of supplier (USA, Japan, West Germany, Eastern Europe, PRC, the other developing countries) it is also advised to carry out, if possible, geographically oriented analysis which will eventually lead to increasing the strength of the bargaining of the local investors.

VII. Basic Findings and Guidelines for Evaluation of Payments by the National Regulatory Agencies

The task of regulatory agency in evaluation exercise of any submitted contract will in principle be of a triple nature:

- to assess the payments of E + C services in total versus the value of the project
- to assess the cost of personnel services in E + C contracts
- to suggest the possibilities for disaggregation of the E + C package in order to lower the negative (if any) effects of introducing the technology into the country.

The sample data related to both salaries as well as available data on hourly earnings in different manufacturing fields[1/] makes it rather easy task to evaluate the cost and the level of personnel services.

A) Evaluation of personnel fees

Personnel fees represent the important element of costs for E+C services and therefore an analysis of the level of such fees should be regarded as a major task in the evaluation procedure. Since this analysis consists predominantly of comparative data we will indicate the principal sources of information which may be used in the course of evaluation:

- data referring to the past experience of the investor and/or supervising government agency
- data supplied by the potential suppliers in their bids [2/]
- information from third sources (professional literature, international exchange, etc.).

In any case the evaluation should begin with an analysis of cost elements which are included in the personnel fee and methods for arriving at a given fee level. The second step is to define the acceptable level for each cost element. For that purpose it is necessary to relate the cost proposals of the potential suppliers to past experience in executing industrial projects, data obtained through international exchange, etc.

Since overhead charges and net profit are added percentagewise to the direct payroll cost, the latter should be considered in the first place. General data on direct payroll costs are relatively easy to obtain as they can be derived from the salary levels in developed countries, giving due consideration to additional bonuses when linked with foreign assignments. As a rule of thumb, it can be assumed that the total personnel fee should not be more than 2.5 times higher than the direct payroll cost.

1/ Business international, as well as other professional megazines.
2/ The experienced investor usually requires the invitees to submit detailed cost proposals in accordance with the standard format.

Another area of concern is the number of personnel effectively engaged in the project. Quite often the supplier lists an excessive number of staff required for performing the services, inter alia, by adding those engaged in part-time work. Special attention should be given to that portion of work done in the supplier's home country, as this cannot be accurately checked during the course of performing the services. This brings us to another important aspect, i.e. the breakdown of personnel costs between the home and recipient country. There is a general tendency on the part of suppliers to calculate total personnel costs as if the services were performed in the recipient country. The proper identification of the portion of work conducted at home should bring essential savings, bearing in mind that:

- the direct personnel costs in the home country should not include incentives for working abroad

- the overhead charges are generally lower for local assignments.

During the second stage of evaluation, comparisons should be made between the proposal made by potential suppliers and similar projects and services performed in a given country or abroad. For that purpose we shall present below the major findings of our empirical survey, based on the inputs provided by TIES participants.

1. Forms of remuneration most often used for E+C services

The analysis revealed a general pattern as to the methods for pricing E+C services. Definitely, the time rates (per day, per week or per month) are the most popular form of remuneration. In rare cases the straightforward lump-sum is applied. In fact lump-sum should be regarded not as an alternative, but as an additional form of remuneration for E+C services. For example, the lump-sum is often used to reimburse services conducted in the home country, whereas the services in the recipient country are remunerated by weekly or monthly fees. Secondly, the lump-sum category often appears in the contract as the indicative figure for the total value or the upper ceiling for the payments to be made in accordance with the time rates. On the other hand, the fees based on construction costs were non-existent in our sample.

2. Factors affecting the level of personnel fees

The analysis of empirical data helped to identify the following major factors affecting the level of personnel fees for E+C services:

- category of personnel engaged in the project
- duration of assignment
- complexity of the project
- the country of origin of expatriate personnel
- conditions prevailing in the recipient country
- government intervention by the recipient country.

