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07902

Distr.
LIMITED

UNIDO/ICIS.56
25 January 1978

ENGLISH

UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION

Ad Hoc Meeting of Experts
Vienna, 20-23 December 1977

OUTLINE OF A PROGRAMME FOR A TECHNOLOGY POLICY (WITH REFERENCE TO GHANA).

Interim report *

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FOREWORD

In response to a request from Government officials of Ghana that visited UNIDO in September 1977, an ad-hoc meeting of experts was convened in Vienna from 20-23 December 1977 for the purpose of preparing a guide for the formulation of a technology plan.

The ad-hoc meeting of experts was attended by various staff members of UNIDO and the following three consultants:

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This interim report highlights the main issues of discussion drawn from the meeting and takes into account relevant knowledge pertaining to the formulation and implementation of technology policies in developing countries.

With the purpose of providing a conceptual framework for UNIDO's future efforts in this field, the need for a more comprehensive report outlining the basic principles of a technology policy and plan is emphasized.

This report is not exhaustive, nor should it be viewed as a final document and is only to be considered as a first step of a continuing activity. It should have to be enriched by further work and in particular from field work experience.

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INTRODUCTION

The discussions of the expert group were directed towards the following:

- A conceptual analysis and operational requirements to comply with the request of the Government of Ghana; calling for UNIDO assistance in the field of technological development.
- The formulation of a basic framework for future UNIDO activities in the technological field, and in the creation and strengthening of national capabilities for the application of technology to development.

A paper prepared by one of the consultants served as a basis for discussions and was subsequently broadened by contributions of all other participants. These discussions served to establish a common ground for the understanding of the nature of issues involved; such as concepts of a technology policy and a technology plan; supply and demand for technology (linkages of technology to production and development) time perspective for different actions to be undertaken, etc.

CHAPTER I

1. Concepts of a technology policy and a technology plan; initial definition and guidelines for further analysis

The group observed that while a policy has a long-term perspective and indicates the main lines of action about development processes, of which technological progress is only a part, a technology plan covers the aspects of concrete short and long-term objectives in the areas of effective application of technology to development and production goals; including the necessary recrientation; strengthening or creation of human, institutional and infrastructural capabilities.

In this context it should be understood that a policy is not an enumeration of actions but rather a guidance to select and initiate actions. Concurrently, a policy provides the criteria to refer actions and decisions through various means for implementing such actions and decisions.

The two concepts, policies and plans and their interrelation, need to be further elaborated for clarification of the framework and orientation of future action by UNIDO.

2. The technological variable as an incentive or as a constraint in the development process

Prior to reviewing the type of operational activities of a programme, such as the assessment of technological capabilities, it would be necessary to ascertain what new possibilities technological factors may contribute to open, and in what manner has technology become a constraint or has affected the national capacity for autonomous decision making and implementation, in the development field. It was noticed that to gain further knowledge in this area it will be necessary to consult with key personnel and government institutions, other than those that participated in preliminary discussions between UNIDO and Ghanaian officials.

3. Formulation and adoption of a technology plan and policy fundamentally a responsibility of the nationals of Ghana

It is to be stressed that only with the full participation of the Government it will be possible to draw the elements of policy and strategy in this field as in other priority areas.

On the other hand it was recognized that not only in Ghana but in other developing countries as well there is a lack of experience in the preparation and implementation of policies and plans in this area. Knoweldge and understanding of the complexities of

these issues are scarce. It therefore becomes imperative to assist the country in the fostering of such capabilities. This has also an implication for the time framework, as the process of building-up experience may take some time to do the field work and draw conclusions.*/

4. Current critical areas of concern in the productive structure

Various technical missions and the Government itself have expressed great concern for the solution of problems affecting the efficiency and breakdown of industrial activities in Ghana. **/

The working group recognized that this was a special area of preoccupation especially in relation to the short-term content of the technology plan. It also noticed that this area had been the subject of multilateral and bilateral aid as well as various types of conventional technical assistance (technical assistance not related to technological policy-making and planning) and that many technical missions and bilateral programmes exist at present in regard to this range of problems. It will therefore be necessary to assess the contribution of such existing programmes when drawing up further proposals for UNIDO action.

5. Existing technological infrastructure and its future linkage with development and production goals.

The situation in Ghana is similar to the situation in other developing countries, in which substantial efforts in the educational and institutional field for science and technology have been made.

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*/ The group felt that in the planning area there is more international experience available, than in the policy aspect and that it would be useful to draw on such experience; however, such experience has largely emphasized the supply side, i.e. infrastructure for research, etc. which is easy to budget and to visualize, while utilization and orientation of capabilities have legged behind in many countries.

**/ Guidelines for 1975-1980 Ghana Development Plan, page 18

It was found from several scurces that universities and research centres exist in various fields. On the other hand, there seems to exist what is described in some cases as a bias towards activities that have academic recognition - or at least a lack of orientation of the technically able researchers towards production problems and research.

This claim (as others derived from indirect evidence) will have to be substantiated by further field work, but it was recognized that according to the answer, the strategy in the short and medium term can shift between capacity utilization and capacity creation.

Conceptually speaking, capacity utilization is linked to the "demand approach" (identification and promotion of immediate applied activities) and to "learning by doing" e.g. developing R+ D management capabilities via specific projects. Capacity creation is related to traning and infrastructure development, the "supply approach". It was argued within the group that whencver capacity utilization via demand creation is possible, it will be most effective in shortening the time required for ensuring the positive contribution of technology to development and self reliance goals.

One key aspect of this is that if "capacity utilization" approach can be developed another critical aspect which is that of the user involvement, e.g. in identification of relevant research objectives and securing the prerequisite for the implementation of research results, can be brought in most naturally, to anchor the technological plan in the development and production needs.

6. Development of human capabilities

The development of human capabilities was revicwed and discussed in relation to:

- Choosers
- Innovators
- Operators

These refer to the selection of technological solutions whether through purchase negotiation, imitation or invention, the creation of solutions and the application and maintenance of the "know-how" available within the country.

Another important category is that of co-ordination and supervision to provide the unifying principles, to make and to identify and select options and to promote linkages, e.g. between the proper assimilation of imported knowledge and complementary national research activities aiming at reducing dependence or technology costs in a given field.

7. Patterns of industrial and general productive development and industrial structure

It was considered of interest to assess the overall pattern of development with respect to sector linkages, main input-output relation, use of local intermediate goods, existence of capital goods sectors with reference to national value added, sector and branch participation, depth of import substitutions, dependence on various inputs and availabilities, etc.

It was recognized that this knowledge would provide a view of the patterns of development and advancement of the infrastructure in the broadest sense, i.e. the productive potential, the technological levels already achieved, and the assimilation and adaptation of know-how in specific sectors.

Not all countries have followed similar patterns of acquisition of capabilities nor is there a fixed sequence of stages in technological development; but it is quite evident that certain metal working, metallurgical and chemical processes, activities as well as design, maintenance or trouble-shooting skills provide the basis and the linkages for the creation of industrial activities in specific sectors.

