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Rai, Sudhanshu; Kühn Pedersen, Mogens

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by

Sudhanshu Rai and Mogens Kuhn Pedersen

Department of Informatics

Howitzvej 60

DK - 2000 Frederiksberg

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By
Sudhanshu Rai and Mogens Kuhn Pedersen
Department of Informatics

For further information contact the authors

Introduction

In this paper it will be our endeavor to highlight some of the key insights from analysis of the 60 companies we interviewed, (we refers to the five regional teams along with myself and my co-author). In our discussion of the findings we will present three case reports to enable us to draw some key insights from the cases. That we will use to answer the following questions: What is co-creation of IT innovation and how have Indian IT companies evolved in the application of this concept? How is co-creation different from collaboration and outsourcing?

The analysis of the interview data along with researcher's notes indicates that the landscape for Indian IT Innovation is not a formal phenomena nor it is well institutionalized. Meaning that IT firms understand what innovation is, they are engaged with it in servicing clients and they appear to live by their innovation but IT firms find it a challenge to build a formal process where the institutionalization of innovation is enshrined in the structural philosophy or the structural layout of the organization. We will come back to this insight in a later section in this paper. However by not having their ideas of innovation not institutionalized is leading to a differentiation in how IT companies engage in the domestic market as opposed to their foreign clients. The most important insight of this paper is that those IT innovative firms that we studied seem to have different approaches to Innovation. When they are addressing the domestic market they adopt a Co-creation model where as when they are servicing their foreign clients they use the tested outsourcing model. But in all the interviewed firms they emphasized that Co-creation of IT innovation for them is a better working framework as opposed to other preexisting frameworks because the co-creation is about the redistribution of knowledge.

We will develop the idea of co-creation; ground it in the 60 companies that have informed my reflection. The central question we aim to address in this chapter is; what is co-creation of IT innovation and how have Indian IT companies evolved in the application of this concept. How is co-creation different from collaboration and outsourcing? In section 2, we will define some key terms that we frequently use in this paper, we will justify why we define these terms in the way I do and how it informs the analysis that follows. In section 3, we will present the interview procedure and explain why we designed the interview module in this way. We will argue, in this section that conducting innovation research is complex enough hence the methodological

intervention needs to be flexible but structured. The flexibility should be in the nature of dialogue within a set framework. In section 4, we will present three cases, each of the cases presented will demonstrate an aspect of co-creation of IT innovation.

We will inform the reader through the case presentation to how IT leads the co-creation process. The aim of this section is to prepare the field for analysis. In section 5, we will analyze the case study and provide some insights to the dominant trends in terms of the key operational dynamics identifying ideas and operators that appear to driving the process of co-creation from the three case studies. We will fortify our argument suggesting that co-creation is an extension of collaboration and outsourcing but distinct from them; because IT drives the creation process by moving out of its domain to co-create with other partners from different domains and the artifact they create is aimed at fulfilling a need in a third set of domain. This we posit is a different conception of IT innovation because it aims to redistribute knowledge and not wealth.

We explain what we mean by each of these ideas and show how co-creation enables novel products to emerge in new domains. In section 6, we develop the conceptual framework for the co-creation of IT innovation. Here we will argue the co-creation works at two levels, one a higher conceptual level which we call the Meta framework and then a lower conceptual level which we call the operators of co-creation. In developing this framework we emphasize the Co-creations does not necessarily have a single path but can be witnessed at several instances on the innovation trajectory. We use the three case studies to illustrate the diversity in operational context but similarity in its conceptualization. I draw some implications from the analysis in section 7. In section 8 we will discuss and conclude this chapter.

2 The definition of terms

The key term to be defined in this chapter is Co-creation of IT Innovation. I define Co-creation as an instance of developing an artifact driven by information technology and in alliance with other non IT knowledge base that is needed to develop the artifact. The process of creation is as much a process of coordination as it is of knowledge generation, construction and instruction. Co-creation then implies the coming together of divorced non similar knowledge base to collectively identify an opportunity and pool their knowledge base and resources together to take advantage of the opportunity. I call this Co-creation of IT innovation because information technology with its domain flexible knowledge drives the opportunity identification and goal setting. It is able to bring in line other knowledge base to provide a solution set which is different from the IT knowledge base but the artifact has a component of the IT knowledge base. In effect the artifact that is produced in the Co-creation mold has large contributions of diverse knowledge base other than information technology. Co-creation is then the coming together of a diverse set of knowledge bases and domains to engage in a project for creating a new artifact that may be different from each of the contributing knowledge base. I refer to it as IT innovation because the driver in the Co-creation mold is Information technology. Innovation from the perspective of Co-creation can be defined as the creation of a novel artifact that may or may not resemble either one or all of the knowledge base but it is a synthesis of all these knowledge base for creating a new artifact for a totally different domain. Notice how the IT researcher in case A, endeavor to develop a mechanized, tea tasting, texture recognition and smell analysis tool. The artifact addressed a need which was alien to the IT domain but the IT knowledge base drove the

