Why promoting relationships among universities, research institutes and industry difficult in developing countries?

Based on empirical evidence from Sri Lanka

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Conceptually, the relationships among universities, industry and research institutions are considered as any interaction taking place in the form of educational and training, service or R&D based interaction. These three types of interactions can take place in a combined form in a specific relationship between firms and universities or research institutes. Within these modalities, the relationships can take place either in a rather informal (personal contacts) or formal manner (organized manner). It can also take a combination of formal and informal relationship depending on the context.

University-Research-Industry (URI) relationships are regarded as one of the central instruments to develop technological capabilities in a country. The intense nature of the relationships varies from country to country, according to the technological advancement, knowledge base and the industry base of the country. Also, the nature and characteristics of the relationships can be different depending on the availability of resources, social and cultural issues and policy environment.

In the context of knowledge intensive economies, the governments have increasingly considered the importance of URI relationships as a means to keep up the leading edge research capabilities, to improve applicability of knowledge for social needs and to use the resources for international competitiveness. Furthermore, the developed countries increasingly provide the necessary indirect services such as venture capital, intellectual property protection laws to promote knowledge creation and utilization. In this context, governments in industrialized countries play a crucial role by long range planning followed by a catalytic role.

Globally, universities, industries and research institutes have a social responsibility to fulfil social needs for a better quality of life. One of the purposes of URI relationships may be satisfying social needs while achieving their own benefits. The social responsibilities of universities, industries and research institutes in industrialized countries are equally applicable for less industrialized countries.

However, less developed countries do have less capabilities for leading edge research due to lack of skills, competencies and weak industrial bases, but the social responsibilities remain same. Hence, the goals of URI relationships in less industrialized countries may vary in terms of intensity and nature.

However, the firms in these countries still need to keep them competitive in the local market or limited export market. In this context technological capabilities have become a major determinant of the competitiveness which in turn support industrial growth. Hence, firms in less industrialized countries also need to capture the required skills and know-how to become competitive. Firms can do this through networks and relationships with academic and research organizations either within the country or outside the country. Even to understand the technology borrowed from outside, a substantial level of know-how is required for these companies. This can be achieved in many ways. One is to recruit skilled staff who can understand or access the knowledge to utilize the technology efficiently. Otherwise, companies need services of technical experts who can explain the new technology. Even after acquiring the

technology, they may need process related changes or modifications to suit the environment or raw material. This needs purposeful access to the local S&T base. Collaboration with the local S&T base seems to be the most appropriate and productive solution as the local S&T base has better knowledge on local conditions and material. Such collaborations can also be cost-effective in the long run as capability building through technology adaptation reduces the knowledge gap between the knowledge "Producers" and "Users".

These three reasons may drive the local firms to involve in relationships with local S&T base, i.e.

- To become competitive in local & export market
- To understand borrowed technology
- To adapt the technology to suit local conditions,

However, the local S&T base in less industrialized countries shows its own weaknesses such as inefficiency and irrelevance. On the other hand, the industries are working on their own agenda despite the need to overcome many weaknesses such as lack of technological capabilities. Hence the governments in less industrialized countries need to play a more active interventionist role than to be a catalyst to facilitate relationships between firms and universities or research institutes.

There is no standard formula for promoting relationships. Formation of new structures with new functions, allocating financial and other sources for the new forms such as university based incubators, facilitating spill over concept, and promotion of venture capital are general features of evolution of linkages in developed countries. These structures seem to have promotional effect in general. The real contribution from such structures depends on how external environment shapes the relationships.

The governments in developing countries tend to implant policy tools that are seen in promotional context of developed countries, without taking trouble to understand properly the country specific conditions which are critical in operational context and performance. For example, constraints in most developing countries such as a weak industrial base, less developed skills and lack of R&D capabilities, including level of R&D expenditure can usually be overcome by adapting generic policy interventions. Governments can also intervene by copying the establishment of promotional structures, which are seen in developed countries. Despite the presence or absence of such policies, how different actors of the URI spheres react to the emerging requirements, appears to have country specific formula. Hence, it is emphasized that understanding the micro strengths are equally important to promotional mechanisms such as structural mechanisms.

Interventions related to framework conditions

With respect to frame work level intervention, the government interventions in supporting structural mechanisms such as liaison offices, university innovation centres, Technology Innovation Programmes, University Companies, Teaching Companies, joint R&D programmes and University Industrial Parks may be capable of fostering frequent and informal contacts, and more effective formal interactions. In relation to incentive schemes, the government can also offer financial incentives to firms , and specially to SMEs, to contract out R&D work to universities.