This composite know-how available at the national level helps also to determine import substitution and export potential activities at enterprise or sectoral level. The working group felt that this knowledge would be highly useful as background for planning the stages and goals of a technology plan linking this to a broad knowledge of the origins of specific technologies; ownership structures; concentration patterns of industry; and similar industrial economic indicators.

8. Direct and indirect policies and incentives and disincentives for technological development

Several dimensions of the "technological variable" in broad development policies as well as the reciprocity and existence of interactions were recognized, and discussed at the working group.

The role of technology as either a stimulus or a constraint on development efforts was the subject of detailed discussions. In this context the discussion included not only technological inputs for one or other industry, but the wider implications of technology for autonomous decision making; development constraints; international economic relations; trade; etc.that are conceived as integral parts of the general concept of"technological variable for development."

At the same time it was recognized that these relationships were closely interlinked and therefore that: (i) incentive policies; (ii) tax policies; (iii) trade bottlenecks; (iv) financial factors; and other questions of development policies and experiences were to determine the way in which the technological "TRUST" or "technological capital" of the country was to evolve, as well as the inducement of the productive sector for the recognition and utilization of such trust.

It was found that when there are import restrictions that in turn imply industrial loss of production jointly with "sellers" markets because of larger demand than supply, the prices at which

finished goods are sold are such that some firms make large profits operating only part of the year - this reduces any incentives for improving technology or efficiency.

9. The time dimension

The views expressed emphasized the need to consider and allow for several years of co-ordinated action both at planning and policy making in order that at the operational level the technological development plan could extend to its full possibilities.

There were some tasks that could not be postponed, especially in the area of current difficulties in the productive sector or inputs required in compliance with the current development plan.

10. Resources for some specific technological activities and relative complexity of policies and instruments

The general principles of national development of a technological capability must be adapted to the reality of the present stages of industrialization in Ghana (or for that matter of any other developing country).

The development or strengthening of technological capabilities via stimulus from the demand side is closely linked to policy considerations and studies for the "unpackaging" or "disaggregation" of imported technology.

It is to be recognized, however, that a minimum set of prerequisites for this policy involve some minimum level of consultancy; engineering, and design services, as well as equipment contractors. Even a moderate start in the supply of some peripheral technologies or equipment, separated in the "unpackaging" from the "core" of technological components, would imply the ability to undertake feasibility studies, selection and negotiation of contracts, some design and construction capabilities, etc.

With respect to the industrial and human components it was recognized the need to identify the level at which national capabilities have already developed and to programme activities for "learning by doing" from that level upwards.

In the case of consultancy services, for example, two levels requiring assessment were described.

- The availability of services for public and private application in the formulation and implementation of projects as well as plant operation.

- Capabilities required to undertake tasks defined within the scope of the project to be unpackaged, for example, the possibility of participation of the mechanical engineering department of a technical institute or university in the structural design of main or acillary components of an industrial plant.

This chapter of the report deals with conceptual considerations that may serve to orient future activities of UNIDO in this field. This, in turn, will serve to design operational activities to be further developed through field work.

CHAPTER II

Field Work

The various aspects and considerations outlined in the previous chapter required further elaboration on the basis of field work. The methodology for assessing the technological capabilities at the national level, was subject of detailed discussions. It was agreed that this essential prerequisite had to be covered at the three different levels:

(i) at the enterprise level;
(ii) at the institutional level;
(iii) at the policy level.

The systematic identification and assessment of technological capabilities was to be undertaken as an in-depth analysis of relevant skills.

At the enterprise level

The technological capabilities at the level of the enterprise could be studied, both with regard to existing industries and also in relation to new enterprise development. Implied in this analysis was the need to differentiate the various productive units within the country not only as they relate to various sectors of industry, but also regarding their ownership structure, size, product mix, etc.

This distinction appears to be relevant in view of the different objectives pursued by various enterprises; their ability to react to technological and financial problems and the degree of interlinkage needed between them and the government.

Similarly, it is important to study the industrial structure within the country vis-à-vis (i) sectoral development; (ii) advancement in the technology field; (iii) foreign participation; (iv) size of enterprise; (v) local value added, etc.

Furthermore, a structural analysis should be evolved for the purpose of determining the manner in which technology has been applied, the experiences of these enterprises in dealing with foreign groups, and in particular in relation to foreign participation, and licensing history in the licensing and technology from external sources.

In this area special attention was to be given to identify interlinkages such as the utilization of capital goods and intermediate products available in the country.

At the institutional level

The assessment of technological capabilities at the institutional level is required in view of the significant role that these institutions are called to play in the implementation of a technological policy. Recognizing as well that government institutions would have to be instrumental in orienting and enhancing local capabilities, there is a need to ascertain at this level, the type of existing linkages and capabilities that exist within various government institutions.

The assessment of technological capabilities at the institutional level should in particular pay attention to R+D units, universities or technical institutes and consultancy and engineering facilities, information centres, and other government agencies having direct responsibility in promoting and regulating industrial activities.

At the policy level

At the policy level the assessment of capabilities would have to give particular attention to identifying what are the existing policies related to technological activities and who are the people and agencies in the government at various levels of decision-making that should be contacted and have to play a central role in the development of this programme. The latter aspect concerns itself with ascertaining their views and the level of understanding vis-à-vis the objectives and implications of a technology policy. In this connection, special attention will be devoted in identifying the human aspects and capabilities available within the country.

Finally, it was stressed that towards evolving a criteria to deal with this programme it was necessary to underline the role of technology as an element that provides a stimulus for growth in the economic and industrial sphere. A more specialized survey and appraisal of industrial activities in a number of sectors chosen in the light of local conditions and the relative importance of these sectors was the subject of careful deliberations.

Possible sectors for appraisal

Tentatively and subject to further analysis a preliminary listing is given below on possible sectors for appraisal in the context of preparing a technology plan for the Republic of Ghana.

- Mining - exploration techniques of mineral resources, their recovery and utilization (particularly bauxite, manganese, limestone and silicate deposits);

- Agricultural resources oriented industrial technology requirements, particularly
  - cocoa and cocoa-based products, for which a comprehensive research and technology development programme could be considered;
  - timber-based industries, applied research programme;
  - other food processing and -preservation industries, various types of technological know-how to institute new industrial development;

- Domestic consumer oriented product technology requirements - these would particularly relate to increased domestic supply and quality improvement of daily livelihood consumer products, durable articles for which primary acquisition and dissemination of the "initiation" type technology know-how may be required;

- Imports substitution programme for partial yet systematic replacement of long-term of imported materials, semi-finished products and capital goods. The technological know-how requirements may in this instance involve also integrated product and process know-how of a comprehensive nature;

- Export products quality improvement measures, including the strengthening of commodity inspection and a longer term programme for sustained development of quality improvements;

- Housing and construction technologies oriented towards urban as well as rural development respectively.