conceptualization and the development of the artifact with other domain experts such as tea tasters, factory managers and auctioneers playing a crucial role. Here the Co-creation of an artifact is the tea tasting machine, it is called innovation because it addresses a domain that otherwise was not addressed by such a device and the idea is novel. Similarly from case B; the firm combines resources with a tire manufacturer to create a distinct set of services in a new domain and by so doing it shifts the focus of the manufacturer from production based revenue model to a service based revenue model. Here to the set of artifacts created are novel, they are in domains different from the knowledge base of both the participants, and hence I refer to this process as Co-creation of IT Innovation.

3 The Interview process

The interview process was organized in three stages. The first was the training of the interviewers. This became necessary due to the geography of India. Since we were working with five regions and needed to interview people in all the regions simultaneously due to the lack of time. This meant I could not go region by region one after another conducting interviews. Instead we opted for a collaborative interviewing pool where innovative companies in the region were interviewed by the regional team leaders. These leaders were all faculty members at reputed research universities across India. We make it mandatory that the interviewing were to be done by senior faculty associated with the regional teams. We needed to ensure that all team leaders and members understood what we are looking for and how they should engage with interviewing. To share the key features of our expectations regarding conducting and processing the data for the interviews we conducted the pre-survey workshop in May of 2009 at Mumbai IIT. The key objective of this workshop was to have a common understanding of how to start the interview, how to engage the interviewee and the recording procedure.

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 recording template, see (appendix 5.1) and interview reporting template. These two documents were to form the instructive framework on how they were to conduct the interview.

Second, 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 questions which were semi structured.

Third, once we concluded the post survey workshop all the teams initiated their interviews in their own regions; we also agreed and identified criteria that the teams were supposed to use for selecting companies to take the interviews. We determined that each company will 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.

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

	North	East	South East	South	West	Total
Number of companies	10	8	10	12	20	60
Number of interviews	20	16	20	24	4	120

Note; in each company we interviewed project level as well as enterprise level individuals.

3.1 Recording the interview

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 ask our interviewers to be diligent on this account.

We propose; a two step approach to recording the interview. 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 necessary for all interviews. This recording needs to be transcribed and attached to the pertaining report when uploading the complete documentation for the interview to the online reporting database. The transcript along with the audio recording will form a part of the recording template.

The second step; is the actual dialogue with the interviewee. The interviewer initiated 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 firm needs to be recorded and transcribed separately for uploading. After the interviewee has narrated the Innovation story of the firm (either enterprise perspective) or (project perspective) the next stage of the interview should start.

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

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.

3.1.1 Initiating the interviews

We expect all interviewers and interviews to 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, we would like to ask the interviewer to 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.

4. Cases on Co-creation of IT innovation

In what follows are five cases, each selected to bring out the nature of Co-creation. Nature is defined as the inherent feature analogous to elementary interest that drives the process of co-creation. The case presentation in this section will primarily describe the case without engaging in any analysis that we will leave to the following section:

4.1 Case One

Company A, is a research laboratory established by the government of India to provide technical solutions to the Indian industry. It is referred to as CDAC and has a number of subsidiaries all over India. Its main task is to support Indian Industry in providing technical solutions to Industrial problems.

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 tea leaves. All of these were to be brought together and driven by information technology.

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 an 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 during an auction is determined by tea tasters. Tea tasters are specialized people who 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. The central challenge for the scientist was to think of an IT artifact that will perform tea tasting objectively to the extent possible and act as a complementary support to the tea tasters.

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 central problem with such kind of idea generation: “We get plenty of ideas, most in the past has been within the domain we work, but the sensor artifact for tea analysis was one important idea that did not fall into our domain., I had no understanding of the tea industry. No understanding of sensor technology. All I knew was software development and project management”.

