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AN INVESTIGATION OF THE ROLE OF UNIVERSITY IDENTITIES ON THE SUBJECT AND MODE OF THEIR RESEARCH

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Universities occupy a leading role in knowledge economies through their entrepreneurial activities to develop products and technologies based on cutting-edge research. While there are strong isomorphic pressures across nations to transform their universities on these lines, it is important to contextualize university entrepreneurship to take into account the unique circumstances of emerging nations, namely, a historical emphasis on teaching with less attention to research, and the imperative to go beyond profit motives and western notions of research in order develop products and technologies that are suitable to the needs of local populations of these economies. This paper looks at these twin challenges from the lens of organizational identity. Based on a case study of a leading medical research university in India, the paper examines the role of organizational identity of universities on their research and innovation activities. It concludes that organizational identities of universities in emerging nations might impede them to carry out more developmental and engineering oriented research, without a concomitant emphasis on basic research due to the pressure to fulfil their primary mission of teaching (and health care in the case subject). Implications for future study to understand how universities policies and practices might impact such organizational identities are discussed.

INTRODUCTION

Universities play several roles in national economies. However, in recent years, the growth of the so-called knowledge clusters in several countries has highlighted their entrepreneurial role over teaching and basic research. Commercializing research, entrepreneurship, and inter-organizational collaborations are activities that have become increasingly important (Miller, Richards & Arora, 2011; Hendry & Brown, 2005), for which the "research university" has emerged as a key institution (Altbach, 2009).

Etzkowitz and others (Etzkowitz et al, 2000; Etzkowitz & Leylesdorff, 2000) have developed the "Triple Helix" framework to explain these developments. Three modes of the Triple Helix are posited – mode one with the state regulating university-industry relationships, mode two with strict boundaries around these three constituents, and the present mode with significant overlaps and hybrid structures connecting the three constituents (Etzkowitz & Leydesdorff, 2000). There is considerable interest across the

world, but quite prominently in some emerging economies, to transform universities to take up active entrepreneurial roles. These isomorphic pressures raise two questions for emerging economies.

Firstly, the role of universities in these nations may be different from those in advanced economies in ways not adequately captured under the Triple Helix framework. For instance, they may have important "state-building" roles besides research (Ordonika & Prusser, 2007: 189). Shenhav & Kamens (1991) suggest that their pursuing research agendas of advanced economies confers greater legitimacy than researching on local issues. However, such isomorphic pressures may constrain research to economically useful innovations at the cost of "socially relevant science" (Drori et al., 2003: 227).

Secondly, the question of whether university research aimed at commercial gains complements basic scientific research is open. Basic scientific research is important for furthering technologies and products, especially when they approach theoretical limits (Fleming & Sorensen, 2004). Hence, this question is important for university research in emerging economies for their technological competitiveness. Research funding (e.g. Bolli & Somogyi, 2011; Just & Huffman, 2009; Thursby & Thursby, 2011), ownership structure (Just & Huffman, 2009), university-industry collaboration (Ponomariov & Boardman, 2010), internal policies and structures (Chang, Yang and Chen, 2009; Caldera & Debande, 2010), patent assignee (Czarnitzki, Glanzel and Hussinger, 2009), and mix of faculty activities (Landry, Saïhi, Amara & Ouimet, 2010) are some of the variables studied in this context.

At a more fundamental level, Duberley, Cohen, & Leeson (2007) suggest that motivation for scientific research has shifted from curiosity of individual scientists to extend the frontiers of knowledge in scientific disciplines to the application of science into technology through inter-disciplinary and collaborative research. One reason for this might be the way researchers and scientists define themselves. Jain, George & Maltarich (2009: 924) differentiated the role identities of academic and entrepreneurial science based on their norms, processes and outputs. Academic science is characterized by norms of universalism, communalism, disinterestedness and scepticism, experimentation, long-term orientation, individualistic/small group work, and outputs such as papers and peer recognition. In contrast, entrepreneurial science is characterized

by norms of uniqueness, private-goods nature, passion, optimism of entrepreneurial science, focussed processes, short-term orientation and team management, and outputs such as products and profits. Some recent studies (e.g. Jain, George & Maltarich, 2009; Lam, 2010) indicate that university scientists make a distinction between their identities as pure science researchers, and more applied entrepreneurial science researchers, with a hybrid identity as a possible outcome for many scientists. Thus, the choice between a basic research orientation and applied research orientation might derive from the way universities and researchers define themselves.

This paper contributes to this discussion by examining the role of organizational identities. Such identities have been known to significantly impact the way organizations strategise and take crucial decisions. Accordingly, it is possible that the way universities define themselves might have an important bearing on what they research on, the manner of such research and its outcome. More specifically, it addresses the question: *How does university identity affect university entrepreneurship within a Triple Helix framework in emerging economy contexts?*

In the following sections, I shall first outline recent work on organizational identity that forms the conceptual background for this discussion. Following this, I shall report the findings of a case study on an institution of higher learning and research in the health sector in India. Based on this case study, I shall discuss some implications of university entrepreneurship, with suggestions for future research in this area.

CONCEPTUAL BACKGROUND

In this section, I shall elaborate on the roles of universities as they have evolved over time and the concept of organizational identity.

Organization identities and hybrid organizations

Organizational identity can be understood broadly as those features of an organization that are relatively stable, enduring and central to organizations (Albert & Whetten, 1985). It has important strategic consequences for universities, including their survival (Czarnikwaska & Wolf, 1998). While organizations with a utilitarian identity use remuneration to maintain its identity, those with a normative identity prefer to build norms (Albert & Whetten, 1985).

