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Academia - Industry Interactions: Towards A Conceptual Perspective

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The economy, both globally as well as in India, is turning more and more knowledge-driven. This implies that the basis of competition and the sources of sustainable competitive advantage of the players in the economy would be increasingly determined by their technological capability. Technological capability demands the support of a knowledge-infrastructure consisting of research institutions and higher educational institutions. India can boast of a large number of research institutions under Council of Scientific and Industrial Research. The country has also witnessed an exponential growth in the number of engineering institutions - from 157 nos. in 1980 to 1208 nos. in 2005-06. However, paradoxically, the number of engineering graduates registered with the employment exchange had increased from 168,000 nos. to 181, 000 nos. While many causes have been attributed to this phenomenon, one of the key factors has been the 'mis-match' between the academia and the industry. It is shocking to note that NASSCOM estimates that only 10% of the engineering graduates are found to be employable by the IT industry. This refrain is also heard from other sectors of the industry, in various fora. In this context, the 'need' for interactions between industry and academia assumes the proportion of a very 'critical necessity'.

Academia Industry Interactions (AII) is among the most debated topics in both industry as well as the academia. Statutory bodies such as AICTE, UGC and industry associations such as CII, NASSCOM, FICCI have been expending efforts on this. Despite such attention, there has been little progress on the ground so far. This may be attributed to many factors, including lack of a coherent understanding of the content, process and the context of AII:

1. Content of AII - covers a very broad spectrum of goals and objectives ranging from a long-term, strategic, knowledge-driven, cutting-edge innovations to a short-term, operational, exigency-driven interactions
2. Process of AII - since this has received the least attention among both academia and the industry, there has been less scope for 'mis-understanding'. Potentially, this can vary from a deep, formal, structured, collaborative organizational relationship, to a loose, one-off transaction
3. Context of AII - this, again, has a large canvas. It can range from a 'developed economy' to an 'emerging economy' to a 'developing economy'. The context can also vary in terms of the actors involved in the interactions.

The 'academia' may vary from a dedicated 'Research Institution', 'Premier national-level Technology Institution', 'University-based technical institutions' or 'Private, autonomous, local engineering college'. In fact, even B-Schools could constitute the 'academia'. Similarly, the 'industry' could range from large, established firms to small start-up ventures, either in technologically mature or sunrise sectors. In this paper we attempt a brief survey of the literature on AII, both western and Indian (though much of the writing remains conceptual and prescriptive), in Section-I. We pull the issues together to present a set of conceptual perspectives, in Section-II. In Section-III, we offer certain directions for research in the Indian context. This, we hope, would contribute to a better understanding of the prevailing 'state-of-the-art' of AII, and facilitate drawing-up of the road map for taking it forward in the future, especially in India.

Section-I

Literature Review

Knowledge has emerged as the single most potent determinant of economic and social progress the world over. The resultant coalition of beneficiaries and benefactors constitute what may be regarded as the 'educational-industrial complex (Craff & Zilberman (2002). However, the paradox is that Academia-Industry Interactions are difficult to create and maintain because universities and industry have fundamentally different cultures, the nature of the work and products of universities and firms differ, and there are unexpected events or exogenous shocks, that can affect the relationship (Cyert 1997). Universities and enterprises are very different institutions from one another, operating with different time schedules, agendas, actors, and with different mission and objectives. Each needs to adapt to the other's requirements and cultures. It is, hence, suggested that universities should develop new modes of operation, institutional leadership and more flexible institutional management (Burquel, 1997).

Process of AII

Forms of Partnership

Multiple terms used to denote 'partnership' - alliance, collaboration, network etc. While these imply different levels and complexities of linkages, we shall confine our discussion to a simple partnership between the academia and the industry. Glenda Kruss (2005) defines 'Partnership', in its broadest sense, as any form of linkage of mutual benefit or mutual interest between academia and industry. The following sums up the issues with regard to 'partnership':

- Different ways of describing the partnership
- Traditional forms or new forms of partnership
- The levels at which partnership happen - Individual, group, department, institution, sector and country
- The fit between the various forms of Partnerships and the types of institutions in terms of their historical legacy, uneven research capacity, institutional capacity, financial base and even geographic location.

