Knowledge Creation and its Transfer: Is Academia Redesigning its Deliverables for Industry.

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Knowledge Creation and Transfer are two mutually reinforcing academic interventions which determine rather impact the academic deliverables. Knowledge economy and third mission of academic varsities has created urgency on the part of academic stakeholders to develop industry academia interfaces that support academic as well as industrial needs. Academia as knowledge repository is continuously creating knowledge resources in the form of publications, books, journals and other teaching-learning resources, but their applicability across industry is marginal specially taking the case of Asian Economies. The present paper explores the knowledge creation and transfer interfaces across academia in general, and different knowledge management models adopted by academic varsities. The paper further delves deep into the different categories and forms of knowledge transfer channels that spur the commercialization potential of academic deliverables.

Keywords: Knowledge Creation, Knowledge Transfer, Commercialization and Industry Interface.

1. Backdrop

Knowledge management as arecognised research area emerged historically from the intersection of various schools of thought that include Religion and Philosophy (Wiig, 1993), Psychology, Economics and social sciences (Simon, 1976), and management literature that rigorously explained the role of knowledge in determining organisational competencies and the relevant mechanisms to complement the competencies (McClelland, 1973).All disciplines on summarising knowledge concluded that knowledge can be best defined, created, replicated, and applied by those organisations and institutions that endure transformation from a culture of embeddedness to a culture of learning.

The basic essence of knowledge management is to harness the institution's knowledge resources and knowledge management capabilities to be able to learn and adapt to its changing environment. In this context, the academic institutions that are knowledge intensive, knowledge driven and knowledge bound are best examples of learning organisations. Thus, the paradox in knowledge management is to understand the various forms and relevance of these forms of knowledge in different institutional setups and their readiness to adopt industry centric needs and demands.

Thus, as derived from the studies and works in the area, knowledge management consists of the following variables:

- Knowledge Acquisition (Ward and Aurum,2004) ;
- **Knowledge Creation** (Nonanka and Takeuchi, 1995);
- Knowledge Refinement (King, 2008);
- Knowledge Storage (King, 2008);
- **Knowledge Transfer** (Nonanka and Takeuchi, 1995),
- Knowledge Sharing (King and Ko, 2001);
- Knowledge Utilisation (Ward and Aurum's , 2004).

The knowledge management function across academic institutions operates along the above-mentioned processes by developing institutional systems and policies which in turn guides the people involved in these processes to leverage upon the process competencies for building state of the art research and commercialization infrastructure (King,2008).

Knowledge Management in Organizations: **Inference for Academic Institutions**

Source: *Author's Compilation*

When extending knowledge management processes as shown in Figure in academic set ups, it is thus inferred that the key knowledge management processes comprise of **knowledge creation and transfer** (Nonanka, 1994), that as institutional processes infuse the spirit of sharing amongst the organisational members (University Faculty, Research Scholars, Scientists and Research associates-Respondent Profile for current Study) and industry set ups. This sharing of knowledge sets up tone for concrete and structured collaborative arrangements that work upon the principles of collective learning and **interface development** (King and Ko, 2001).

The collective learning (King and Ko, 2001) on both the ends, that is industry and academia, increases the scope of knowledge transfer improvisations in the form of iterative cycles thereby influencing intermediate academic outcomes in the form of **patents (Products), Publications (Products)** (Bongers et.al 2003), **mobilisation of researchers (Relationships)** (Bongers et.al 2003), **Spinoffs (Products and Relationships)** (Bongers et.al 2003), **Consultancy (Services**) (Bongers et.al 2003), **placement of academic personnel (Services)** (Bongers et.al 2003), and **Policy making (Organisational Decision Making).**Quality of interface development which primarily depends upon knowledge transfer efficiency, also in most of the cases depends upon the academic research output. Industry-academia interface is a value chain wherein inbound and outbound research resources determine the commercialization margins. Inbound research refers to patent texts, as found in the patent office or in patent databases and licensing of patents and 'know-how' licenses to industry. The outbound resources refer to the industry recipient capacity. The quality of inbound research thus is an outcome of quality of infrastructure in the form of resource profile, knowledge transfer channels and funding. Extending all these inferences for the current study the present research aims to build the understanding about knowledge creation and transfer across Indian academic institutions.