Brickson (2005, 2007) introduced the construct of organizational identity orientation, arguing that organizational identity reflects how an organization sees itself vis-à-vis others, and distinguished between individualistic, relational and collectivist orientations. She suggested that these orientations might explain the nature of "social value" creation by organizations, which she defined as "...that which enhances the well-being for the earth and its living organisms" (Brickson, 2007: 866). Muller & Whiteman (2010) categorized organizational identities in terms of the underlying values and community networks in which organizations are embedded. In terms of values, organizational identity could be employee-centric or philanthropy-centric.

Research suggests that organizations might have multiple identities (Albert & Whetten, 1985; Pratt & Rafaeli, 1997). Such identities may be triggered in non-profit organizations, for instance, as they evolve and change, and as questions are raised by members about how the proposed changes fit into the way they see themselves and their organization (Dutton & Dukerich, 1991; Glynn, 2000). A specific form of multi-identity organizations is the hybrid. Albert & Whetten (1985: 270) define an organization as a hybrid when its "... identity is composed of two or more types that would not normally be expected to go together." Such organizations may face conflicts amongst their identities because of the inherent tension that exists between the two largely incompatible identities. Examples of such organizations have been discussed in a variety of contexts such as the modern university (Albert & Whetten, 1985), musical orchestras (Glynn, 2000), health care (Golden-Biddle & Rao, 1997), rural cooperatives (Foreman & Whetten, 2002) and micro-finance (Battialana & Dorado, 2010).

Considerable scholarly work has been devoted in recent years to study how hybrid organizations cope with identity conflicts. Some researchers have investigated how organizations may align their structures to concentrate on their primary identities. For example, Pratt & Foreman (2000) suggested a conceptual model in which multiple organizational identities may be managed by addressing how many identities need to be retained and their inter-relationships. Possible actions might include deleting a less important identity, aggregating the conflicting identities under a priority scheme, or integrating them to form a composite identity. Changing the way hybrids handle symbols can be another way. Thus, Pratt & Rafaeli (1997) found that an identity conflict that was precipitated from a decision regarding a dress code for nurses in a hospital was resolved when the nurses decided to give the choice of wearing either street dress or scrubs to the individuals concerned. Hybrids may also adopt certain hiring and socialization practices that take into account identity conflicts. Thus, Battialana & Dorado (2010) examined how hiring practices of hybrid organizations affect their ability to negotiate conflicts. Their study of two micro-finance NGOs in Bolivia suggested that one of these organization's approach was to hire fresh apprentices and socialize them into a

culture of operational excellence. The second organization they studied hired experienced personnel and socialized them into the superordinate goals of the hybrid organization.

University roles

Etzkowitz et al. (2000: 313 pp) summarised the roles of universities in terms of three "missions" - the first being that of teaching, the second related to research, and the third being entrepreneurship. This "third mission" (Etzkowitiz et al, 2000) demands entrepreneurial activities such as spin-offs and technology licensing. On similar lines, Basant & Chandra (2007) suggest four types of linkages - contribution to labour market (training, education), demand & supply of goods and services by way of requirements on the local economy by students and faculty, as well as serving by way of testing services, etc., creating new enterprises by spin-offs etc., and creation, acquisition and dissemination of knowledge through joint projects, consortia, lectures, etc. Vang et al., (2007) categorise these linkages into generative roles (teaching and research) and development roles (commercializing research, linking with industry, entrepreneurial actions etc.).

A convenient way to reconceptualise these roles is by looking at them as three types of activities involving knowledge processes. An extensive literature on knowledge search - the process of problem-solving by locating and combining relevant technological knowledge (Katila & Ahuja, 2002: 1184; Katila, 2002: 996) by organizations - suggests that organizations undertake two broad types of activities. Drawing on the seminal work of March (1991), this body of work suggests that some organizations are relatively better at exploring new knowledge, while others are relatively better at exploiting knowledge. In the context of research, knowledge exploration would be akin to activities such as basic research designed to discover new knowledge. Knowledge exploitation, on the other hand, would primarily involve using an existing knowledge base to develop innovations. This body of literature suggests that organizations that rely exclusively on exploiting an existing knowledge base over a period of time may end up adversely affecting the quality of innovations (e.g. Katila & Ahuja, 2002; Katila, 2002).

For universities then, there are three roles that are related to three types of knowledge activities. Their original mission involves *dissemination* of existing knowledge through teaching, training and consulting. Later, *discovery* of new knowledge by exploring new fields or new frontiers of existing fields through research became accepted as a legitimate mission. Finally, in recent years, the stress on university entrepreneurship is about the application of an existing body of knowledge to *design* new products or technologies. Thus, while discovery is about knowledge

exploration, both dissemination and design are about knowledge exploitation. They relate to the three missions discussed by Etzkowitz et al (2000).

It is possible that how a university defines itself, that is its identity, might have an important bearing on its roles. Several strategic decisions, such as structures and policies to incentivize faculty for basic or applied research, source of funding, nature of university entrepreneurship, and so on are likely to be based on what the university sees as its main identity. For example, with appropriate incentive structures, university researchers may be motivated to take up entrepreneurial activities aimed at either public goods such as low-cost health care devices or high-cost devices. Similarly, policies may favour basic research or applied research.

Thus, more private goods oriented university identities may be an important factor that influences the roles they take up. Whether this actually holds out in practice or not, and to what extent, is not adequately investigated. In the next section, I report on a case study of a medical research institution to investigate how dual organizational identities affect the research orientation of universities.