Rise of the Triple Helix Model

Etzkowitz & Mello (2004) have studied 'the rise of the triple helix culture' in Brazil, involving the government, academia and the industry, in fostering innovation. Haribabu et. al. (2005) report, based on their case study of interactions between Public R&D institutions and Private firms in the bio-tech sector, different forms and content of networking. Sujit & Praveen (2004) have studied the different types of linkages, the perceptions of the actors involved in the linkages with regard to the factors and barriers of interactions and the role of government in facilitating these linkages. This was based on a pilot survey of seven universities and three firms in the Bio-pharmaceutical sector. The authors have reported 'mixed results' of the current state of the art of Industry Institute Interaction (31) and concluded that the role of government has been rather weak. They opine that in terms of the Triple-Helix model, the current state of 3 I could be characterized as 'Laissez-faire'.

Collaboration Techniques

The thinking in this perspective recognizes that AII is a marriage between university and industry which is 'against nature'. It is a symbiotic relationship between two unlike organisms with vastly different characteristics and objectives. Hence, it is suggested that a very pluralistic and individually tailored approach to the practices of partnering be adopted. Establishment of new operational units and administrative structures to manage and organize research collaborations is recommended. Organizational mechanisms such as Technology Transfer Office (TTO), Knowledge Transfer Officers (KTO), - Association for University Research and Industry Links (AURIL) are in operation. In fact, the UK government has unveiled a set of model

agreements designed to support University - Business collaborations and speed up IP negotiations -saves time and money for both parties involved, removes existing barriers in negotiating collaborative research agreements, especially in the case of SMEs(Graca 2005).

In the Indian context, mechanisms prescribed and to some extent practiced are Industry Interaction Cells established in many Institutions, the Endowed Chair, the Postgraduate Bursary, and Grants of various kinds (Gupta & Shekha, 2000).

Content of AII - Benefits & Costs

There is significant amount of research conducted and reported on the multi-dimensional benefits of AII. Benefits have been classified as Financial, Technological and Strategic; Economic, Social and Other. University is in the midst of a paradigm transformation from the 'traditional' to one of that is entrepreneurial - this is causing tensions in the university by raising new and important issues that are yet to be fully resolved. However, they stress that the real issue is how Universities can contribute to regional and national economies while preserving its integrity and autonomy.

Costs of AII, mainly intangible, have also been reported upon in the literature. The world of values and principles guiding academic pursuits which set the academic standards could be undermined. This could damage the academic community and pose an overall risk to university reputation as the primary source of knowledge and talent creation. These could lead to what is called 'academic capitalism' - a contamination of academia. Critics of All have expressed concerns regarding 'deepening' of commercial ties posing a threat to academia's commitment to both basic research and the academic norm of free disclosure (Prigge, 2005). In the Indian context the benefits have been emphasized more than the costs. Most often stated benefits are related to aligning the needs of the industry with the curricular inputs and skills inculcated in the students, so that the 'learning curve ' is reduced after the graduates join the organizations (CII, 2003). At the higher end of the 'content spectrum', the All is also expected to facilitate transfer of research findings from university to industry and provide newer knowledge to enable economy to remain competitive (Naik, 2000) . But the current track record of academic support for innovation in India has not been very encouraging - that hardly seven per cent and four per cent of the process and product innovations, respectively, had benefited significantly from academic research (Madan Mohan & Krishnan, 2000). Another study by Chaudhuri & Dixit (1995), revealed that the real demands of the industry was more in the form of technical services such as standards and testing, education and training, information and problem solving, than product or process optimization.

Interestingly, there is some writing on the interactions between B-Schools and industry too. The issues related to mismatch between the industry needs and the B-School curricular inputs and output (student quality) remain important topics of debate. The content spectrum, similarly, covers research (new knowledge generation), education (with more originality, perspective and innovative content) and training (standardized knowledge) (Sen, 1999). Techno-entrepreneurship is an emerging topic in India and has been receiving some attention, more as an option to unemployment and under employment(Arolkar & Patil, 2003).

Context of AII

This is, perhaps, the most contentious dimension in the overall understanding of AII. This operates at different levels - at the country level, in terms of the state of economic and intellectual development, within the country in terms of the scale of enterprises, sector of the industry, maturity of the industry etc. The fundamental issue is - would one size fit all?

