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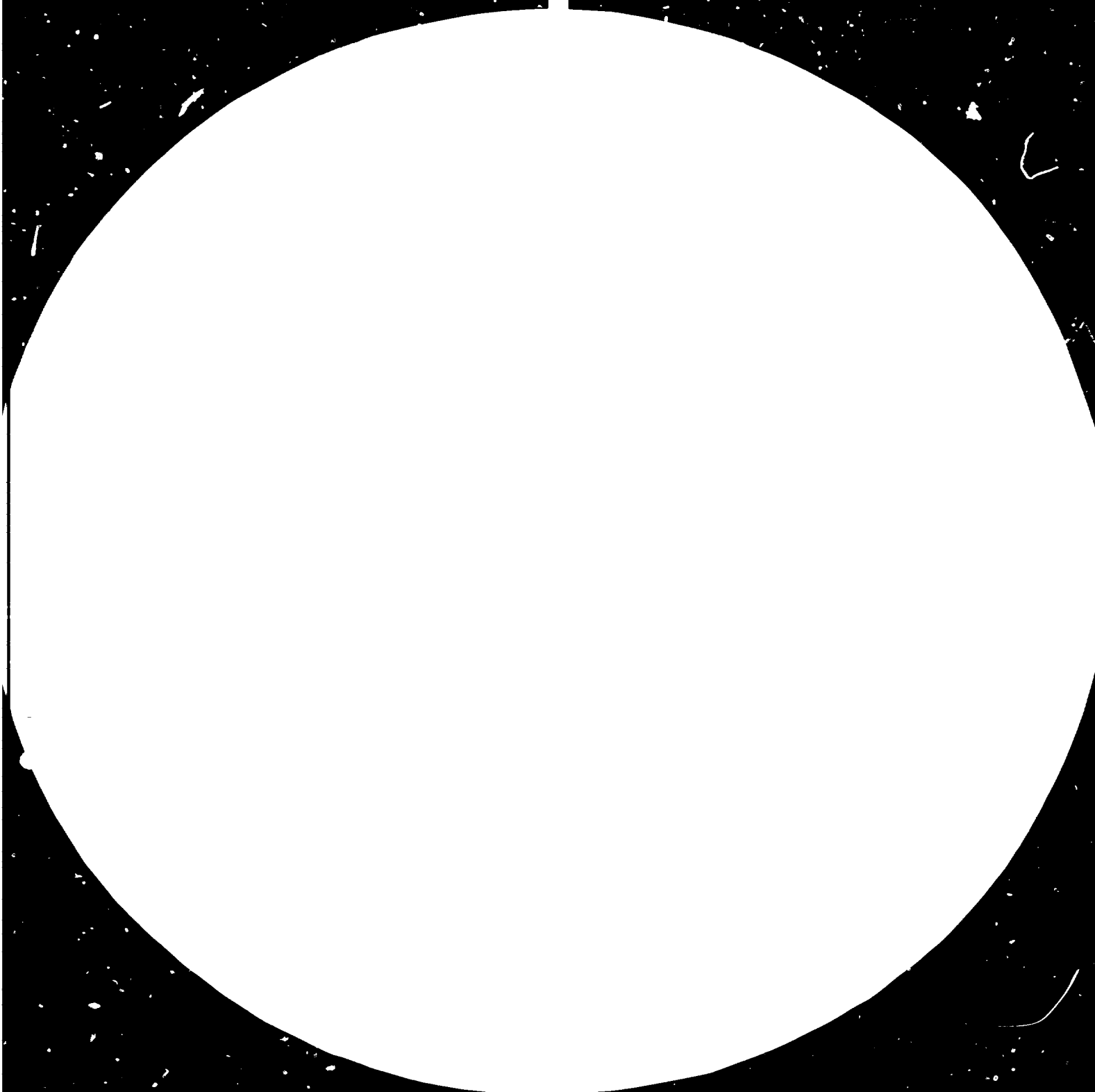