The case of Sree Chitra Tirunal Institute for Medical Sciences and Technology

The case of Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTI henceforth) at Trivandrum, India provides a useful ground for study. Not only is this institute a "deemed" university, meaning that it is empowered by an act of the Indian parliament to conduct post-graduate and doctoral courses and grant degrees, but it is also a research hospital, with a dedicated R&D wing to carry out advanced research in medical sciences and develop bio-medical devices. As a research hospital catering to tertiary health care in cardiology, cardiac surgery, neurology and neurological surgery, it runs a speciality hospital for medicine and surgery. At the same time, it is also mandated to carry out state-of-art research in medical sciences and develop state-of-art bio-medical devices for mass manufacture. It has had some remarkable achievements in both medical treatment and bio-medical engineering, with its "Sree Chitra heart valve" being extensively covered by the popular media. The daily *The Hindu* for example, ran an article on how the low cost of this device has enabled thousands of Indians to undergo an otherwise very costly surgery (Gopal Raj, 2009). Its third mandate, that of public health, is less consequential to the present discussion.

Several reasons account for the attractiveness of this organization as the research setting for this study. Being a university that caters exclusively to medical research and also running a teaching hospital, it provides a natural setting to study the effect of different identities. Secondly, as a

relatively young organization, with many of its first members still on rolls, it was possible to understand its devlopment and the evolution of identity over time with relative ease. Finally, the stature of the institute, and also its documented success in a critical area such as bio-medical innovations made it interesting, with a potential for significant practical application of this study's findings. In the following sections, I shall first provide a brief description of the institute, followed by an analysis and a discussion of theoretical implications and avenues for further research.

Data for this study was collected primarily through interviews with several members of the top management, middle management and other members directly involved in operations. A semi-structured interview format was followed, with questions touching upon the history and development of the institute, its mission and objectives, its organization identity, the specific role that the respondent performed (in case of those who were in operational roles), institute policies that impacted research, changes in the institutional environment, challenges that respondents and the institute faced, relationship between the two main wings of the institute (the roles of the wings are detailed in the case description below). Each interview lasted between 30 minutes to more than an hour for the top management representatives. Besides two members of the top management, 9 other respondents were covered. They included four clinicians, four scientists and engineers, and one respondent in administration. These interviews were transcribed and analysed. This was triangulated through annual reports since inception, data on publications, patents, manpower etc.

SCTI – its birth, growth and issues

SCTI started off almost fortuitously when its founder director Dr. M S Valiathan, an accomplished surgeon, decided to settle down in Chennai after an active though arduous professional career that had taken him to three continents over fifteen years. He had been invited to join the faculty of the bio-medical engineering at the Indian Institute of Technology at Chennai with a concurrent role as a consultant in cardiac surgery at another hospital in the same city. Dr. T J Cherian, who had played an active role in promoting this hospital, was invited by the government of Kerala to head SCTI and requested Dr. Valiathan to join him. However Dr. Cherian backed out later, leaving Dr. Valiathan to take over the mantle of heading the fledging organization. His resolve to join was strengthened when he met the then chief minister of Kerala Sri Achutha Menon, who assured him of his government's full support. The Chief Minister had taken the initiative to bring the centre under the Department of Science and Technology (rather than the Department of Health) of the government of India. This was quite unexpected and underlined his intention of seeing the centre evolve into a top class institution

for multi-speciality treatment for the poor while simultaneously being responsible for research. The latter was the justification for bringing the centre under the ambit of the department of science and technology. With Dr. Valiathan's joining the centre on 1st October 1974, construction and administrative activities such as recruitment of medical practitioners took off rapidly. Despite several obstacles, including a protest by some members of the faculty of the government medical college in whose premises the centre was established, and some occasional adverse publicity and hiccups, the centre was formally inaugurated on February 28th 1976 and the first patients started receiving treatment. In recognition of its work in health care, the centre was granted the status of an autonomous "Institute of National Importance" with degree granting powers under an act of parliament in 1980 and came to be known by its present name.[1]

Over the years, SCTI Chitra has churned out a good number of medical products, some of which have been licensed out for production, and some that are yet to find interested parties. A list of these products and their status may be seen in Table I below:

1 This paragraph is a summary of an account prepared by Valiathan (2004)

Table I: Technologies developed at SCTI

Year	Milestone
1990-91	Blood bag
1990-91	Hydrocephaleous shunt
1991-92	Sree Chitra heart valve
1996-97	Opthalmic sponge
1996-97	Concentric needle electrode
1997-98	Hydroxy apatite porous granules
1999-2000	What are these?
1999-2000	What are these?
2001-02	Large diameter vascular valve
2001-02	Heparin coating of intra-ocular lens
2001-02	Disposable ECG electrodes
2002-03	Membrane oxygenator
2002-2003	Vascular graft
2005-06	Diagnostic kit for field testing of antibiotic sensitivity for mastitis milk
2005-06	Centrifugal blood pump
2005-06	Five technologies comprising dental composites, bonding agents and glass fillers
2005-06	Hydroxyapatite bioglass bioceramic composites for orthopaedic applications
2005-06	Bilayer HAP burr hole buttons

However, of all these products, three have become really well known. These are the heart valve, the oxygenator, and the blood bag. Of these, the heart valve has become synonymous with the institute due to the amount of media attention it has generated and has been instrumental in putting SCTI on the national radar. The story of how these were developed and the challenges faced by the institute in their development and marketing is interesting itself and point to some of the fundamental issues faced by institutes of research and higher learning in India and like economies as they undertake an active role in technopreneurship. This story is narrated briefly in a following sub-section.

Challenges from changes in the institutional environment

The setting of the institute perhaps would have been impossible without the active support of the government. Similarly, its initial forays into product development would perhaps have been a non-starter without government support. This is illustrated by the manner in which its blood-bag program took off. One of the scientists who was involved in this project narrated a fascinating account of this. Till then, the market for blood storage in India was mostly served by blood bottles. Blood bags were imported and were expensive, which only the very well-to-do could afford. After being in development for several years, the SCTI blood bag was offered at a drastically low price. It was reported that at that moment, foreign companies that were exporting blood bags to India immediately dropped their prices below this level in order to force SCTI's product out of the market. The situation turned to its favour when the technology licensee, a local entrepreneur, successfully lobbed with the government of India to bar importers from selling blood bags at prices lower than its product.