Earlier the academic institutions were traditionally bound to perform the functions of teaching only with little emphasis on research and negligible attention on commercialization of research that completely ignored the relevance of academic outputs for industry. However, the role of academia has changed in the knowledge-based society. The changing economic scenario also demands a reorientation of role of academic institutions from knowledge accumulator to creator, disseminator and interface creator with industry. In the light of the preceding discussion, the chapter has diagnosed the knowledge creation potential across select academic institutions.In this backdrop, the present chapter provides insight into the phenomenon where the industry does not turn to academics or academic research inputs in developing management strategies and practices. Similarly, the academics do not consider to develop their research deliverables around market/ industry parameters. This accounts for the gap that persists between theory and practice. The stakeholder of any academia-industry interface involves academicians, scholars and industry participants. The intention is more individual determined variable rather than externally determined. This kind of intention impacts the resource profile of academic varsities. Accordingly, intention to research, intention to collaborate and intention to create knowledge for industry act as deterministic variables to justify the academia-industry interface quality, content and applicability for industry**.**In light of preceding arguments, the underlying objectives for the chapter are to identify drivers of knowledge creation and its transfer in collaborative research and to examine different categories and forms of existing industry-academia interfaces that support industry centric endeavours, wherein the study respondents shall be academic stakeholders and the empirical investigation of knowledge creation and transfer variables shall aim as achieving the underlying objectives of the study.

2. Introduction

The ultimate institutional resource in the knowledge-based economy, knowledge driven institutions is knowledge and the institutional competitive advantage rests in the ability to exploit knowledge across length and breadth which when consolidated is termed as knowledge management (Oxbrow& Abell, 2002).The 21st century that is knowledge intensive has witnessed various paradigm shifts in management literature particularly in the field of knowledge management. The institutional relevance of knowledge management is visible in the literary works of Peter Drucker (2006), Toffler (2022, 1991), Quinn et. al. (1996). Peter Drucker (1999) elaborated upon the concept of knowledge as one of strategically important and relevant resources which when compared to the land, labour and capital is more powerful in terms of utility. Complementing Drucker's (1999) view on knowledge, Toffler (2022) describes knowledge as a power tool with in the hands of knowledge intensive institutions that enables institutions to evolve continuously in the dynamic business scenarios. Quinn et. al. (1996) on adding upon the above said argument deliberates that the institutional excellence of academic institutions in the form of research and spinoffs rests on the tacit forms of knowledge that include human and social capital. Nonaka (1991) empirically tested the impact of knowledge management on Japanese corporations wherein the organisations are leveraging upon their knowledge assets for gaining competitive advantage and industry leadership.

Broadbent (1998) in his explanation over knowledge management talks of optimum utilisation of knowledge which can be done by having state of art institutional knowledge management practices and a climate of organisational learning. Theories of organisational learning advocate the importance of learning organizations that are pioneer at creating, acquiring, organizing, and sharing knowledge, and are thus able to apply this knowledge to develop institutional behaviour aligned towards knowledge management by creating knowledge centric objectives. Broadbent (1998) further advocates that the basic essence of knowledge management is to harness the institution's knowledge resources and knowledge management capabilities to be able to learn and adapt to its changing environment. In this context, the academic institutions that are knowledge intensive and knowledge driven are best reflections of learning organisations.

As universities play leadership role in the knowledge economy, they have the responsibility to equip the future workers with required competencies and skills. Accepting new roles and functions in the academic management (in education and

research), universities undertake responsibilities to provide demanded competencies and deliverables to prospective stakeholders. In addition to academic orientations, the roles and functions of universities have widened, to a phase which is named as "academic enterprise" or "enterprising universities" (Shane and Venkataraman, 2001). This envisages that universities are required to share the knowledge creation (Nonanka and Takeuchi, 1995) process with enterprises in a collaborative and cooperative manner. This collaborative process in the creation of intellectual capital makes universities to expand their functional environments. This proposition needs to be tested, as it impacts the frequency of knowledge transfer depending upon the context. The traditional role of universities is valued in those contexts wherein the structures, stakeholders and knowledge forms are more static and internally defined (OECD, 2002; Siegel et.al, 2004; Rothaermel and Thurs by, 2005). On the contrary, dynamic contexts that focus on commercialisation calls for a change in status quo. This form of value creation not only benefits universities but would lay value addition to intellectual capital, as relevant in case of third mission-based academia that is centred around enterprising and commercialization.

