

LINKS OF RESEARCH AND DEVELOPMENT INSTITUTIONS WITH THE PROCUCTIVE SECTOR IN SRI LANKA

An UNCTAD Secretariat Study

between industry and the institutes. Industrial liaison activities can play a very important role in promoting an effective interaction between industry and the R & D institutes by keeping industry informed on the activities and services offered by the institutes.

Most of the R & D institutes, especially those operating in the industrial sector, do not have specialized services dealing with industrial liaison and technical extension activities. Another major weakness is that no attempts were ever made in the past to determine industry's priority technological needs in order to give a better orientation to the work of the institutes. This seems however to be changing now. The Rice Processing Research and Development Centre has carried out recently a survey of the rice-milling industry in Sri Lanka in order to determine the technological requirements in this field. A similar exercise was also undertaken by the CISIR in order to identify the problems of local industry.

When the question on the lack of an extension and industrial liaison arm was raised with the institutes in the industrial sector, they pointed out that the Industrial Development Board (IDB) was originally set up to perform that function. The IDB acts independently and does not co-ordinate its activities with the R & D institutes. It also carries

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out its own research and development work. But its resources are mainly concentrated now in the establishment of small-scale industries in the provinces and rural areas. As a result it has been placed under the supervision of the Ministry of Rural Industries. The IDB constituted an attempt to establish an autonomous institution in charge of industrial liaison and diffusion of technologies, including local R & D results. This has clearly not worked since the establishment of a separate institution for commercialization cannot by itself be a solution to the problems of linkage between R & D institutes and the industrial sector. To be able to commercialize R & D results, the relevancy of such results to the technological needs of the productive sector must be secured first. A new and separate institution may also

Ranking by respondents for the relevance of Sri Lankan R & D Institutes output to their firm's technological needs

Ranking of relevancy of R & D Institutes' output to technological needs of firms	Chemical industry	Agro-food industry	Sector Metal-working and machine-building industry	Total (out of 20 respondents)
Number of firms which consider R & D output of no relevance	2	1	3	6
Number of firms which consider R & D output of little relevance	3	2	1	6
Number of firms which consider R & D output of some relevance	1	2	-	3
Number of firms which consider R & D output of great relevance	2	3	-	5

give rise to new problems of co-ordination and collaboration. Faced with such problems, it may be assumed that the IDB decided to do what it could do best i.e. promotion and assistance in the establishment of small-scale industries.

The lack of communication between R & D institutes and the productive sector can not be exclusively attributed to the absence of industrial liaison and technical extension services in the institutes. Another major problem is that most enterprises - especially small and medium-sized ones - do not possess the expertise to define and clearly communicate their

needs and problems to the R & D institutes. Small-scale industries in particular are often unable to articulate their production problems, or to seek the requisite assistance from the R & D institutes.

(ii) Inappropriateness of institutes output in respect of domestic technological needs

Almost one third of the respondents to the questionnaire affirmed that they consider the R & D output of the institutes of no relevance to the technological needs of their enterprises (See Table above).

When added to the number of firms which consider such output of little relevance, nearly two thirds of the respondents believe that the present output of the R & D institutes does not correspo-

nd to the priority technological needs of industry in Sri Lanka. It is, however, interesting to note that more than half of the enterprises in the agro-food sector considered the R & D results either of great relevance or of some relevance to their technological needs; while in the chemical and metal-working sectors the majority of enterprises expressed the opposite view. This shows the relatively strong comparative advantage of the R & D institutes in research and development of locally available raw materials. But, the problem of inappropriateness of R & D results arises here also due to the origin of R & D projects, the nature of the projects undertaken and the ways in which such projects are selected. Indeed, enterprises in the agro-food sector are rarely consulted before an institute decides to embark on an R & D project. Most of the projects are thus in-house conceived and sponsored by the researchers themselves and do not respond to real or explicit needs articulated by the agro-food industries. However, it may happen that such projects do sometimes correspond to local technological needs; in which case their results may find an immediate application in industry. It may be said that such a coincidence occurs more often in the agro-food sector than in the chemical and metal-working sectors.

Another reason given by many respondents for the inappropriateness of the R & D results to domestic technological needs is the lack of knowledge of industrial problems. Most of the researchers in the institutes lack industrial experience. As they are engaged immediately

after their university studies, and given the lack of an institutionalized interaction between their institutes and industry, they have never had an opportunity to be directly involved in the production problems of the industries they are trying to serve.