However, respondents reported that changes in the institutional environment are impacting the services of the institute. Over the years, as its reputation as a provider of state-of-art super-specialty hospital has grown, so has the demand on patient care. As one of the respondents observed, "[we] need more human resource, more specialized people, number of patients have increased over the years...[so that] many surgical specialities have high workloads". This was corroborated with archival data obtained from the institute. This data suggests that while patient treatment (both indoor as well as out-patient services) increased several fold, the increase in the number of doctors has not kept pace.

Changes in the institutional environment was also affecting the supply of quality manpower for research. As one of the respondents commented:

"Retaining good manpower, especially in the clinical side, where pay outside is ten times more...[in particular] getting good manpower in the research wing is a challenge post the IT boom – basic sciences and engineering technology have suffered as people have shifted, even for permanent posts sometimes only two or three persons apply...[in general] higher education is not prestigious any longer."

One of the measures that the institute is taking to overcome this problem is to collaborate with an Indian Institute of Technology, a prominent research institute in Bangalore, and a government atomic research laboratory specializing in imaging technologies.

A third area in which institutional changes are felt at the institute is in research funding. While the director said that most of the research carried out at the institute was government funded (i.e. without much industry participation), one of the senior scientists commented, "Funds [are]

now adequate; internationally medical research is government funded but government is refusing to fund ... says institutes have to be more independent". On similar lines, another respondent said "government policies [are to reduce] non-plan expenditure, so non-plan allocation is getting reduced every year, whereas our non-plan expenses are going up." One of the fall outs of this, as one respondent pointed out, is that it was becoming difficult to induct new staff.

Fourthly, support from the industry was an issue, and several respondents held the view that industry support was not forthcoming to the extent that was desired. Thus, commenting on the readiness of the industry to support activities of institutes such as SCTI, the head of the BMT wing said that Indian industry is weak in areas that matter to it, such as electronics, automation, and electro-mechanical engineering. He elaborated:

> "[research funding would be a problem] unless industry is willing to fund ... [I have been] floating to industry to have centres of collaborative work, [but] I think industry is still not ready...time spent for industry to recover the investment is going to be long at least 7 to 8 years...industry not coming forward much to put in the R&D as have been in the west...what is their perspective, what is their impression about...and how their confidence can be gained better...that is one area we thought we have not done enough."

Challenges internal to SCTI

While institutional changes and inadequacies in the institutional environment certainly raise important challenges, the interviews also highlighted concerns internal to SCTI that seem to have important implications for literature and for future research in the field.

The head of BMT observed:

> "Dr Valiathan used to say what's the purpose of having research if we can't have a valve...we felt that what he said was very true… challenge is converting that research into a manufacturing technology… [while research/publications require less money, but from there to proof of concept to commercial application involves a] lot of dirty work with very little publishing… big challenge of converting research into technology continues...in India its still a bigger challenge...we have still not learnt that well unlike the west where they started with the industrial revolution and eventually they were doing research for making money or for better technology... balance required between academic component/ research component and transfer – this challenge is true internationally"

But apart from these, there also appeared to be a concern that the research and products coming out of BMT were not as impactful as the earlier products. The clinicians were certainly less charitable in their comments on this. One of them, for example, said "[we] are not able to sustain the quality [of research]…"we came out with the valve in the 80s, but then beyond that for 25 years...no value addition, nothing has happened." Interestingly, a similar comment was made by one of the scientists when he said no big things were coming out of BMT. While others may or may agree with these observations given the number of products that have come out (Table I), perhaps the perception is that other than the heart valve, blood-bag and oxygenator, other products have not quite seized the imagination of the institute or the general public. Perhaps the reason for the emotive appeal of these three products lies in the fact that the common man and the media can easily identify with them.

One pointer to this state of affairs is the change in the mode of product development at SCTI over the years. Clinicians informed that "goals [for research] are very diffused" and that projects are taken up "out of our personal interest". A researcher based out of the hospital wing similarly said, "…we are not monitored as such…output [of research] will be PhD students plus research publications." A scientist at BMT wing explicated this point:

"I am told that during the time that the heart valve was being developed, there was a lot of institute level attention… [now there are less] institute programs… very few initiatives that are institute driven, may be 10% while 90% projects are individual driven. Ideally, this ratio should be 50-50…May be the institute should identity two or three thrust areas."

Thus, although there is a recognition from clinicians that "concepts just come from experience by brainstorming", the problem was in systematically taking them forward to develop products. In this regard, one of the important challenges related to the relationship between the hospital wing and BMT wing. The director highlighted this issue:

"[idea of product development comes from] close interaction between the user and the product development...infrastructure to develop it...under the same roof...accumulated experience...what kind of technology...can be transferred...[and a] good mechanism for this technology transfer…[but] we have not done enough...medical personnel will have to tell the bio-medical engineers regarding these equipment [that need to be developed]...what kind of modifications or improvement we should have so the hospital also has to play a large part in order to develop this..."

Similarly, the head of BMT recognized this issue when he compared the situation with the USA, where "...policy of clinical professors and research professors, sharing of time for research – demand [for bio-medical technology] exceeds supply."

This issue in fact was not new, for even as far back as 1993-94, SCTI's annual report (p. 7) on its activities noted:

> "Over the years, the gap between the medical, engineering and social sciences has grown to such proportions that interdisciplinary communication has become increasingly difficult".