The above listing may require further expansion and is to be determined in a more definite form during consultations with the Ghanaian authorities. During such appraisal the total structure of the Ghanaian economy and national development objectives on a longer term are to be considered (the present level of industrial development, the envisaged contribution that the industry sector may make to the Ghanaian economy over the next decades, the external trade situation, technical education and training, and financial development resources). In appraising the above sectors, some specific appraisal criteria may deserve particular attention. The capital labour ratio would in connection with the capital constraints presently effecting the Ghanaian economy be one of the primary considerations. To strengthen a coherent pattern both with immediate impact as well as development on a longer term, a systematic analysis of technological manpower requirements is needed, directed towards:

a) policy-making levels
b) system operation and maintenance levels
c) to support creative and innovative development.

Another aspect which may deserve special consideration are locational factors. Seperate from the industrial location policy it would seem appropriate for the structure of the Ghanaian economy to concentrate technological development activities in a few "concentration locations" (e.g. Accra-Tema region, Kumasi region, and possibly a third region).

As regards the mechanics of the mission that may go to Ghana, it was agreed that the mission will achieve the following main tasks:

- test the findings of this meeting and provide feedbacks;
- transmit to the Ghanaian authorities some of the ideas and concepts that have emerged within UNIDO;
- revise the proposed programme to Ghana in the light of the findings of the mission.

Outline of the work of the field mission

It is envisaged that the work of the mission would proceed as follows:

preparatory desk work - visit to Ghana - drafting of report

Step I: at UNIDO's Headquarters, in which a reference file on Ghana, in genral, and its development plan and economic situation, in particular, will be compiled. Special attention will be given to the industrial sector and its development.

The material collected will be collated so as to provide specific answers to the "check list" prepared for the field mission on the basis of the paper presented to the ad-hoc meeting and the discussions.

Gaps in information, or "grey" areas will be clearly identified for further information to be gathered in Ghana.

It is obvious that the clearer the picture that emerges from this excercise and the greater the number of answers provided, the more effective will be the work of the mission.

It is thought that this phase might take 2-3 weeks of desk work in Vienna.

Step II: visit to Ghana of advance party (one member mission) 1 - 2 weeks.

His tasks will be:

- to establish contact with Ghanaian authorities and particularly with national counterparts;
- to acquaint them with the outline of the terms of reference and plan of action of the mission;
- to identify and contact the various organizations, and - if possible - the individual(s) in each, who will be visited by the mission;
- to draw up a tentative itinerary on the basis of these contacts;
- to check - as far as possible - on the validity of the information collected in Step I, fill in the gaps and clarify ambiguities. This will probably involve collecting and analyzing more literature and data obtained on the spot.

Step III: field mission in Ghana, 2 - 3 weeks (2-3-man mission) Work will proceed according to the final itinerary mutually agreed upon with the Ghanaian authorities, and in fulfilment of the terms of reference, guidelines or "check list" finally adopted for the work of the mission.

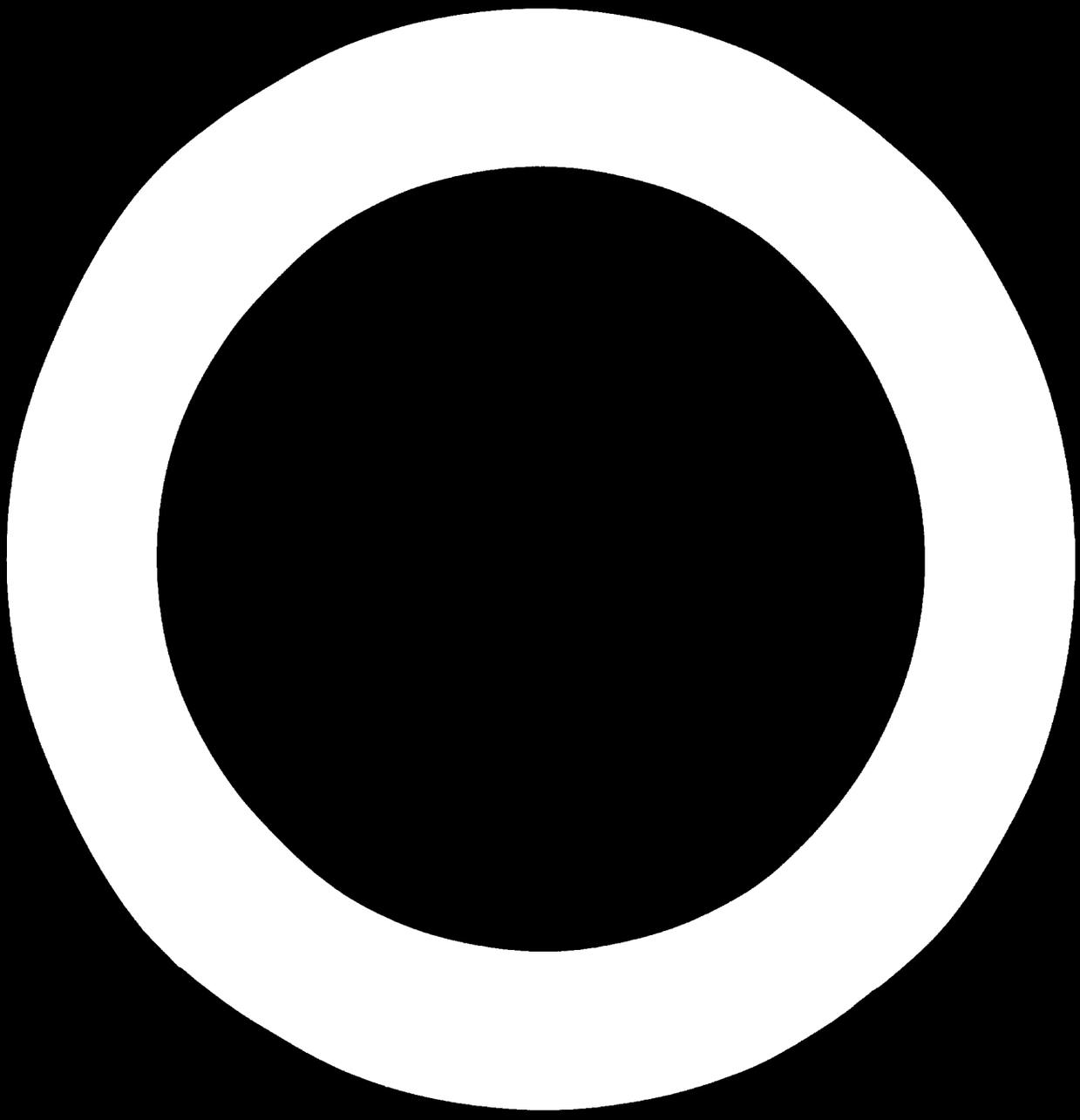
It would be useful to pay special attention to :

- the political "weight" of persons interviewed;
- assessing the professional standing and experience of individuals at various manpower levels;
- differentiating between "official" attitudes and personal views of persons interviewed, as the latter can provide useful significant information and suggestions.

The work will, naturally, be reviewed and discussed periodically within the mission and with the national counterparts and alterations in the itinerary and further information identified and appropriate action taken.