In the subsequent sections we shall discuss the scope of influence of the above factors in a more detailed manner. As a general rule, while referring to the specific fee levels, we shall relate them to a calendar day in order to avoid confusion resulting from applying different time intervals (days, weeks, months, etc.). Secondly, we shall rely on the "full cost" fees covering direct payroll costs, overhead charges and net profit.

3. Category of personnel

The category of personnel effectively engaged in the rendering of E+C services constitutes the key factor taken into consideration while defining the fee levels. This is indicated explicitly in the agreements surveyed, as they defined the personnel categories to be engaged in the project and the respective fee levels. In some contracts more than 10 categories of expatriate staff were enumerated. However, no uniform standards for categorizing personnel were identified as they relate mostly to the experience and staff position levels used in the public or private sectors of the recipient country. For the purpose of the present analysis we shall distinguish three broad categories of personnel:

Group A. Senior professional staff

These are mostly highly qualified engineeres and managers with more than 15 years of professional experience. In the complex projects they generally assume supervisory or managerial functions (e.g. project leader)

Group B. Professional staff

Graduated engineers with an average experience of 8 - 12 years

Group C. Technicians and junior engineers.

The empirical survey revealed the following fee levels for the above-mentioned personnel categories:

Group A - in the range of US$ 400-600 per calendar day
Group B - in the range of US$ 250-~~350~~ 350 per calendar day
Group C - in the range of US$ 150-220 per calendar day

One other element should be taken into account and that is for example female technical personnel (at least in the USA) is usually paid approximately 30 per cent lower salaries, providing still similar high quality services.

Naturally not in all cases it would be possible to employ female expatriate staff, but an effort can be made to achieve certain improvements of the cost by using such services.

The findings presented above have some obvious implications which have to be considered in the course of contract evaluation and negotiation. In the first place the actual needs with respect to the categories of personnel should be carefully defined, especially for Group A personnel. As a rule the suppliers tend to over-represent this group by duplicating managerial functions which are not required for the efficient execution of the project. Another area where special attention should be given during the evaluation process is the possible "inflation" of categories of personnel. This happens, for example, when junior engineers are posted at the B level or professionals are classified as senior professionals. Alternatively, the supplier often indicates higher categories of personnel in his cost proposal whereas in the course of implementation lower categories of staff are effectively engaged in the project. The careful evaluation and subsequent monitoring of the above-mentioned problem areas may lead to a substantial saving for the client.

The evaluation of payments for the portion of engineering services conducted in the home country is more complicated. As indicated earlier such payments are usually reimbursed in the form of a lump-sum. The amount of time required (e.g. man-months) and the fee levels applied constitute the basis for arriving at the final amount. Past experience gained from the implementation of comparable projects should be used in order to establish acceptable time requirements for the preparation of drawings, designs, calculations, etc. Taking into consideration the lower cost involved, it might legitimately be requested that the lower fees be applied for the portion of work done in the supplier's country.

4. Duration of assignment

Taking into consideration the length of the assignment, the following principal types of E+C services may be distinguished:

- services of a "trouble-shooting" type lasting only a few days or weeks
- services associated with the project execution and with the well-defined time limits resulting from the length of a given project phase
- consultancy assignments rendered during the operational phase and extended over a longer period of time.

As a rule the fees appplied in the case of long-term assignments are definitely lower than those used for trouble-shooting, bid evaluation, etc. In fact agreements covering assistance in operating the plant which extend over longer periods of time may stipulate the salary rates for Group C personnel to be as low as US$<100 per calendar day. On the other hand the trouble-shooting services of highly qualified experts can easily cost US$>1,000-1,500 per calendar day.

5. Complexity of the project

In the case of highly complex projects (in the technical sense) the fees charged are 20-50<per<cent higher than for the average projects. This corresponds to the relative scarcity of consultants who may perform complicated tasks. It should however be emphasized that the majority of

projects implemented in developing countries are technically at the average or below average level. This aspect should be carefully examined in the course of evaluation in order to eliminate unjustified demands for increased fees which are often made by the suppliers of service.

