

Policy for Enabling Sustainable ICT Innovation, Reflections from the Indian Experience

A Delphi Study

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Using ICT Innovation as a lever to break out of the developed-developing paradigm; The Indian Innovative Journey, reflections and challenges

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Note

Please do not refer to this paper in any form but the author will be delighted to get comments and critical inputs to improve this paper.

Abstract; in this paper I present a framework of innovation and then use the framework on interview data collected to reflect and gain insight on the status of ICT Innovation using India as a case. The central question I pose in this paper is how ICT Innovativeness can be articulated. In this paper I argue that innovativeness is a dynamic concept distinct from notions of R&D, although elements of innovativeness determine the outcome of successful R&D but a successful R&D does not necessarily imply that the is innovative. We make distinction between R&D and innovation, using the distinction we demonstrate how the dynamic nature of innovation needs to be understood distinctly different from R&D, I propose that R&D is a institutional arrangement while innovativeness is a contextual phenomena being determined by factors both inside and outside the business entity. I conclude this paper with a framework for understanding the dynamic nature of ICT Innovativeness, I use data from India to reflect on the research question.

Key Word; ICT Innovation, R&D, Innovation, Institutional logics

Introduction

Planning the Interview process

To ensure a smooth running of the interview across region, we organized the post survey workshop. The workshop was designed to discuss the material we had submitted indicating how we thought the process of interviewing might take place and how they might be recorded and reported. Interviews though are a very exciting medium for researchers to collect data; they bring onto the table challenges and problems. To discuss these challenges we wanted to engage the workshop participants in understanding how best might they want to engage with the interview. In advance of the workshop we developed the interview's recording template and interview's reporting template. These two documents were to form the instructive framework on how to conduct the interviews.

During the workshop we agreed that the interviews would be divided into two parts. The first part will be a question on the firm's innovative story, which was to be recorded without any interjection from the interviewer. The purpose for recommending this stand was to allow the interviewee to proceed with his version of the story, the way he feels it should be told without disruption. The focus was to achieve two objectives, first provide sufficient time to allow the interview to talk in doing so enables familiarity with the subject matter of innovation, second, to create a sufficient base for engaging with our framework of semi structured questions.

Once we concluded the post survey workshop all the teams initiated their interviews in their own regions, we also agreed and identified a criteria that the teams were supposed to use for selecting companies to take the interviews. We determined that each company should be interviewed from two perspectives in alignment with the survey conducted previously. We were to interview the same two individuals, one from the enterprise level and the other from the project level who took part in the survey. The argument behind such a design was primarily two fold, first because of familiarity issues. No doubt there are problems of bias here and also sampling issues that may be critical to taking the interview data as valid. We had a research problem on our hand, to seek rigor or opt for relevance. We preferred relevance to rigor. Second, we believed by interviewing the same two people we would spend less time in preparation and we could engage them in areas where we felt the survey had not been comprehensive enough. Furthermore the two interviews were designed to be separate activity but there were times that the enterprise level preferred the project level interviewee to be part of the same interview. Although we had not designed for this we agreed with the assumption that the two will be questioned separately. Each interview lasted for approximately an hour and a half.

During the post survey workshop we decided that the teams in each region should interview a minimum number of 10 and a maximum of 15 companies per region.

Table 1, Number of companies interviewed and total interviews per region

	North	East	South East	South	West	Total
Number of companies	13	8	13	12	22	68
Number of interviews	26	16	26	24	44	136

Recording the interview – the process

Recording the interview is the most challenging part in the interview process. At the centre of being able to work with the interview information is the ability of the interviewer to record analyzable information, we thus recommend that interviewers conduct the interviews with a team of two. One interviewer asks the questions and sustains the dialogue; the person engaged in the dialogue ought to be an academic with some experience. His partner’s role in the interview is to populate the interview template that captures the process, key words and phrases and keeping track of the recorder, if and when permitted at the interviews. Taking notes along with a time indication so to make cross-reference between the tape recording and the overview created by the notes. Further, if the recorder decides to make notes over and above the recording framework, he or she should compile a situation report describing the flow of the interview without inserting his or her opinion. At no stage in the recording template should either of the interviewers record their opinion, we asked our interviewers to be diligent on this account.

