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TECHNOLOGICAL SERVICES DELIVERY SYSTEM (TSDS) ISSUES

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Introduction

1. Industrialization is a means of achieving integrated, self-reliant and self-sustaining economic development and thus solving the problems of underdevelopment. It is a key to a higher standard of living and an improved quality of life; it could bring about radical transformation in all sectors of society, leading to greater progress and independence. Industrial development in the rural areas could increase rurual employment, reduce the income gap between rural and urban areas and improve living conditions.

2. This was the framework defining UNIDO's role as expressed at the Fourth General Conference of UNIDO in August 1984. Some of the general observations voiced at this conference focused on the fundamental imbalance in economic interdependence highlighted by the vulnerability of developing countries to external forces as shown by the results of the world economic crisis. While acknowledging that international interdependence is not only unavoidable but a necessary condition to balanced growth, it was recognized that, to accelerate their industrialization process, the developing countries must count on their own efforts. They must create the domestic conditions necessary for reactivating a self-sustained development and growth process and adopt policies that showed flexibility in adapting to changing conditions. As a first level consideration emphasis was put on the local processing and optimum use of the country's natural resources and raw materials. In that connection, agro-industries and rural development were considered a fundamental component both of the world food scene and of industry. Attention was also drawn to the need for decentralization of industry and diversification of producitivity, the establishment of small-scale and medium-scale industries and of the capital goods industry and building up of adequate infrastructure.

3. A key issue to development, it was agreed, was the effective integration of science and technology into industrial strategy and into the process of industrialization. It was noted, however, that the technology gap between the developed and developing countries was widening and the industrialized countries concerned were urged to

dismantle barriers to technology flows. In particular, access to modern technology was vital. It was pointed out that developing countries should develop their own appropriate technologies and adapt foreign technology to local conditions and increase the share of resources for research and development. The developing countries also required assistance in setting up research and development institutions, which would enable them to keep pace with progress and to take technological considerations into account in development planning. The utmost care was required in the selection and transfer of advanced technologies and in the planning and control of selected technologies. The developing countries should also have access to information on foreign technologies, including fair prices and contracts.

4. Strengthening of scientific and technological capabilities in order to have a major impact on development has been a focus of UNIDO's activities as emphasised by the Vienna Programme of Action on Science and Technology for Development, adopted by UNCST in 1979. This concept encompasses a broad spectrum of issues including human resources development, institutional infrastructure, information systems, fundamental and applied R&D capabilities, and articulation of a technology policy framework within the industrial development plans and measures. Since the industrial development policies of most developing countries indicate increasing emphasis on strengthening of the small and medium industry (SMI) sector to form a broad and diverse basis, a systematic approach to integrating these efforts for SMI development has become a major concern.

5. The role and importance of SMI in the industrialization process of developing countries has been adequately articulated in the last several years. This recognition has given rise to studies, surveys and analyses to delineate the advantages and disadvantages of SMI, the factors determining their growth, integration, technical sophistication and impact on the overall economy, as well as the particular problems faced by SMI. It is these problems and barriers which need to be carefully diagnosed and be the focus of a systematic approach, starting at the national level.

6. It is a recognized fact that many developing countries have national institutions and that, to a great extent, these are high level institutions, capable of providing excellent services and counselling needed by industry. In most cases, however, it is evident that there exists a gap between the sources of technical and other support services and the productive system which needs those services. The problem is the absence of a mechanism linking these modes of supply and demand in feed-back loop whereby the activities of the service institution are responsive to the needs of industry and the excellent work of these institutions is utilized by industry. One of the reasons for this mutual isolation between the industrial base and the institutional and technological infrastructure is that the latter is being created in parallel with industry and not, as was the case with most developed countries, evolving in response to strong and specific demands of an established industry. Therefore, there exists a strong need for an integrated national network system to bridge this gap, especially in the case of SMI, in the rural and remote areas, in order to enhance the impact of existing scientific and technological capabilities on upgrading their performance.

Objectives

7. The objectives of this workshop are to:

(i) Discuss the issues involved in setting up a national network for providing a complete support package to the SMI by linking their requirements with the existing scientific and technological capacities;

(ii) Review and evaluate the TSDS in the Philippines and CTCS in the Caribbean region, drawing the lessons to be learned from these experiences and discussing possible improvements of the general system;

(iii) Discuss similar programmes in other countries (represented in the meeting) and ascertain how the concept could be adapted to the local conditions of those countries to improve their SMI programmes;

(iv) Reach final conclusions and recommendations on actions required at the national level for establishing a TSDS network and formulate a general framework for application in other developing countries.