The scientist approached the system that he worked for financial support to help him enable the actualization of his idea. “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. Skills that is

tacit in nature and honed over decades of tasting experience. The management was skeptical but 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” we needed to get others onboard such as the tea industry, the taster community, the sensor experts”

The team the scientist got together were diverse but none had any definitive idea to the outcome of the project. They wondered 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 impossible 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 continued to address the basic questions and the answers continued to be vague, directionless and confusing. However what they were definite about is to get more people involved in the project from outside the scientific community. 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 due to lack of divorced inputs, no sooner had they involved other cross domain stakeholders the solutions started coming fast and rapidly. The challenge was then to rapidly build a prototype. What the manufacturer facilitated was the contextualizing of the idea and provided valuable knowledge that helped the scientist make concrete the prototyping plans.

“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 among ourselves we did not get far in achieving the task but when we opened the gates to involving others from relevant domains we realized the progress was rapid and in the direction we wanted it, the only down side to this was it took the scientist one year to realize this requirement. We are better off now and we seem to have solved most of the problem in alliance with other non stakeholders who do not know my domain nor I know their but we seem to work well in creating a product for a third domain, in our case the artifact is for the tea taster community not so much the factories nor us the scientist. After the joining of the manufacturer and other non IT actors 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 five years ago.

4.2 Case Two

Company B, works in the web video streaming space, it was founded by four engineers' all returning from the United states after having worked there in different software companies. The company was established in 2000 and started commercial activity at the end of 2000. They have several offices all over the world, including their headquarters in Kolkata East India. Their main source of revenues is sale of software technology to international broadcasters.

It is skilled in developing media streaming technology for web environments. Its strength was in developing codex for DVD players. They soon realized that streaming technology on the web was proliferating fast and their revenue was constantly under pressure. After two years of being within the web based video streaming they wanted to look for new products and new revenue models. The management at this stage did not have much of an idea to how they should go about evolving a new business model nor did they have an idea to what this would be: and to what extent the choice of an external person would act as a mitigating strategy.

“Product director; we absolutely felt lost, we were bleeding, our revenues was heading down, at this time someone said, why don't we create a post of Director R&D and then lets hire an R&D director to find the path for new products and new solutions”

The company's top managers with a lot of persuasion agreed to hire a R&D director who would understand and “have a broad deep knowledge of our domains and how we could apply this knowledge in different scenarios”. The understanding of the role of the R&D director among the management was that he would be the firm's savior and provide new insights how to shape the new product. What the management overlooked was that technical knowledge does not lead to good products and good products do not always lead to successful products. There are plenty of intermediary challenges that needs be addressed one among them is to answer the question why has the company finds itself in such a predicament. Moreover, the innovation view of the management team was markedly different from the newly hired person, which the management team overlooked. They focused on domain knowledge but overlooked a key perspective of the R&D director's role, which was to identify projects that would involve people from across the company with diverse competencies.

“With the benefit of hindsight, I wish we had spend a lot more time in exploring the functions of the R&D director, you know we in India think that if a person is technically competent we assume he has the intelligence to get up to speed with required other competencies, we simply do not give any other kind of competency much value except technical. That is today's world will simply not work”

No sooner had the R&D director taken charge he started emphasizing how he thought he would like to run the R&D aspect of the firm. He had a set of preconceived notions of how an R&D process and what it entails, while the management team had a more loose understanding of the process. The head wanted systems and resources dedicated to a single window R&D activity, while the management team wanted a loser approach to the process of R&D.

“R&D is not about living in a closet and working on your own, it is about being in touch with the needs of people”

There was a fundamental difference in their approaches leading to the clash between the CEO and the head R&D. The CEO 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 wanted 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 director’s 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. The CEO argued that keeping a lower profile meets the culture of collegiality and collective enterprise so important to the firm. He insisted that working across domains was the key to finding new products and identifying new opportunities. The R&D view was more along the line of a problem solving view.

“We do not know what we should produce that is why we hired the R&D director, how can we be focused when we do not know where we are going”

Amidst the conflict the company continued to drift, by then 6 months had passed and the tension between the two perspectives were not resolved. One evening as the management team was trying to sort the issue a member of the team said “why don’t we do both”.