Recording the interview; a two step approach. The first is the simpler of the two steps. It consists of taking permission prior to the interview to audio record the interview for later referencing; audio recording for verbatim transcription is done for all interviews. This recording is transcribed and attached to the pertaining report when uploading into a database.

The second step; is the actual dialogue with the interviewee. The interviewer initiates the discussion by requesting the interviewee to share the firm’s innovation story. This story will have two different perspectives as we are interviewing both the enterprise level and the project level participants, these stories referring to the same company needs to be recorded and transcribed separately for uploading. After the interviewee has narrated the Innovation story of the company (either enterprise perspective) or (project perspective) the next stage of the interview starts.

The main body of the recording template consists of five rectangular boxes with rows and columns. Each row indicates a trigger, aligned to the trigger and along the horizontal trajectory are key words associated with that trigger. For each perspective there is a separate rectangular box.

A trigger is defined as an instance in a conversation, when employed, has the potential to elucidate rich response aligned to the current discussion. These triggers are aimed to start a dialogue, enrich a conversation or broaden the scope of the discourse within the main tool of the interview, which is the model of innovation processes that we call the CAMP-I framework. Keywords are used to capture the best-fit response. This means the keywords will indicate to us the path of the discussion within the CAMP-I framework.

Initiating the interview

All interviewers and interviews should begin with a simple question, asking the interviewee to narrate their firm's innovation story. We want the first question to be regarding the firm's innovation because we want to get a holistic understanding of the interviewee's innovation story before soliciting their responses to specific framework related questions. Once their story has been recorded using a digital recorder, the interviewer should stay within a perspective till the recommended triggers have been utilized. During the interview it is required that the recorder, who is accompanying the interviewer take notes, aligning the notes to the triggers and keywords as the interview progresses, if possible during the interview. Alternatively after the interview the recorder completes the alignment of keywords and triggers along with supporting notes to ensure better coverage of the interview process.

The framework for analysis

A trigger is defined as an instrument that launches the interview in a manner most congenial to the subject matter. A trigger for it to be identified as such, needs to fulfill two preconditions; a) it should be rooted in literature, in this case we have anchored the triggers to innovation literature, with sub-literature sets, like communication, leadership, institutions and negotiations, all playing an important supporting role in forming our backdrop. b) The trigger has to be clear, non-conceptual and open ended, meaning not seeking a "yes" or a "no" answer. Below we show some triggers that we used.

We were aware of two important facts, first in an interview we are not recording data like numbers, we are interested in practice, knowledge and attitudes in the firms innovation story and are interested in understanding the innovation processes. Second, to an extent possible it is a semi-structured interview with no less emphasis on the unstructured aspects of the dialogue. If we are to capture the unstructured part of the discussion, we have to find a way to record the process systematically. So audio recordings are required but only as a complement to the paper recording template. Thus it was vital that all teams understood the recording template and used it to the best of their ability during the interview sessions.

The paper-recording template consisted of five perspectives namely;

Creativity

Ambiguity

Mitigation

Projection

Impact.

These perspectives are the entry point for the interview, meaning they will be used to initiate a dialogue and record responses only after an answer to a simple question has been recorded.

CAMP-I model: A framework for capturing innovation processes

These five perspectives of innovation processes are not five stages or phases. They are meant to be ways of approaching innovation in practice, implying that an innovation story could take off from any of those perspectives. It is vital therefore not to consider these suggestions as a sequence or a step-by-step approach. Innovation can be initiated from within any of these perspectives and influence any of the other perspectives. Moreover by stating these perspectives we do not discount the role of other aspects of innovation but merely try and limit what needs to be captured for the sake of relevance granted by the very interview method.

We conjecture that most innovation driver's fall into these perspectives, while we do not pretend these perspectives to be neither exclusive nor comprehensive in indicating definitively the processes of innovation, but expect them to cover a large canvas of innovation related aspect. Beneath, we elaborate upon these perspectives in what we have called the CAMP-I model of innovation processes.