As we are reflecting knowledge creation and transfer across academic setups, it becomes pertinent to navigate some of the Knowledge Management Models and their underlying assumptions and premises for further connecting academia with industry through knowledge creation and transfer.

Model	Proposed By	Explains
SECI Model:	Ikujiro Nonaka and Hirotaka Takeuchi(1994)	Knowledge creating process so as to understand the dynamics of knowledge creation.
3-Stage Model: Knowledge Management	Davenport and Prusak's (1998)	Explains generation, codification, coordination and transfer.
7-stage Knowledge Management Model	Ward and Aurum's (2004)	This model talks of knowledge creation, acquisitions, identification, adaptation, organisation, distribution and application.
Model: Knowledge Life Cycle	Firestone & McElroy (2003)	Knowledge as a continuous process involving production and integration, thus promoting innovation
Knowledge Management method	Chris Collison and Geoff Parcell (2007)	A framework that advocates learning, sharing and tapping knowledge and experience.
Model: Six Knows Knowledge	Lundvall &Johnson (1994)	Knowledge: What, how, why, who, when and where.

Source: *"Knowledge Matters" (http://www.durantlaw.info/), Knowledge and Intangibles Management. Methods, Models and Theories, 2009. (http://www.12manage.com/i_ki.html)*

Nonaka and Takeuchi (1995) in SECI Model as shown in Figure 1.2 depicts that knowledge creation process of an institution depends on the extent to which tacit forms of knowledge gets converted into explicit forms. The tacit forms of knowledge are more difficult to convert, the reason being that tacit knowledge is embedded into the thinking process of institutional members and hence depends upon the will of individuals to translate the tacit forms of knowledge (Nonanka and Takeuchi, 1994).

Figure 1.2 *SECI Model*

Source: *Nonaka, Ikujiro; Takeuchi, Hirotaka(1995). The Knowledge Creating Company: How Japanese Companies Create The Dynamics Of Innovation, Oxford University Press.*

The SECI model proposed by Nonanka and Takeuchi (1994) as depicted in Table 1.1 highlights the conversion of intangible forms of knowledge into tangible forms of knowledge which further leads to the creation of processes that facilitate the conversion. The tacit forms of knowledge may be the individual expertise, specialisation and research experience. The four conversions processes that impact the knowledge creation at institutional level are socialization, externalization, combination, and internalization (Nonanka and Takeuchi, 1994). The efficiency of these processes impacts the knowledge creation capacity of institutions which in turn impacts the organisational capability and knowledge management.

Further the core processes as shown in Fig 1.2 are Socialisation (Nonanka and Takeuchi, 1994), Externalisation (Nonanka and Takeuchi, 1994), Combination (Nonanka and Takeuchi, 1994) and Internalisation (Nonanka and Takeuchi, 1994). Socialisation refers to creation of social capital within the institute for development of trust that is an essential prerequisite for

knowledge creation (Nonanka and Takeuchi, 1994), and sharing. Combination (Nonanka and Takeuchi, 1994) refers to translating the intangible forms of knowledge into documentary evidence. Externalisation (Nonanka and Takeuchi, 1994), refers to the connect that the measurable deliverables have with the market place and Institutionalisation refers to building institutional knowledge management infrastructure that can built upon all above said processes in a routine manner.

Davenport and Prusak's (1998) 3-stage model advocates that knowledge management comprises and also, three core processes as knowledge generation, knowledge codification and also knowledge transfer. The Ward and Aurum's (2004) 7-stage model is comprehensive and exhaustive one as it includes processes that are visible in majority of organisations which are knowledge creation and acquisition that involves acquiring knowledge from external sources (Menon and Pfeffer, 2003), and according to source compatibility (King and Lekse, 2006). Knowledge identification (Ward and Aurum's 2004) leads to partner selection, knowledge adaptation refers to institutionalisation of partner's knowledge into organisational structure and processes. Knowledge organisation(Ward and Aurum's 2004) refers to management of varied forms of knowledge in systematised manner, and knowledge distribution refers to applying knowledge in the industry so that commercialisation potential of academia can be enhanced.