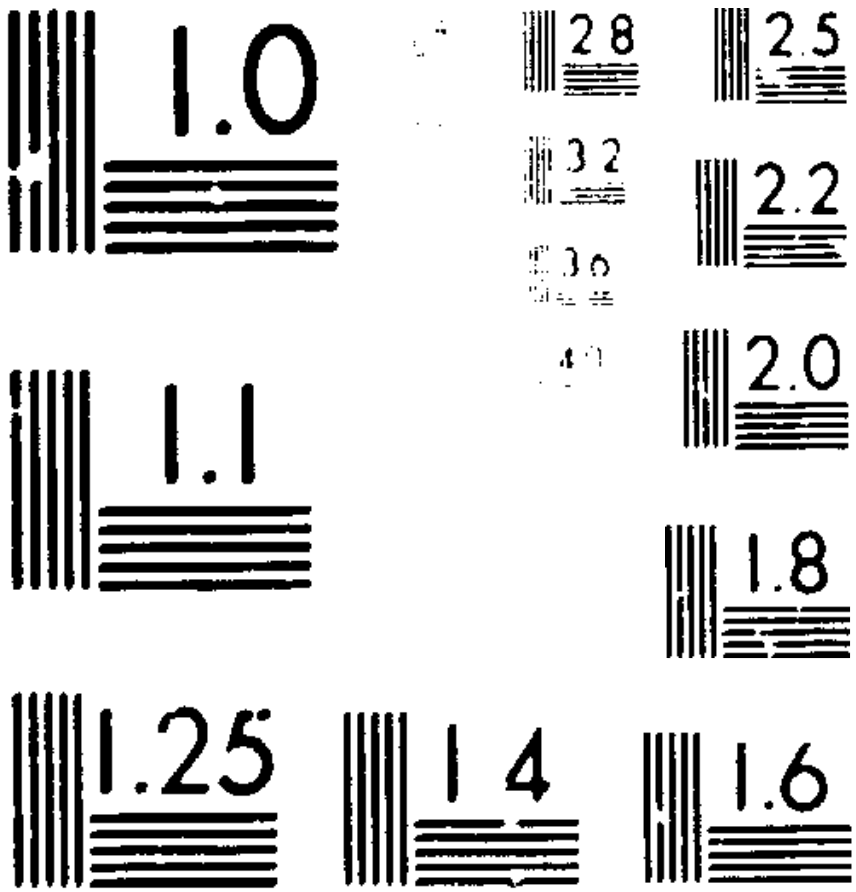

11083

Distr.
LIMITED

ID/WG.362/4
8 January 1982

ENGLISH

United Nations Industrial Development Organization

Preparatory Meeting of Directors of
Industrial Development Finance Institutions (IDFI)
on the Creation of a Technological Information
Exchange Network (TIEN), Bridgetown, Barbados, 1982

Bridgetown, Barbados, 26 - 28 January 1982

Background Paper on Creation of a Technological Information Exchange Network for Development Finance Institutions*

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V.82-20304

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I. BACKGROUND

1.01 Various aspects of technology may relate to choice of product, the method of production, the intensity of capital, the design and sophistication of equipment etc. This connotation of the term technology though important, is rather narrow especially from the point of a Development Finance Institution (DFI). The primary interest of a DFI, which, besides financing industrial investment, can also play an important role in the development of technology, is in ensuring that projects assisted by it are efficient, based on most appropriate technology and are viable financially. Besides, a DFI also has to bear in mind a variety of objectives which relate to the social and economic impact of projects. In this paper, therefore, I propose to deal with the subject of technology from a broader angle. At the same time, I do not think a DFI should consider the matter entirely from a macro-point of view, such as labour-intensive vs. capital-intensive nature of alternative

technologies. I consider it appropriate and relevant from the point of a DFI to define the subject for the purpose of this paper as the role of DFIs in evaluation of technological contents and in promoting viable technologies.