Some issues for discussion

8. The unsatifactory performance of technology resource institutes (TRI's) in terms of their techno-economic impact on the production system, especially the SMI, illustrates the need to establish formal institutional linkages such as the TSDS concept (in the Philippines) and CTCS. This co-ordinated effort to mobilize national resources to serve better the needs of the national industry would lead to greater self-reliance and reduced dependence on outside technical assistance.

9. The basic needs of SMI may be grouped under two broad headings:

(i) Those of a general nature related to plant-level operation such as managerial techniques (production planning and control, inventory control, personnel management, etc.); economic analysis (investment decisions, costing analysis, techno-economic studies, etc.); general market information and marketing assistance; information on different types of financial resources available and assistance in preparing applications to relevant financing institutions; analysis of the implications of laws, regulations, policies, measures and planning strategies, etc.

(ii) Those which are sub-sector specific and more technical in nature. These would range from provision of training and basic extension services such as repair and maintenance of installed equipment; to provision of technical expertise to debug and improve processes in use; to product/process design and development. The needs in this category would also include assistance in identifying technological options and in the selection, acquisition (negotiating terms of technology transfer agreement), adaptation and absorption of industrial technology.

These broad categories may be overlapping in many instances and are certainly not exhaustive but merely indicative.

10. In contemplating the setting up of a TSDS type network to systematize and co-ordinate the flow of support services to meet these needs, the first step would be a stock taking of existing institutions, profiling their present capabilities and activities. Based on this analysis the stortcomings of the institutions for performing the role attributed to them within the network would be identified and appropriate action taken.

11. The basic framework of the TSDS concept envisions three functional categories for the institutions. The first would be grass-roots type for direct contact with individual plants. These should be regional institutions representing the initial contact point between the enterprises and the network. Their function would be to integrate the enterprises in their region to the network; determine their specific needs; provide basic consultancy; direct specific needs beyond their scope to the appropriate institutions within the network and follow-up on those contacts. (This function was filled by the Small Business Advisory Centres (SBAC) in the Philippines.) The second is the technology resource institutes (TRI's) comprising R&D institutes, universities, business institutes, engineering consultancy firms, such as technology regulatory office, design centers, development banks, quality control and testing centers, export promotion and marketing office, etc. The third is the central co-ordinating unit providing the linkage between the first two categories and ensuring the smooth functioning of the system.

12. The role of the regional institutes (front line) is to facilitate the interaction between the SMI units and the system. How this function is fulfilled will depend on several factors such as resource availability and capabilities. These institutions may be limited to walk-in facility where enterprises submit requests for assistance with specific problems through their own initiative and the institute forwards the request to the co-ordinating unit. In this version the institution may be involved in promoting the network ("advertising") to ensure that the regional enterprise are aware of the availability of this service. On the other extreme the institute may actively solicit the services through seminars plant visits, questionnaires, assist managers/owners in identifying and formulating needs.

13. These institutes will bear the burden of gaining the confidence of the SMI by ensuring the availability of and rapid access to technical, administrative and financial information. They will be responsible for thorough compilation of the requirements of the enterprises in their regions. They will be responsible for insuring that the necessary feedback is attained and follow-up support is provided.

14. The regional institutes will not only provide the linkage between the SMI and the TRI but will also provide assistance to their enterprises through advisory services. The extent of this advisory service which will be discussed at the general type needs described under 9(i) will vary depending on the capabilities available to each regional center.

15. On the TRI side, adequate measures should be formulated to ensure that the incentives and rewards are linked to commercial application. This would be a first step to correlating the research priorities to the technical issues confronting the SMI. This could pre-suppose a resource allocation system to R&D activities tied to economic pay-offs at the end of the technology delivery process.

16. Furthermore, since problems not experienced during laboratory investigations will surface both at pilot plant stage and the industrial production stage, the relevant TRI unit must be geared up to follow through the entire process and to provide production lines with research and development and technical assistance, development and demonstration, etc.

17. In designing the overall network it may become evident that there is no existing institution to fulfill a key role. In such a case the creation of a new institution to fill this hole may be necessary.

18. The role of the national financial institutions within the system may be important. The question is how and how much will these institutions contribute to the functioning of the network. The financing of certain activities such as techno-economic analysis and market feasibility studies may be done through such institutions.

19. In certain cases, some institutes may play more than one role in the system. For example a designated TRI may also function as a regional institute. In these cases it must be ensured that the institute in question is adequately geared up so as not to neglect its secondary role.

20. The central unit has to co-ordinate the delivery of diverse services from different institutions to ensure that a complete package is being provided to the end-user. These may include testing, technical services, techno-economic and market feasibility studies, technical extension services, training, management assistance, financing, etc. In order to establish credibility and gain the confidence of SMI the network must demonstrate the capability to assemble complete technological packages and follow-through to successful commercial applications.