Further, 'Knowledge Life Cycle Model' (Table 1.1) propounded by Firestone & McElroy (2003) focuses on the management of knowledge in continuous manner wherein, production and integration of knowledge should occur simultaneously, for minimising the knowledge divide across industry and academia (Rynes et.al, 1999). This kind of orientation should be supported by the innovative culture operating at institutional level which can be mapped by kind of resource profile.

The Knowledge Management model (Table 1.1) proposed by Chris Collison andGeoff Parcell (2007) corroborates the importance of learning, acquiring, sharing and unleashing knowledge and expertise in interface kind of structures. The learning dimension as per this model when applied to the understanding of the universities and academic institutions, reflect that these institutions are symbols of learning organisations (Galbraith, 1999) as they are continuously evolving in terms of knowledge content and mission. This characteristic of academic institutions has necessitated them to pursue knowledge management not as a complimentary process but a policy tool that shall enable them to move across the knowledge divide (Rynes et.al, 1999) and leverage upon in house institutional competencies for creating a niche in the market.

Knowledge management Model (Table 1.1) as proposed by Lundvall & Johnson (1994) deals with the reason for knowledge management in organisations, besides the ways in which knowledge could be managed, created and shared. Accordingly, the academic institutes need to develop structure and policies to complement the culture of innovation with the involvement of industry as partners.

In light of the various knowledge management models, the organisational theories of knowledge management highlight the role of knowledge creation and knowledge transfer, wherein knowledge creation is an academic output and its marketability potential (Kotler and Fox, 1985) is a determinant for the application of this knowledge in diverse contexts (Demsetz,1991).Knowledge created at the academic level attains two distinct forms that further determine the application of different bits of knowledge. The first form is the explicit and can be easily coded as well as decoded when transferred into other systems and contexts. The other form of knowledge is tacit and rests in the thought processes of the academia that is involved on knowledge creation. Tacit knowledge finds its application only when it is supported by the mobilisation of resources (primarily people) (Nonaka and Takeuchi, 1995). The key differentiator of knowledge creation and transfer capacity across institutions is the rate of specialisation and differentiation. In this light, therefore, academic institutions need to create specialised forms of knowledge assets that cater to the select market needs. This specialised form of knowledge assets demands special forms of transfer channels so that they find appropriate industry partner for commercialisation.

3. Knowledge Creation and Transfer: Literature Review

Knowledge creation as defined by Becker (1973) highlighted that knowledge creation is an outcome of synergy between the industry and academia. The synergy depicts the importance of "value creation and the ability to attract desirable partners under competitive conditions", taking into consideration the alliance needs. The economic theory of knowledge creation was propounded by Becker with an aim to establish economic relationships between academia and industry. This further shifted the mission of academia towards 'Near Market Research' with high commercialisation capacity.

Polanyi (1995) deliberated upon the concept of knowledge creation in more generic form wherein knowledge creation was researched as 'Organisational Knowledge Creation' rather than academic knowledge creation. The study revealed that organisational and academic knowledge creation deals with same forms of knowledge creation i.e. explicit knowledge which can be quantified along with tacit knowledge may be hard to confirm and convey. The tacit bits of knowledge are deep embedded into individuals that are important entities. The tacit bits of knowledge are deep embedded into individuals that are important entities.

The resource-based view of knowledge creation was developed on the basis of specialization in terms of research and channels of transfer. advocated the importance of academic institutions in terms of resources that are created by the research centres in collaboration with the industry partners, thereby facilitating the process of knowledge transfer after it is being created at academic level. This kind of the approach caters to academic goals in a wholesome manner. Thus, the authors highlight that on one side, knowledge repositories are created in depth and simultaneously on other side the channelization of these resources take place.

Nonanka& Takeuchi (1995) explained the dependency of knowledge creation on the content of knowledge. The content analysis of organisational knowledge explains that knowledge in its generic form is an understanding and belief of the association between the institution and the broader context under which institution is operating, this broader context refers to institutional environment. The authors thus suggest that the knowledge creation at the institutional level is a static process which adopts dynamic character when influenced by the environmental variables. The content analysis further revealed that the extent of dynamic depends upon whether knowledge is explicit or tacit.