6. The country of origin of expatriate personnel

Since the payroll costs constitute a basis for calculating personnel fees it is obvious that the salary levels in the supplier's country have a direct impact on such fees. The empirical survey revealed that the highest fees for the consultant services were from experts originating from the USA. Somewhat lower fees were charged by Western European and Japanese personnel. With respect to experts from Eastern Europe, these are mostly contracted for long-term group assignments. Under such circumstances the personnel fees are generally lower than those used for remunerating consultants from developed market economy countries, though again on average the quality of services is not inferior.

It should be noted that several developing countries have recently started exporting E+C services (e.g. India, Republic of Korea and Philippines). As a rule they offer competitive financial conditions for rendering such services and their fee levels are quite reasonable.

7. Conditions prevailing in the recipient country

Viewed from the perspective of the foreign consultant, developing countries vary substantially as to the hardships encountered in the course of performing their services (difficult climatic conditions, lack of adequate accommodation, lack of personal safety, etc.). For those countries identified as being extremely "hard", the supplier of services has to introduce additional financial incentives for his personnel. 3/ This has obvious consequences to the level of fees charged to the client.

8. Factors affecting the level of subsistance allowance

A comprehensive analysis of subsistence allowances in 11 engineering contracts implemented in Portugal revealed that on the average the allowances reflected the daily living cost at a hotel of international (but not luxury) standard. This is also a general rule used with the United Nations system while establishing the daily subsistence allowances.

The second factor which should be considered is the category of personnel engaged in the project. In the past there were clear differences as to the level of allowances as a result of the different hotel classes used in order to accommodate senior professionals and technicians. The analysis of empirical data leads us to the conclusion that at present such differences have been substantially narrowed and in most cases uniform subsistence allowances are being applied to all categories of foreign experts.

3/ On the other hand a country may exploit its tourist attractions to obtain E + C services at reasonable cost.

Another factor which ought to be considered while defining the level of subsistence allowances, is the duration of stay of the expatriate consultant in the recipient country. In the case of a longer say (e.g. more than two months) the allowances are usually decreased by 25-30 per cent. It is worth mentioning that this is a standard procedure followed by UNIDO while contracting consulting services. The idea behind such an approasch is that while staying longer the living expenses of the expert decrease as he or she very often stays in an appartment or house, which is definitely less expensive than staying in an hotel.

In the complex long-term projects the client is often directly engaged in arranging accommodation for expatriate staff, either in an hotel, house or appartment and sometimes even meals or cooking services. This becomes the only feasible solution when the project is implemented in backward regions of the country far from major towns. A major problem which should be taken into consideration in the course of contract negotiation and evaluation is the proper adjustment of the subsistence allowances by subtracting the cost of facilities provided directly by the client. In extreme cases the expatriate staff shall be given pocket money only, rather than a subsistence allowance. A typical error often found in engineering contracts executed in developing countries is that the consultant receives free accommodation as well as a full daily subsistence allowance. Obviously such a formulation should not be approved in the course of contract evaluation.

Bearing in mind the worldwide experience of the UN organizations, it is recommended that the level of daily allowance and the principles of granting such allowances be used as a reference while evaluating and negotiating E+C agreements with foreign partners. The respective data can be easily obtained from UNDP offices in a given country.

B) Evaluation of cost of engineering (basic and detailed)

The provision of basic and detailed engineering comprises of the single most important technological input into th. given project.

It often happens that the basic engineering is provided by the supplier of technology (the licensor) and therefore the cost of basic engineering will in many instances be equal to that of know-how or technology, expressed in the contract in the form of the royalties.

Sometimes therefore, the basic engineering is called process engineering and its cost usually is reflected in running royalty.