II. REVIEW OF CURRENT EXPERIENCE OF DFIs IN EVALUATING TECHNOLOGICAL CONTENT OF INDUSTRIAL PROJECTS

2.01 The first thing to note is that the environment in which DFIs operate in different countries varies considerably. Therefore, it would not be prudent to attempt a model which can be adopted by all the DFIs. The variety of experience of DFIs in matters pertaining to technology bears this out. Nevertheless, to derive some lessons from the experiences of different DFIs it would be useful to identify the major determinants of the role which a DFI can play in matters pertaining to technology. Some of the important determinants could be listed as follows :

a) Government policies pertaining to industry in general and technology in particular;

b) structure, particularly the degree of diversification and the size of industry;

c) background and experience of entrepreneurs; and

d) DFIs' own technical competence.

a) Government Policies

2.02 In developing countries, governments often adopt economic planning. Such planning involves allocation of resources. Governments of developing countries assume, in different degrees, regulatory powers for sanctioning industrial and import licences. As regards the import of foreign capital and technology also, governments of several developing countries often impose certain regulations.

2.03 If entrepreneurs are required to obtain sanctions from government as a part of the procedures adopted by it for the allocation of resources, the basic details of technology get fixed well before a project reaches a DFI. In some countries, however,

DFIs themselves may form part of the sanctioning agency when they have a chance to assess and influence technological aspects of each proposal. However, as I shall elaborate later in the paper, even when DFIs are not associated right from the beginning with the choice of technology, they can improve upon technological aspects of the projects in several ways.

2.04 As regards Government policy relating to import of foreign capital, technology and equipment, it is obvious that the insistence on the use of indigenous technology restricts the options. While developing countries may not wish to follow a free import policy in this regard, no developing country can dispense with imports totally. Thus the extent of openness or otherwise of economies from the point of view of import of foreign capital, technology and equipment would determine the role which DFIs can play. While liberal import policy would increase access to technology from different sources, the task of DFIs would become more complex in so far as they may have to choose from among a number of sophisticated technologies.

b) Structure and Size of Industry

2.05 In a small economy with the small size of domestic market, DFIs' role in matters pertaining to technology is likely to be limited. For one thing, industrial sector might, in many cases, account for a relatively modest investment and the number of projects which come up for assistance may also be rather small. In such cases domestic industrial structure might comprise mainly small industries. Import content in such economies is likely to be quite high. The main role which DFIs are called upon to play in such economies is two fold. First, while the basic technologies might be simple and the application repetitive, DFIs help to improve their efficiency in operation. Secondly, they assist the process of import substitution requiring gradual indigenisation of components. In the latter case, generally the process of indigenisation is based on technologies supplied by foreign collaborators.

2.06 Some economies with relatively small domestic markets have adopted a totally different course for their economic growth. They have sought to expand predominantly through exports, the phenomenon often being described as export-led growth. Since technologies used by export-oriented industries are initially imported by foreign collaborators who also often provide capital, DFIs have a limited role to play. However, in some developing countries DFIs have assisted indigenisation of ownership and adaptation of technologies by local entrepreneurs.

2.07 In contrast, in economies endowed with natural resources of diverse types and having a reasonably large domestic market, DFIs play a more active role. A sustained growth in capacity in industries already in existence - i.e. deepening of industrial structure and diversification in industrial base-require evaluation of technology almost on a continuous basis. DFIs in such large economies, started with evaluation of small and medium sized projects initially. In due course

they have evaluated large-sized projects, often based on foreign technologies supplied from different sources and also, indigenous technology. Thus, both in small and open economies in whose growth export markets have predominated and in large economies which have undertaken a programme of industrialisation, especially of diversification of industrial base, DFIs have played an important role in matters pertaining to technology.

c) Background and Experience of Entrepreneurs

2.08 In the matter of absorption and successful application of technology, technical background and experience of entrepreneurs are the plus points. Such entrepreneurs are generally less prone to some of the pitfalls in selection and procurement of technology. After gaining experience, some of the entrepreneurs, if they are managing large-sized projects, develop their own R&D in different degrees at the time of expansion. They are, in any case, better equipped to negotiate technology procurement, indigenously or from outside.