Rothaermel and Thursby (2005) while conceptualising on Knowledge transfer emphasise further that transfer is facilitated by the industry-industry collaboration, that provides the basic insights related to the absorptive capacity of other partner, tacit knowledge that is embedded within individuals, trust that determines intention to solve problems and the relationship building. It has been found that budding organisations enjoy higher rates of research prosperity that collaborate with universities, the reason being that both parties not only get involved in knowledge creation and transfer but also develop and devise transfer structures and strategies in consonance with the partners need (Rothaermel and Thursby, 2005),thus are able to leverage upon the increased patent capacity and profitability (Baum, Calabrese, and Silverman, 2000).

On the academic side, collaborative outcomes are more tacit in form and ambiguous. Some of the literary studies tend to be more cynical about the collaborative benefits, whereas others believe that the academicians that actively engage themselves with the industry participants publish intensively and more concrete, as they have first-hand experience of market and thus can put into writing the industry feel. (Zucker and Darby, 1996; 1997). There are certain economic payoffs associated to the industry academia collaborative networks wherein academicians continuously struggle to find a path for commercialising their research insights so that the research budget of academic enterprise can be strengthened. Such a diverse portfolio of benefits that is attached to the academia-industry collaboration led to conclude (Zucker, Darby and Armstrong, 1998) that "the relationship between academic institutions and organisations appears to be truly symbiotic contributing to the success of both academic and economic ends".

The emergence of the term Knowledge transfer can be traced back to two different streams of research. The first stream of research focussed on technology transfer literature that was important for innovative corporations and was studied extensively by (Clark and Fujimoto, 1991). Another stream of research was based on knowledge transfer in terms of tacit and explicit forms. Knowledge transfer is defined as the exchange of discrete or bundles of knowledge among institutions, within institutions, across institutional members that may be from same functional areas or from interdisciplinary background. (Schwartz, 2006). The present study defines the term organisation in context of academia and organisation units in terms of research centers. This study seeks to examine the relevance of existing knowledge transfer channels amongst the academic community that in future can suggest policy to recreate the knowledge transfer channels that are more market sensitive and academically viable.

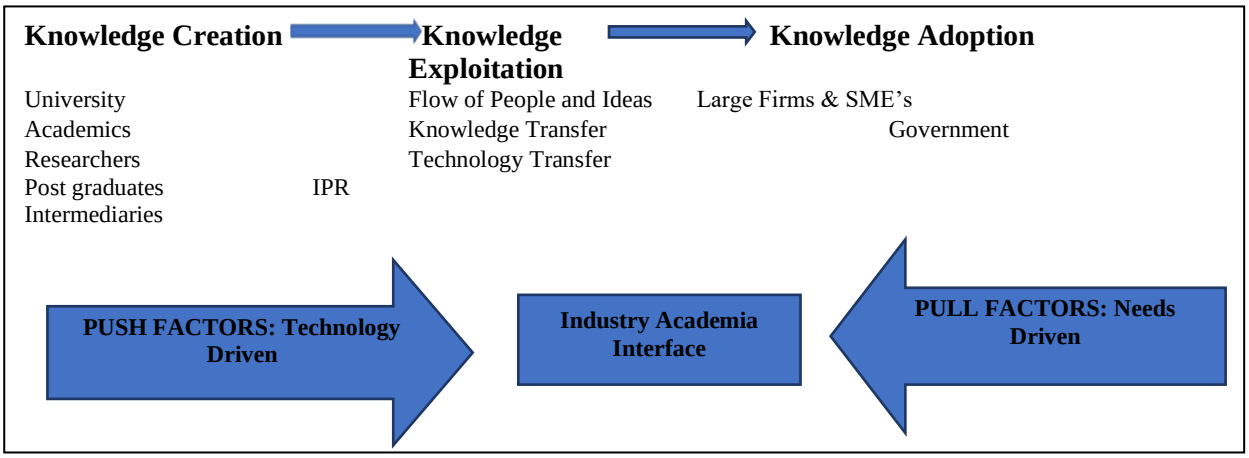

Figure 1.3 *Key Factors Related to Knowledge Transfer*

Source: *Key Issues and Actors Relating to Knowledge Transfer (Adapted from Lockett, 2006) Lockett, N. (2006) 'InfoLab21 Knowledge Transfer Study, October 2006', URL (consulted March 2007): http://www.communitiesofinnovation.org/docs/InfoLab21KTStudyFinal.pdf*

Academic Research and Knowledge Transfer are important assets of academic institutions. These assets once built in a concrete form yield return. Academic institutions in order to be effective in the transfer of knowledge to the community as a whole need to have recognized research excellence which can be in form of (people, ideas and technology) as shown in Figure 1.3. The outcomes of these three forms of research excellence nurtures the industry as well as academia, as royalty is earned by academia and new products and technologies get absorbed by in the industry. Essentially knowledge transfer is a fundamental process of any academic varsity which are cardinal to learning for policy making and futuristic research agenda. The three forms of research that are dominant in academic institutions are: Basic Research, Applied Research and Experimental Research. In Indian context it is the applied research that gets translated through knowledge transfer and exchange, into deliverables, having impact in economic terms.