To the management team this translated into two things, the R&D director will get his way but only after the product has been identified. In determining the product to work with that the entire organization will pool their knowledge and talents from diverse domains to work on an idea which will bring them increasing revenues. The management team instituted a cross domain task force to take part in the exploration phase, this phase lasted for three months and led to the development of technology that was targeted to the broadcasting companies. Once the idea was identified the R&D director took charge of the problem space and developed cross domain competency that eventually resulted in a successful product. Although the R&D director was not entirely behind this strategy he did make a contribution but left the company shortly leaving the management team to continue the challenging work. Today a large part of the company’s revenues comes from the product they developed for broadcasters across the world.

4.3 Case three

Company C, started its life in the mobile and ERP space in 2005 and is based in Poona, Maharashtra state. Their founders were engineers’ from leading technical Universities in India. During their formative days at the university they found it difficult to engage with firms who could provide access to engineering students for their summer training. While at the university they launched a portal that connected students that were seeking for summer internships to those

companies that wanted to take on board these young engineers'. The consequence of their endeavor resulted in elementary success and they found themselves attracting attention from both prospective students who wanted summer training and companies.

Later on in 2007, during a discussion with a president from a leading management school they realized that admission management in India was a very complicated process needing specialized knowledge. Not only students needed to pass exams but they also needed to do background research about management schools from different sources that took time. The entrepreneurs went back to the president as asked him how they as entrepreneurs could help the students seeking management education in India. The principle indicated that they needed to work with all the business schools in India to create a framework for examination, selection of students and online application.

The young entrepreneurs quickly saw the potential and went to work.

“I did not know where to start, for where ever I looked I saw the thing I was dreaming up was going to have an tremendous impact on students, but the problem was we were all engineers, we did not understand how management schools conducted admissions says founder CEO”

“Yes, the problem was not so much that we did not know but the idea was over welming and success guaranteed if we did it right, says project manager”

The first thing they decided on is the nature of the team; “I believe we did the first things right, we decided very early on our recruitment policy and went around the country recruiting the people we wanted because we were assured of an impact” They chose a diverse set of people who were interested more with working with knowledgeable people outside the firm then working with colleagues inside “I knew if I wanted to build this firm, I need to get everyone involved, those I paid for and those who I did not pay” .

The companies: information, analysis and updates on management school admission procedure started playing an important role in the student's decision making and the business schools soon realized that they needed to give access to this company if they wanted to attract good students. “I think we succeeded because we thought out of the box, we went out and learnt from anyone who wanted to teach us how to work in this space”.

The company today is considered as the leading information centre for MBA admissions in India, they provide online registration, admission and empower students with up to date information. They have created the largest community in India of management students to date and they proudly say, “Our understanding of the likely impact we would have was well understood, that is why we are still in business”.

5. Analysis of the cases

5.1 Analysis case one

From the case story presented above, we can draw several important insights. In this section I will try and analyze the dynamics of how the co-creation of innovation unfolds inductively. I will then develop a first level framework of co-creation predicated on the case studies. I will end this section with a theoretical conceptualization of what co-creation of IT innovation might entail.

Several features from case one stand out. Recall that the lead investigator who conceived of the problem and the solution set belonged to a domain deferent from the one that the solution set was targeted. This implied that his knowledge of the solution set was insufficient but his interest and ability to pursue the solution set was diminished by the lack of domain knowledge. Notice also that the scientist acknowledges his lack of knowledge of the solution set. Further recall the scientist not being providing a convincing illustration to what the solution set would like, in this case was the tea tasting machine. What the scientist did know however is that the domain for which he was trying to innovate needed an augmentation of a scientific nature. His colleagues were not sure of his vision nor did were they convinced of his approach but they all understood the need and they were convinced to the purpose of this artifact. In addition to the challenges faced by the scientist his unclear goal did add to the confusion but it also laid the foundation for a kind of collaboration that I am refereeing to as co-creation. Had the scientist claimed clarity and full oversight of the product he wanted to develop would lead little room for cross domain partnership, which in this case the lack of domain knowledge and unclear path to the solution set provided? There are two key features of this case that need some further exploration. The first is the ambiguous nature of the proposed solution set. Second is the willingness to look outside the knowledge base of the scientist for knowledge augmentation.