Creativity: plays an important role in enabling innovation. Our objective is to capture creativity during our discussions with interviewee. Creativity is defined as "the ability of the individual to think of fresh perspectives, new trajectories that could aid a process, a product or policy to target intended constituency"(Amabile 1996) and (Milliken et al. 2003) define creativity as an "idea that enables the availability of new information". It is not only an individual perspective we seek in our interviews in elucidating creativity but also look to creativity being manifested in how humans function in a social system or groups, (Csikszentmihalyi 1999) indicated creativity as "the product of single individuals, but of social systems making judgments about individual's products.". During the interview we look to capturing creativity, manifested in instances of education, scientific knowledge, curiosity, inquisitiveness etc. Our purpose is to use these instances as an indicator to capture creativity, to encourage the interviewee to tell his firms innovation story. The focus as always should be on his innovation story and creativity is the channel enabling the project exploration and overcoming obstacles.

Key words: Idea generation, “not invented here”; “how in life should I..?”, “an education-tolerance-talent combine”, in-house training for creativity.

Ambiguity; are instances where all ideas have unclear determination, are muddled with some direction or path but without determinants. Ambiguity rules as we acknowledge innovation need not be complete at the onset. Ambiguity is a period in the innovation process when thoughts and ideas are thrown into a process to gain clarity of an idea. Capturing the potentials in an idea is as difficult as are capturing a fruitful idea. However we believe ambiguity in a project has some merits in indication of the vibrancy and sustenance of an innovation for three reasons; first, exploring an idea takes it further, the endeavor is always to make sense of an idea space, because in doing so stakeholders not only clarify and state ideas but also refine their ideas; second, if there is a constant interaction with the abstract nature of the idea, the idea is kept alive; and finally, generating associations is at the core of creativity. Tolerating ambiguity allows for creative processes and visions to evolve and mature the idea.

Key words: No purpose but captivated; rudderless - meandering; tolerance for ambiguity; vision-mission awareness.

Mitigation; is instances in an innovation process where the idea is clear and its objective and purpose identified. Here the innovation has a level of maturity where a set of skills is required. Mitigation has two components, first managing risk and second negotiation. The latter is critical as the innovator or the innovating group needs to negotiate with the decision maker to the merits of the innovation. Negotiation that appropriates the innovation is critical for the innovation to see the light of day, demonstrating how the innovation purports to generate value. Innovation management is critical for the mitigation process as it develops procedures, mechanisms to take the innovation from a proof of concept to prototyping stage.

Key words: IPR, negotiation, partnerships; appropriation (“identifying your value additions”), knowledge sharing, knowledge creation, transfer.

Projection; is an instance where the prototype has been developed, the battles relating to the mitigation has been fought. The projection gathers the company’s resources to market the innovation. The issue here is how to explain to the outside world what the innovation does, how it can make a difference and what are its features. Here elements of communication are essential in developing the projection story. Relating an innovation to its effective surroundings and environments means to work on and manage the systemic nature of an innovation.

Key words: innovation packaging; getting stakeholders onboard; managing innovation; innovation promotion.

Impact; is the expected as well as actual take-up of your innovation in all contexts and scenarios, backward and forward linkages meaning impact of innovation in regard to either or both in domestic and foreign markets; in civic society or government. Repositioning your organization by default or by coincidence (meaning products ultimately define company positioning and competitive and/or social environment). Being innovative means to redefine and renegotiate your product and eventually your company boundaries as your innovation matures.

Key words: linkage creation; capacity building; indigenous uptake of technology; technology families.

Case presentation and analysis

We will share some of the insights from interviews gathered while interviewing CEO, CTO founder directors of innovative start up, small and medium companies and large IT enterprises. The subsequent narrative illustrated through simple cases tries to explicate three ideas. First, that the motivation for innovation is multifaceted, they occur out of ambiguity, mitigation and impact among others. We will narrate three case illustrations indicating the role of these ideas in enabling innovation.

We address innovation in a wider sense than the classic one of a new device or gadget. Innovations today take place over the whole range of products, services, processes, organization, business models, environmental and climate compatible changes. In all of these ICT emerges as a critical ingredient in enabling the creation of innovation, in hardware, software, networks and in sensors, accelerators, nanotechnologies, etc. We thus engage with ICT innovation in India with a broad-minded approach.