Government intervention can either end up at the creation of framework conditions (leaving the different actors to perform the rest of the functions according to their mandates) or continue finetuning and providing additional interventions in the form of process related interventions or new forms of framework related interventions. To continue the interventionist's role, a government needs to perform coordinating and consensus building -role while participating and allocating resources at different stages. For this to happen, evaluation on impact of interventions and incentives needed to be put in place.

Process related interventions

The facts on process related interventions are comparatively little known in the literature. The reason for such scarcity may be due to process related interventions which are mostly practiced at institutional level rather than macro level and hence contain case/situation specific behaviour.

Macro level regulatory mechanisms can be regarded as another set of process related interventions.

The influence of the government in determining the research programmes, which can be regarded as process related interventions, varies from country to country. Although, it is obvious that the government support linked to an overall industrial strategy can have an integrative effect, in many countries, the government involvement in determining directions of research is relatively small. Behaviour of institutions and individuals can be changed by the regulatory interventions. For example, regulations related to human mobility and freedom can change the institutional outlook and individual character.

The most common policy instruments related to promoting innovations which many developed countries and developing countries are using is to encourage investment in collaborative R&D by their respective enterprise sector in the form of tax incentives, variety of research grants and loans, and government backed venture capital. These policy interventions are clearly articulated for developed countries as those enterprises are usually technology leaders or close to the leaders and need to keep up-to-date with the basic research. Developing countries are perceived to be assemblers or imitators of technology that are usually developed elsewhere and imported through various channels. In this direction, a more advisable policies are, for the government interventions to promote technology flow into the developing country economies and conduct adaptive R&D to suit local conditions and materials. The interventions for promotion of process of adaptation and imitation need not be only financial instruments but also non-financial instruments such as policy instruments on human resource development and other non-financial incentive schemes. In other words, for developing countries, non- financial based interventions are equally important compared to the developed countries.

Evidences

The evidences show that personal contacts are more prominent in URI relationships in Sri Lanka. The person-oriented relationships can be seen as more prominent even in coordination and communication patterns. The only exception seems to be little institutional support received by the research institutions in terms of coordinating, funding and communicating with the partners. These evidences lead to a preliminary conclusion on the non-existence of proper systemic mechanisms to promote relationships in the URI system. The institutional arrangements seem to have low capabilities to take initiatives to promote relationships.

Also, it was revealed that education & training mode of relationships are more prevalent while informal consultative & extension services and student projects appear to have played a prominent role.

The barriers for initiating a relationship show a more homogeneous pattern among all. The lack of information on research capabilities is noted as the most significant barrier which plays a major role in initiating linkages. In this context, the government has a role to improve information systems to facilitate fast, accurate, reliable and customer oriented information exchange.

The lack of rewards and an incentive system, needs the attention of decision makers and has to be worked out carefully, as any approach to reduce the magnitude of the problem will have multidimensional and multifaceted effects. Therefore, it is necessary to consider case specific approaches rather than general public policy direction for rewards and incentives.

Both the researchers and academia feel that the lack of research orientation of the industries as the main barrier for the continuation of existing linkages. On the other hand, as stated earlier, the lack of rewards/incentives and the lack of information are considered as major barriers for initiating relationships. This suggests that continuous efforts to bring the two groups into a common forum and the development of a reliable information system would help in overcoming the latter issue. However, the incentive systems have to be worked out by institutional level or national level based on the performances to motivate continuation of existing relationships.

In addition, from the point of view of industrialists bureaucracy of research institutes/universities are regarded as the major barriers. This leads to the relationships that the industry personnel have with universities and research institutions being dealt with at an informal and personal level. By doing so, the universities and research institutions are losing in two directions. In one way, the possible income from consultancies through official channels will not be available for the institution. In addition, if a proper system is established that will enhance the power (and the reputation) of the institution in terms of capabilities. Also, the institution will be in a better position to attract many more assignments both nationally and internationally.

Framework conditions

In relation technological development using local S&T capabilities, industry is mostly concerned about the, lack of systems and mechanisms to support relationships , limitations in the communication facilities, and inadequate laboratory facilities and services in Government labs. In addition, the industrialists consider market factors such as limited market due to the smallness of the country and the purchasing power of the customers, which is related to the economic condition of the country have connections to the relationships.

Micro level conditions

The micro level issues are multi-faceted, inter-connected and they show an accumulative and influence effect on one towards the other.

For example, the problem faced by the research institutions related to technology transfer to industry is connected to several issues. In one hand, the local industry very rarely use locally developed technology. For industry it is more reliable and time saving (some times it is cheaper also) for them to import technology. On the other hand, the technologies developed in research institutions are not adequately tested in the real life conditions. In addition, even if they are adequately tested, the technology is not adequately marketed. These things lead to the fact that even though there is a potential, industries tend to neglect and by-pass the local research institutes for their technological needs.