Why should ambiguity enable innovation? Current innovation researchers shed some light on the role played by ambiguity during the process of innovation, primarily in enabling the innovator to seek more knowledge of the solution set. In our case the lead scientist was uncomfortable about not having clarity of the solution set. He repeatedly interacted with his colleagues and presented clarifying documents for funding. All these instances can be seen as attempts to enable a clearer vision of the solution set but that did not happen. It would not be unreasonable to argue that when one is unclear of a solution set one tries to reformulate it and share that with trusted peers, to help in the clarification of the solution set. In our case the scientist was engaging in such a community supported refinement of the idea. One could then link the clarification seeking need of the scientist to openness for diverse interpretation. Here in lies the argument for innovation. When diverse ideas around a locus are sought for clarification, the outcome might be different to the anticipated one priore to the exercise of exploration. Ambiguity due to its lack of clarity and thus ownership keeps idea owners open and looking for ways to improve their own understanding or augment their knowledge, therein lies the potential for innovation. From the case above if our scientist knew exactly what was needed then he would not need much clarification or support for the idea. The fact that he was unclear about the solution set left him open to his conception of the set being fertilized by other interpretations of his conception of the artifact.

The second point worth discussing is the realization after a year of working with his colleagues he had not moved forward and needed out of domain assistance. Ambiguity enabled a sense of openness; he needed generative ideas that forced him to think outside his domain, which did not happen with his colleagues who were all IT engineers'. By aligning himself with manufacturers he could get an out of domain perspective. This according the case narrative was the savior of the project. How does this become co-creation of IT innovation? Let me address this question with three key arguments. First, ambiguity enables the scientist to be open to others interpretation of his ideas and clarification of the possible solution set. Second, moving to the domain for which the solution set is supposed to address gives him important insights but the critical inputs comes from the manufacturers who are different from tea tasters. By involving the other two players in his project he is able to understand the context, be aware of challenges and continue on the co-creation path supported by his new partners. Third, both ambiguity and working cross domains enables him to inhabit a generative phase, where new ideas are being articulated for the solution set. In effect this becomes co-creation of IT innovation because it focuses on generative aspects of human endeavor supported in some measure by ambiguity and openness.

5.2 Analysis case two

Several aspects of the second case are worth discussing within the co-creation fold. In this instance the narrative is about being threatened by weakening sales and how the management team planed to address the falling revenue. This case is also about differences in the conception of innovation help held by two different sets of people. Note that the solution set relies on a well developed mitigating strategy. This strategy is suppose to pay rich dividends if the company relied on building new products, namely focusing on the construction, construction here refers to build specific products that when launched will arrest falling revenue, this is different from the first case where the challenge the scientist perceived fell within the generative fold referred to in case one; in the second case the solution set needs to be constructed because there is a fair understanding of where the company is in terms of its generative paradigm.

From the second case three ideas are worth discussing and have implication for my argumentation of co-creation. First, the managers of company B wanted a solution within the existing paradigm but involving domain experts from across diverse area within information technology. Second, their endeavor was driven to mitigate risk of falling sales, the company was losing money. Third, tension between the CEO and the R&D director led to some kind of innovation in how they saw what they needed and the way they should achieve it.

The first insight that one can derive from the case is the way different stakeholders engaged with the solution set. The management team's idea of the solution set was technology centric and so was the perception of the R&D director, the difference between the two groups understanding of innovation was related to operational aspects of how innovation takes place. The management view was a collective view; meaning the management team viewed innovation as a social activity engaged by different skill sets, while the R&D head thought of innovation as product development and specialization centric. The implication for co creation is in the manner of how the process unfolded. The skill and domain centric view of the R&D director saw the problem as one of new product development where as the management team of which the R&D head was a

part saw the operational aspects of innovation as finding new products outside their current line of business.

Co-creation as defined in section 3, as a process where innovation can either be taking place within or outside the domain but the key distinguishing feature of this is nature and knowledge of the cross domain actors. The people contributing to the rediscovery of new revenue streams needed cross functional expert's but not necessarily cross domain. We distinguish cross functional from cross domain; cross functional refers to individuals that represent a role identified by what they work, it refers to the talent of the individual within a functional area, where as cross domain refers to knowledge about a set of technology. Cross functional then is non technical talent specific where as cross domain has a technical focus. How is this different from collaboration? Collaboration as we conceive it occurs within a domain largely and is developed around a technological locus, where as co-creation need not necessarily have a common technological platform.

The second feature indicates that the managers engaged in a mitigating strategy. A key feature of a mitigating strategy is that it relates to the construction of an artifact. The discussion was more about for which target user should the new artifact be created and for what type of market. Co-creation of IT innovation in this case is about how the management team and the R&D director aligned the solution set for achieving the task. They were able to reconcile because both had similar ideas of risk the company faced if they did not come up with a solution. Where they differed was in the process. Third: the instance of co-creation of IT innovation occurred in enabling the entire company to participate in the redesign of the company's product. Recall by the time the entire company got involved the R&D director had left thus leaving the management team with a free hand to enable a community solution across domains and functions.