Step IV: final report will be drafted in Vienna. This would take 2 weeks.

The report will in particular address itself to the Ghanaian scene and outline programmes for further action, short and long-term. It should also provide useful feedback to the conceptual part of the excercise concerning UNIDO's line of thinking and possible future actions on matters of technology policy and plans for other developing countries.



ANNEX

AN AIDE-MEMOIRE AND DISCUSSION PAPER FOR DESIGNING UNIDO TECHNICAL ASSISTANCE TO A MEMBER COUNTRY IN THE FIELD OF TECHNOLOGY POLICIES

PART I : CONCEPTUAL DISCUSSION

1. Outline of paper

This document has two parts:

(i) a conceptual treatment of the scope and content of technological policy, and areas, means and strategy to establish it (sections 2-6);

(ii) tentative programme to establish technological policies and execution of relevant activities in the country that has applied for assistance in that field.

The conceptual discussion examines what is technology, what is a technological policy, interrelations with global development policy, specific instruments, feasible ways to establish it.

Span of ideas has to be kept open to avoid prejudging on policies most appropriate for this specific case (not same policies suit all countries).

There should be no conscious or unconscious attempt to replicate in this case policies which were adequate for other countries or regions. Such experience is, however, valuable at a more "abstract level". To assist future work in this matter we include an assessment of what type of knowledge and information about the country would be required.

2. [illegible] approach to what is technological policy and problems observed in that context

First clarification: a policy is not a list of actions. It is rather guidance to select actions. A policy gives criteria to refer actions and decisions to, and to choose the means for implementing such actions and decisions.

Policy making is concerned with developing or identifying relevant knowledge for particular problem areas. The policy options are specified using that background. The outcome is not less and not more than a set of principles.

This is to be contrasted with a plan or programme for specific achievements such as securing specific technical inputs for specific industries at given dates. This has to be done, of course, and it is very urgent in the case that occupies us, but it constitutes a different level activity.

It can be quickly seen that the second activity has to be carried out (ideally) within the terms of reference established by the first one.

In very simple, terms, the first one would indicate the "policy for shopping for, and/or for creating, technology".

The second, the programme, would include the "shopping list" and the purchases or developments to be carried out according to the criteria arrived at in policy making.

Policy guidelines are, however, broader than what the concept of purchasing/creating technology would seem to indicate. Sometimes it is obvious and explicit that a certain action belongs in the field of technology: e.g., signing a licence contract or developing a new process. But many more activities have a technological impact or technological "angle" to them. A tax, tariff, a development loan, a foreign investment, can be shown to have an effect on technological development besides its primary goal of raising a revenue, starting a productive activity, etc.

The rôle of the technological policy makers consists then in perceiving and specifying this "indirect" technological angle of development activities (and evaluating their impact and the need for their regulation) as much as dealing with the direct questions related to technology.

Policy makers have to learn in each national context how do different apparently/(unrelated) activities affect in fact technological development, and how do technology and specific technological activities affect the others.

We shall come back to these matters in other sections of this paper, building up progressively our definitions and understanding. By way of example, however, and without suggesting that this is representative of the country that will be studied, we shall complete this section with an illustrative list of situations typical of countries that find themselves in problems with the "technological variable" in their early industrial development:

- Production decisions incorporate "wrong" types of products, e.g. by imitation of foreign consumption patterns.
- Technologies acquired displace or preempt actual or potential local skills.
- Technology development left to particular inclinations of researchers developed during training - technology not related to production..
- Imported technology not understood, taken apart and assimilated to assist in better application, adaptation and as step in substituting local technology in part at least for imported technology.
- Contractual obstacles to such understanding, e.g., prohibition of further use, patent systems blocking local developments.
- Contractual limitations to expansion of use of acquired technology (e.g., export prohibition clauses).
- Unnecessary purchases (of goods or technical components) tied to necessary purchases of knowledge.
- Lack of criteria for selection of technology and confusion between different kind of goals such as efficiency, global output, development of initial skills, employment, income distribution, etc.
- Development of national technological institutions unrelated to the productive units and processes.
- [illegible] or non-existing purchasing and contracting policies in the public sector or enterprises.
- Weakness of infrastructure and manpower, and/or underutilization of what already exists.
- Lack of consultancy, extension, information and other "link-up" facilities.

This list helps us illustrate the point made about differences in the "abstract" structure of a policy and the complete, scheduled, contents of a plan: the problems just seen are not referred to specific products or branches or sectors: they can appear in anyone, and furthermore, they are created by many different causes in legislation, administrative practices, different areas of public and private decisions, etc.

More strongly we can show that neither of these problems is solved by a purely technical decision: the discovery of one or several new processes, or the hiring or training of a group of plant managers or the opening of a new research institute are not in themselves policy solutions that will positively influence future events, e.g., if by a fortunate coincidence a researcher who pursues a personal interest discovers a useful process this does not guarantee that other research undertaken will be increasingly useful (closer to development production goals) in the future.

3. The current state of the country's development and technology: forms of appraising it

In this section we shall not make a case for inventories of scientific installations and personnel as a means for assessing technological capabilities of the country under study. Nor, when explaining the proposed method of assessment, will we mean we require a complete and detailed appraisal of the country's productive structure to be especially prepared for this project.

The information needed has to be correct but in terms of broad orders of magnitude chosen to indicate indirectly the main features of the economy, the depth of industrialization, the extent of the markets and prospects for different types of goods, the degree of integration of production, etc.

It is important, for example, to know if import substitution - of the final goods/final touch type - has created linkages or not, if there are already rigidities in input structure, what levels of intensity of capital and skills have been achieved (as shown by branches in operation, value added, processes incorporated).

(Remember that the technology fixes itself in production processes and not in libraries or laboratories).

Data needed will include rough ratios of subsistence vs. market economy, agriculture vs. industrial sector, industrial product vs. national product, consumer goods vs. intermediate goods vs. capital goods, purchasing power and its distribution, ownership of industry, capital accumulation, role of the state, forms of financing, industry branches, modern or primitive establishment, concentration, capacity utilization, origin of the technology and conditions, origin of capital and intermediate goods, efficiency, costs, etc.

Other questions will cover the more specific aspects of capabilities for technology, but noticing, as we anticipated, that education, science and technology inventories are not enough. We need , of course, to know the availability (quantitative and qualitative) of engineers, physicists, chemists, and when and how are they working together in research units or in the universities. Or we need to know the status of technical libraries and laboratory facilities. But we need to know some different things too:

a) We have to appraise to what extent their resources are oriented or anarchic, and in what direction, and by whom, e.g. assuming there exists technological research, and further assuming that it takes place in a potentially beneficial field, we still need to make [illegible] in a productive and distributional structure that can eventually take up the results for effective final application.

b) We need knowledge of the linkage functions such as consultancy, extension and information, how they are performing and contributing to the integration of technology and production.

c) We need to know the ways in which technology is being obtained (investment, licences, consultancy, imitation, invention) and with what results (in the production process and in forming the technological fund of the country).

d) As we asked about technological assets we need also worry ourselves about problems. What level of skills and knowledge constitutes a development bottleneck and why? What are the practices in research and in purchase of knowledge that reinforce weakness and dependence?

