

Working Paper 1; November 2009

**Challenges and solutions for mapping innovation in a large emerging economy
Experiences from India**

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Note

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Abstract; this paper is an outcome of my experience as a team member of the Euro-India Innovation mapping project. The project set out to map India's IT Innovativeness over two years from January 2008-to December 2009. Here I bring to the fore the different methodologies that we reviewed in order to implement the innovation mapping project and our realization that each methodology in itself though useful may not be sufficient to address the complexity of the subject matter due to the vastness of India and its emerging nature. I outline some of the challenges faced by us when designing a methodology for mapping innovation in a large emerging economy. I discuss some solutions and report on how we solved the problem only to be faced with newer challenges. A methodological design is a challenging endeavor in the normal of time, when it comes to doing the same in a large emerging economy the problems becomes compounded. I highlight some of these problems and discuss some solutions in this paper. I conclude this paper with some insights proposing a mix methodology approach has been useful in addressing the challenges of data collection in emerging economies using our Indian experience as a backdrop to our findings.

Keywords; Innovation Mapping, Innovation, Knowledge Mapping, emerging economy, Methodology, mix methodology.

Introduction

In any study a good research design is as important as the intent of the study. The research question often determines the choice of methodology. However, if the stated inquiry is projected as a mapping exercise, meaning some kind of thematic scanning of a particular subject matter, then a single methodology ceases to become interesting for two reasons, First, the vastness of the stated inquiry, implying the absence of a research question or a clear hypothesis; instead there is a clarity on the intent. In effect, a methodology would be appropriate for a objective driven research, where the objective is enshrined in a research question. Instead, a study of this nature aims to understand particular phenomena, in which case the focus is on the process and not the research question. Consequently the methodology cannot be a singular phenomenon but a constellation of approaches for gathering data using a diversity of instruments. In effect, what we are conjecturing here is a difference between research and a study, between methodology and a research design. This being a study, our focus was on developing the research design that encompassed a constellation of methodologies, each geared to the discovery of a particular set of information.

Considering the knowledge mapping to be a study, we arrived at a four step modular research design, each step dedicated to enabling our understanding of a part of what we referred to as ICT Innovation in India. Each of these parts were precursors to the next module, meaning the subsequent modules used the results from the previous in order to move forward in the implementation of the research design. This chapter focuses on the historical module along with some results.

In section 2, we will introduce the historical module, in section 3, we will describe in details the historical module, in section 4, we will discuss some results from the historical module. In section 5, we will engage in a short discussion followed by section 6, where we will conclude this chapter.

2 The Historical Module

Our greatest challenge was to find a starting point for our study. We had two options. First, find an existing Indian data set institutionally collected that we can use as baseline data for initiating our study or create the baseline data ourselves. Our initial interest was to explore if such data existed in India, we did find national data set reflecting R&D, however that data set could not be used for two reasons; a) the data reflected R&D generically, meaning it did not distinguish between IT and other instances of R&D, and, b) Innovation was hardly stated in the data set. We soon realized that we needed to create our own baseline if we wanted to collect ICT Innovation data. We then developed the historical module.

3 Description of the Module

The historical module, as its name suggests, aims to go back five years in time from 2003 to 2007 and look at publically available records and articles written in trade journals, national and regional

newspapers and magazines, in English and in local languages, with a technology section, research journals, and specialized/trade magazines to capture instances where innovation has been reported. All relevant data related to innovation was then categorized into five regions, the northern, southern, southeastern, eastern and western region of India. The reasoning behind this segregation was to capture the regional differences while acquiring the national picture. To capture instances of innovation, we deliberately did not define innovation. This is because we are influenced by the methodological arguments of grounded theory, where we wanted to allow the indigenous understanding of innovation to emerge and inform our theory. To link the common understanding of innovation with the theoretical reflections, we wanted to develop a common denominator of innovation alluded to in the news, journal, and research clips. Our next step was to merge the grounded understanding of innovation with the theoretical indicators of innovation, in so doing we wanted to arrive at a definition of innovation that would better reflect the ground realities of the Indian ICT.

The purpose for acquiring the historical data was for developing a baseline. A base line in research is the sample of empirical data that will then be treated to different stages of the methodology, for our purpose module 2 to 4 respectively. However, we realized in the early stages of the planning process that creating the baseline data will have some obvious remittances, as current data may be missing or firms having produced innovations in the past may have ceased to exist. To address this challenge we identified regional experts. A regional expert has two distinct features. First, the person has a good understanding of innovation in the ICT domains in his/her region. Secondly, a deep understanding of the ICT sector and application domains in his/her region. A deep understanding implies the awareness of the variety of ICT domains, services, business models. Thus the historical module was designed to enable us to create a start line for the innovation mapping exercise. The data was then put into a region-wise database for further treatment, Refer to appendix 1 for a for a understanding of the companies spread.