2.09 In dealing with such entrepreneurs DFIs themselves obtain a large pool of information pertaining to technology. Besides, in the process of monitoring the operations and assisting expansion of such entreprises, DFIs also build up a pool of knowledge. In fact, some of the successful entrepreneurs, in the process of their expansion, adapt and improve upon technology thus emerging as an alternative source of supply of technology which DFIs could help to transfer to other clients.

d) DFIs' Own Technical Competence

2.10 DFIs' competence to evaluate the technological content of projects depends, among others, upon the point at which they get associated with the appraisal of technology of a project, variety of sources of technology and industries in respect of which they are required to evaluate and above all, on perception of their own role in technological development. DFIs which have been faced with the task of evaluating technological content of projects of diverse sizes and in different

industries have developed their own competence. Some other DFIs have made fairly good use of experts, individually or as a committee, to assist them in the task of evaluating technological parameters of projects.

2.11 Thus, the openness of the economy in terms of import of technology and equipment, rapid growth of industrial sector and diversification of the industrial base expand the role which DFIs can play. However, as stated earlier, technological evaluation is not an end in itself. Evaluation of technological content of a project is an integral part of its appraisal. Thus, information required for technological evaluation, from the point of choosing a viable technology, transcends merely the technical details.

III. INFORMATION NEEDED FOR TECHNOLOGICAL EVALUATION

3.01 Since the function of information is to improve the effectiveness of the evaluation of technological content, as defined in the broader sense, in the beginning of this paper, the main areas of information can be listed as follows.

These are the focal points for collection of information.

a) Choice of product.

b) Choice of technology.

c) Source of its procurement.

d) Terms of transfer.

e) Modalities for transfer.

f) Capacity to absorb.

g) Requirement of other inputs.

h) Commercial Application and Financial viability.

i) Socio-economic impact.

a) <u>Choice of Product</u>

3.02 A DFI must be in a position to evaluate appropriateness of the selected product from various angles. In the first place, it is important to assess whether the product in question has an adequate market. Further, it would be necessary to examine the nature of industry, whether it is resource-based or is

technology-intensive etc. For instance, in technology-intensive industries, developed countries which tend to invest more in R&D, would have an edge over similar industries in developing countries. Another important factor is the level of domestic demand and the sources of current supplies namely, indigenous production or imports. If either the product is totally new or viability of manufacturing it crucially hinges on promotion of new applications and replacement of other substitutes, the commercial risk is greater. The entire proposal would become still more risky if the entrepreneur is either totally new or with limited resourcefulness.

b) Choice of Technology

3.03 The next crucial question is the choice of technology. It needs to be appreciated that generally there is a range of alternatives - a spectrum - from among which a choice of technology is to be made. While an entrepreneur might wish to make a technological choice solely on the basis of its financial viability, for DFIs the problem of choice is seldom

so simple. They have to take into account implications of a particular technological choice on socio-economic aspects such as employment, balanced regional growth, promotion of indigenous technology etc. DFIs would therefore need information to assess technology from these aspects in addition to the technical ones.

3.04 However, information required even for technical evaluation is not insignificant. Ideally, DFIs must be in a position to obtain information regarding alternative technological options and assess relative merits of all of them so that the best option is chosen. To an extent, global tenders and choice from among a large number of bids, would provide an opportunity of choosing from several alternatives. But for medium and medium-large projects, which account for the bulk of assistance in respect of most of the DFIs in developing countries, neither the financial cost nor the cost in terms of time, would justify the global tender approach. The best insurance against the choice of a wholly inappropriate

technology is alertness on the part of entrepreneurs and more so of DFIs which should keep abreast of developments in the sphere of technology. Those DFIs which receive requests for assisting similar products and projects of different sizes can also make use of inter-project comparisons in evaluation of technological contents of projects seeking assistance.

3.05 An aspect of choice of technology which has assumed considerable importance currently is energy efficiency. While this is an area where technological developments are very rapid, DFIs would have to keep abreast of the development in these areas especially in respect of energy-intensive industries. Likewise, in respect of industries which have high incidence of pollution, DFIs must obtain requisite information and pay special attention to ecological aspects of alternative technologies.