Academic Deliverables

Different transfer channels through which all forms of research i.e. basic, applied and experimental research get transferred to industry.

Categories of Industry Science Relationship as given by Bongers (2003).

Different Categories	Forms of ISR
1 Publications	Scientific publications, Co-authorships and Publications
2 Participation	Participation in conferences, professional networks, boards, fairs, exchanges, govt. organization.
3 Mobility of people	Mobility between knowledge Institution and industry of graduates, trainees, personnel
4 Other informal contacts/ networks	Friendship Groups, Alumni Groups
5 Cooperation in R&D	Joint projects, research supervision/financing and or research sponsorship.
6 Sharing of facilities	Shared laboratories, machines, building (Science parks) and purchase of prototypes
7 Cooperation in education	Education or training, employees and students, curriculum development, scholarship and sponsorship.
8 Contract research and advisement	Contract centric, research and consultancy
9 IPR	Patent texts, Licenses of university-owned patents and copyrights etc.
10 Spin-offs and entrepreneurship	Spin-offs, incubators setups and entrepreneurship

Source: *Bongers, F. P. den Hertog& R. Vandeberg (2003) Naareenmeetlatvoorwisselwerking. Verkenning van de Mogelijkhedenvoor meting van kennisuitwisselingtussenpubliekekennisinstellingenenbedrijven/maatschappelijkeorganisaties*. Den Haag: AWT

The literature review of researchers like Cohen et al (2001) and Bongers et al (2003) reveals thatthe type of channel selection depends upon the variety of ways in which academia interacts with the economic processes. This interaction helps an academic institution to identify and explore the potential knowledge transfer channels. The interaction process primarily involves the collaboration networks between the industry and academia. The type of organization and the industry under which it is operational decides the channel of knowledge transfer. The interaction of industry with the academia reveals the key stakeholders including research sponsors and funders thus making it easy for an academic institution to evaluate the economic consequences of each channel.

Edvinson and Malone (1997) elaborated upon the learning environment and different forms of the structural component of the structural capital of the institution which are always under evaluation. According to authors, the industry income-innovation, international mix of students and staff forms the relational component of the institution and determines the degree to which an institution has been successful in collaborating and maintaining academic relationships with the corporate bodies and other academic institutions. Thus, while analyzing the ranking and evaluation behaviour of the ranking agencies, it can be deducted that the intellectual capital of an institution is evaluated and is first priority for the ranking agencies to evaluate (Edvinson and Malone, 1997).

The importance of intellectual capital is supported further by the literary work of Kaplan and Norton (2004) that defines intellectual capital as the driver of institution's resource variables, which in turns offer a foundation for generating core competencies. It is the core competency of an academic institution that helps it in carving a niche in the market place and finding suitable industry partner. The academic institutions thus need to capitalize the internally created intellectual capital to generate the core competencies. The core competencies can be in the form of patents, intellectual property rights, international publications, the relevant experience of academic institution in collaborations and the human resources. The core competency developed by an academic body need to have a market value economic value attached to it so that it can generate earnings for the institution. The industry attractiveness thus is a function of market value of core competency (Kaplan and Norton,2004).

According to Stokes (2011) the academic institutions internally also witnessed the differential rate of research activities among various disciplines and departments. The reason for the differential behavior can be explained by the pasteurian orientation of universities as depicted by Figure 2.5. Thus, the department's involvement in the type of research determines the knowledge utilization potential of the department.

Stokes (2011) depicts that the departments that are highly involved in the pure applied research stand on higher probability of getting involved with industry. These departments maintain optimum level of resources in order to furnish their research processes.