This dimension of AII has received very little attention in the literature - both western and Indian. In the Indian context, the interactions between large-scale sector of the industry and the institutions such as IISc, IITs and IIMs cannot be used as the benchmark for other Higher Educational Institutes and Small & Medium Enterprises. Contextualization is imperative. The existence of systematic differences among firms, sectors and countries must be acknowledged. Only then are comparisons likely to yield meaningful and useful lessons (Lorentzen, 2005).

Section- II

Conceptual Perspectives

We had so far explored the various streams of the existing literature underpinning AII, on the three dimensions of Content, Process and Context. We present a conceptual integration of the streams to gain a holistic understanding of the perspectives of AII.

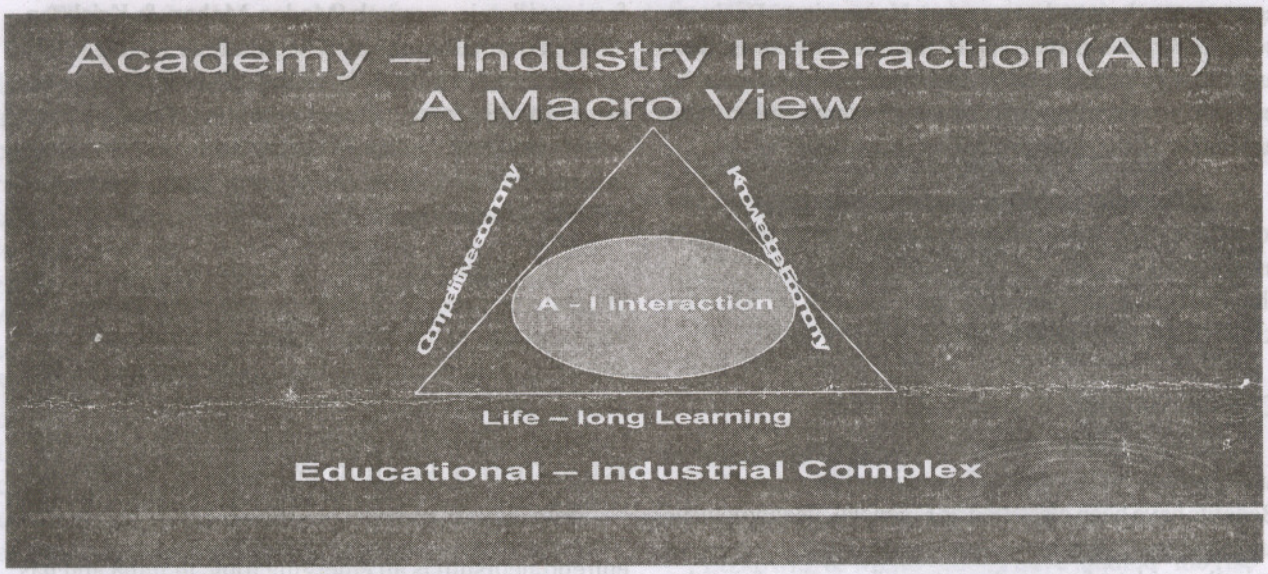