c) Source of Procurement

3.06 A related question is one of the source of procurement. For several DFIs, particularly in

countries with rather modest industrial base, in practice, the source of procurement of technology is one foreign country or the other. In this case, the information required is principally such as would enable evaluation of the terms of technology transfer. For some DFIs, however, there is also an option of considering an indigenous source, quite often adaptation and at times an improvement of the originally imported technology. It is seldom possible for DFIs in developing countries to be able to decide on the 'best' source on the basis of an evaluat on of all the alternatives. Often, government policy, source of funds (e.g. bilateral country-tied aid) etc. virtually fix the source. As regards indigenous source of technology, often the 'giver' of technology might be DFI's client. DFI's own assessment of the latter's capability might be an important source of information. Besides, in the case of relatively simple processes and products the choice of indigenous supplier may not pose any problem. Further, domestic source of technology may also not pose serious problems if supporting technical and managerial consultancy services have developed. DFIs would

have to evaluate capability of the supplier, cost of plant etc. Information on all these facets is important especially, if the source of supply of technology is local.

d) Terms of Transfer

3.07 One of the most important aspects to be taken into account is the terms of transfer. Indeed financial costs like front-end payments, royalty rate etc. are important parameters. Other important areas for which information is required are: guarantees regarding consumption norms, level of output etc. Information should be available for assessing, among others, provision for testing local raw materials if these are used for the first time, training of staff etc.

e) Modalities for Transfer

3.08 Besides terms of transfer, the modalities for technology transfer constitute an important aspect of the problem. For instance, the supply of equipment which embodies the technology to be transferred alongwith designs, drawings and process know-how might not be enough in effecting the best transfer of technology. The recipient company should be associated with the process of

transfer from the initial stage itself, preferably when the equipment is designed. Its technicians should not only obtain training in the company which uses the technology being transferred but also technicians from the latter spend a specified time with the recipient company. Further, quite often the modality for transfer of technology involves a prime agent. In such cases, to affix proper responsibilities a multipartite agreement should be entered into involving the prime agent. Information would thus be required on all these aspects.

f) Capacity to Absorb

3.09 Another relevant factor is the assessment of the capacity of the project to absorb technology. Several factors would determine absorption capacity. Some of these are: technical background of entrepreneurs, experience and competence of their technical staff, arrangements made for training of the technical staff, the use, if any, of the services of consultants etc. If the technology to be evaluated is new for the country or is hitherto not tried commercially, more comprehensive information would be required regarding the steps proposed by the entrepreneur in the event of some difficulties.

g) Requirement of Other Inputs

3.10 The other aspects which would need to be looked into would include availability, adequacy, quality and prices of raw materials; availability of plant and machinery and experience of suppliers; availability of other inputs such as power, steam etc; availability of skilled work force, or feasibility of inculcating necessary skills within a reasonable time frame; ecological aspects of technology and the laws in this regard. Assessment of all these issues is necessary to have a complete analysis.

h) Commercial Application and Financial Viability

3.11 In addition to these aspects which essentially deal with the acquisition of technology, information would be required to assess the capability of the entrepreneur in commercial application and the financial viability of the proposal. I highlight this aspect with a view to emphasising the importance of managerial competence as against technical competence in the matter of absorption of technology. A successful commercial application of technology would depend upon, inter alia, strength of management, product promotion and marketing etc. Further, the assessment would not

be complete without an analysis of the profitability and the financial returns covering the return on equity, return on investment, the discounted rate of return and the debt service coverage. Information would be needed on these aspects also.

i) Socio-Economic Impact

3.12 The impact of the technology on employment generation, foreign exchange earning/saving, promotion of use of waste or surplus resources, conservation of scarce resources, the development of skills as a result of introduction of technology, scope for adaptation and its linkage effects need to be studied. Further, an analysis as to how a technology fits in within the socio-economic policy framework of the country is also required. While quantification of social cost and benefits is a difficult task, it is necessary that this is also done, so that a broadly objective analysis is carried out.

3.13 I have attempted to identify various factors having bearing on evaluation of technology and the type of information required with regard to each one of them. I would like to stress that there cannot be a universal check list for information. Basically, the requisite information system has to be developed to suit the needs of each DFI. A comprehensive appraisal of a project is the best method of developing the required information system. A systematic development of appraisal skills through training of staff, a continuous refinement in appraisal formats and practices and the adoption of a multi-disciplinary approach to project appraisal by constituting a multi-disciplinary team are the surest ways of developing an information system (please see 'Country Brief' on India for discussion of this approach).