The physical distance between the two wings was itself a problem that affected the closeness of interaction between clinicians and scientists at BMT. But apart from this, and at a more fundamental level, was the issue that the approach, goals, and identity of the two wings seemed to diverge. Scientists at BMT acknowledged the need for closer interaction between the two wings while admitting that on the ground this was wanting. Thus, one of the senior scientists commented, "interactions do take place informally [but] interdisciplinary work is not happening...BMT wing has its own drivers in terms of interests...hospital should be driving the BMT", while a clinician admitted that interactions were "not up to the expected level." This was concurred by another clinician: "I have a concern... [collaboration among medical wing and BMT] in a small way is still going on. But [it] could happen in a bigger way if there are specific programs."

In a sense, the clinicians saw their role as limited to giving ideas and spelling out requirements that BMT could then work on. Consider the following statements made by two clinicians:

> "I don't think there is any great disharmony between [the wings, but] all I think are independent…we have been giving them a lot of ideas...probably the ideas are not actually being put into production. We can only...say our requirement…"

> "…clinicians find it difficult to work here as well as to [carry out research]...many of our patients [give us] ideas, but to bring that idea to fruition is difficult…we can't be interacting regularly [with BMT wing]"

For one BMT scientist, the gap stemmed from the difference in approaches and research focus between clinicians and BMT, and this needed to be addressed. Another senior scientist at BMT appeared to concur with this:

> "multidisciplinary work is still difficult because of the culture...they are overloaded with patients...rather than finding time for research…as a culture in hospital still not evolved culture for research…the culture is still not very strong...in terms of patients driving so that I think needs to be strengthened"

At a deeper level, the issues seemed to be one of identity. It was pointed out that SCTI represented a mix of three identities – high quality health care, research and development of

medical devices and materials, and public health. The director referred to the first two in his interview when he said that the institute represented patient care, bio-medical technology development, human resource development (training programs), but pointed out that the mission of the instituted placed bio-medical technology research as number one and high quality patient care as number two. For him, the institute stood for developing products that are affordable in countries like India. On similar lines, one of the respondents said that the institute was a "model" that emphasized the "amalgamation of health scientists...clinical scientists...the public health, and the bio-medical technology development...improve patient care." However, as will be apparent from the statements in Table II below, which one took precedence was contested by different constituents.

Table II: Statements related to identity of SCTI

Statements made by scientists and researchers at BMT and hospital:
Role identity: • Sree Chitra comes under the department of science & technology, not ministry of health because of the bio-medical (not biotechnology) wing. • only institute in India that integrates idea conceptualization to clinical trial of end product • basic objective – products should be "affordable to the public" and quality is same as imported products • "development of high quality ... affordable medical devices" • "basically this is a research institution" • "research component is very important" • mainly focussing on the research for biomedical devices • "what we stand for is ensuring that research ends up […] and the product is available...it is part of our culture" • "we can keep on doing research we can publish a lot of papers but that is not going to get anywhere unless people convert them into technology" • "People do research, people have publications that is also valued, but work that is involved in commercial development is also highly valued" • "develop and provide very low cost indigenously made devices for health care" (researchers based in the hospital) • "[For the founder], the priority was that" research would not end on the lab bench" • "good quality health care" Motivational component of identity: • "satisfaction you get out of this is that when somebody is using your product, and he is happy with the product" • "very clear [that]...product should be for public welfare, to reach the market, in a cost effective [way]"

Statements made by clinicians at Hospital:

Role identity:

- "I consider myself a surgeon; the biggest impact factor is get a patient right, instead of getting five papers in some international reputed journals"
- "quality of work that I do...makes up for any sort of, you know, deficiencies in research and related activities."
- "make my patient better than when he came in that gives the great satisfaction"
- "I am a cardiac surgeon...It is a really well functioning hospital primarily, but then we got the advantages, technology development centres"
- "I work for the neuro-surgery department, ... We have been the pioneers in the country"
- "basically this is a hospital. Everything else is being added on to that"
- Institute is for health care aspects for poor patients, and also promote research"
- "their priority is into teaching and treating poor patients, teaching and to some of them at lease to do research also"

Motivational component of identity:

"this is one institution where you can find that kind of a [profit] motive is not there in the philosophy of any of the staff or employee of the institution"

"private practice – I am against that because it will change the spirit of the [hospital]"

"you get invited [to deliver lectures etc.]"

not a profit making organization

"doctors who are existing here they choose to be in this hospital because they want to do patient care activity, research and this academic activity"

"government institution"

Derived from this identity, and also reinforcing it, the clinician saw the image of the institute defined as:

> "...basically it is [known] as a very good hospital...to the general public... which I believe counts among the best centres across the world... what Chitra stands for, I think the USP is that of credibility, we can trust you with our life... they [the general public] are very sure and high quality care that we provide"

This suggests that that the gap between the hospital and BMT wings is at the fundamental level of how they construed their identities. Further probing indicated that these identities were reflected in, and indeed reinforced, by the policies of the institute. On this, one of the clinicians said:

> "…every section has become more individualized over the years...roles have become more individualized for each of the departments, even each of the faculty members have own interests... [therefore, faculty evaluation should be customized] don't evaluate them blindly…each faculty member may have different goals."

Further:

> "… Nobody is asking you to do it [carry out research]...But it kind of rubs off on you. When you have the top [the director] doing it, the others also tend to do something new"

And:

> "[research for clinicians] is not compulsory, you are not forced to do any research, but if you are interested… the administrators have been good; they have not kind of said that you must do, as a clinician, so many papers." Concurring with this, another clinician said that there was probably no formal policy requiring clinicians to do research, "they are supposed to have some research programs… [and that there] could be individual motivator to so some [research] work."

