ACADEMIA-INDUSTRY INTERACTIONS IN DEVELOPING COUNTRIES - AN OVERVIEW OF DEVELOPMENTAL ISSUES AND MANAGEMENT CHALLENGES

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Abstract: This paper addresses some of the developmental issues concerned with academia-industry interactions in developing countries & challenges involved in the management of these collaborations. The issues addressed here are directed towards organizational level ones from the point of view of their importance and action needed. A few dimensions of development of this activity are picked up for detailed discussion followed by a few suggestions.

INTRODUCTION

The desire to bring academia-industry into closer relationship with each other is more being felt now than before by developing countries in view of increasing volume of scientific activity taking place in these countries and consequently its larger potential for influencing the quality of life of the people and the nation.

Academia-industry collaboration is an interactive process through which the scientific and technological efforts of academic institutions are translated into productive economic realities under effective management. Management of these collaborations entail greater responsibility on the part of these institutions in the light of greater enthusiasm shown by them towards promotion and integration of this activity in their main stream and greater expectations aroused among industries from this activity.

The concept of academia-industry collaboration has universal applicability. However, the response to it would depend upon the socio-cultural backgrounds and techno-economic conditions. A 'HIGH CONTACT' system exists in today's developed countries with strong links and definite mission towards R&D and commitment to it. Whereas in developing countries a `LOW CONTACT' system exists where interactions between the two are sporadic, most of them revolving around secondary lines of enquiry.

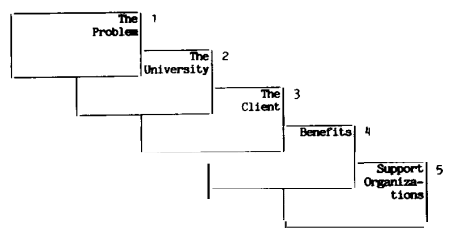
However, in recent years, lot of changes are taking place in developing countries, with emerging demand for academic consultancy and collaboration. The expected scenario seems to be one of increasing awareness and willingness to make the necessary commitment on the part of industries, and increasing capacity and readiness on the academic side. From such a perspective one can hope to build sustainable advantages from such collaborations.

COLLABORATION -A SYSTEM VIEW POINT: Relationship between the academia and industry is not just one of technology donor-recipient, but is of interactive, collaborative, participative nature spanning respect for each other's role and contributions to bring about research-production integration - the true purpose of such interactions. Here, academia-industry interactions are viewed as a system where active participation of all players is important. The anatomy of collaboration is highlighted in Figure No. 1.

1. The Problem	Relevance, Attractiveness, Feasibility
2. Organization - Consulted	Skill & Will of the consultant; Commitment and deliverability of research results
3. Organization - Consulting	Techno-economic capability, credibility, commitment
4. Benefits	Proximate Benefits - Interactive learning and mutual advancement Ultimate benefits - Trigger Indigenous R&D; Enhance quality of Research; Enhance Industrial Competitiveness; Economic development, Income revenue, savings
5. Organization - Supporting	Policy and other support

FIGURE No. 1.

ANATOMY OF ACADEMIA-INDUSTRY COLLABORATION

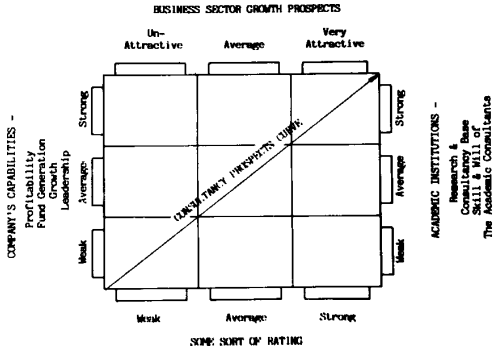


ACADEMIA-INDUSTRY COLLABORATION - DEVELOPMENTAL ISSUES

The winds of change taking place in developing countries have created opportunities for academia-industry interactions. Prospects for consultancy is depicted in Fig. No.2.

FIGURE No. 2

CONSULTANCY PROSPECTS



Success of converting these opportunities into fruitful collaborations depends on two factors: (1) certain basic conditions essential for introduction of consultancy, & (2) the stage at which it is introduced.

To convert these opportunities into projects, academic institutions should integrate their Desire-Need-Action and provide required orientation. There often appears

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to be a genuine DESIRE in the official and individual attitudes as well as NEED for interaction for mutual benefit and growth. Crucial aspect seem to be at the COMMITMENT and ACTION level and ORIENTATION to be provided. With this in background, various dimensions and developmental issues are discussed.