IV. FEASIBILITY OF CREATING A TECHNOLOGICAL INFORMATIONAL EXCHANGE NETWORK FOR DFIs.

4.01 Let me now turn to the possibility of creating a Technological Information Exchange Network (TIEN). The advantages of disseminating

technical information cannot be overemphasised. An information network which enables DFIs in different countries to keep informed of the developments in the sphere of industrial technology in general and with respect to specific projects/industries/countries in particular has obvious advantages. But before we launch upon a scheme, the ultimate purpose of which is to supply, so to say, off-the-shelf technologies ready to be used, it would be useful to consider some inherent problems and identify some preliminary steps to be taken by each DFI to facilitate the flow of useable technological information.

a) Inherent Problems

4.02 Technology is constantly developing all around the world. It is inconceivable that any single agency would be able to keep track of all these developments. Again, the main source of technological progress is industrialised countries. Feeding of technological information pertaining to industries in these countries to the proposed network suffers from serious short-

comings when considered from the point of view of its applicability to industrial projects in developing countries. For instance, the size of plants in industrialised countries, which is considered economic is too large for a majority of developing countries. Technological information pertaining to these projects would be therefore of a limited use. It is not possible to adapt this information to evaluate plants of smaller sizes, as consumption norms, productivity, capital costs etc. are not proportional to the scale. They rise generally disproportionately as the plant size declines. Moreover, technologies developed by industrialised countries are more suited to their environment which is characterised by highly developed infrastructure, abundance of capital, rigorous pollution standards, etc.

4.03 Let us now consider the alternative of building the Technical Information Exchange Network largely on information fed by developing countries. It would be a misnomer to talk in terms of developing countries as if they constitute a homogenous group. Apart from differences in size, both the oil-exporting developing countries and newly industrialised

developing countries differ significantly from low-income developing countries. Nevertheless, there could be several areas of industrial activities where technological gap is far less among developing countries than between them and industrially advanced countries. In my view, the flow of technological information as a step towards closer technological linkages, could be more meaningful between developing countries. Bilateral arrangements in this regard would be a useful way of identifying operational difficulties so that these could be dealt with effectively.

b) Operational Difficulties

4.04 While it is theoretically feasible to feed information for industries to the network, I would like to draw attention to the following problems. First, if a project in a developing country has obtained technology from a foreign collaborator and has furnished some information and documents to the DFI, the latter would be treated as confidential. In that case, DFIs might not be in a position to feed the information to TIEN. Secondly, it is seldom the case that the entire technical information is put on paper. For understandable reasons some technical information is imparted in the form of

training. Again, while DFIs may call for and obtain basic documents such as collaboration agreement, terms of technology transfer etc.; certain key information is likely to remain with the DFI client exclusively. Thirdly, some aspects of technology e.g. consumption norms of raw materials would vary with the quality of raw materials. In short, both the incompleteness of details and project-specificity of some of the technological details would not make it possible to use meaningfully technical information in several cases and seriously impair its utility in most of the cases.

c) Role of TIEN

4.05 My purpose in pointing out these operational problems is mainly to sound a word of caution. I am neither suggesting that there is no scope for a mutually beneficial cooperation between developing countries in the sphere of technology nor understating the importance of the role of international agencies in bringing this about. Since a successful application of technology depends upon a variety of factors, in my view, a transfer of technology requires a close

cooperation between a donor of technology and its recipient. DFI in a developing country through its active participation in negotiating the transfer can expedite the process of transfer. An international agency such as TIEM could play a very important role in this process by bringing the DFIs in the donor and the recipient countries together on a bilateral basis.

4.06 An important gap, which exists in many developing countries, is in the area of industrial services. DFIs in small developing countries are not always equipped to evaluate technological contents of the projects. Due to their relatively small industrial base, industrial consultancy services are also generally absent. Often, such countries tend to engage consultancy services from industrially advanced countries. Such consultants tend to select technologies which are often a misfit in the generally low level of technology prevailing in other industries. Due to the lack of knowledge on the part of developing countries of industrial services available in other developing countries, the latter, though more appropriate to their needs, are overlooked. It is in this area that international agency such as TIEM can play an important role.