The evaluation of royalty levels has been extensively described in publication entitled "1982 Licensing Law Handbook[4/] in the chapter entitled "Remuneration in licensing and technology transactions"; moreover is to a degree covered in UNIDO publication, "Guidelines for evaluation of transfer of technology agreements.[5/]

It is therefore suggested that the registries in the evaluation will apply to basic and process engineering cost the similar methodology applicable to know-how cost in particular in such case like a supply of a plant on a turnkey basis or introduction of semiautonomaus process in the existing manufacturing facilities.

The data collected by the UNIDO Secretariat supports in principle the above suggestions as to the evaluation of the cost of basic engineering.

The issue of the detailed engineering services in certain instances is of a simple nature in this sense that provision of such services entails the "translation" of basic engineering into detailed drawings related to the individual plant, individual project or specific order.

4/ "1982 Licensing Law Handbook" published by Clark Boardman and Company, New York 1982

5/ "Guidelines for Evaluation of Transfer of Technology Agreements" by UNIDO 1980, ID/233.

Certain basic criteria for the establishment of orientation benchmarks in specific industrial sectors has been provided for in the preceding chapters.

Those suggestions are still valid and such calculations should be made by the regulatory agency on the basis of already existing contract. Updates should be periodically carried out in order to develop and observe the changing cost trends in different industrial sectors.

The fee for the detailed engineering as described earlier may be developed in principle on the basis of cost + fixed fee formula (including guaranteed celing), or fee based on percentage of construction cost (either net or estimated).

In either of cases it is normal that in view of the time factor, the "cost" elements may undergo changes and therefore E + C contractors will usually require the inclusion of the following price revision formula:

$$P1 = \frac{P0}{100}\left(a + b\,\frac{M1}{M0} + C\,\frac{S1}{S0}\right)$$

where P1 means final price for invoicing
P0 means initial price for goods/services as stipulated in the contract and as prevailing at the date of contract (or in other fixed dates)
M1 shall be the mean (arithematic or weighted) of the price (or price indixes) for (type of material concerned) over the period of time (to be specified).
M0 = prices (or price indexes for the same material at the date stipulated above for P0.
S1 shall be the mean (arithematic or weighted) of the wages (including social charges) or relevant indexes in respect of (specify categories of labour and social charges) over the period of time (to be specified).
S0 shall mean wages (including social charges) or relative indexes in respect to the same categories on the date stipulated above for P0.
a b c shall represent the contractually agreed percentages of the individual element of the initial price which adds to 100 (a + b + c = 100).
a = fixed proportion
b = percentage proportion of materials
c = percentage proportion of wages (including social charges)

For the engineering contract a more typical price formula will in principle be applicable:

$$P = P0\,(0.15 + 0.85\,\frac{L}{10})$$

where P means revised amount of the instalments to be invoiced
P0 = original amount as per agreement
L = living cost indexes for fixed location (usually where the services are carried out)

Another escalation formula was used in a drilling agreement and read as follows[6/].

$$P = P0 \left(0.50 \frac{S}{S0} + 0.50 \frac{M}{M0}\right)$$

where P0 = original rate as per contract as value of index for average earnings provided by Employment Gazette Coal and Petroleum (January 1976 = to 100) for the 3rd months prior to the date of the review.
M = value index according to oil field machinery equipment (1967 = 100) S.I.C. code 3533 published in the Monthly Labour Review by the US Department of Labour for the 3rd month prior to the date of review.
S0 and M0 repective indexes for the original contract.

When assessing the price revision formula the regulatory agency should specifically look into the following components:

- what are the values to be taken for the fixed components
- detailed application of individual indexes
- care should be taken for the definition of the date of supply in the contract and all consequentive dates
- the indexes should be readily available and if possible published by recognized institutions.

Despite visible progress achieved by number of developing countries in establishment and development of local E + C skills the group as a whole is still largely dependent on the acquisition of respective services from abroad.

Therefore the improvement of conditions for import of such services should be seen as one of the more important activities of technology registries - and activities of the investors - in the field of influencing the cost of technology transfer. With this in mind this material has been prepared.

6/ See also UNIDO's "Technology payments" forthcoming.