DIMENSION 1: RESEARCH BASE: Research is the main source in technological progress. Scientific research by itself cannot ensure progress. The state of R&D in various areas, infrastructural facilities available within the academic institution under which this pre-development gaps could be bridged are very essential for successful collaboration with industries. Consultancy will be attractive to only those academic institutions with strong research and infrastructural base.

In developing countries, excepting a very few national universities, research itself is in infancy and many do not have even basic infrastructural facilities. In fact, the main motivation for academic institutions in these countries to collaborate with industries is to develop and strengthen their capacity for research and innovation and facilitate continuity of their research activities.

Industries on the other hand, excepting a few enlightened ones, look for immediate problem solution and are not coming forward to facilitate strengthening innovative capabilities of academic institutions which inturn could be more relevant in the longrun.

Regarding the state of R&D in academic institutions and scope for collaboration, collaborations have quite different risk profiles and trading circumstances influencing their performance. For example, taking up consultancy projects in newer areas of research have different risk profiles as compared with taking up projects in on-going areas.

The question is how far academic institutions in developing countries can go on committing their faculty on tasks relevant to industries. The problem is acute where research base is weak and research teams do not exist or weak. The position in most of these institutions is they are inadequately equipped to meet the challenges of technical collaboration with industries. Without proper back-up, scientists cannot make proper headway. Consultancy and collaboration may be limited to on-going areas of R&D.

Augmentation and strengthening of R&D facilities and capabilities is suggested for developing consultancy potential in newer and on-going areas of R&D.

DIMENSION 2 - PEOPLE RELATED: Consultancy is inextricably - related to the intellectual capabilities of the academic staff and their interpersonal effectiveness with the clients. Since the consultants involved are spectialists in their fields, the responsibility is vested more in the person even in cases of institutionalised consultancy arrangements.

Availability of required, motivated academic manpower is the real crux of the problem. Most of the academic institutions depend on existing manpower for consultancy. Irony here is, the people who are good in teaching and research are also good and effective in consultancy creating faculty time management problems and consultancy will be restricted to only those areas where sufficient manpower exists, or if these institutions are ready to give a reduced load of other academic functions to consulting academics, which is not the usual practice. Appointing consulting professors is also not a usual practice since consultancy is not a continuous activity in these countries.

Academic staff are a heterogenous group as far as expertise, motivational, interpersonal, effectiveness aspects are concerned. Broadly speaking, there are two categories of academics - those truly interested in free enquiry and creation of knowledge, and those engaged in application of knowledge to produce wealth and revenue. Any support to the latter category through designing suitable rewards structure may help them to make positive contributions to consultancy.

At any point of time, opportunities for consultancy work may vary according to subject areas. Within the university, whereas some academic staff members might have found adequate fields of research which have direct relevance to the practical problems of industries leading to greater demand for their services, others might be working in areas which have only remote or no connection with the industrial problems. Differing opportunities for consultancy in different areas may somewhat become a source of uneasy feelings among academic staff.

Efforts are required in academic institutions towards consultancy manpower development. It needs a new generation of academics - young entrants to academic consultancy with a difference in attitude towards application seeking R&D, with more professionalism and commitment. Specific efforts are required by the academic institutions to prepare the young entrants for consultancy assignments.

DIMENSION 3 - DYNAMIC MARKET SEARCH:

Market Scenario in Developing Countries: Academic consultancy serves a specialised market. It deals with R&D. Problems in R&D and its dynamic nature calls forth creative solutions. It is concerned with knowledge which is intangible; outputs are uncertain because of newness of R&D.

The extent of market for academic consultancy in developing countries depends on the demand and supply conditions prevailing. Considered in general terms, there is continually a growing reservoir of consultancy potential in academic institutions in these countries. However, there seems to be limited but growing demand for such consultancy. The underlying scenario is one of limited and a sellers' market still with vast potential untapped market. A marketing strategy for academic consultancy needs to be evolved to facilitate development of industrially relevant R&D, new ways for expanding consumption of R&D results by industries, effective coupling of academic capabilities with industrial requirements. Following are some of the marketing strategies available:

Strategy - 1 Managing Consultancy at its own pace	No special efforts done, wait for opportunity, match capability with requirements. A passive development strategy with limited opportunities, lacking dynamism and growth prospects.
Strategy - 2 Market Mode	Envisages a high contact system between the academia and industries with high degree of awareness of each others' needs and capabilities. The environment in developing countries is not yet fully ready for such a mode.