21. The central unit represents the brain or command center of the network. In addition to the co-ordination of effort, it will be responsible for orienting the TRIs more towards the SMI sector. In general, the technological research institute may find the incentives from collaborating with large enterprises more rewarding. The central unit must formulate appropriate incentives to motivate such TRI to be sensitive to the needs of SMI.

22. The central co-ordinating activity may require developing innovative procedures to ensure that all potential resources are mobilized for putting together a complete technology package. Furthermore, this unit must not only co-ordinate the servicing of immediate needs but also direct the TRI's to engage in research activities related to future problems of the industry. It is important to note that the TRI's may provide direction to the development of industry and the network must be capable of processing this opposite flow. This sort of activity may include dissemination of R+D institutes ripe for commercial application.

23. The central co-ordinating unit's functions could also extend into international co-operation. It would serve as an ideal national counterpart for bi-lateral and multi-lateral assistance related to SMI, tying such inputs into the TSDS scheme; it could seek such assistance to

create "missing" institutions or strengthen weak ones; in cases where the required assistance proves to be beyond the scope of existing institutional capabilities it would try to secure it through international means while ensuring that the relevant TRI also absorbs the new skills so that in subsequent cases there will not be a need to refer to international sources; it could be active in promoting technology transfer agreements between national SMI and foreign partners; it could pay a role in assisting national enterprises negotiate terms of technology transfer (or joint venture) agreements with foreign partners (the network should include the equivalent of a technology transfer registry).

24. In developing the co-ordination methodology, whether it is unstructured and informal or somewhat structured involving established reporting procedures, standardized forms, etc. or even involving computer link-up between institutions, formalized linkages should never be taken for granted nor treated as automatic and mechanical. The importance of the human resource element in establishing and maintaning links should be continuously re-inforced. Each request should receive individual attention and not fed into a "processing mill".

25. The design of the system will be specific to each country depending on the dispersion of SMI units, nature of demand for technology services and characteristics of existing institutions. Most importantly, however, it will depend on the extent of the Government's commitment to strengthen the SMI sector. Resource allocation to finance the system will determine its scope of activities and effectiveness. A system of cost-sharing with the end-users may be worked out and with increasing credibility of the system, enterprises may become more willing to pay for the services.

26. The system should ideally have a built-in self-evaluation system to measure its effectiveness in converting scientific and technological capabilities on one side into commercially viability on the other side. This will serve to justify Government resources made available to the system, help determine resource allocation within the system and facilitate the identification of flows and weak links. This could vary from simple accounting of requests processed to full scale analysis of increased productivity attributable to the services delivered by the system.

Formulating a Pilot System

27. Establishing a comprehensive TSDS type network would necessarily follow a step-wise procedure, beginning with limited scope and modest expectations and as each step is consolidated the system would be expanded in scope and depth. At the first stages regional coverage may be limited depending on geographical dispersion of institutes and enterprises.

28. The initial skeletal framework may be limited to one, two or three priority sub-sectors and incorporate the regional institutes, the TRI's relevant to the selected sub-sectors and the central co-ordinating unit.

29. The first activity would involve a survey of the needs of the SMI in the selected sub-sectors. A number of representative enterprises from each sub-sector may be selected for in-depth profiling of requirements. This would be done primarily by the regional institutes and the identified needs would be categorized into those requiring advisory services which could be provided by the regional institute itself, or an extension service which would be refered, through the co-ordinating unit to the relevant TRI. In addition requirements for training may be identified and also forwarded to the relevant TRI. At the first stage, in order to establish the links, the scope of activities may be limited to these three functions.

30. As the links become more firm and there is interaction between the personnel of the respective institutions more far-reaching programmes would be contemplated.

31. At the initial stages several key factors need to be addressed - these would include:

- How many sub-sectors to include during pilot stage and their selection;
- Regions to be included at pilot stage;
- Selection of regional institutes, TRI's and central co-ordinating unit;
- Financing of pilot phase;

- Survey of SMI's in the selected sub-sectors;
- Analysis of findings and establishment of links with TRI's to develop appropriate programmes;
- Establishment of co-ordination methodology at Central Unit to implement support programmes;
- Developing capacity at regional institutes to provide advisory services to their enterprises;
- Evaluation of pilot implementation;
- Formalizing pilot network linkages and development of more extensive programmes;
- Measures to increase accessibility of network to largest possible number of enterprises (newsletters, pamphlets, seminars, letters, etc.);
- Information packages on technology acquisition, technology information banks, financial resources available for investment projects, etc.;
- Establishing permanent financing structure for continuation of network;
- Gradual expansion of network into other regions and sub-sectors.

UNIDO - TECHNOLOGY SERVICES DELIVERY SYSTEM (T S D S)

CONCEPTIONAL DIAGRAM