These and probably many other questions must find answers. This is not to say that any effort to start building technological awareness and capacity has to be postponed until a deep study has been completed.

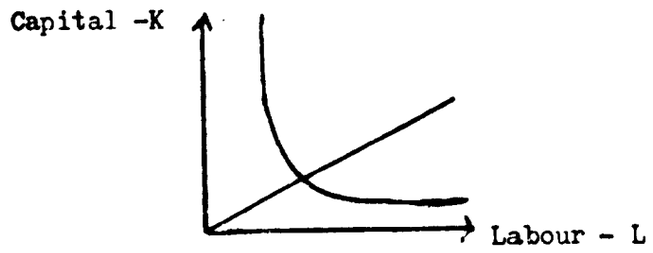
The point is rather that this knowledge has to be progressively improved as background information of the forthcoming field/ mission and technical assistance operation and for the regular attention to technological policy matters in national planning. It should be clear that most of the socio-economic data will already exist in pertinent government divisions, therefore the need is for finding, collating and interpreting the data in such a way as to throw light on the extent and structure of the acquisition (in the sense of productive assimilation) of technology in the country.

For example, although it would be unscientific to say that most countries follow similar technological development patterns, comparison of production levels and depth can be possible against the experiences of other countries and carefully used may be of guidance to assess the underlying technological advance of the sectors and of the country as a whole.

4. What is technology?

We need now to become more specific about what is meant by technology. We avoided a detailed discussion until now because an intuitive knowledge of the term was enough to/ carry us through other discussions. But we now want to emphasize certain aspects - the "social" aspects of technology, i.e. technology as an attribute of a whole society, and this needs elaboration.

In the first place, some definitions currently used. For example, an economist could define a technology by a production function and the technique or proportion in which the factors of production are used by a straight line through the origin (assuming constant returns to scale, etc.) when there is substitution between factors:



If there is no substitution, the case of fixed coefficients can be represented in various ways, one of which is the input-output matrix.

Alternatively, it can be said that "technology is the aggregate of knowledge strictly necessary for transforming inputs into goods and services".

These definitions and others could be discussed and criticized but even that clarification would not get us closer to our goal, because of the narrow construction used in those abstract approaches. Notice that those definitions can very happily operate in a vacuum or in a spaceship in which one operation of production is located. But we are interested in discussing the development of a nation, and we have to pay attention to the fact that the technological capacity of such nation is not encapsulated in any finite sense in any type of material depository. Even in common, ordinary language common sense helps people to recognize that "Switzerland has watch-making technology" or that"Britain had technological leadership in the XVIII century". The notion of technology as a characteristic of a whole society is justly incorporated in such parlance.

If that is the correct way of looking at it, it better be known, so that attention is payed to the true dimension of the problem(s) of technological policy: to promote technological development one would need to act in such a way that all participating levels of the society receive some stimulus in that direction */.

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*/ Under certain assumptions the market, it could be argued, can do that job, but the context of planned development and the reality of underdevelopment and market imperfections allow us to ignore this possibility.

Can we agree that technology is not a formula or a building with testing equipment but a social ability with countless components? Without pretending to present a philosophical proof, we can indeed for a moment look at it that way, for example in the case f a firm that "possesses technology" and applies it. Where is that technology in the firm?

Can we find one, two or ten experts, engineers and scientists who "know" and control such technology in the firm? Indeed, there may be in the enterprise some persons 'possessing' key knowledge, difficult or impossible to replace, but even they do not "possess" the whole of the technology; they know the processes and can improve them or invent new ones, perhaps. But the technology is in the whole ongoing industrial concern, spread over several hundred people; they are in technical departments, specializing in different operations, testing for quality, designing, maintaining the productive equipment to the specific standards; they are in the shop floor operating the equipment; they are buying the inputs and directing the activities of suppliers via technical specifications; they are organizing the flow of production or costing the operations. And outside the plant there are other suppliers with technical (and plant) capabilities to build or modify equipment as required. I.e. whether we look within the factory or outside it at the whole society we find a web of interlocking skills and services anyone of which has a part of the, and in, the firm's or country's technology, and a limitation of one specific capacity may become a social limitation.

E.g., it was recently revealed in a large industrial country, which has pioneered the nuclear industry, that there is at present no (national) firm which can make the main steel pressure vessel of Light Water Reactor systems to the required specification. This shortcoming closed technological options to such country, forcing it to import the pressure vessels and preventing future exports - <u>in spite of the regular award of Nobel prizes to that country's scientists.</u>

The preceding paragraphs therefore strongly suggest that a technological policy (as opposed to a technological "shopping basket" type of plan) has to concern itself with transformations in the whole of the productive network of society as well as with possible shortcomings of some functions.

5. Is a technology policy possible?

The preceding discussion seems to indicate that it is not possible to induce technological development as it would require to simultaneously reach an infinite number of agents with the relevant actions: i.e., if technology is a social skill, of which many members of society are individually (or collectively as in a firm) the holders, it would seem to follow that it is not possible to train all of them, or to supply all the information that each and everyone requires, etc.

But that is not the content of a policy. As we said a policy is made of guidelines, criteria, indications of means. It operates on what is common to many individual situations and their number is not an obstacle. The description of technology as a social attribute is there to motivate our work and not to inhibit it. It should lead us to more correct proposals than we would have reached, if we had adopted a more simple minded view.

The technology policies adopted in other developing countries have suggested methods to achieve the wide-spread impact that we have shown as:

- One technique used is the generation of demand for local technology e.g., by acting in the "breakdown" or "disaggregation" of imported technology. Each operation of purchase of technology, even if it is decentralized, has to go through a process of analysis and negotiation that deepens the utilization(and, therefore, encourages the improvement and further development) of local capabilities. (This is based in turn on the observation that, given previous effort in formal education and in the promotion of science even if only at academic level, there is always some talent and infrastructure available).

- Another structured technique is the assessment of overall needs of development programmes and public sector purchases and the establishment of preferences and support for local services and equipment.
- To be able to spread production technology common to many aspects of manufacturing, information and extension services extend their action to the whole range of industries.
- Regulations on licensing, patents and others are modified to ensure they promote and not inhibit technological development.
- Correct research and transmission procedures are demonstrated via projects undertaken by existing technological institutions.
- Firms are required to present project proposals for applied research as they contribute to a fund to finance such activities and the best projects are selected to be financed by the fund.
- Tariffs, taxes and incentive structures are examined to make explicit their effect in promoting or blocking correct technological behaviour of ecnomic agents.
- The effects of technological options on development objectives such as employment or income distribution are analyzed to provide criteria for other policy actions.

In conclusion, a number of methods exist and can be created, to widen the reach of policy. The first step is to ensure awareness of technology as a feature and an asset of the productive unit or country, and to understand that - not withstanding the intrinsic merits of scientific achievement and/or invention - the point of technology is to acquire and exercise a comparative advantage in production. The technology position of a firm or production unit of any kind has to be as explicitly understood as the financial or commercial position, meaning by this not only knowing the technological assets exist but knowing how they are constituted and the individual value of the components of the"asset bundle".