The remedy to resolve this situation seems to be simple but difficult to arrange. A proper mix of technological requirements of the industry and the technical solutions from the research institutions is an ideal solution. One cannot simply say that such a mix will work. As a matter of fact, it would not work without conscious orientation towards industrial requirements specially by the research institutions. An enhanced levels of orientation to industrial research together with R&D based relationships with industry has to be developed, jointly with industry. At this point, the industry access to market needs will play as a beneficial source of information for researchers , specially to those who are reluctant to work on product development due to their perception on some characteristics of the local market such as low purchasing power and low quality concerns of local customers.

One of the other mechanisms for such orientation for mixing needs and requirements would be structured/motivated by exchange of personnel between industry and institutes. RIS can be structured to absorb people with industry experience while industry can recruit researchers on a specific tasks.

I think it is important to mention at this point that some good productive relationships take place here and there even in the present context. The required attributes for such relationships such as maintenance of confidentiality, trust and adhering to time targets are understood by those who are involved in relationships. They have found their own ways to get closer to the partners. This understanding is now widely spilled over to the rest of the potential partners also. Hence, the desire among the researchers to take a window of opportunity to utilize their capabilities can be seen considered as a "readiness" state of researchers to join relationships.

However, these readiness in the mindsets of researchers can be pulled back by other related systemic failures. The limited authority to handle funds in a more flexible manner and inability to

retain generated funds for development purposes are the important systemic failures. By knowing the difficulties in having such relationships within the existing orgaizational boundaries, the researchers support creation of new forms of organizations with private sector outlook within the traditional institutional boundaries to overcome difficulties related to systemic failures. Hence, unless these systemic failures are removed, the negative perceptions of the researchers and industrialists towards each other will remain long. Coupled with these systemic failures, there can be seen many functional failures within the institutional boundaries that need ratification. Inter and intra communication and coordination, industry oriented approaches, effective internal management and leadership, and focus on available resources and capabilities are some of the areas that contribute to better performance of the functions of the institutions. These functional failures to my knowledge, can easily be corrected through innovative approaches by institutions.

The other side of the story is that many potential industries show weak technological capabilities due to limited skills and facilities. The remedy for such problems can have many alternatives. Collective approaches by industry clusters is one of the best approaches in terms of availability of resources for industries. It was seen that for industries, where the skills are available (it can be seen that in many cases the ownership posses high level of technical competencies and desire to try out new products and processes), the problem of limited facilities can be addressed in a more radical fashion. One of the approaches is to allow those industrialists to work in state sector laboratories for a specific purpose for a time frame for a fixed price. I suggest this approach as from the point of view of technically talented industrialists, they need to feel the product/process development by themselves where a lot of tacit knowledge come into play during the development stages. (Technology Incubators are the ideal solutions for such entrepreneurship but unfortunately, in Sri Lanka such structures are still absent).

At this point, it is possible to quote some case studies with the practical world examples. In this context, the ways that the actors attempted to overcome the constraints and weaknesses was examined. It was noted that all three types of organizations involved in changing their role towards interactive modes, sometimes by setting up organizational structures where multidisciplinary, multi-actors interactive approaches are performed.

It can be seen that new forms of organizations evolved in the traditional academic and research institutions encompass remedial measures against the weaknesses perceive by the traditional system. This suggests that the public policy needs to encourage the establishment of such organizations.

The need for extensive set of policy initiatives imply that the Government still has to play a major role in the industrial development in the country. The industrial Master Plan (Rainbow plan) provides similar evidence for linear model approach. For example, the Master Plan recommends compartmentalization of research, development and design functions at universities, research institutes and industrial enterprises respectively, where very little interactions can be expected between academia and "enterprises". Although the plan seems to have identified the deficiencies in the policy making and implementation instruments such as isolated policy dialogues by various affiliated policy making bodies in different ministries, weak interface among these affiliates and ministries, fragmented nature of policies, and duplication of functions in different ministries, The plan itself seems to have ignored the existence of micro level deficiencies, to some extent. The plan does not provide recommendations or instruments to bring universities and research institutes to act within the R&D circle for common benefit.

In summary, the study shows that relationships in Sri Lanka are based on lower end of the spectrum which are characterized by short-term orientation such as education & training and service based relationships. The micro-level constraints and weaknesses are wide spread in all three types of organizations in addition to the weaknesses related to the framework. Within these weaknesses of the framework conditions, the URI relationships contain a vast potential of opportunity while micro-level issues prevent them from exploiting the opportunities for mutual benefit. It also concludes that in addition to removing weaknesses in the framework, it is imperative to understand micro-level conditions to propose public policy interventions, that are needed to promote URI relationships.