We survey three different cases, each have its own distinct motivation and processes for innovation. By sharing these experiences we intend to draw your attention to how each of these companies addressed the challenge of innovation, then speculate about how these experiences add to an Indian innovative story. The three case narratives bring out three key ideas that drove each of these companies to embark on their journey of innovation, these key drivers were, ambiguity, mitigation, and impact.

We conjectured - to briefly recap - that ambiguity are instances where all ideas have unclear determination, are muddled with some direction or path but without a specific goal. Ambiguity is a period in the innovation process when thoughts and ideas are churned to gain clarity of a perspective in a emerging context. Mitigation is instances in an innovation process where the idea is clear, its objective and purpose identified. Here the innovation has a level of maturity where a set of skills is required to leverage the idea. Mitigation has two components, first managing risk and second negotiation. The latter is critical as the innovator or the innovating group needs to negotiate with the decision maker as to the merits of the potentials of the innovation. Negotiation that appropriates the innovation is critical

for the innovation to see the light of day, demonstrating how the innovation purports to generate value. Innovation management is critical for the mitigation process as it develops procedures, mechanisms to take the innovation from a proof of concept to a prototyping stage. Impact is the expected as well as actual take-up of an innovation in all contexts and scenarios, backward and forward linkages meaning impact of innovation in regard to either or both in domestic and foreign markets; in civic society or government. Repositioning the organization by default or by coincidence (meaning products ultimately define company positioning and competitive and/or social environment). Being innovative means to redefine and renegotiate boundaries in the wake of an evolving innovation.

The first of the three cases discusses the role of “ambiguity” in this company’s innovation experience; we will refer to this experience as case 1. We then explore the role of “mitigation” in the innovation process using a second case study, which we will refer to as case 2 and finally, we will introduce the role played by “impact” in enabling innovation in the ICT sector referring to this experience as case 3.

Case 1; Ambiguity an instance for innovation

Company A, is a research laboratory established by the government of India to provide technical solutions to the Indian industry. In this instance I was introduced to a project that was developed over a five-year period to make scientific the process of tea tasting. The idea was to combine tasting, smelling and texture verification empirically so as to determine the quality of the tealeaves.

The lead scientist came up with the idea when he observed the inconsistency of the tea tasters, in their ability to determine the quality of the tea consistently over time. He wondered whether there would be a set of technologies that would be able to perform this task. His idea at first was born out of a mere curiosity, which later got translated into a challenge that acquired the frame of consistent validation to tea quality, which did not exist according to him.

The idea, though simple in its intent was not clear in his mind, as the following statement indicates, “I did not know where to start, which set of technologies could be involved and how to combine them, all I knew was that I wanted to build this solution for the tea industry, not because they asked for it but because I thought it could make the judgment of quality consistent” Tea tasting is a very critical job in the valuation and the sale of tea. Tea tasters are specialized people tasters that determine the quality of tea after having tasted the tea for real. The challenge as observed by the scientist. Even though tea tasting is a critical event in the valuation of tea, its arbitrary unscientific manner of value determination puzzled the scientist.

When he introduced the idea to his colleagues on how to make the tea tasting more scientific he received a number of responses, from outright amazement, coupled with the attitude, “it

cannot be done” with some tacit support from his colleagues. “I only knew that the present system was not scientific, I wanted to introduce a more scientific, transparent and a method based approach to tea valuing” What I did not know was the how question.

The first thing the scientist did was to collect a team of converts, but then “I had a problem, I was not sure what technologies are needed to build this imaginary product I was talking about, I had not talked to the tea manufacturers, all this was just in my mind, I know I did not have the answers but I was convinced that it was a good idea and doable”.

The scientist approached the system that he worked with. “The first question I was asked what you want to make, the answer to this question was not clear to me. I knew I wanted to introduce a scientific way to conduct tea tasting. But I was not clear in my mind what the product will look like, who will it serve and why should a scientific way to conduct tea tasting be better than the existing way. The management was skeptical and allowed me to continue work in a very limited way. “My colleagues too were confused, we talked a lot about what the product should do, what challenges it should address and how”.