5.3 Analysis case three

There are several key features from company C that is worth noting before we engage with the analysis; First, the assumption of elasticity of demand in terms of market creation and the speculation of its impact on the company's growth prospects. The founders understood very well early on the impact they wanted to make and they were convinced on the impact they are likely to have on reshaping the market for management school education in India, from admission to job placements. Also note that this was made possible by an external source, a president of a leading management school to help them understand the latency in the demand were they to integrate the business school admission procedures, to examination to job placement. Further recall from the case the awareness of the founders to seek expert domain advice for they acknowledged their lack of knowledge in this domain.

Three key features stand out that we will argue qualifies this outcome as a co-creation of IT innovation. First, the founder's ability to understand the consequence of impact on the market they are likely to create. The importance of that market and how they could further differentiate this market that was yet to be created. Impact assessment at this stage is a calculation based on the set of information they receive about their field of operations. Who provides this information and why? The answer to this question lies in two further arguments. Information or instruction is the key to creating space for thinking differently. Once that thought process is initiated a logical

conclusion of that process is to determine in concrete terms the impact of the thought, in our case the instructive role was played by the President of a management school he also provided an assessment of the impact. The impact was then converted to tangible potential income projections and the founders started their activity; second the founders took seriously other market players like business schools presidents and the schools admission procedure. The founders quickly realized that they needed to work with all of these stakeholders in order to create a market for admissions.

There are two important implications for the co-creation of IT innovation here. The founders worked with key market stakeholders for management education in India to create a market in full knowledge and under constant instruction from the managers of management school. The second is the role impact assessment played in enabling co-creation. How does this case enable our understanding of co-creation of IT Innovation? We conjecture that co-creation has an instructive role to play, meaning that it provides instructive value. With this information entrepreneurs assess their chances of success. Co-creation in this case is reflected dynamically through the involvement of the presidents of the business schools in instructing the creation of the market for managing admissions efficiently.

6. Framework for the Co-creation of IT innovation

Co-creation of IT innovation from the case presentation and its analysis can be looked upon as having two levels of conceptual operators. One we call a higher level conceptualization that informs our theory of Co-creation of IT innovation and the second lower identifiers or operators can also be identified that inform our higher level conceptualization of Co-creation of IT innovation. In this section we will identify the higher level constructs and associate it with its operating variables, variables that has the potential to theoretically inform our theory of Co-creation of IT Innovation.

From the case analysis we have identified three interconnected higher level constructs: namely “the generative frame: the constructive frame and the instructive frame. Each of these frames play have played an important role in our Co-creation of IT Innovation story. The generative frame is identified as a state around a locus where the co-creators are in a generating mode. This implies they may know what problem they want to solve but as the problem area does not precisely fall into each of their domain but distinct from their knowledge base: they tend not to know nor understand the knowledge required for the solution set. From case one: our scientist wanted to make tea tasting scientific but did not know the domain of the tea taster nor the tea industry. We refer to this lack of path determining domain clarity as being a critical component for initiating the process of Co-creation of IT Innovation.

The generative frame lays the foundation for identifying the knowledge base outside the core competency of our scientist and is consequential in enabling the framing of the problem and associated knowledge gaps. This is not to say that the generative phase must always come first. From case two and three presented above the generative phase is not the likely starting point for the process of co-creation of IT innovation. The point about working out of the generative mold tells us more about the nature of the problem rather than the solution path. It also indicates how

far away the solution set is from the locus and suggests that the generative frame may be a relevant first step when the solution path is ambiguous needing a fair amount of idea generation and creative thinking.

The lower level operators that mark the generative frame can be identified as creativity or ambiguity to state a few; 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”. We consider how creativity is manifested during human interaction. For instance Csikszentmihalyi (Csikszentmihalyi 1999) indicated creativity as “the product of single individuals, but of social systems making judgments about individual’s products.”. We define ambiguity as instances where all ideas have unclear determination, are muddled with some direction or path but without determinants. We conjecture that ambiguity is a period in the innovation process when thoughts and ideas are thrown into a process to gain clarity of an idea. Recall from case one the ambiguous nature of the scientist sense of purpose but total ambiguity about his path.