V. SELECTION OF A FEW PILOT SECTORS FOR THE TIEN

5.01 In view of the operating constraints outlined above, it might be desirable to experiment with the TIEN idea in a few pilot sectors. Some of the criteria which could be applied in the selection of the pilot sectors are : simplicity of technology, its unquestionable commercial viability especially in large and medium - sized plants, the availability and the reliability of information feasibility of codifying the key details and above all, industrial sectors where most of the developing countries would direct their import substitution effort.

5.02 The sectors which are simpler and could be taken up are given below :-

i) Light Engineering

ii) Heavy Chemicals

iii) Process industries such as cement, sugar, paper etc.

The aspects which could be codified and included in the data bank for industries are indicated below. It may be mentioned that the data, to be meaningful would need to be maintained for different plant sizes as economies of scale would come into play.

i) Product :

Uses
Features
Substitutes
Likely obsolescence

ii) Process :

Alternate processes available
Evaluation of processes
Flow-charts, operating parameters, balance
Success/failure record of process and experience of other users
Likely obsolescence

iii) Technical Arrangements :

1) Know-how

Sources of know-how
Details of source covering activities, size, turnover, financial performance, experience in providing technology abroad, R&D strengths
Evaluation of alternate sources and experience.

2) Consultancy Services

Evaluation of consultant covering experience, staffing, scope of services provided in the past, experience of other clients.

iv) Plant and Machinery :

Sources of supply
Experience of the suppliers
Evaluation of capability of the suppliers including experience of other clients.
Likely obsolescence.

v) Raw Materials :

Quality required
International sources, availability and prices.
Requirement/unit (i.e. Standard consumption norms).

vi) Utilities :

Standard consumption norms.

vii) Ecological Considerations :

Effluents generated.
Statutory requirements regarding treatment.
Treatment schemes suggested.
Costs.

viii) Staffing :

Broad staffing pattern required, category-wise.

ix) Profitability :

1) Input requirements, costs.

2) Return on equity, return on investment, discounted rate of return, debt service.

x) Socio-Economic

Direct/indirect employment
Linkage effects - backward, forward
Use of waste resources, conservation of scaree resources, skill development.

VI. UNIDO'S EARLIER EFFORTS IN PROMOTING EXCHANGE OF INFORMATION

6.01 Before conculding the paper, I would like to take note of the steps taken by UNIDO in this direction. A data bank based on projects assisted by DFIs was set up by UNIDO. The basic information sheet sought to collect information on key aspects, such as nature of products, capital cost, capacity, manpower, raw materials, export etc. On this basis, the UNIDO Secretariat compiled a list of 3,500 industrial projects and distributed the same to 200 DFIs all around the world. The purpose of this data bank was to disseminate "knowledge of industrial financing activities" of DFIs. The scheme was terminated in 1978. UNIDO has also set up an Industrial and Technical Information Bank. It also invites information from consultants with a view to ascertaining availability of consultant services in different fields.

6.02 Although the information network has given rise to some inquiries from DFIs, on the whole the response cannot be considered very satisfactory.

I make this observation on the basis of the fact that our institution which has had the privilege of financing projects over a wide spectrum of industries received rather a modest number of inquiries. Perhaps, this was due to the fact that the whole concept was rather new. It is also possible that the information system did not receive the attention it deserved both from the DFIs which fed the information and those which received it. One must learn a few lessons from this experience and make sure that TIEN, whatever the shape it takes in practice, should receive from DFIs the attention and the importance which it deserves. The senior management and all those who are engaged in policy making in DFIs should take interest in the TIEN, otherwise the data collected might just end up being one more set of statistical information printed on a neat computer sheet.