Once this consciousness is acquired, it becomes possible to visualize either the consequences of any action for the technological position, or the consequences of the technological actions for the overall development of the concern, sector or country.

Finally, to make clear not just that the technological policy is a possibility but how it is to be constructed, we have to add that it must be a gradual process. There are several interacting factors behind this requisite:

- Some initial help may come from international technical assistance but no definitive policy commitments can be taken until full responsibility has not been transmitted to qualified personnel in the national government.
- Initial resources of personnel and information to specify the policy are scarce. (As we shall see, the progressive development and application of the policy generates more of these resources as they "learn by doing").
- Although initial assessments must be quite broad and quick to allow a minimum of actions to start immediately, the deepening of the policy studies and decisions takes time (see section 3 for example for information requirements).
- Having selected a number of areas of action for immediate application projects with the double aim of reaching a specific goal and supplying a training and demonstration ground, certain time will elapse until they are implemented, completed and evaluated.
- Technology policy is not to be left just to isolated "technology policy units". Technological criteria, as well as criteria with respect to technology, have to appear in other policy areas, and this will take time to achieve because a number of persons in different areas of the administration will have to become familiar with the new (additional) aspect of their functions and will have to develop procedures and criteria to link their field with the field of technological policy.

In consequence, it is not possible to implement a technological policy by the production of a set of documents and official instructions and regulations. Neither could it be done by a technical assistance mission not by a national committee and/or legislative body. A progressive approach is required.

However, we are not saying that the whole matter of adopting a policy and a plan with respect to technology has to be postponed so that prerequisites can be previously fulfilled. All we suggest is that an evolutionary approach is needed. The actions that conform that evolution should start in the shortest possible time and it should be possible to assess them very soon. In fact, the first contacts of the national government with UNIDO are clear in indications of what is needed in the shortest term and it is clear that the first steps of any programme should account for the needs so identified.

The point of our argument so far is then not to deny or postpone attention to well-known problems, but to provide a framework that will enhance the role of the relévant set of projects to become the first steps in the evolutionary process of a national technology policy.

Part II of these notes takes up this objective in the context of describing a progressively developed technology policy, that will rely far more heavily on doing and on learning by doing than on abstract plans, thus developing in parallel the policy, the instruments, the actions, and the personnel and institutional capabilities required in government, production and technology itself.

6. On the possibility of optimum short-term use of limited resources

When, as in this case, the national government (and the international organizations which act in its support) face the need of dealing with shortest and long-term issues simultaneously, keeping the proper perspective on ends and means as well as defining exactly the role of participants in the process requires special attention to avoid unbalanced solutions and to make sure the available resources are used in an imaginative way in the process.

In this case the range of required actions goes from securing immediate improvements in industrial operations to incorporating technological policies into the long run planning and programming.

A lack of balance in design and/or implementation of the necessary measures can lead to some of the following mistakes:

a) Concentrate on covering present needs only, relying on technical inputs (technical assistance, foreign consultancy and/or technology and/or investment) in an ad-hoc basis without an integrated vision of the consequences for the whole technological process and without establishing any foundations for the medium-term satisfaction of broader needs.

This can include as a special pitfall excessive reliance or methods that require longer time for yielding results, as may happen if too heavy a burden is put on formal training of technical and managerial staff, which may take years.

It also includes the dangerof overlooking the specific short-term contribution that local personnel could make if redeployed for better contact with industry, as in backing up extension and information activities.

b) At the opposite end of the spectrum, concentration on the sometimes called "scientific and technological infrastructure" (..., ... facilities and personnel) and quantitative goals in ... "supply" of advanced capabilities, may not only distract attention from urgent short-term action but ... so mislead the government into believing that the links between science and technology and production will be automatically taken care of by institution building, observation trips abroad, creation of hierarchies in the scientific community, etc.

Our point of view (working hypothesis to be verified) is that, even if there is only a limited number of trained technologists and engineers, there are probably ways of increasing in the short-term their impact on industrial decisions and operations.

A first step on any programme must be the assessment of this possibility closely linked with evaluation of the feasibility and requirements of in-plant advisory extension services, information support and trouble-shooting and short-term training on specific skills for managers with responsibility for running industrial plants, e.g. in organization of production, maintenance, etc.

It is not known a priori if this is possible but it is worth indicating that it may entail some temporary or permanent changes in the role of existing staff and institutions.

We are thinking for example that, on the one hand, a too formalistic approach may block personnel mobility, by stating, for example, that university scientists, technologists and engineers must only devote themselves to certain levels of teaching and research; while on the other hand many times it happens that many of them could break production bottlenecks by part-time trouble-shooting and advice to industry; as well as acting as referral points for the research for available free information and technical data required in the production process. Another hope would be to engage more closely this qualified staff in the design and testing of national equipment and adaptations, acting perhaps more as design consultants, than as researchers, for some time (as it happens even in advanced countries in war or space programmes in which the formal science-technology-production links have to be shortened and the scientist successfully contributes to design, pilot plant or equipment building and organization of production).

Finally, with respect to plant or technology which are imported, if there are not enough engineers for techno-economic evaluations, the technologists of universities and research institutes could give substantial support to project evaluation teams in understanding the various implications of alternative technical proposals.

We are hoping in conclusion that, assuming that at least a core of capable personnel currently exists in institutions not linked to decision and production, their capability could be brought into industrial and technological matters on at least a part-time basis to bridge the gap in time that more formal training would require, through the mobilization of existing knowledge in the community.

(An additional benefit would be the forging of permanent links between the scientists and the producers which would survive the return of the former to their more specialized tasks).

All of this is, of course, tentative and requires an on the spot feasibility assessement before making it into a strategy, but it has been included in this paper to broaden the scope of ideas beyond the more formal and hierarchical notions that could be suggested by the example of more static scientific, academic communities of highly industrialized countries in which a higher specialization is possible and only rarely an emergency may suggest questioning the existing structures.

PART II: TECHNOLOGY POLICY, STRATEGY AND ACTIONS

7. Areas and stages

We are clear that we do not expect to see a technological policy established in a monolithic, once-for-ever, way. We know that decisions on guidelines for action, criteria for decision, choices of means, will have to be developed over a period of time.

We can be slightly more specific about the main thrust of policy and policy making during the first stages of its development (we are not however specifying the concrete actions and goals but the general type of results pursued).

At the beginning, there is bound to be some confusion between overcoming current difficulties in the productive sector, and technology policy activities. In terms of industrial development, a number of assistance and training activities could take place, without reference to technological policy. They become technological policy activities only when they are explicitly managed to generate awareness and experience of technology as something that has a meaning and importance in a broader concept. They also contribute to technological policy as the specific experience of those activities allows to understand the way in which the technology factor can be handled in development. Also, insofar as personnel become familiar with looking at things from this point of view of the behaviour of technology, they can become involved in the design of policy. Economic and planning experts and managers who supervise these processes similarly increase their awareness and understanding of technology as an identifiable factor.