Strategy 3 Cuts and-Compulsios	Regulation of academia-industry interactions through budgetory and fiscal instruments-and regulations. This strategy has received mixed reactions. Under this mode, academic institutions may face financial hardships and may be forced to solicit projects without much scope for exercising selectivity
Strategy - 4 Dynamic Market Search	Dynamic market search referred here means a voluntary approach towards promotion of academia-industry relationship, introduction of change through creating awareness, educating the client on the new value of academia-industry collaborative R&D and initiation of change, effective coupling of S&T/R&D needs of industries with academic capabilities, sustainability and perpetuation of such collaborations and relationship. This approach facilitates need based consultancy

Though search is an elementary and continuous process in any marketing exercise, both in developed and developing countries, it assumes significance in developing market for consultancy in developing countries.

While voluntary and walk-in consultancy enquiries from industries are limited and academia-industry interactions are limited to personal setting, there is vast potential untapped market for academic consultancy which needs to be tapped through dynamic market search.

With limited market opportunities and lack of market clout, over the last few years, selling of academic consultancy has assumed greater importance. Academic consultancy which was once a personal interest requiring direct action from him has now become an institutional activity with the establishment of separate units to promote and coordinate this activity. This change has brought in fresh thinking and new ways of management of consultancy involving aspects of search, relationship, task and risk.
Organised search is still a weak activity in developing countries and they are yet to take a deep dive into hard core marketing, and effective coupling of R&D/S&T needs of industries with capabilities of academic institutions. It is time for academic institutions to start doing real, serious market search, chalkout proactive marketing strategies. Such an approach is needed if development and diversification is accepted as an aspect of academic consultancy policy and render consultancy dynamism.

There is a strong link between the economic and industrial state and structure prevaling in the country, and industrial R&D/S&T levels and needs, and academic consultancy.

Company views R&D (which reflects on their need for consultancy): (a) *As* a need-based activity - for it develops as a need for combating the dynamic environment (b) As an adaptive mechanism - for survival and growth (c) R&D will be attractive to companies if technological change is faster and/or when science seems to offer major technological improvements and bring in benefits (d) Nature and process of adaptation - depends on company's recognition of R&D as an important function and its commitment to it (e) This inturn depends on - techno-economic competition prevailing in the country, techno-economic status of the company, sources of R&D and access to it.

It is futile to expect the company to spend on R&D if it does not really feel the need for it, unless it is compelled, and if they are not certain about returns from investment in R&D.

Major Components in Market *Search* Activities and Problems in *Search:*

* Search * Awareness creation and Technical Public Relation * Educating the client, confidence building and initiation of change * Conceive the Market * Collaboration Initiation * Collaboration sustenance and perpetuation

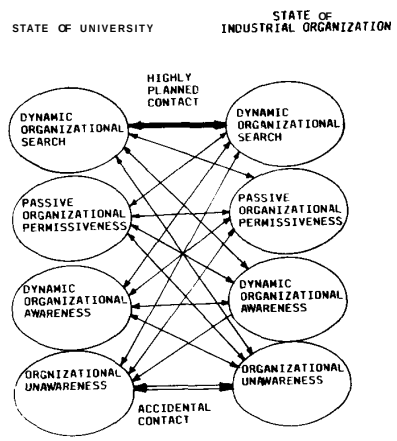
Search - Market search problems can be classified into two categories: Those relating to educating the client and creation of awareness, and those relating to actual business development. The emphasis in market search needs to be on both the aspects.

In academic consultancy development strategy, the importance is given to Academia-Industry Relationship Management. Emphasis is on (1) Longterm (2) Interactive (3) Relationship between the two. The expression Longterm, Interactive, Relationship is emphasised since collaboration in R&D has to be continuous to be effective. One has to work hard to sow the seeds of new thinking and create climate and mechanism for integration of research with production.

Awareness - There is a direct correspondance between awareness and the extent of market for consultancy. Hence market for academic consultancy depends on the organizational states of awareness for collaborative contact which is highlighted in Fig. No.3 which shows possible modes of contact between the highly planned contact and pure chance initiation. The chance element becomes increasingly emphasised as the situation moves from (1) to (4). It is true that the chance element in the establishment of contact cannot be totally avoided. However, moving towards planned organizational search can reduce the chance element.

FIGURE NO. 3

MODES OF COLLABORATIVE CONTACT



Coupling Factor - Awareness itself is not enough for collaboration initiation. There must be a will and force on the part of the client to make the necessary commitment which inturn needs to be influenced. With S&T developments offering unlimited developmental opportunities, academic institutions should work to woo industries to commit. Hence the importance of coupling factor. Here, coupling agent - his/her skill & effectiveness is an important factor. The quality & intelligent approach of coupling agents play a vital role.
Conceive the Market - In market search, R&D and Technology factor is very important. It is necessary to know the risk profiles in R&D areas and trading circumstances. In cases of search for collaboration in on-going areas of research, as research and application of research results are less speculative, collaboration may have satisfactory end. Certain degree of uncertainity and speculation is associated while search is in for projects in newer areas of R&D.