4 Results of the Historical Module

ICTinnovations reported in the mass media, trade and research journals in India indicate that a large slice dwells on conceptualizing technology aimed at improving the systemic productivity of a perceptively weak infrastructure in India. Four dominant ideas under the supply narrative guide the quest for innovation; these narratives can be identified as accessibility, price differentials, financial, and healthcare innovation. In no way are these four domains exclusive, but they certainly dominate the innovative discourse reported publically between 2003 and 2007.

Table 1

	2003	2004	2005	2006	2007	Total

Supply Narrative	15	22	21	33	40	131
Technology narrative	31	22	27	22	41	142
Collaborative Narrative	10	16	28	33	51	122

4.1 The Supply Narrative

The first dominant view of the supply narrative is the lack of accessibility experienced by rural folk due to the weak connectivity either through physical infrastructure or through communication channels to relevant markets for goods and services. The innovation then is targeted at providing some access to market and enabling the rural folk to get the best price for their produce. Such a conceptualization fits the supply constraint thinking as it assumes that the market is not operating at full capacity so one can use technology to enable the market to improve its operation.

Kerala Fisheries Minister S. Sarma Wednesday informed the assembly that in the next fiscal, satellites will identify the potential fishing zones (PFZ) and would pass on information to the fishermen in Kerala on a regular basis with the help of the fisheries department. It would also help reduce the expense incurred by fishermen because they will be clearly told where the density of fish lie,' said Nair. **P31: ICSF_28Mar2007**

Innovation within the supply narrative in India also takes place along price differentials. The endeavor is to broaden the market by competing on lower prices. These price innovations are primarily aimed at getting more out of the market using the combination of technology by bringing in new buyers into the fold. The product is not new, the assumption is that current technology is badly targeted, crowding out a large section of society. Price innovation thus brings more buyers into the market without dramatically changing the product; maintaining standard product functionality, while pricing it lower.

Wipro eHelpline, launched primarily for the Indian market is nearly 40% cheaper than any existing e-enabled helpdesk product available in the Indian market today. It comes with an inaugural offer of free one-year maintenance for customers coupled with a variety of features, at a cost unmatched in the market today. **P158: CIOL News_19Jun2003**

The other dominant innovation response to the supply constraint thesis can be seen in the banking and the healthcare sectors. The healthcare sector in India takes as given the basic inefficiencies of the Indian healthcare system and tries to innovate in areas where there exists a fit with its competencies. For instance innovations in the health sector can be captured right from frameworks for drug design all the way to delivery of portable communication devices that keep the doctors informed, to using technology to conduct remote diagnosis and in some instances even surgery. In the banking sector, innovation is targeted primarily at cheaper service delivery using wireless automatic transaction machines. In all these innovations the opportunity is perceived not because the technology is radical, but because the market is

fragmented, infrastructure weak and administrative capacity, poor. Innovations in these instances are focused at maximizing returns from existing systems by tinkering with basic technology.

4.2 The Technology Narrative

Innovation reported in the Indian media appears to be dominated by our technology narrative, meaning the innovation is a technical manifestation of a challenge. In this case the innovation focuses on the technology, meaning the specified solution is a tool, application, or a service that needs the technological innovation to thrive. Here innovators talk of new products, novel ideas and, at times, the creation of a new market. Three innovation families inhabit or dominate the technical narrative. These three families are not exclusive but they are certainly dominant among the technology discourse. They can be identified as software response, hardware response and tracking technologies.

The first concentrates on providing better solutions to firms in terms of ERP, CMS and better database and data retrieval features or simply a better, localized computer. The innovation is predicated on knowledge of a domain. Innovation is both a technological response and also a knowledge response, meaning the solution provider studies the environment before providing solutions. Thus the application and tool response is largely dedicated to improving the stock of technology through innovation. Technological innovation is designed to make things more productive, activities better synchronized and information easier to retrieve.

The received data is authenticated and forwarded to an application server, which provides tracking information through an Internet accessible user-friendly interface. The user also has options to receive tracking information via e-mail, mobile, fax or SMS besides the facility of calling the customer support team on a toll-free telephone line. **P29: Elogistics_2005**

The hardware innovation focused at bringing the computer to the masses occupies a large spectrum of innovation in India, These innovations are technological in nature, but largely aimed at improving computer literacy and access. We place this type of innovation here, as the innovation is a technological response to a perceived need for solution. For instance, technological innovation in creating diverse language accessibility is critical for enabling large populations to use the computer. Similarly, tinkering with the keyboard and making it compatible with Indian languages is also considered as an innovative technological response within the technological narrative.

For a long time now, regular computer keyboards have posed challenges to non-English users especially those using phonetics or sound instead of letters to represent words, an HP software engineer said during a quick demonstration in their Bangalore lab, **P 2: Info_tech_20Oct2007**

The third domain within the technology narrative is dominated by innovations in the logistic area. Here the innovation response is a product that enables a new and more efficient way of conducting tracking than previously available. The technology is new and novel, meaning it creates a new channel of interaction for service delivery companies, which would not be possible were the technology not there.