The industry academia interface and its prospective benefits on the regional development of the country is well justified by the econometric study of Mueller (2005) where the impact of interfaces on the regional economic development in context of Germany were studied. The research deducted a positive relationship between the grant provided by the local private bodies to the academia and its influence on the development of the academia.

The fragility of relationship was at first empirically justified by the Brocker (1989) who examined the "growth of employment in 87 regions in Germany from 1970 to 1982 and rejected the hypothesis that public research has a positive impact" on the local development. According to Brocker (1989),the positive impact of interfaces could not be generalized as such there are cases and empirical evidence that go against this proposition but certain researched prove that university industry linkages impact only specific sectors of the economy.

Loof and Brostrom (2006) while surveying 2071 Swedish corporations concluded the university research and industry absorption differs across industrial sectors. The manufacturing sector is the major interface partners to Swedish universities in

comparison to service firms. Thus, the exact nature and causal structure of industry-academia interfaces need to be explored in depth the authors advocate.

According to Lambooy (2004) the exemplary practice in this direction is the Silicon Valley wherein the organizations and academia have developed the entrepreneurial hubs and spinoffs. This nature of activity minimizes the geographical constraint, which impedes the knowledge transfer spirit of academic institutions. The external environment according to Lambooy (2004) encompasses the academic-academic, academic-industry collaborations and partnerships that academia has established with the global corporations. This tendency of collaboration varies across geographical boundaries wherein the western and European academic fraternity acquires the innovator category he opines.

Where Indian Academic Varsities stand in the Industry Academia Connect

The Times Higher Education (THE) World Reputation Rankings are a subsidiary of the annual World University Rankings, and they are based on entirely on the results of a worldwide survey of academics. 'THE' is a measure of a university's reputation for excellence, in both teaching and research, among experienced university academics around the world. Figure 2.3 draws that the reputation rankings are drawn from an Academic Reputation Survey carried out by polling company Ipsos for their rankings data provider, Thomson Reuters, as part of the Thomson Reuters Global Institutional Profiles Project. The survey results formed two of the 13 performance indicators used to create The World University Rankings 2010-2011, published on September 16, 2010. The invitation-only survey was sent to tens of thousands of experienced academics, based on the United Nations' estimate of global academic researchers by geographical area. The survey was offered in eight languages: Japanese, Simplified Chinese, Spanish, French, German, Brazilian Portuguese, European Portuguese and English. The survey was distributed between March and May 2010 and 13,388 people from 131 countries provided usable responses. The average respondent had been working at a higher education institution for more than 16 years and had published more than 50 research papers (Baty, Phill2010). The questionnaire breaks into five categories with 13 separate indicators designed to capture a broad range of activities from teaching and research to knowledge transfer (*THE world university rankings (http://www.timeshighereducation.co.uk/world university rankings/2010-2011/analysis.html)*. The five categories and their weightings are:

- Teaching-the learning environment (worth 30 per cent of the final ranking score).
- Research-volume, income and reputation (worth 30 per cent)
- Citations-research influence (worth 32.5 per cent)
- Industry income-innovation (worth just 2.5 per cent)
- International Outlook (worth 5 per cent)

The weightings for 5 categories and the 13 indicators within them vary considerably. High weightings are given for the valuable proxy and clear confidence of the data. Low weightings are employed where confidence in the data or the usefulness of the indicator is less pronounced depending upon the type of institution and the country of residence. The data describedabove reveals that the ranking institutions assign maximum weightage to the quantity and quality of research while evaluating academic body. The model above presented can be correlated to the intellectual capital theory wherein the structural, human and relational capital is considered to be the key determinants of the institutional interface success. The research citations, teaching, research volume forms the category of human capital and thus is an index which is measured for university or academic evaluation purposes.

In the recent years, Indian academic varsities, have strongly advocated the strengthening of industry interface across above mentioned verticals, and in latest 2023 ranking, the institutions namely, Indian Institute of Science and IIT's have been able to perform against the verticals, but the global ranking for academic institutions on industry income showcases the academic institutions of countries like Turkey, South Korea, Germany, Taiwan, China, Netherlands and South Africa performing better in terms of attracting industry income, as evidenced by the Times Higher Education Global Ranking, 2023. Navigating across the ranking of 1799 Universities across 104 countries and regions, wherein the academic varsities are ranked against 13 carefully calibrated performance indicators that measures institution's performance across four areas of teaching, research, knowledge transfer and international outlook.

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