Again, reflecting their identities, a particularly challenging aspect of the work schedule of clinicians was getting adequate time to do meaningful research. Although the director thought that the idea behind the super-specialty status of the hospital and its policy of admitting only referred patients was that clinicians were "not overburdened...we can at least get time think", the clinicians interviewed revealed this was still not enough for serious research. Thus, "clinicians are too tied up with patients to devote time for research", and "many clinical departments have little time for research" were some of the comments made by them. The growth in the quantum of patient care over the years would also seem to bear this out.

In comparison, a senior respondent from BMT observed, "Compared with Silicon valley – medical technologies coming out of Stanford, MIT & Boston area – many technologies – small and medium technologies promoted by professors with venture capital availability – system [institutionalized mechanisms] exists."

The head of the wing said that for researchers at BMT, the system linking equivalent publications to various stages leading up to clinical trials was available as policy now, and that for promotions, technology transfer is given equal or more weight than just research. However, he was concerned about sustaining this in the long term:

> "…whether it will get sustained is my worry...maybe [with] this explicit performance appraisal it may be easier to sustain many aspects of policies [that] are implicit [but] that need to be made into explicit policies…I have been keen on implementing a balanced scorecard ...because performance evaluation as I said has been more implicit than explicit so one of my primary things is to make it more explicit."

Nevertheless, there is a growing recognition that the two wings need to integrate better. Thus, one of the researchers posted at the hospital said that while earlier programs used to be isolated, now there was greater integration, emphasizing that "programs used to be isolated [earlier]. Now there is integration", while a clinician noted, "…nowadays they [clinicians] also realize that it [interactions with BMT] is also important."

The director referred to the similarity in culture in medical & engineering wings, "I started learning about these things after I took over as director, before that I was only a neurologist. But when I enquired, I started interacting with them [the BMT wing], then I know that there is very little difference…interaction between clinicians and engineering taking place although there is a distance – people go over to the other campus every day or every other day. [I have] accomplished good amount of understanding and exchange of information between the medical and engineering."

Other respondents concurred with this. Thus, one of the researchers at the hospital said, "…now with the present director, I think there is a lot change. He is forcing us to interact….because of this [silver jubilee of SCTI] celebration, people got to know each other, otherwise there was little bit of isolation… we have committees, grouping of people from both wings". While a clinician also noted that the director was trying to increase collaboration, another said, "Co-ordination happens at [director's] level... [also] technology side there are some parallel relations. Research side there are some project which are multidisciplinary."

On the part of the BMT, its head was similarly alive to the possibilities of increasing interactions with the clinicians. He was suggesting having research professors who can spend 30% time for research, and that BMT wing could give them room so that they could spend some quality research time there.

Implications for research at SCTI

The issues confronting SCTI may be interpreted as an inter-play of organizational identities at two levels. Two of its important roles – patient care and bio-medical technology development – are distinct activities that are nevertheless intricately interwoven. The interconnection between the two wings becomes important in the context of bio-medical technology innovations in two significant ways.

Firstly, of significance is an *absence* of pecuniary considerations in its clinical care and technology commercialization. Statements such as "very clear [that]...product should be for public welfare, to reach the market, in a cost effective [way]" by one BMT scientist, or "private practice – I am against that because it will change the spirit of the [hospital]" by a clinician highlight this aspect. The collectivist identity orientation (Brickson, 2007) of SCTI is essential for research programs to be socially relevant. The social relevance of research becomes especially important in the context of developing economies, where it is important that products are relevant to the particular contexts of these economies, including low cost.

Within this collectivist identity orientation (Brickson, 2007), however, there is a difference in the way clinicians and scientists thought the institute stood for. Statements such as "basically this is a research institution" by a scientist and "…basically this is a hospital. Everything else is being added on to that" by a clinician suggests this divide. The institute's policies on staff selection, career progression, and remuneration, and its practices (such as use of canteen space) appear to support the identities at these two levels. Additionally, demands on clinician time from ever increasing number of referrals appears to accentuate the clinical care identity, while some of the policies at BMT (such as those that link appraisals to technology commercialization) appear to privilege applied research and engineering. This difference is likely to impact the orientation of SCTI to carry out basic research.

Carrying out basic research has an important implication for the development of future technologies in the field. Basic research in science becomes important when a particular technology reaches its theoretical limit of development (Fleming & Sorensen, 2004). For example, clinical research into human physiology is likely to yield ideas regarding newer forms

of treatment. Furthermore, clinicians ultimately take on the role of users of the innovations developed at BMT. Recognition of this particular role is evident from statements such as "...we have been giving them a lot of ideas...We can only...say our requirement" by one of the clinicians , and "[idea of product development comes from] close interaction between the user and the product development..." from the head of BMT.

Hence, SCTI's long term ability to develop fundamentally new technologies and treatments might be compromised without clinicians' active participation in research programs. Without an identity that fosters clinical research on the part of the clinicians and deeper inter-linkages BMT, it is possible that the long term ability of SCTI to develop fundamentally new forms of technology might be compromised, although it might still be very effective in reengineering established technologies to suit the contexts of emerging economies.

Implications for university entrepreneurship in emerging economies

In his interview, the director of SCTI pointed to a basic question when he asked, "Why is that the medical device development, in spite of a large market which everyone knew, is not being [developed in India]?" This study suggests that the issues may have to do with a fundamental issue of how universities in emerging economies define themselves.

Emerging economies face twin challenges of technologically competing with advanced economies while also developing affordable solutions for health, education, etc. These present competing demands on universities. Firstly, they need to develop affordable and commercially viable technologies to address social issues. At the same time, institutional changes require them to depend less on public funding. Thus, under the "neo-liberal consensus", education is seen as a private rather than a public good (Altbach, 2009: 19). Further, within a new public management framework, universities are required to raise revenue from sources other the government or compete for government funding (Bolli & Somogyi, 2011). Universities are increasingly required to depend less on public funding.