The innovation allows consumers to use a simple SMS to pay pizza companies for pizzas and other eatables delivered at home. **P13: India Weekly_20April2007**

The latest from the Reliance Infocomm kitty is a vehicle tracking system (VTS), which can offer updates every two seconds on a 24-hour basis. Speaking at the sidelines of Supercomm 2003, Bala Krishna, ECFU, Reliance **P165: CIOL News_21Jan2003**

These three domains dominate the innovation reported in and captured by our teams. The key feature of the technology narrative is the overt reliance on technological solutions for creating new products, applications and services. The technology narrative assumes that individuals will automatically like the technology solutions as it caters to a previously unsolved challenge.

5 Discussion and Implication; a Narrative on Collaboration

In the previous sections we have argued that innovation researchers, when researching ICT innovation in emerging economies, engage with some preconditions. We have identified these preconditions, framing them into supply or technology narratives. The supply narrative assumes the market to be fragmented requiring integration for productivity and growth reasons. The role of innovation is to broaden the base of market operators by providing better market information and access, improved governance, better finance and healthcare. The second framing we have identified focuses on technology per se, their preoccupation is to create new technologies, for capturing particular aspects of the market. Markets in this narrative are assumed to work effectively and are reasonably well integrated with limited advantage from arbitrage. The narrative frames innovation as a focus on the development of new technology with the goal of moving the firm onto a new growth trajectory. This narrative's key preoccupation is to take the market as quasi-efficient and focus on maximizing product differentiation through innovation.

From the analysis of the empirical data, a large number of reported innovations fall into the two categories discussed above. However, we detect an emerging narrative that predicates its argument on the ability of technology to enable people and firms to collaborate. Innovation is perceived as a tool, application and a service that is targeted at improving collaboration between groups, professionals, technologists and firms. We identify this emerging narrative as "collaborative narrative".

Two key features of the collaborative approach dominate the innovation landscape in India. The first targets improving collaboration between software production units. The second collaborative area that appears to be dominating the innovation spectrum is associated with social networks. Firms in this space think of tools, applications and services to convert these networks within firms into productive units. While the collaborative narrative finds less mention in the database, the fact that innovation in this area is being reported at all appears to indicate a growing awareness among IT companies that focusing their innovative energies on enabling better collaboration will in future bring richer dividends.

It is ideal for enterprises that want VoIP across their multi-location offices and those that are looking to offer cheaper, toll-free customer care services. The innovation: The product works on low-bandwidth Internet connections like dial-up (including wireless Internet). It offers three-party conferencing, answering machine, and whiteboard features for collaboration. Based on a proprietary protocol and fully encrypted the products work on the MS Windows platforms. It is available as a "Click-toTalk button" for Web sites to use for toll free VoIP services. **P302: Esqube01 - 302:3**

In summing up we would like to conjecture that innovations focused at enabling the adoption of collaborative frameworks will be a feature of the Indian ICT industry in the days ahead, while the supply and the technology narratives will continue to play an important role. For a detailed understanding of the three narratives see, (Rai&Pedersen 2008).

6 Conclusions

We detect a shift of innovation activity from the technology narrative to the collaborative narrative. We conjecture that the shift will have two sets of impact on ICT innovation in India. First, ICT innovation will no longer be limited to large or medium scale companies situated in the Indian metropolitan cities, but innovation will be more contextual and unique. This innovation will continue to fall within the supply narrative. We expect to see a shift in Indian innovative activity from building technology for services to a product based provisioned on enabling collaboration. Consequently, we conjecture that innovation in India will continue to be perceived as a supply response but increasingly with a shift to innovation in enabling collaboration. We also conjecture that the technology narrative will continue to support either the supply narrative or the collaborative narrative, but the major innovation is likely to be seen either within the supply or the collaborative narrative.

What implication does this have on our understanding of innovation in emerging economies? We conjecture that emerging economies will most likely in the immediate future continue to innovate within their dominant narratives; however we expect a subtle shift to the collaborative mode and the crowding out of the supply narrative with the technology narrative continuing to flourish. Here our expectation for the Indian context is slightly different from our conjecture for the rest of the emerging economies because of two reasons. The Indian ICT sector is mature and needs to move up the value chain in order to sustain its competitive advantage, hence innovation in collaborative frameworks will drive Indian firms. Second, the large rural development focus of the government of India will ensure that innovation continues to take shape in the smaller cities. We detect a shift of innovation activity from the technology narrative to the collaborative narrative. We conjecture that the shift will have two sets of impact on ICT innovation in India. First ICT innovation will no longer be limited to large or medium scale companies situated in the Indian metropolitan cities but innovation will be more contextual and unique. This innovation will continue to fall within the supply narrative. We expect to see a shift in Indian innovative activity from building technology for services to a product based provisioned on enabling collaboration. Consequently, we conjecture that innovation in India will continue to be perceived as a supply response but increasingly with a shift to innovation in enabling collaboration. We also conjecture that the technology narrative will continue to support either the supply narrative or the collaborative narrative but the major innovation is likely to be seen either within the supply or the collaborative narrative.