VII. CONCLUDING OBSERVATIONS

7.01 Let me, by way of summary recapitulate the main points made in this paper. The role which DFIs can play in matters pertaining to technology depends upon a variety of factors. Some of these, for instance, government policies pertaining to

import of foreign technology, comprehensiveness and modalities of planning, are external as far as DFIs are concerned. However, in countries with a reasonably large industrial base and where industrial investment is expanding, DFIs can play a useful role. Even if the process of planning pre-empts technological options, DFIs can improve the terms of transfer in many ways and also guide clients in modification of technologies to suit their requirements. Further, a successful application of technology does not depend solely on technical aspects of the project. Managerial competence, organisational strength, background of entrepreneur, marketing arrangements are all important elements in evaluation of a project. DFIs must therefore develop capabilities and evolve procedures for comprehensive evaluation of projects submitted to them.

7.02 A network which envisages exchange of technical information can play a useful role in many ways. But one must be clear about some of the inherent limitations. No information network can, for instance, make it possible to pick up a project from the shelf and make it available for use to a developing country. Each

technology application is different from another, though basic technological details might be the same. It is essential therefore that each user DFI develops its own capabilities to evaluate the 'appropriateness' of technology for its clients and identify modifications and adaptations required to be made for application in the case under consideration.

7.03 Often, DFIs on their own may not be in a position to develop in-house capabilities due to expenditure being disproportionately high. For instance, it may not be prudent to incur expenditure on in-house capability for comprehensive technological evaluation by DFIs in say, chemical sector, for one thing because it is a very diversified sector and because the scope for additional investment in a particular sub-sector of chemical industry may be limited in small countries. DFIs in such cases should locate consultants within the country or in other developing countries whose services can be used in appraisal of technologies in areas where DFIs' in-house expertise is limited. DFIs should identify, on the basis of investment forecast for the next few years, the volume of investment in different sectors

They should attempt to build up technical information base and manpower capabilities for evaluating technological contents atleast in these areas.

7.04 The role which an international agency can play in this regard would be as follows. An international agency such as TIEN could initially collate information relating to areas of investment from developing countries. It could then identify sectors where the bulk of investment is likely to occur in different developing countries. The likely areas of investment then could be subdivided into two broad categories, those which are relatively simple technologically and others which are somewhat complex. In addition to technology-intensive industries, capital-intensive and energy-intensive industries would fall in the latter category.

7.05 The help which TIEN could render to the two categories of industries would vary. With regard to the first category of technologically simple industries, TIEN could revive the practice of preparing a roster of projects implemented by DFIs in other developing countries with details of project size, raw material used, process technology, source of supply of technology

and equipment and similar other key parameters. In my view, the emphasis should be on the sources of technology over a wide spectrum rather than on comprehensive details in respect of each project. At any time, if a DFI seeks assistance of TIEN, the latter would be in a position to suggest alternative sources of supply. As it is the common experience of all the DFIs who have been called upon to assist clients in locating a source of technology, choosing a right source is an expensive and time-consuming process. TIEN could cut short this time and save money, by providing the necessary information.

7.06 While the roster could include in respect of technologically simple industries list of consultants, in addition to the basic technical details, in the case of the second category of industries, information fed to TIEN is likely to become obsolete more rapidly. In the case of this category of industries - technology, capital and energy-intensive the dependence on information available with TIEN would therefore be less useful. It is in this

case that TIEM should concentrate on preparing a comprehensive roster of consultants which, I believe, is already being done by it at present. The main role of TIEM could be to help DFIs in identifying consultants with whom negotiations could be taken up on bilateral basis. In my view, the issue of technology transfer is too complex and hence any institutional arrangement for facilitating its transfer must pay due attention to these complexities and aim at a gradual and step by step approach.

7.07 Indeed an international agency such as the proposed TIEM would have much greater credibility than transnational corporations which are often suspect in the eyes of developing countries. But it would be desirable to make a beginning with national, regional and international organisations in this regard. The concept of an exchange network can fructify into an operationally useful agency only if it is supported by national and regional organisations. The national TIENs could serve as repository of technological developments and capabilities within each country. Indeed, in the case of small countries, national TIEM does not make sense and therefore the

regional TEN may be considered straightway. It is obvious that countries within the geographical region would generally have trade and cultural relationship and are often might be endowed with similar natural resources. International agencies can play a major role in bringing the regional DFIs and other agencies together for setting up of a regional TIEN as well as in facilitating mutually beneficial bilateral negotiations.