The team the scientist builds to look into this matter were themselves wondering to the outcome, whenever they discussed the ideas. They came up with very vague notions of the product and the functionality, very un-real and totally imposable to attempt but they kept discussing and bouncing ideas. This went on for over a year with several ideas being rejected. “The funding was running out and I had not yet conceptualized the product, its purpose and functions. I was in deep trouble after a year, not much progress had been made and no results to show for. I only had a lot of ideas of how this product could look like and would do.

The scientist continued to soldier on, preventing the state of confusion to affect the seeking of a solution. The scientist continues to address the basic questions and the answers continued to be vague, directionless and confusing. However by now the team members had been convinced that it was a good idea and wanted to find a solution. The solution came in the second year of the project, one day a group of scientists asked a question, it is not about tasting, it is about a combination of sensory inputs analyzed, it is not about a set of technologies that can be done, but it is about talking to the manufacturers who are actually face this challenge every season. Ask them how best they would like this idea translated and whether one of them would participate in this development.

The design team quickly zeroed in on a few tea factories that produced high quality tea. Once they involved the manufacturer they realized that their vacillation in the absence of a clear causal path was indeed useful in sharing the final requirement for product prototyping. Because they were able to think of various ideas to solve the problem without the manufacturers influence, meaning it was useful for them not to have talked to the tea factories at the onset but very late in the process when their own ideas about the project were sufficiently addressed. What the manufacturer facilitated was the contextualizing of the idea. "The manufacturers shared with us about how a tea taster does tea tasting. After five years, of which the first two years were spent wondering how we might achieve our goal, to the rapid development of the prototype after the joining of the manufacturer into the team made the team more confident in their belief that they can deliver and that their creation will make a difference in the manner they imagined at the onset of the project some five years ago.

So how did ambiguity facilitate the process of innovation? First, while the team had little focus they not only bounced ideas among themselves thus developing a shared understanding of the problem space, they also created a common goal among themselves. Second, when they were finally introduced to the manufacturer they all had a very clear understanding of what needed to be communicated and done. The manufacturer understood precisely what they were trying to achieve and helps them in the process irrespective of whom in the team talked to the manufacturer and third, they were not unsure of their idea of making the tea tasting process a scientific one. In terms of innovation, while ambiguity may seem difficult to address, allowing for ambiguity in enabling the creation of a shared understanding, a better appreciation of the problem set and an increased awareness of the role of other stakeholders as equal contributors to the problem set creates a constructive framework for addressing the challenges during an innovative activity.

When actors like firms focus on innovation one of the important ideas they subscribe to is the reduction of risk, mitigating risk during the uncertain process of innovation is as important to firms as it is to scientists pursuing research in order to innovate. Uncertain, because there is no guarantee that the innovation will succeed in the market. The challenge for many companies is therefore to ensure a balance between continuing to innovate and mitigating risk, that is minimizing the un-intended consequences of exposure to innovation. Limiting exposure implies that during innovation the company could be vulnerable to a multitude of dynamics, so it needs to manage that process. In the second case study, I illustrate how one company has mitigated its risk from innovation processes and how it has continued to innovate over the past several years.

Case 2; Mitigation for innovation

Company B, works in the media space, it is skilled in developing media streaming technology. Its strength was in developing codex for DVD players. They wanted to create an online digital viewing product, which they would use to target the broadcasting companies. To help them achieve their task the management team identified a group of individuals who they thought are creative and would be able to address the challenge. To ensure that there is a management oversight on this very critical endeavor for the firm they hired a R&D head from outside. This person was qualified and understood what R&D is all about. He had set idea about the process, while the management team had a more loose understanding of the process. The head wanted systems in place while the management team wanted a looser approach to the process of R&D.

There was a fundamental difference in their approaches leading to the clash between the CEO and the head R&D. The CEO was of the opinion that the innovation process need not be separate from the day to day life of the company while the R&D head disagreed, wanting a dedicated team insulated from other regular duties engaged in the process of innovation. While the CEO's point was to have a broader perspective of innovation embedded among all employed the R&D view was to carve out a role for the specific innovative team. The CEO's point was not to put all the eggs in one basket, so if the innovation did not succeed then the company had other means to earn its livelihood from while the R&D perspective was to ensure that the innovation team succeeds and thus all resources were directed on that team.