The initial stage would therefore comprise two types of activities: those motivated by the shortest term priorities, rehabilitation and modernization of industry (in which the "learning" about the technological factor would be not the main outcome but a "joint product") and others undertaken more specifically to learn through doing (e.g. in areas of search and negotiation, diffusion and information, applied research, etc.)

A new stage would then see the establishment of effective policies and instruments in the required areas. We do not know with precision what these areas will be: the learning by doing includes finding out (in the initial

stages, through the experiences pointed out) what the relevant areas, boundaries and interrelations are. But we can point out the more likely spheres:

Operational areas: Creation (adaptation, invention, innovation)
Absorption (search, negotiation, implementation, assistance training, complete assimilation)
Support (information, extension, standardization)
Industrial continuing technology processes (in-plant adaptation, trouble-shooting, extensions and new applications).

Direction areas: Management of knowledge-oriented activities
Policy-making on technology

Capability areas: learning formally and on the job, technological skills at operational and direction levels defined above.

At such stage, the understanding of interrelated implications of different actions in the planning and administration of development, in running the production system and in the explicit operation of technological programms, should be quite advanced and policy-making in the areas indicated should have become quite reliable.

The technological factor would at that stage have become well integrated with the rest of the development policy, with the centre of gravity of technology policy close to the planning and production institutions.

Also, thetechnological policy would have to be internally integrated as well. The areas shown are not independent but interdependent (witness the important relation (option) between creation, and external absorption, as shown in the use of "disaggregation" as a policy instrument.

The question will surely be raised, what are the resources for developing this policy-making (and execution) capacity. Will they have to be especially added to administration? Will the local personnel be recruited from the current professional pool? Can it be trained? Will it be necessary to establish an institutionalized policy-making system?

We cannot answer these questions in detail but in principle the strategy should be one of finding roles for existing resources rather than embarking on development of entirely new "cadres". With respect to institutionalization, the approach by projects may postpone the need for creating bureaucracy or technocracy for at least two or three years. Perhaps the

only concrete recommendation would be to establish an interagency "thinking group" on technological policy, in the Planning Office area, or in the Ministry of Industry or its equivalent.

8. Possible range of technological programmes

To conclude this paper with a possible foundation for concrete activities we shall now tentatively list/ those eligible for a programme (of several years duration) for a country committed to the development of its technological capacity in an orderly manner.

The actual timing and interrelation of projects and adoption of policy measures in each andall areas will depend in each case on the ability of the country's government (assisted by UNIDO staff and consultants as required) to assign existing resources to and develop new ones for the project activity areas to maximize the acquisition of experience to gradually reduce technological dependence. The feasibility of any schedule can only be assessed by the UNIDO staff, consultants and national counterparts by analysis of conditions on the spot; it may require several rounds of discussion and proposals, because this area of work is largely uncharted and it will therefore be advisable to allow new ideas and orientations to mature before launching programmes of uncertain success. In other words, the content of this section is quite tentative and presented as a basis for discussion only.

(On the other hand, at least some support activities are clear cut and the need for them has been stressed, therefore some practical start may be made in the field of more urgent assistance to the productive sector in the shortest term, while medium and long-term actions are specified).

The proposals to be presented encompass those already discussed at UNIDO Headquarters with a delegation from the country under study and incorporated in a draft set of projects in that opportunity. This new document, however, introduces fundamental changes in orientation, broadens the scope of the proposals towards production and planning in the economic sphere and sharpens definition of roles of institutions and staff. The possible goals of "technology management ability" at macro and micro levels become more visible and therefore more open to profitable discussions.

About the time horizon, it should be kept in mind that the final goal of this programme will be to establish in the country a technology policy prepared by nationals of the country. This means that it will be required to develop the necessary capabilities where these do not exist. It will be necessary as well for national staff to become fully conversant with the role and limitations of technology policy and its instruments before a formal policy-making effort is established. We may, thus foresee first a stage of perhaps two years in which a number of practical and training activities will be undertaken; second an interval of evaluation finally followed by the setting up of a formal policy-making effort and preparation of a proposal and its discussion within the government for its approval.

The final stages are represented in the list below by subsection C. Activities A and B are the ones with the highest impact in the shortest term. At the same time A and B together with those from C to F have the three-fold role of providing positive results */, training personnel and building up expertise, and experimenting with and analyzing theoretical and environmental factors to obtain the prior knowledge required by the policy-making effort itself.

These activity areas are discussed individually in the final pages of this section in order to facilitate their analysis by the Work[illegible] Group. It is to be noted that there will be close interrelations [illegible] between these activities within the overall programme, t[illegible] paper does not cover this last aspect in detail. In fact, although the ultimate goal of this analysis(and of the discussions to be undertaken between December 19 and 23) in the preparation of a specific proposal including detailed description of UNIDO participation, it is not yet possible to outline such proposal. The scheduling of national implementation and UNIDO support cannot be undertaken before agreement on the general orientation is evolved at UNIDO Headquarters and appraisal in the country itself has been conducted.

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*/ In term of some immediate solutions for the industrial sector.

A. Short-term technical and technological assistance

This activity is the one that is closest to conventional technical assistance from external sources for the industrial sector.

We assume that all the ordinary techniques in that matter are valid and required in this case too. We believe the situation in the industrial sector does not admit postponing support and/or remedial action. But there will be a difference in that a specific effort will have to be made to establish these support activities in a framework of at least some "abstract" thinking about the overall goal of technological management. It will not be enough to resolve problems with outside inputs. It will be necessary to improve the overall problem solving capacity of the country at the same time. The indirect implications of technical solutions apparently correct in the short-term must be appraised, and national staff must participate in this process.

B. Industrial extension services (IES)

An expanding industrial sector pressing against the limits of the accumulated managerial expertise and availability of production and industrial engineers will possibly require a service activity to deal with day-to-day production and management problems, information needs that do not involve sophisticated search for new knowledge, etc.

An IES is a permanent link between operating enterprises and formal and informal sources of assistance and trouble-shooting. It may help to bring about more fundamental changes, but in principle, its function is to fill gaps in managerial ability and to bring a fledgling industrial sector to a minimum level of technical competence.

An IES can be established with the involvement of existing technical and research institutions and technical and engineering staff with in-plant and production experience.

C. Short informative and diffusion courses.

It will be convenient to create awareness of what is planned to do and understanding of the basic principles by means of conferences, short courses and discussion seminars on the matters involved in the explicit consideration and management of the technological variable-in general and in developing countries.

The target population for these courses will be constituted by appropriate groupings of senior and operating staff in different branches of the government, the promotion and development institutions, the producing sector (public and private), and the scientific and technological research community.

The contents of Part I of this paper is an appropriate example of the issues to be explained. Also, the relation between technology and economic and business power of industrial countries has also a great didactic potential.

Subjects for lectures and conferences will range from the more abstract topics of what is a policy and what policies are possible and what elements they comprise, to the explanation of activities to be undertaken in extension, information, search, evaluation (including criteria), unpacking of technology, organization by projects, programmes and institutions, applied research and implementation of results, etc.