The second high level concept can be identified as the constructive fold; Constructive because actors in this phase are engaged in looking for solutions within a said technological domain. This implies the focus is less on looking for inspiration for identifying the path outside the domain but looking for a purpose for combining technological elements within the domain in a novel way. The output is a novel set of technological combination for the creation of a new product that did not exist earlier and which involved non technical people from their own domain. Recall from case two that two different conceptions of co-creation existed. The one that succeeded was based on a collegial distributed knowledge acquisition and not domain centric specialization. In effect one of the key features of construction is linked to the construction of new products within the competency of the domain but working with functional experts that may not have necessarily had the domain knowledge. Recall the role of the management team in setting the research and development agenda of the firm away from the R&D director centralized view on research and development. The constructive fold is different from the generative fold in two ways: first the constructive fold talks of a product differentiation approach where as the generative fold looks at creating a totally new product. The second is that generative fold brings in new industrial and knowledge domains to bear on the solution set where as the construction fold aims at co-creating a separate track of products within the same domain. Both are co-creation of IT Innovation because both enable a diverse set of knowledge base to engage with each other at the boundaries of each knowledge base.

The operators within the constructive fold are; mitigation; meaning taking a risk to do something different that will address the current risks. 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. Other operators that can be associated with mitigation are IPR, negotiation, partnerships; appropriation (“identifying your value additions”), knowledge sharing, knowledge creation, transfer.

We think of “instructive” as our third level conceptual construct. Instructive during co-creation of IT Innovation means how information and knowledge flows and internalized. Thus the role of the instructive fold is to spur co-creation taking the point of departure the external world. This implies the instructive fold is more sensitive allowing itself to be influenced by the external world. The instructive fold influences co-creation by informing different stakeholders to consider the problem space from their own perspective. Recall the third case where the entrepreneurs started the business of co-creating their Innovation by interacting with external stakeholders. Their preoccupation with external stakeholders is reflective on the way they co-create. The idea is generated outside the framework and what drives the entrepreneurs to innovate is the perceived impact they presume the fruition of their idea might have on the solution space. The instructive fold is different from the generative fold as the instructive fold draws its inspiration from an expectation and analysis of the impact. Hence information and open ideation is critical to this form of co-creation of innovation. Whereas the generative fold relies on a individual or set of stakeholders to drive the process. Instructive fold is different from constructive as the core objective of the co-creation is constructive or the development of an artifact where the co-creation in the instructive fold focus is on ensuring efficiency of information flow across domains.

A few operators in this fold can be identified as projection and impact; we think of projection; is an instance where the prototype has now 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. Other aspects of projection can be identified as innovation packaging; getting stakeholders onboard; managing innovation; innovation promotion. Impact; is the expected as well as actual take-up of the 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. Some other operators within the impact fold can be identified as linkage creation; capacity building; indigenous uptake of technology; technology families;

7 Some implications

There are several implications for new business models and managers, for policy makers in Europe and India, for globalization, for IT innovation researchers working with India. Before we launch ourselves in the specific implication, we need to contextualize the implication within a trend that is emerging from the analysis of the three case studies and our understanding of the direction the companies appear to be taking relating to IT Innovation in India: three key generic insights that will influence our implication speculation in this section irrespective of their operational specificity.

First; the Co-creation of IT Innovation is increasingly domestic focused while IT companies continue to engage with older business models and proven clients to meet their bottom line. However companies we interviewed keep foreign generated revenue to invest in co-creation fold in the domestic market. Second, alliances appear to be less popular among IT companies when it comes to co-creation instead joint ventures appear to be a more dominant way to engage in the co-creation of IT innovation and third; the co-creation of IT innovation is enabling to a larger extent the redistribution of knowledge as opposed to wealth..

The implication for companies and business models is three fold; first companies both Indian and overseas need to move away from the outsourcing fold and into the Co-creation fold because there is a larger potential for both urban based Indian companies and overseas companies to have direct access to the vast domestic markets through their co-creation partners. The domestic market for information technology is increasing rapidly needing companies to operate in this space. Taking part in a co-creation of IT innovation both urban firms and overseas firms ensure access to this large market which they can then service with modified products. Second, due to the cost structure of the Indian market consumers are price sensitive, this would provide ample learning opportunities for overseas partners to reengineer low cost but relatively good quality products for their own markets and third, the business models that may emerge within the co-creation fold are likely to emphasize value of the co-creation partner rather than price indicators for participation in the co-creation endeavor.