The management team had a difficulty in reconciling the CEO's view of encouraging a lower profile innovation activity which was different from the R&D heads innovation activity. Of course one might speculate that the job of an R&D is to create new solutions and therefore his emphasis on a separate team for R&D. Both these leaders had a mitigating strategy, though they were different from each other. The result was that the management team decided that it is better to go along with the CEO's perspective of low emphasis on innovation where each department will be charged to come up with some innovation in their own context as opposed the R&D head's view that a separated entity be created that has full support of the management. The result of this disagreement translated itself in the R&D head being marginalized leading to him leaving the firm. The company went on to innovate based on the CEO'S model and today command a large share of the market for multimedia and broadcasting technology.

Both these views have merit as mitigating innovation, meaning insulating the company for extreme risk while the process of innovation continues. The CEO's low intensity risk mitigating approach to innovation tended to resonate among the management team's overall beliefs on the direction the innovation should continue. The result was the shifting of the emphasis from high profile innovations to

low profile fast delivery products. While there was a R&D department, it slowly merged into functional areas in order to develop new innovation while providing service or developing new products.

From this case study you notice three things, first, two distinct models of mitigation for innovation. Second, the belief that innovation is as much formal as informal, thus the insistence of a loose approach to innovation across the organization and third, that a mitigating strategy that focuses on diversifying the risk to all employees has a fierier chance of addressing risks from innovation.

Case 3; Working on Innovation through understanding impact

Case three is where the innovation activities get initiated by the threat perception from the introduction of a new set of technologies, namely “cloud computing”. The resulting innovation is a consequence of the company considering the impact this technology will have on their business and moving to adopt cloud computing for creating new opportunities for themselves. Here the resultant movement on the innovation trajectory is a consequence of the company’s impact perception from cloud computing as a threat as well as an opportunity.

Consider company C. In the past that is before the advent of cloud computing its main objective was to provide localized web enabled content management services. Over the past five years the success of cloud computing has made it reflect on the opportunity created by such an impact on the Indian market. Anticipating the increasing relevance of cloud computing this company is actively involved in bringing out innovative ways to imagine services in the future within cloud computing.

One of the management team members was engaged in a discussion about how cloud computing will change the way we work and store data, making a reference to Google; he engaged in a passionate discussion with his interlocutor taking the view that people like their data stored locally as they own them, and it is not a matter of convenience but privacy. People according to him look at data ownership like buying clothes;

“You do not buy clothes for yourself and then store it in a wardrobe in a third location, so when you want to access it, you will not be able to because of low band with in India” he said. His companion took a alternative view indicating that “well that might be the case now, but that will change in a few months, believe me, you can have your clothes and store it in a third location, then access it as and when you want without any additional hassle” he said.

The next day the manager formed a task force from among his colleagues in the company to look into the role cloud computing will play in the future for firms that have his type of business model. The task force reported in two weeks and “thus began a whole new experience for me”, the task force indicated that we change our business model, we create new products and services dedicated to the Indian market, they indicated that businesses would be interested in outsourcing this type of services to a reliable firm with up to date infrastructure.

The challenge for the manager was twofold, how to conceptualize a process that will shift the focus of the company from present location based service model to a service model based on cloud computing and second, how to manage the delivery mechanism of the new products and services. “I quickly realized that I had embarked on a process that would change the focus of my entire company and that I needed to reflect. The first thing I wanted to know was the nature of the impact, meaning what is the precise challenge to my existing business model with the introduction of cloud computing. Further investigation indicated to me that my company was likely to be impacted in a very substantial way and that if I did not act the company would no longer be relevant for the market, it was my acute understanding of the impact of the new technology that got us to where we are, now I have several products build on the cloud computing model and we are doing very well” thank you.