D. Doing and learning in specific areas

It is impossible to train technology searchers, evaluators, planners and researchers just by formal teaching. There is a role of course for basic academic education, which we assume takes place

in any case */; there is a role for "consciousness raising" as in C above; there may be a role for complementary education, as in F below.

But there are two important reasons for recommending doing and learning, and learning by doing:

(i) There are no formal techniques for the training results desired;

(ii) We should absolutely avoid separating personnel from what are or should become their responsibilities. It is bad enough to have to cope with an internal wastage of talent caused by erretic and self-serving scientific work (which even if "good" can not go very far in a depressed technical and productive environment in any case!). We would not want to add to that evil another wastage, i.e. taking away from industry and from government and technical responsibilities the good elements to isolate them via "schooling" and "study tours" for long periods from the positions in which they can employ and expand their talents.

The programme will then include selecting cases and forming mixed teams (country officials and consultants) to give information, to search for technology, to define and negotiate conditions, to evaluate and propose the means for unpackaging and demand creation, for adaptive and original research, etc. always related to ongoing development projects such as the modernization or development of industrial branches. The technologies found, chosen, or developed must be the ones actually incorporated in the process of development. These are not abstract, theoretical "case studies".

The depth and actual content and progress that may be achieved in these areas will of course depend heavily on the availability of at least some skills and capabilities in the national technical services and production sector. Also, it may be found that current industrial sector policies, investment practices and other promotional measures actually hinder the national development of technological capabilities, as it has been frequently observed in the experience of other developing countries.

*/ If there are serious educational troubles it would be possible to bring some action in the academic field into this proposal, but we cannot think it advisable for the time being.

With respect to the first point, consider this example: the principle of "unpackaging" technology is well established in theory and in the experience of many countries as a means for directing demand for technological inputs toward national engineering, capital goods design and construction, etc. This is however contingent upon the existence of at least a potential for supplying these inputs. If this potential is below the minimum required, it will be necessary to establish additional activities for its development (e.g. see F below).

With respect to the effect of current policies the project approach as recommended should allow to discover specific instances in which these policies in fact block positive practices with respect to national technological development and which will require adjustment and modification of such policies to allow such development.

general/

E. Theoretical studies and development of criteria

The pressure of decisions in activities of type D will force the fast search for advice and criteria for decision-making inthe short-term in the different policy areas mentioned. The development plan guidelines, and the expertise of various units in the planning and government spheres will be the possible source for this information.

In the longer term though, it will be necessary to enrich the background for this activity. Special study and research groups should gain command of state of the art knowledge (and later make [illegible] own contribution) in fields such as:

- Definition and evaluation of technological status of sectors and industries;
- Identification of technological content and effecitve transfer in technical assistance, investment projects, licensing and service and design activities;
- Economics of technology;
- Appropriate technologies;
- Interaction between development policies and technological policy;
- Employment effects
- Income distribution effects;
- Linkages and externalities in investment and technology;

- Technology and development styles:modern large-scale industry, low production/simple technology village industries, etc.;
- Capital and technology accumulation;
- Horizontal co-operation with other countries in the region and in the developing world. Also, possible links with smaller advanced industrial economies and/or enterprises.

F. Complementary training outside-the-job

In C and D we covered respectively general awareness and learning by doing, as means for developing the additional skills required to handle "technological variable thinking".

In a selected limited number of cases, it may be useful to train more formally, at home or abroad and on a full time basis the personnel required for specific functions such as information and research in selected areas, technical services, etc. Such training will possibly be on the job. We do not recommend to send staff abroad to "see" how research is conducted or how information is sought and supplied.

People selected for travel should go abroad to do actual work in their fields and upon their return home they should organize and do the same sort of work as managers of projects and services, training also/ in turn their staff "on the job". This may imply promotion of younger technical staff to the management of operational services where they will be responsible for both management and results, whenever it is not possible to obtain a dynamic response from established groups and institutions.

G. Technological policy activities

As explained at the beginning of this section, we do not foresee the formulation of explicit policy before activity areas A to F bear fruits. Any attempt to develop such a policy in a formal way in the short term will be theoretical and self defeating because there will be a dearth of understanding, knowledge, people and commitment to the effort. A premature orientation towards establishing abstract technology policy guidelines may result in a wasteful misallocation of human resources which would lack the foundation for contributing in a positive manner to this effort.

If, on the other hand, activities of the types A to F (and/or others) bear fruit in the extension of the range of experiences and capabilities at different levels of the administration and production systems, the country will have the opportunity and the means for a meaningful policy making effort within the national development framework.

9. A comparison between supply of technical inputs and development of technological policy and instruments.

There is one matter we have referred to before which deserves a final word of clarification.

The problem facing us is in two dimensions: the short-term improvement of industry via supply of technical inputs, and the longer term capability of procuring such inputs.

The first problem can be seen (in a very simplified way of course) as a "technological shopping-list". In figure 1 we represent the short term problem saying that it consists of looking at each sector (vertically) and checking what inputs are required to improve its performance without delay:

Sectors / Inputs	Textile	Wood	Boatmaking	Chemical	.....	.....
Material selection	↓	↓	↓			
Machinery maintenance						
New processes						
New equipment						
Production planning						
New licences						
New investments						

Each sector is examined with respect to all possible support and remedial actions, this gives origin to a technical assistance programme with adequate components for each sector. Some of those components are technological inputs and we may decide to call that a technological plan, but will, in fact, have little long-term impact in the ability to make decisions and choices about technology, i.e. the inputs provided by technical assistance will restore or improve production capacity, but on the other hand, the enterprises which receive the inputs may or may not become more able to secure similar inputs in the future.

The objective of a technology policy, however, is precisely to enhance that capability for search, choice and incorporation of required technological inputs.

In order to do that the country needs a policy and policy instruments and when the objective is a technological policy the procedure is different: emphasis shifts from covering all sectors to covering all instruments, as shown in figure 2:

FIGURE 2

Sector/ Instrument	Textile	Food processing	etc.
Search	→		
Evaluation	-	→	
Selection			
Negotiation			
Disaggregation			
Adaptation			
R + D			

The technological policy programme requires the development of capabilities in the area of each policy instrument - but not in all sectors.

When we think of technological policy capabilities, we need to make sure that training, learning and application activities are undertaken in each area: in search and information, in negotiation, ..., in research and development. But it is not necessary to attack simultaneously all sectors. We may develop negotiation skills by working on the licence contracts of, say, the food industry and the electric industry. These skills may later be used in other industries, e.g. in the chemical industry negotiations.

The condition in the technological policy area is then to develop all instruments. In the technical assistance for the short- term solution of current problems, the condition is to check all sectors and attend to their needs.

In terms of the actions specified in section 8, the actions of groups A and B necessarily refer to all sectors. But the activities that follow, specially in D are to be organized by instruments or policy areas and the learning and development of experience will be referred to real development needs but limited to selected cases and sectors.

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