Implication for policy makers; First; traditionally policy in the area of Information technology continues to lag behind the actual needs of the industry. From our discussions with a large number of IT innovators in our sample the implication for Indian policy makers is twofold: First policy should be directed towards increasing the knowledge base of the community. Thus policy makers should try and focus on enabling high quality research and education in the area of Information technology. This does not mean providing computers in classroom.

Computers are a visible face of the information technology field but there is a large knowledge base that enables the computer to be useful for the community. Additionally computer education is an important part of creating a high quality knowledge base but what is lacking is the over emphasis on technical education in India. A field of research such as information systems is completely lacking from the knowledge base of the educational environment. Indian policy makers should be aware of combining computer education alongside education relating to information systems, which studies the impact of computers on organizations, cultures and societies. Second policy should be indirect, meaning policy makers need to understand the key stakeholders of the economy such as the consultants and bring them into the policy fold. Our data indicates that consultants are the real policy agents and not the government. A policy agent is an entity that is able to convert policy into a business model for value addition to the IT Industry.

For globalization and IT researchers the implication is straight forward: global companies need to focus on access to new markets and the Co-creation provides a fairly robust way to access the domestic market which were out of bounds for global product and service providers in either the outsourcing or the collaborative fold. For researchers, key challenges lie ahead in elucidating the

nature of Co-creation and how it might work across boundaries and geographical regions. Here the co-creation work could be combined with research in cross functional teams to get new insights on how this process might unfold

8 Discussion and conclusion

In concluding this chapter we need to revisit the questions we raised in the beginning of this chapter, with the aim to revisit the objectives to explore whether we have addressed them to our satisfaction. The key research question we set ourselves to addressing was:

What is co-creation of IT innovation and how have Indian IT companies evolved in the application of this concept? The conceptual framework developed in section 6, indicates three key ideas in relation to the co-creation of IT innovation. First, that the co-creation of IT Innovation has three key components as seen in the case study. The generative fold; which is engaged in a novel formulation of an artifact that needs IT as a large component but does not necessarily inhabit the IT domain. In effect the generative fold is about creating artifacts new domains using a diverse knowledge base. The constructive fold; is where products within a domain are constructed or developed. The artifact in this kind of co-creation mode is domain specific having functional diversity. Meaning most stakeholders in the creative fold share a common knowledge base but each stakeholder has a different perspective on that knowledge base based on the stakeholder's functional role in the co-creation process. The instructive fold; is where information regarding the co-creation process plays a primary role in enabling the creation of a novel artifact. Here the co-creation mode is influenced by the context in which the domain is located.

At the operational level we discover Co-creation of IT innovation as being driven by lower level operators. We have identified them as creativity, ambiguity, mitigation, projection and impact. These operators feed into one of the co-creation folds and act as a transmission mechanism for the transformation of entities brought about through the co-creation of IT innovation. Hence Co-creation of IT innovation can be considered as the alignment or coming together of a diverse set of stakeholders to pool their knowledge base by innovating to address a challenge that cannot be addressed by any one stakeholder on his own, because of the diversity in the requirement of the knowledge base.

How have Indian companies engaged with co-creation of IT innovation? From the case studies it appears the Indian companies we have interviewed and studied (60 of them) tend to co-create because of their increasing focus on the domestic market. Since the Indian domestic market needs a diversity of knowledge inputs, technological solutions alone cannot be a sufficient requirement to succeed. The Indian companies have addressed this by working with non domain actors to address challenges of a sector that none of them have full information but provide a part of the full knowledge; we identify this process as co-creation.

How is co-creation different from collaboration and outsourcing? We spent some time developing our arguments in explaining to the reader to the difference between co-creation, collaboration and outsourcing from our perspective. We argued that co-creation is the seeking of

novel solution in a new domain of which none of the stakeholders have full knowledge put provide a part. We also indicated that there are several modes of co-creation, the generative aspects of co-creation, the constructive aspect of co-creation and the instructive aspects of co-creation. Collaboration from our point of view an agreement to innovate around a locus using similar knowledge base but between different functional units or companies, the key difference is in the knowledge base, collaboration works within a cohesive knowledge base where as co-creation functions well at the boundaries of the knowledge base. Outsourcing is a descriptor of a business model and an operational frame that enables collaboration.