(iii) Inadequate arrangements for the implementation of research results

It is said that industry does not often show interest in the research results of an institute until these have been carried through a pilot or demonstration plant phase, and the questions arising in production and economic and marketing feasibility have been resolved. This appears to be the case also of industries in Sri Lanka. However, the R & D institutes are unable to meet such requirements because of inadequate facilities and mechanisms for the implementation of research results. Their capability to deliver the goods in terms of products and processes developed and susceptible for immediate industrial use is rather limited. Moreover, even those amongst them which possess some pilot plant facilities, such as CISIR, readily admit that their equipment is obsolete, or that the required engineering capabilities are often in short supply.

Economic and marketing feasibility studies are rarely, if ever, undertaken by the R & D institutes themselves. It may, however, happen that an enterprise develops an interest in a product or process innovation, and decides to undertake economic and market feasibility studies relating to it. This was the case of the process developed by CISIR, for infusion of scents into instant tea and coffee which is now being produced by a State-owned corporation for marketing in middle-eastern countries. Another example is the process for the extraction of oil from lemon-grass developed also by CISIR, and currently used by a local enterprise which carried out its own economic and market feasibility studies on the product.

Another factor which hinders the implementation of research results, as well as their commercialization, is the lack of information on R & D institutes' activities and output. This is most acutely felt among the small and medium-sized enterprises. Some of the institutes are now trying to provide a remedy to this problem through the publication of book-

lets, bulletins and leaflets describing their R & D activities as well as the new processes and products developed by them. However, unless industrial liaison activities are established or strengthened by the institutes, the inadequacies in this area are likely to persist.

Problems also exist with respect to the licensing of new products and processes to the private sector. Enterprises interested in product or process innovations developed by the institutes are not usually willing to take the risks of investing in such products or processes unless they can obtain them on an exclusive basis, at least as far as the local market is concerned. However, the R & D institutes are unable to grant them the rights to the utilization of the technology on an exclusive basis, since it is government policy to encourage the sharing of locally-developed technological innovations. In those rare cases where a licensing agreement has been achieved, enterprises often complain of the lack of a follow-up by the institutes in the process of utilization of the transferred technology. The institutes admit to this shortcoming and attribute it to the high rate of mobility of their research staff.

Need for switching the emphasis from supply-side aspects to demand-side aspects

The findings of the survey show that the success of the R & D institutes depends to a great extent on maintaining close contacts with end-users, while, at the same time, building up a reputation for good and prompt service. A closer interaction with industry may require more emphasis on the demand-side aspect of the activities of the institutes. The establishment and/or strengthening of industrial liaison and extension services within the institute could contribute to a better understanding of the demand for R & D services. The direction of innovative efforts and the process by which demand is transmitted to the R & D institutes is determined not only by the technological and industrial capabilities of the institutes, but also by the technological characteristics of the industrial sectors concerned as well as the market structure and other environmental conditions. R & D institutes, as well as government policy regarding their activities, appear to have overlooked the

latter factors and to have concentrated exclusively on the former.

The emphasis on the supply-side factors has led to efforts to create new institutions for the commercialization of R & D results. Such efforts have not succeeded. Their failure may be attributed to the linear conception of the innovation process on which they were apparently based. A demand-oriented problem-solving approach may however enable the institutes to contribute more effectively to domestic technological innovation through a better appreciation of local needs and requirements.

Policy measures for the promotion of technological innovation

There also appears to be a need for new policy measures for the promotion of technological innovation. Such policy measures may include a better co-ordination among the activities of the various R & D institutions in the country, and the adoption of an overall R & D policy in keeping with the national development programme. Perhaps even more relevant to an effective linkage between the R & D institutes and industry would be the establishment of risk-sharing schemes for the promotion of innovation to encourage local enterprises to resort more often to the services of R & D institutes. Other types of incentives, such as fiscal incentives for local enterprises utilizing the services of the institutes, could also be envisaged in order to promote more local R & D and to establish better relations between medium-sized enterprises and R & D institutes. The financing of innovation projects of national importance by local development banks could be considered.

Other measures that may prove useful, more immediately, for the improvement of R & D - industry linkages could be envisaged. These might include the encouragement of R & D staff to acquire experience in industry and the establishment for this purpose, of mechanisms for industry - R & D institutes - university exchange of research personnel; elaboration of appropriate procedures and standards for industry - R & D institutes collaboration, especially as regards risk-sharing in R & D projects and costing of non-R & D services; and determination of sectoral priorities for R & D work in keeping with national investment plans.