Collaboration Sustenance & Perpetuation - One of the **major** dimensions in market search is development and promotion of longterm perspective with dynamic interlinkages between the academia and industries. Industries in developing countries are still pursuing conventional collaboration strategy based on their immediate needs resulting in sporadic arrangements. Transition from old perspectives to new ones is required with positive features of collaboration - mutually acceptable and enduring collaboration arrangements for their effectiveness and beneficial impact. Academic institutions value high such longterm collaborations as they value imparting knowledge as high and would like to leave behind something of lasting value.

Few Drawbacks *in* Market *Search:*

1. In developing countries, consultancy promotion and dynamic market search activities have been initiated mostly at the Academic End. This has aroused high expectations from industries. The danger is, how best these expectations can be met and managed given the limited base and infrastructure in academic institutions. Industries look at academic consultancy as a Service Concept' and do not appreciate the Mutual Benefit Concept'.

2. Problems associated with University Push Type' Collaborations with possible non-utilisation of research results; speculative project bookings with no / partial financial commitment; and possibilities of mis-match of needs with capabilities.

3. Another set of problems are associated with Generalised Market Search. Generalised search will be mostly unstructured with high cost and time consumption.

CONCLUSIONS AND SUGGESTIONS

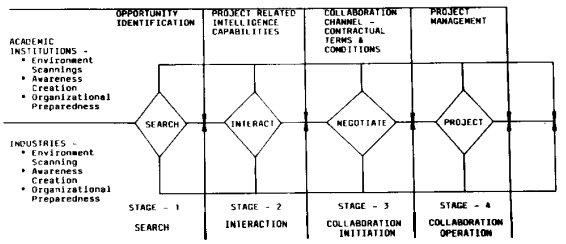
1. Academia-Industry interactions are vital for economic development of developing countries. So far, it has been a weak activity in these countries due to limited appreciation and action at both the ends. Appreciation of 'Mutual Benefit Concept' & initiation of action and orientation at both the ends is suggested for effective intgegration of research results with production as highlighted in Fig. No.4.

2. Developmental Dimensions and Requirements - At the Academic End:

   (a) Academic institutions desirous of promotion of collaboration need to make an early beginning, if

FIGURE NO. 4

DYNAMIC SEARCH FOR COLLABORATION OPPORTUNITIES AT BOTH THE TERMINALS



they have not done so far; It requires years of persistence; and necessary orientation - R&D, people, market; Aggressive market search; Development of both hardware (technical, physical infrastructure) and software (human resource development) aspects; Emphasis should be not only on R&D strategies but also on marketing and management strategies.

(b) Requirements - Academic Manpower

i) Their availability, skill and will - is the real crux of the problem. There exists still a mixed feeling among academics regarding their involvement in industrial problems - a passive attitude with the needs of academic freedom and scientific creativity, and a positive attitude for involvement in practice-oriented research.

ii) In Academic institutions which are dependent on existing manpower, collaboration will be restricted to only those areas where sufficient manpower with required attitude and skill exists. If importance is given to this activity, either they have to give reduced load of other academic functions to consulting academics (which is not the usual practice) or appoint consulting professors (which again is not a normal practice)since consultancy is not a continuous activity. However, this has not been seen as an unsurmountable problem since collaboration work is minimal and capacity to take up work exists without disruption to normal academic functions.

iii) Consultancy Manpower Development - Efforts are required from a longterm point of view towards consultancy manpower development. A new generation of academics - young entrants to academic consultancy with a difference in attitude towards application seeking R&D should be encouraged.

(c) Dynamic Search for Collaboration Opportunity Identification:

i) Search at both the terminals of collaboration suggested as high-lighted in Figure No. 4

ii) Search at the Academic End: - While voluntary and walk-in collaboration enquiries from industries are limited due to various reasons including unawareness, organised search needs to be initiated/ strengthened by the academic institutions with emphasis on all components of search. A Two-Stage Planned Search is suggested to facilitate exercising selectivity and promotion of need-based collaboration. In the first phase, a generalised search is carried out to identify a sample of organisations which are likely to collaborate and absorb research results. In the second phase, the scientists conscerned can make an intensive search among the sample to locate the most promising/suitable one.