Fig.1: Academy - Industry Interaction - A Macro View

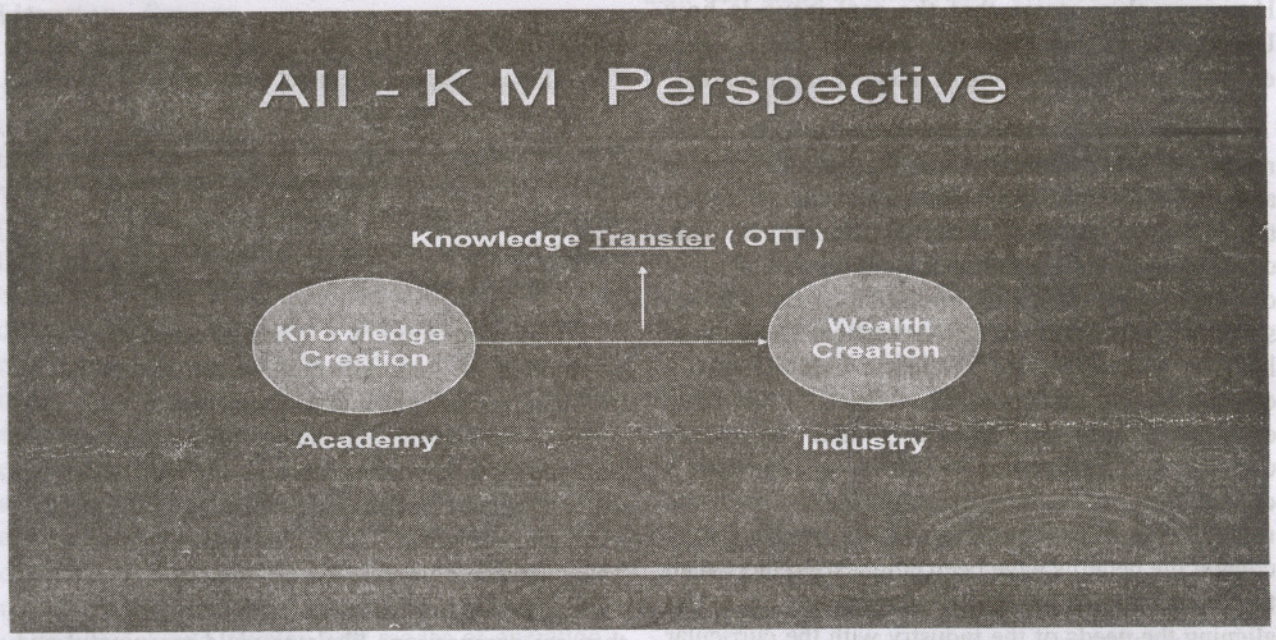

Fig. 2: Academy Industry Interaction - A Knowledge Management Perspective

This framework captures the essence of AII as arising out of the demands of an increasingly competitive economy - local as well as global, the rising importance of the knowledge assets as opposed to the traditional capital assets as the mainspring of the economy and hence the felt need by the players in the economy to keep themselves updated and upgraded to remain 'productive' through Life-long continuous learning. We refer to this as the 'Educational - industrial Complex' paradigm. In fact, the demands for a vigorous AII have never before been more meaningful in India than in the prevailing milieu.

This perspective draws on the three traditional missions of an academic university - Generating new Knowledge, Transferring Knowledge to future