One way for universities to address these challenges is through their entrepreneurial activities. Spin-offs, joint ventures, technology licensing and similar activities are likely to yield significant revenue for them. However, this translates into an ethical issue as universities may require to balance their collectivist and individualistic identities (Brickson, 2007). What may be good for the universities may not necessarily be good for the public at large. For instance, Just & Huffman (2009) developed a theoretical model of university behaviour in the face of increased return to privately funded research. They suggest that in a context of decreased federal funding, universities are incentivized to decrease public goods oriented basic research

and instruction when they depend on external funds requiring applied private goods research. They present some empirical evidence from universities in the US to show that this effect is more pronounced in the case of private universities, followed by public universities, and then by land grant public universities.

In this context, the study suggests the effect of organizational identity on the kind of research that universities in emerging economies may like to pursue. A collectivist identity orientation may be able to foster social entrepreneurship through research and engineering that is "socially relevant" (Drori et al., 2003: 227). This implies not only that the subject of research is attuned to this end (for example, research on solutions to malnutrition rather than on medicines that address life-style diseases afflicting the affluent), but also the manner of technology transfer agreements (for example, agreements that make technologies accessible to multiple parties rather than being tied to only one).

Secondly, universities need to engage in cutting edge basic research but with an ability to translate these into disruptive innovations. Yet, the precise contribution of university entrepreneurship in this regard is contested. For example, in the context of knowledge clusters, some researchers attribute a significant role to universities (for example, Bramwell & Wolfe's (2008) study of the role of Waterloo University in Canada). On the other hand, Huggins' (2008) comparative study of the Silicon Valley, Cambridge, Ottawa and Helsinki knowledge clusters suggested varying levels of university involvement. In Cambridge and Helsinki, for example, universities had played a more influential role than in the Silicon Valley and Ottawa, where other players such as government/corporate R&D laboratories had also contributed significantly. Thus, there appears to be some merit in the comment that "...the jury is still out on the role research universities may play as 'drivers' of local high-tech development" (Doutriaux, 2003: 64).

Moreover, research is equivocal regarding how faculty roles in basic and applied research interact. Some recent studies highlight the complexities of this issue. Crespi and others (2011: 65) examined whether commercial activities of academics affected non-commercial academic activities. Their survey of academics in the United Kingdom suggested that patenting and publishing had a quadratic (inverted U-shape) relationship, where patenting tended to crowd out publishing beyond a limit. This crowding out effect seemed to be more in basic sciences such as physics and chemistry, while a complementary crowding-in effect appeared to be the case in computer science and engineering. Almost similar relationships were observed with the effect of patenting on other forms of university knowledge transfer activities (joint research

with industry, contract research agreements, consulting work, joint supervision of PhD programs, equity interests in new companies through spin-offs).

Czarnitzki, Glanzel & Hussinger (2009) examined the effect of patent assignee on publication quantity and quality. They found that when patents were assigned to non-profit entities (e.g. universities, non-profit research institutes or the professors themselves) they tended to positively correlate with publication quantity and citation quality. Conversely, when patents were assigned to for-profit entities, a weak negative correlation between patenting and publication quality and quantity was observed. In another study, Thursby & Thursby (2011) examined the effect of faculty disclosing their inventions on their ability to attract government and private funding. Government funding was taken to represent an orientation towards basic research, while industry funding represented a more applied focus. The results suggested that disclosure had an inverted U-shaped effect on government research funding while it generally had a positive effect on industry funding. The effect of a disclosure in a particular year tended to have a substantially larger effect on industry funding than on government funding. Landry and colleagues (2010) investigated whether six knowledge transfer activities (three forms of non-commercial activities consisting of publications, teaching and informal knowledge transfer; three forms of commercial knowledge transfer activities consisting of patenting, spin-off formation and consulting) were complementary or substituted for each other. Their results suggested support for the complementarity argument for some of the activities only. While patenting, spin-off creation and consulting complemented each other as did spin-off creation and consulting, publications and teaching appeared to be substitutes of each other. The relationship between publications and patenting/spin-off creation, and between teaching and patenting/spin-off creation/consulting/informal knowledge transfer were statistically insignificant.

These results are summarized succinctly in a statement in one of the cited studies: "...academic scientists who become too involved in patenting activity may become distracted from (or devote less time to) other activities..." (Crespi et al., 2011: 65). One of the likely effects might be a shift in attention from discovery activities.

The situation in emerging economies appears to be more complicated. Etzkowitz et al. (2000: 313 pp) suggested that universities need to undergo a “first academic revolution” in order to make the transition between the first two missions, and a “second academic revolution” for the transition from the second to the third missions.

While research to understand the role of universities in knowledge clusters in emerging economies is only emerging (Basant & Chandra, 2007), this body of work points to the limited

role that universities in these countries have traditionally played, and continue to play in carrying out discovery and design roles. For example, commentators on the growth of the Bangalore knowledge cluster have noted that universities have played a relatively minor role in the growth of these clusters (e.g. D'Costa, 2006; Vang, Chaminade & Coenen, 2007; Basant & Chandra, 2007). Datta & Saad (2011) analysed the historical development of universities in modern India and suggested that the nature of linkages with industry has been largely through teaching and providing human resources.

The case of SCTI highlights the challenges that universities in these economies may face in terms of organizational identities that accentuate activities related to their first mission (clinical care and training in the case of SCTI) at the cost of basic research. The case suggests that organizational identity does play a significant role in the research output of universities by specifying the *type* of research universities are likely to carry out. The direct implication for university entrepreneurship is that without an identity that supports investment in basic research, it is difficult for universities to continue their design roles effectively in the long run. In a situation where multiple identities pull universities in different ways, universities need to be able to reconcile these divergent identities in order to balance both basic research and applied research.