Three important ideas emerge from the above narrative, first, that innovation here is not necessarily the pursuit of a passionate dream to create new technology and improve the world, it is rather maintain, it is to survive in the market place for products and services. Second, that threat and opportunity are both part of the impact landscape, some companies react to new technologies from a standpoint of threat, other companies react to changing technological landscape taking it as a challenge to change themselves and their portfolio of offerings to the market.. In this case the initial reaction was one of refusing to believe that cloud computing will have an impact in India or it is relevant to the Indian condition. IT was not considered relevant; upon further investigation the manager quickly realized that it was not only relevant but also a threat and an opportunity. The manager then acted fast from a standpoint of opportunity and looked to taking advantage in mastering the technology. Third, correct impact perception was instrumental in enabling the shift and the innovation that this company then embarked on for addressing the challenges.

Two important ideas for innovation are relevant and worth discussing. First, the ability to perceive an impact as an opportunity, this is very critical in enabling the company to survive and second the ability to take collective action and involved creating a shared understanding of the ensuing impact is critical for innovation.

What we take away from this case is impact as a preview of how new technology platforms may open new product or service markets, here due to new applications that need the attention even before the market has emerged and matured. Moving into a market creation position where the exposure to unexpected competition increases dramatically. Management alertness, agility and exposure to new sets of technology is critical for initiating ICT innovation along with the managers ability to create a shared understanding of the impact of the new technology on the future of the company from a standpoint of opportunity and not threat.

Some reflections on ICT Innovation in India as we experienced it

IT innovation is not necessarily well defined and does not take a predetermined path. From the three cases above a few ideas emerge.

First, opportunities for innovation can take hold at any level of the organization, in which case the management should be sensitive to inputs from the periphery as well as the main organizational structures. Consequently, the innovation in the first case emerged from ambiguity, meaning the scientist wanted to make tea tasting a more scientific process but did not know exactly how to go about it and where to start. The management in not wanting definitive structural explanations to the final goal of the project enabled the scientist to inhabit the ambiguous space along with his project partners, enabling him to bring new stakeholders into the project, allowing the redefinition of the project and listening to the potential buyers.

From the second case the innovation was spurred by a disagreement in the process of innovation. One set of ideas thought of innovation as a separate focused activity, separate from the rest of the company. This view can be closer associated with the R&D view of innovation. While the other perspective thought of innovation as a free flowing all encompassing phenomena, where it was not one group that was charged with doing the innovation but the entire company was involved in the process of innovation. The two perspectives, the R&D view of innovation and the free flowing view of innovation are able to mitigate risk in different forms. The R&D view of innovation while concentrating the resources in one group also predetermines an outcome; this involves a large resource commitment. Whereas the free flowing of innovation view, which looks at innovation as a all encompassing company wide activity allows individuals to take initiative and is less expensive thus less risky for the company. In effect innovation is likely to be more widespread in the latter scenario as in the former view.

From the third case innovation persisted because the management considered the emerging challenge from new sets of technology as an opportunity. They quickly organized themselves and focused on the challenge ahead. The innovation activity was spurred by three instances, correct analysis of the likely impact from the new and emerging cloud-computing technology. Second involving others into the innovation process and third making the innovation transparent. The insight for innovation here is twofold; companies whose managers are sensitive to the changing technological landscape are in a better position to initiate innovation by interpreting the

market condition as a opportunity. And companies that initiate a shared problem solving are better placed to take advantage from a changing market condition.

What can we say about the innovativeness of Indian IT companies?

We suppose from the above that we can draw four insights. First, individuals in the innovation game need to be on the lookout for new opportunities constantly; second, innovation is as much about how you relate to other individuals as opposed to your own community, in effect innovation needs to bring in other disciplines, other than your own for cross fertilizing ideas. Third, innovation is a tension-laden experience and therefore individuals that are involved need to manage tension in their own contexts, and fourth innovation is about prejudging its impact. These appear to be the key insights from the three short cases presented here.

Does this mean they are uniquely Indian, well we do not think so. We believe that innovation in India is still a nascent activity and IT companies are increasingly recognizing IT innovation as an important value addition activity. However we detect that Indian ICT innovation is increasingly playing an important role in most Indian firms and we expect this activity to continue gaining importance in the time to come.