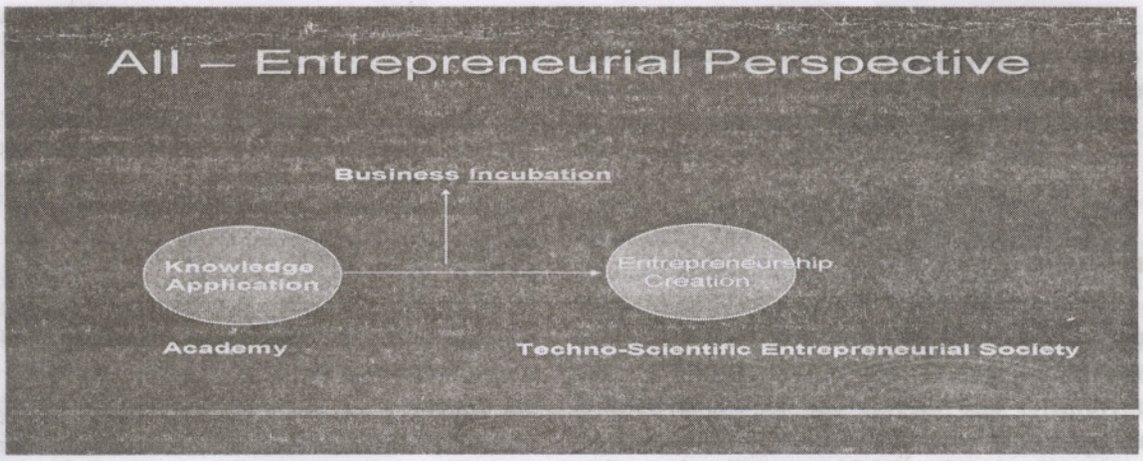

Fig. 3: Academy Industry Interaction - an Entrepreneurial Perspective

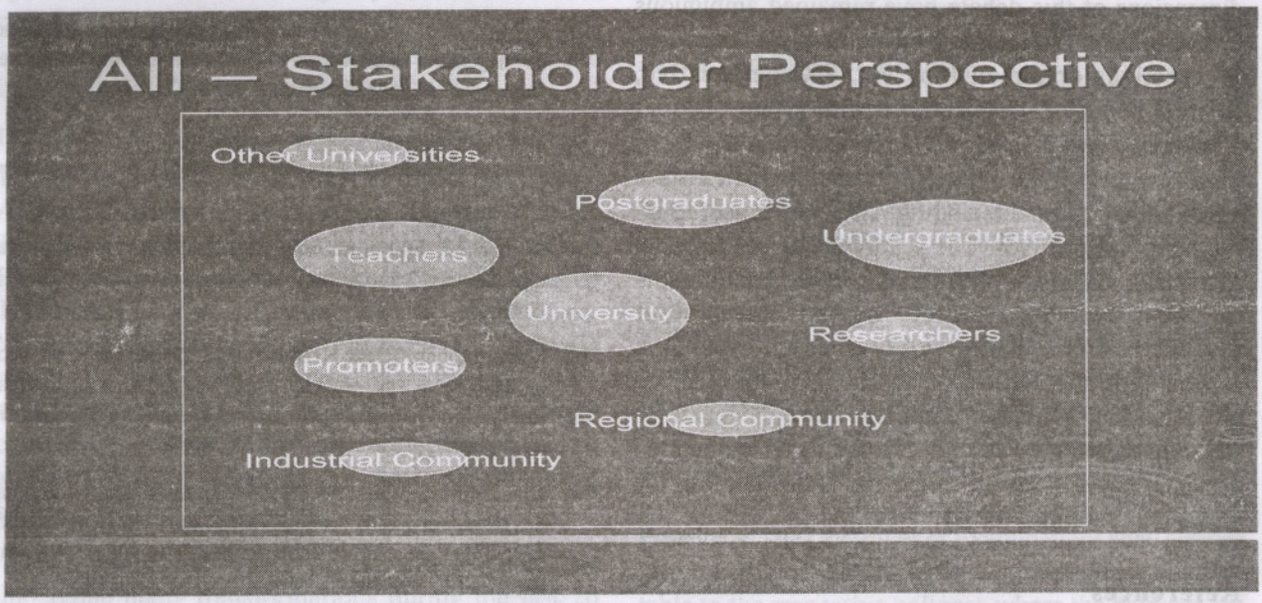

Fig. 4: Academy Industry Interaction - a Stakeholder Perspective

generations and Serving the needs of industry and the community. The stock of knowledge assets within the academia is viewed as the wealth creating tools for the industry. The transfer of the Knowledge assets is sought to be carried out through various administrative mechanisms. Office of Technology Transfer (OTT) and Liaison Cells in Universities such as Institute Industry Partnership Cell are among the popular mechanisms.

This perspective reflects the current thinking which dominates the debate with respect to AII in the developed economy. It is gaining momentum in India too, with the resurgence of science and technology as the mainsprings of the economic growth. Incubation of different kinds are offered as the mechanism to translate Knowledge application into a viable entrepreneurial entity.

In a sense, the Stakeholder perspective is among the oldest and well understood. The last few decades have witnessed an expansion in the scope to include the regional community and the economy as one of the stakeholders. The widely known benefits of AII are part of this perspective.

Conclusion

The critical necessity of interactions between the industry and academia has never been felt more. In an increasingly knowledge-driven economy the opportunities and threats can be exploited and neutralized only with the weapon of technological capability. The building of this capability demands a partnership between the industry, as the commercial users of this capability, and the academia, as the creators of this capability. This partnership presupposed continuous interactions between the two pillars of the knowledge- economy. There has been a lot of debate on how this could be done. However, the conceptual dimensions of this debate have remained ambiguous and incoherent. The authors have uncovered three key perspectives or dimensions viz. KM perspective, Entrepreneurial perspective and Stakeholders perspective. We believe, on the basis of the survey of literature that in the Indian context there exists a yawning gap in understanding AII with respect to all the three perspectives. The scanty empirical research that could be claimed to have been carried out in India has been informed largely by the Stakeholder perspective. One could safely conclude that AII, especially in the context of SMEs have not received any attention — neither empirical nor conceptual. In the sunrise sectors such as biotech and embedded systems, there is a vast scope for understanding the status and potential for AII.

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