Implications for further research

This exploratory study suggests several avenues for further research. It was argued earlier, in light of the inadequate attention to basic research at SCTI, that universities need to balance basic and applied research. This issue is analagous to that obtained in the management of innovations. In fact, an enduring concern in organization studies has been the trade-off between knowledge exploration and exploitation. The concept of organizational ambidexterity is an outcome of this line of inquiry. The core of this concept is that organizations have to develop ways and means to balance knowledge exploitation and exploration, incremental and radical innovations, continuity and change, exploit existing competencies and develop new ones, and balance mechanistic structures oriented towards efficiency with organic structures offering flexibility (Raisch & Birkinshaw, 2008). Some researchers have highlighted the role of senior management decisions with regard to their decision-making processes, organisational structure and processes in fostering ambidexterity (O'Reilly, & Tushman, 2007). Other researchers have differentiated between structural ambidexterity and contextual ambidexterity. The former refers to dual structures with different foci, while the latter refers to the "…behavioural capacity to simultaneously demonstrate alignment and adaptability across a business unit" (Gibson, & Birkinshaw, 2004: 209).

In order to take an active role in the market, universities may have to adopt policies and structures to incentivize commercially viable faculty research. A recent study on the performance of Spanish universities in this regard, for example, suggests that universities tend to be more effective in this regard when they earmark a larger proportion of royalty income from technology transfers for the faculty, grant them leave to setup spinoff ventures, make available adequate risk capital funds, develop science parks in the vicinity and have experienced technology transfer offices (Caldera & Debande, 2010). University research centres, involving faculty from various universities as well as researchers from industry, may also facilitate research, cross-disciplinary work and more papers with industry (Ponomariov & Boardman, 2010). Chang, Yang & Chen (2009) found that institutional and organisational support, such as policies related to reimbursing patenting costs, technology transfer mechanisms, venture capital fund availability and so on (structural ambidexterity) and individual initiatives such as forging research collaboration linkages and undergoing training on intellectual property management (contextual ambidexterity) were associated with greater academic patenting, licensing and spin-off activities.

As of now, there is a paucity of studies that suggest how the policy measures captured in the literature just cited relate to the identity of universities. Yet, as the study suggests, organization identity does matter, for example, in the way clinicians at SCTI thought of research. At one level, policies of universities that facilitate design related activities bring to the fore ethical issues of the role of universities in society. These ethical issues of university entrepreneurship were highligted above in the context of possible decrease in public goods research at the cost of private goods research (Drori et al., 2003; Just & Huffman, 2009). The issue of ethics becomes particularly important for organizations dealing with public goods such as health and education. In this context, to what extent policy measures such as the ones mentioned in the context of academic entrepreneurship foster an individualistic identity orientation at the cost of a collective one (Brickson, 2007), is a subject of further research.

At another level, organizational identity comes into play in the way the university defines the role of its research vis-a-vis science. While a handful of studies have examined this issue at the level of individual identities (e.g. Jain, George, & Maltarich, 2009), the role of organizational identity has not yet been studied in this context. Yet, as the remarks by clinicians and scientists at SCTI suggest, the concept that researchers have regarding what a university stands for might be intricately linked to the kind of activities that they carry out. Therefore, it is necessary to investigate in depth the precise linkage between university identity and their research performance. This might help to better understand why within the same institutional framework, different universities have different foci of research.

CONCLUSION

The case study and the questions raised have some important practical implications for universities. There are strong pressures from a variety of sources on universities across the world to confirm to a Triple Helix framework. Apart from the changing expectations of governments, there is considerable media attention to the success of some of the leading universities in developing cutting-edge technologies. Often, this finds its way into university rankings, which in turn feeds back to governments' and the public's perception of the performance of universities.

In several emerging economies such as India and China, such pressures are likely to be especially stronger given their desire to catch up with universities in more developed economies. However, universities in emerging economies might face greater challenges than those in developed economies while changing their identities. For example, while the triple helix model assumes that universities would have already incorporated research as an academic mission (Etzkowitz et al, 2000: 315), there is today a wide spread concern about the research intensity in a vast majority of universities in these countries. A vast majority of universities in these countries see teaching as their primary role. Investigation into identity transformation of universities and its impact in channelling their research output is likely to answer some pressing policy level issues.

Therefore, the findings from the study suggests important avenues for further research regarding the relationship between organizational identity and university research, with important implications for theory, university administrators and policy makers.

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AN INVESTIGATION OF THE ROLE OF UNIVERSITY IDENTITIES ON THE SUBJECT AND MODE OF THEIR RESEARCH

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Abstract:

Universities occupy a leading role in knowledge economies through their entrepreneurial activities to develop products and technologies based on cutting-edge research. While there are strong isomorphic pressures across nations to transform their universities on these lines, it is important to contextualize university entrepreneurship to take into account the unique circumstances of emerging nations, namely, a historical emphasis on teaching with less attention to research, and the imperative to go beyond profit motives and western notions of research in order develop products and technologies that are suitable to the needs of local populations of these economies. This paper looks at these twin challenges from the lens of organizational identity. Based on a case study of a leading medical research university in India, the paper examines the role of organizational identity of universities on their research and innovation activities. It concludes that organizational identities of universities in emerging nations might impede them to carry out more developmental and engineering oriented research, without a concomitant emphasis on basic research due to the pressure to fulfil their primary mission of teaching (and health care in the case subject). Implications for future study to understand how universities policies and practices might impact such organizational identities are discussed.

Key Words/Phrases: