Organizational Knowledge Sharing from a Motivational Perspective*

by

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Executive Summary

Over the last ten years, there has been an increasing trend of teamwork in the business world. In this type of atmosphere, it has become more and more important for organizations to implement mechanisms that allow for tacit knowledge, knowledge that is implicitly integrated and learned through teamwork, to be available and accessible in an explicit manner to the rest of the organization. This mechanism is known in business as knowledge sharing, and it involves allowing someone to benefit from the wisdom gained through one's own experiences.

Knowledge sharing is especially relevant in the software industry where developers constantly need to create and reuse codes to construct software applications for clients. An organization that promotes knowledge sharing initiatives prevents developers from having to start from scratch and recreate knowledge with each subsequent generation of developers. However, organizations face various obstacles in motivating developers to share and reuse knowledge. In order for knowledge sharing to occur, first generation developers must take time out to save the code for future use. However, taking time out to save codes for reuse takes time away from the developer's current project. The original developer of the code must take time to properly save the code in a manner that makes it easily accessible to subsequent developers. In addition, future generations of developers must deal with the implications of reuse, lack of trust of previous developers work and the search costs involved when reusable knowledge is not easily accessible. These issues highlight the fact that the model of knowledge sharing can only work if both the first generation and subsequent generations of developers have sufficient motivation to share knowledge. The relationship between knowledge sharing and the motivational and psychological factors involved was explored during the course of my internship at Infosys.

Infosys is a world-renowned software development and consulting firm that has emphasized the importance of knowledge sharing initiatives to the future success of the company. In order to examine the factors involved in knowledge sharing at Infosys, I spent three weeks with the knowledge management group, where I conducted interviews and observed employees at work.

Over the course of my three weeks, I found that a significant different existed between the knowledge sharing within cohesive work teams when compared to the knowledge sharing within non-cohesive teams. In addition, interviewees who were part of the cohesive work teams reported that they were more likely to engage in knowledge sharing within their group than with the rest of Infosys at an organizational level. These statements led to my hypothesis that strong group identification will override organizational identification with regards to knowledge sharing as members of these groups will share more within the group than with the rest of the organization.

Proximity of developers to the main development center was also reported as a factor involved in knowledge sharing at Infosys. Developers who do not work regularly at the main headquarters reported feeling isolated from the rest of the organization. These developers seem to use formal mechanisms of knowledge sharing to maintain organizational identification and feel connected with Infosys. This evidence led to the hypothesis that developers who do not strongly identify with the organization will be more likely to engage in knowledge sharing and use it as a method to increase identification.

Finally, although several interviewees indicated that Infosys needs to push knowledge sharing upon its employees, research has shown that this might have a contradictory effect. Developers

who feel that they are required to share knowledge will feel less autonomous and their intrinsic motivation to share will decrease. Thus, my last hypothesis states that developers who view knowledge sharing as a requirement will be less likely to engage in knowledge sharing activities.

These hypotheses will be tested using a survey instrument that will be deployed at Infosys. This survey instrument will use self-reported, as well as objective data, to analyze the relationship between individual factors involved in knowledge sharing at Infosys. The survey will test various constructs including motivation, sharing behavior, as well as organizational and task characteristics.

The research presented in this paper clearly emphasizes the role of group dynamics, organizational identification and intrinsic, as well as extrinsic factors, in serving as motivation to share and reuse knowledge. Further research, including insights that come out of the survey instrument mentioned above will help to shed light on the specific factors that are most effective in encouraging knowledge sharing.

Introduction to Organizational Knowledge Sharing

Working in groups has become the norm in many organizations. Projects are no longer completed by one individual, but rather by a team of workers who bring together their abilities and knowledge to enhance the quality of their output. With the increasing trend of teamwork, it is becoming more and more important for organizations to implement mechanisms that allow for tacit knowledge, knowledge this is implicitly integrated and learned through teamwork, to be available and accessible in an explicit manner to the rest of the organization. This mechanism is known in business as knowledge sharing.

Sharing in the simplest terms is allowing someone to use or enjoy something that one possesses. Knowledge sharing involves allowing someone to benefit from the wisdom gained through one's own experiences. In a business context, it can save time and money. However, in the industry of software development, knowledge sharing is no longer just a time-saver, but a necessary way of life. In this industry, where companies are rapidly failing and fizzling out, fierce and unforgiving competition has forced knowledge sharing to serve as a major determinant of not just whether a firm succeeds, but of whether or not it continues to operate at all.

In this setting, developers constantly need to construct and create new codes and software applications for clients. In addition to creating code from scratch, developers often look for previous codes that have been written in similar domains that they can work off of in the interest of time. If developers do not save their knowledge for future use, the organization loses this knowledge each time a generation of developers moves on to new projects or new firms. Without knowledge sharing, the organization must start from scratch and recreate knowledge with each subsequent generation of developers.

Given the importance of knowledge sharing to the livelihood of software development firms, it is baffling to see how many companies do not have formal mechanisms, such as Intranets and Technical Bulletin Boards, that allow for consistent knowledge sharing. Even companies that do have these mechanisms often have trouble implementing organizational-wide initiatives that encourage and promote knowledge sharing. In an attempt to shed light on the elusive character of knowledge sharing, I will analyze the factors involved in sharing and reusing knowledge in a motivational context. This will cover an examination of the internal and external reasons that encourage and discourage developers to share knowledge.

Motivation

Motivation is defined as the factors that arouse a person to action. It is the reason behind an action. At the most basic level, humans can motivated by intrinsic, or internal, factors including hunger and thirst, which incite us to take action such as to go eat food when we are hungry. In this view, called the Drive Reduction theory of motivation[1], developed by Clark Hull in 1943, humans have internal biological needs that create arousal and tension. We are driven to reduce this arousal in order to maintain an internal balance. However, our actions are not only driven by internal needs and desires. People are also motivated to take action by external factors such as economic rewards that can be gained through our actions. Our actions can be driven by either internal or external motivation or by both.

Intrinsic motivation

Intrinsic motivation refers to factors that originate within a person. An intrinsically motivated behavior is that which is initiated by a person in pursuit of no other goal than the activity itself[2].

This motivation exists when people engage in activities for the sake of their own interest, the challenge or sheer enjoyment of those activities. Activities such as listening to music, spending time with friends or having a hobby are often intrinsically motivated.[3] In addition, it has been proposed that intrinsic motivation stems from human needs to feel autonomous and competent rather than externally-controlled. Events that foster self-determination or competence will enhance or maintain intrinsic motivation, while events that weaken self-determination or competence will decrease intrinsic motivation[4].

Extrinsic Motivation

Extrinsic motivation originates from factors outside the person. People are extrinsically motivated when they engage in activities as a means to an end, for tangible benefits.[5] Extrinsic motivators can include verbal rewards such as praise and positive feedback, tangible rewards such as money and performance-contingent rewards that are linked to people's performance.

Interaction between Extrinsic and Intrinsic Motivation

Intrinsic motivation can be undermined by the introduction or presence of extrinsic motivation. Once extrinsic motivation is introduced, it becomes associated with the activity as a reason for pursuing that activity. If this motivation is taken away, there is no longer sufficient justification for continuing to pursue that activity just for the sake of it. The activity becomes over-justified and is less likely to be pursued further if the extrinsic reward is not restored. In addition to this effect, it has also been noted that intrinsic motivation is most undermined by extrinsic motivation on low-interest tasks[6]. This makes sense intuitively, as I will be most motivated to do something by tangible, economic rewards if I am not very interested in the task in the first place. This

interaction between intrinsic and extrinsic motivation, described in psychology under the Self-Perception Theory, is apparent in the context of knowledge sharing.

Knowledge Sharing

First Generation Developer

When a developer creates a particular code from scratch, he becomes the first generation developer of that piece of code. People who use his code after its first use are part of subsequent generations of developers. In order for knowledge sharing to occur, first generation developers must take time out to save the code for future use. However, taking time out to save codes for reuse takes time away from the developer's current project. Thus, it is detrimental for the original developer to save code for the benefit of future developers. Consequently, first generation developers must possess some form of motivation to push them to save knowledge for reuse so benefits may be reaped in the future.

Future Generations of Developers

One issue that arises for future developers is the implication of reusing someone else's code. Reusing code developed by a coworker could imply that a developer is not able to reproduce that code himself. It might signal a deficiency in that developer and negatively affect his reputation.

Relying on someone else's work also requires a great deal of trust in one's fellow developers. If code is reused as is and is defective in some way, the quality of the current developer's work could be compromised. Reusing a previous developer's code requires trust in the abilities of fellow workers, which are not always present. If the current developer does not trust the quality of previously created code, he will take time to debug the reusable code to ensure high quality.

Thus, developers might find it more desirable to create the code themselves, rather than spend time debugging or reworking old code.

Another issue that arises is the search costs involved in finding previously created codes. If the old code is not easily accessible, then searching for it could become time consuming. This time could be used by current developers to develop the sought after code themselves.

These issues highlight the fact that the model of knowledge sharing can only work if both the first generation and subsequent generations of developers have sufficient motivation to share knowledge. The real-life effects of these issues on knowledge sharing activities were evident during my experience at Infosys.

Background

In order to study the motivational factors involved in knowledge sharing, I examined the Knowledge Management processes of Infosys. Infosys is a highly-regarded and world-renowned software development and consulting firm. It began business in 1981 in Bangalore, India which is the location of its main headquarters. Infosys has additional offices in 16 countries around the world and offices and had revenues of over $500 million in year-end 2002. It is divided up into regional units including EURO (serving Europe), CENA (serving Canada and East of North America), WENA (West North America), as well as by functional units such as the Domain Competency Group.

Infosys was specifically chosen for my research because of its emphasis over the years on knowledge management as a core process. Infosys has been consistently recognized as a leader in the software industry with regards to knowledge management and praised for its knowledge

sharing initiatives such as its Knowledge Management Maturity model. This model had been use by Infosys until 2001 to evaluate its own progress as a knowledge sharing organization. Leaders of the Knowledge Management group have asserted that Infosys understands the importance of leveraging knowledge for future success and envisions itself to be an organization where "every employee is empowered by the knowledge of every other employee"[7].

History of Knowledge Sharing at Infosys

The Knowledge Management Group

The Knowledge Management (KM) group regards knowledge sharing as a People-centric model because "unless people think it is important to share, they will not do it or at least they will not do it well". They refer to Knowledge Management at Infosys as "centrally facilitated, but organizationally distributed". KM is centrally facilitated in that there is a central KM team that handles organizational knowledge sharing initiatives and matches up experts with groups where their Knowledge is needed. KM is organizationally distributed through initiatives such as KM Prime which will be discussed below. In addition, knowledge management is organizationally distributed through informal mechanisms of knowledge sharing such as rotation of employees among project groups and knowledge domains, cross-functional organization of project or business teams and periodic meetings between project leaders or business managers to discuss topical issues, solutions and best practices with one another.

Knowledge Sharing Initiatives

Knowledge Management began at Infosys in 1992 with Bodies of Knowledge. These were hard copies of information people wanted to write down and show to other employees. According to

members of the Knowledge Management group, these are largely responsible for bringing about the knowledge sharing culture at Infosys. In 1995, the use of technical bulletin boards became common. When these bulletin boards were originally launched, they relating to things such as Sports, Real Estate/Buy & Sell, and General information, which were not related to work. However, the popularity of these bulletin boards and the enormous response rates that they generated inspired the first technical bulletin boards, which contained information about such things as coding and hardware/software applications.

In 1996, Infosys launched Sparsh, meaning "in touch", an organizational-wide corporate Intranet. This is the current location of all individual regional and functional unit portals, some of which have restricted access and are accessible only to developers working in that regional unit to use the portal. One year later, a database called Q's Lab was formed which was a repository of client testimonials, project descriptions, proposal templates and case studies. The next couple of years brought about the Project Leader's Toolkit, which were CDs that contained checklists of things all project leaders should do and included templates for projects. In addition, the Knowledge Management Group at Infosys, created a yellow pages containing names of people who were experts in certain areas. This was called the People Knowledge Map. This voluntary program allowed people to post their contact information and indicate in which areas they were experts. However, this program failed because people were unwilling to call themselves experts and boast about themselves. In addition, there was not enough awareness of the program and there was no method to ratify experts.

In the year 2000, the Knowledge Management Group launched KShop, a portal available through Sparsh that is accessible to all Infoscions working in any of the development centers in

India. KShop is a repository of knowledge including sample codes, technology summaries, glossaries of business and technology terms, websites, external reports and many other resources that developers would find useful over the course of a project. In addition, KShop includes an electronic bulletin board, which allows Infoscions to post questions to other Infoscions.

Although KShop was the first company-wide knowledge repository, several groups, including DCG, the Domain Competency Group, had already developed their own repositories. Members of these groups did not see the need to be loyal to a central organization-wide repository because they already had their own group/specialized ones. The Knowledge Management Group tried to resolve this issue by integrating these individual repositories in a central server (KShop) as satellite servers to encourage these groups to utilize KShop. In addition, the KM (Knowledge Management) Group implemented the Knowledge Management Maturity Model in order to encourage use of KShop.

The Knowledge Management Maturity Model

The Knowledge Management Maturity Model is an evaluative model that measures Infosys' progress towards the highest level of knowledge sharing. Infosys' current level of KM is evaluated against established standards of KM maturity progressively ranging from Level 1 to Level 5. Although this model is no longer used by Infosys to evaluate its own KM progression, it is still used as a selling point for clients until a new model is fully implemented. The new model is in the development phase and will utilize a 2-by-2 grid with Utility and Ease of Implementation as its main factors of analysis.

Finally, in order to further emphasize the commitment to knowledge sharing, Infosys launched the Knowledge Management role in each project team. The person assigned to this role is responsible for finding out the Knowledge needs of group and distributing the appropriate resources to them. For example, if a member of the group is working on building an inventory database for a retail firm, the person in the KM (Knowledge Management) role conducts searches on applications previously made to keep track of inventory of other retail clients. The KM person is also responsible for extracting useful Knowledge from the project and disseminating it throughout the organization. This position is now called KM Prime.

Initially, Infosys implemented a system to encourage knowledge sharing that relied on Knowledge Currency Units. Knowledge Currency Units, called KCUs, were earned by Infoscions for contributing to, reviewing or using knowledge assets from KShop. They were also earned every time Infoscions' contributions were reused. These points could be traded in for merchandise at an approved vendor's website. Although KCUs were originally offered as an incentive to utilize KShop, they eventually caused Infoscions to doubt the quality of KShop and The Knowledge Management. Specifically, at one point during 2001-2002, Infoscions began abusing the system by making frequent, low quality submissions to KShop, as well as reading and rating their friends' submissions, in order to acquire more KCUs. When the Knowledge Management group realized that this was occurring, they suspended the KCU system and are currently in the process of revising that system.

Methods

In order to gauge the current state of knowledge sharing at Infosys, I spent three weeks at Infosys working with the Knowledge Management Group. During my time at Infosys, I conducted

interviews with 10 employees of Infosys. Interviews consisted of open-ended questions, and each interview was approximately 30 minutes long. Interviewees were assured that their responses would be kept anonymous and would be used for the purpose of this paper and the survey that would be deployed in the coming months. Employees that were interviewed ranged in years of experience, level of seniority and area of specialization.

In addition, I conducted ethnographic research through observations of a project team at work and the daily routines and attitudes of Infoscions at work. Findings from the interviews, as well as the previous research that has been done in the field of knowledge sharing were used to develop a survey with Professors Kimberly Benzoni, Raghu Garud and Arun Kumaraswamy that will provide more insight into the factors that affect motivation for Infoscions to share knowledge.

Data from Interviews

Interviewees were asked to describe their perspective on the state of knowledge sharing at Infosys, as well as their general feelings on the importance of sharing knowledge, and asked to identify motivational factors that they feel encourage and discourage knowledge sharing at Infosys. Major inputs that came out of the interviews are discussed below. Full interviews are included in Appendix A.

Team Cohesion

The internal structure of Infosys divides developers by regional units and also by functional units (i.e. Domain Competency Group). As mentioned, one of Infosys' informal mechanisms of knowledge sharing is rotation of employees among project groups and knowledge domains.

However, one interviewee stated that, “Differences in knowledge sharing in various groups exist because of differences in high travel group members v. low travel group members.”

It seems that groups that have stable memberships over time are more likely to share knowledge within the group. Individuals in teams that are stable feel more connected to the team as a whole and tend to share more often than individuals in teams where members come and go frequently. Presumably, this is due to stronger group cohesion. These developers know each other better and feel more inclined to help other people within their group. They are intrinsically motivated to share knowledge for the enhancement of their group. These statements show that developers who strongly identify with their project teams will possess high intrinsic motivation to share knowledge.

This high intrinsic motivation for knowledge sharing is evident in one functional group at Infosys, the Communication and Product Services Group, or CAPS group. According to an interviewee, “CAPS’ knowledge sharing operates differently from knowledge sharing at Infosys as a whole because CAPS has a culture of sharing”. The number of documents that come out of CAPS is as high as the rest of the organization put together. The difference seems to be that the people in CAPS are using the content and are happy to use the content.

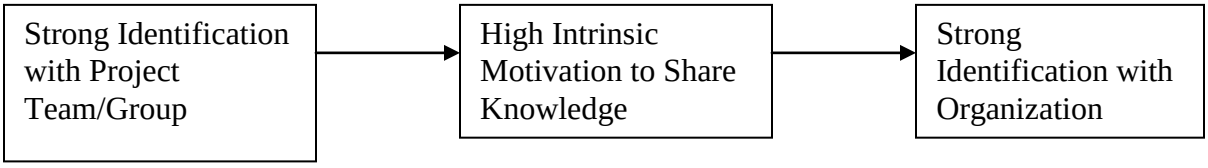
Proximity

The above discussion of team cohesion showed that members of groups that are highly cohesive strongly identify with group members and thus have strong intrinsic motivation to share knowledge within the group. However, examination of another factor, proximity of developers to the main development center, shows a somewhat opposite causal relationship between identification and intrinsic motivation.

During one of my interviews, an employee indicated that he had not made any submissions to KShop for the last couple of years because he had been working abroad at a client site. He said that Sparsh was not accessible to employees who worked in offices other than the development centers in India. In addition, proximity to the main development center in India seems to influence the amount and type of knowledge sharing that occurs.

"People who are in development centers other than Bangalore tend to buy-in to knowledge sharing much quicker than the people who are at the main headquarters." Infoscions who are located at headquarters know that their seniors and project leaders are nearby and if they need any information or knowledge, they can just send an email out or drop by people's offices. These Infoscions don't feel the need to rely on a formal knowledge sharing resource. However, Infoscions who are not at the headquarters feel more vulnerable and isolated from the rest of Infosys. On-site Infoscions and Infoscions who work at development centers outside of Bangalore often feel that they are left behind and not given the same attention as those Infoscions at the main headquarters. Thus, they are more willing to actively utilize Infosys' formal knowledge sharing mechanisms, such as KShop, which allow them to maintain a stronger connection to Infosys.

Developers who work away from the main center in Bangalore engage in knowledge sharing in order to attain organizational identification, whereas members in groups with high cohesion engage in knowledge sharing as a result of strong identification. Thus, frequent knowledge sharing results in increased organizational identification and strong group identification results in increased knowledge sharing. This causal relationship is depicted below:



Trust

An important point that can be noted about the CAPS group is that its knowledge sharing portal has restricted access. Another group, called IBCS, Infosys Business Consulting Services, uses its own portal and also has restricted access. These groups have been reluctant to merge their portals with KShop because they feel the security of their documents in their portals will be compromised. This highlights the perceived lack of security involved in knowledge sharing and the importance of trust in an organization pushing for widespread sharing. Although organizational trust might be lacking at Infosys, these groups do seem to possess high levels of trust within their respective groups. However, lack of trust of other groups has led to organizational isolation. The IBCS group, for example, generally keeps to themselves and is not well known by Infoscions in the other divisions.

Competition

The Indian software industry is very competitive and developers often look for opportunities to prove themselves to peers and managers at Infosys. In order to encourage knowledge sharing, some Project Managers at Infosys develop competitions amongst team members to see who can create the most reusable artifacts. Outcomes of these competitions are reflected in appraisals of team members made by Project Managers. Thus, frequent submissions and incidences of knowledge sharing can increase visibility and recognition of employees. This increased recognition and visibility was often identified by many interviewees as motivational reasons to

engage in knowledge sharing. These factors deal directly with the extrinsic motivation involved in knowledge sharing.

Thus far, it seems that Infoscions engage in knowledge sharing in order to differentiate themselves from other employees and gain recognition for their efforts. However, one interviewee stated that "True researchers enjoy sharing knowledge just for the sake of it, but having knowledge in a business environment translates into competition". Thus, retaining knowledge is a way of differentiating oneself from others; sharing this knowledge will take away that distinction. Sharing and reusing knowledge not only takes distinction away from a developer, it could also imply that a developer is not able to reproduce that code himself. It might signal incompetence in that developer and negatively affect his reputation and his self-image. Hence, developers who originally possess high levels of intrinsic motivation to share and help their project teams or the organization might be discouraged by the weakening of self-competence that is implied by knowledge sharing.

The interesting point about competition brought up in interviews is that there is a presence of both intrinsic and extrinsic motivation. Employees are influenced by the intrinsic motivation of wanting to feel self-competent, which overrides the desire to share knowledge. In addition, employees are motivated by the extrinsic factors of recognition and visibility, which increase the desire to share knowledge.

Culture

Research has also shown that there are certain characteristics of a corporate culture that are conducive to reuse and sharing. These characteristics include a lack of isolation between departments, decision making power for employees, trust and citizenship.[8]

My observations of Infoscions and interview responses indicate that Infosys has an informal culture. Infoscions do not hesitate to call their seniors by their first names, and Infoscions at all levels are very approachable. Team meetings are casual and jovial. Team members are encouraged to speak up about conflicts and issues. In addition, there is a high level of independence among team members, as most of the work on projects is done at the individual level or in small groups of 2 or 3. The status of each small group's progress is discussed during the team meetings.

These statements indicate that Infoscions are given a great deal of responsibility, as well as control over their projects. They are expected to do their work independently but they know that they can ask questions of other team members when necessary. This serves to instill feelings of self-competence and self-control in Infoscions. However, this self-competence can be threatened when Infoscions reuse knowledge. This is precisely what interviewees indicated when they stated that a lack of competence was one of the factors that discouraged their knowledge sharing activities. In addition, feelings of self-control could diminish if knowledge sharing is pushed down upon employees as a requirement as suggested by several interviewees. Thus, Infosys should ensure that knowledge sharing is encouraged at an organizational level, but not pushed down upon employees to the extent that they feel suffocated by obligations to share and reuse.

Major Hypotheses Revealed By Interviews

- Strong group identification will override organizational identification as members of these groups will share more within the group than with the rest of the organization.

This superceding affect of the group over the organization makes sense in the context of knowledge sharing. Developers will feel more inclined to help future developers who will be working on similar projects as them in the same project groups than developers outside of the group who they might never even meet. In addition, developers that feel strong loyalty to their functional groups tend to isolate themselves from the rest of the organization. These developers also tend not to share on an organizational level because they feel the security of their documents in their portals will be compromised by knowledge sharing.

- Developers who do not strongly identify with the organization will be more likely to engage in knowledge sharing and use it as a method to increase identification.

Infoscions who work away from the main campus feel vulnerable and rely on the formal knowledge sharing mechanisms as a way to stay connected with the organization and maintain identification.

- Developers who view knowledge sharing as a requirement will be less likely to engage in knowledge sharing activities.

Intrinsic motivation can be undermined by activities that reduce self-competence and autonomy. Thus, developers who originally possess high levels of intrinsic motivation to share and help their project teams or the organization might be discouraged by the weakening of self-competence that is implied by knowledge sharing.

The hypotheses that have emerged from my interviews, along with several others, will be tested using a survey instrument that will be deployed at Infosys in the coming months.

Survey

The purpose of the survey is to use self-reported, as well as objective data, to analyze the relationship between individual factors involved in knowledge sharing at Infosys. The targeted sample size of the survey is 1500 Infosys employees. This group is composed of both junior-and senior-level Infoscions. The survey is accessible to employees through a link available on Sparsh, the company-wide intranet, which brings respondents to the Stern website, where the survey is actually located. It consists of 98 questions, which vary in form, although most ask the degree to which respondents agree or disagree with the statements made in the question.

Respondents will be provided with ID numbers when they take the survey in order to maintain confidentiality. These ID numbers will be used by Professors Garud, Benzoni and Kumaraswamy to match respondents' names with self-reported and actual data received from Infosys.

The survey is currently in its final developmental stages and will soon be deployed. Although there is no data from respondents as of yet, the results of the survey will shed light on the ideas proposed in this paper.

Dependent Variables

The dependent variables used in the survey include the number of KCU points, the number of reviews of documents done by respondents on KShop, and the number of logins to KShop. In addition, self-reported data including the number of recent downloads of documents from KShop, number of recent submissions to KShop, number of times respondents asked for help from other employees or provided help to fellow employees, and the number of average hours spent in knowledge sharing activities.

Independent Variables

Approximately 16 different constructs are being tested in the survey, which consists of 98 questions. The constructs relevant to extrinsic v. intrinsic motivation are discussed below. A full list of questions and constructs is displayed in Appendix B.

Motivation to Share

These questions will address constructs including Intrinsic factors, Extrinsic factors, Intergenerational Identification, Organizational Identification, Perceived Utility of Knowledge Management Portals and Perceived Impact of Knowledge Management. Questions regarding the perceived utility and impact of KM will ask, for example the degree to which Infoscions agree to the following statement: "I believe that Knowledge Management is essential for a company like Infosys." In addition, questions regarding the degree of personal joy and benefits to the firm that knowledge sharing brings will assess how interested respondents are in knowledge sharing activities.

Questions regarding benefits to the team, as well as relationship with Infosys, will be used to determine the amount of organizational identification of respondents. Analysis of these responses in correlation with the extent of knowledge sharing activities and specific reasons for sharing knowledge will help determine if there is a relationship between organizational identification and motivation sharing, as well as amount of knowledge sharing activities measured by the dependent variables. Certain questions will also examine the extent to which respondents feel knowledge sharing is encouraged in their project teams and the extent to which they share only within their regional and functional groups. This construct will address Hypothesis 1, stating that certain groups will engage in more knowledge sharing than others.

Behavior

These questions will include Problem Solving Behavior, Reuse Behavior, Sharing Behavior and Learnability. Questions in these categories will assess the type of knowledge sharing that Infoscions engage in, i.e. within their groups v. outside their groups, the type of mechanisms used to share knowledge, formal v. informal, ability to use knowledge from one situation to another, and approaches to problem solving.

Organizational Characteristics

Questions regarding organizational processes, management involvement and project team characteristics will assess the degree to which knowledge sharing could differ based on external characteristics. These questions would allow for the identification of respondents that are members of high sharing or low sharing teams. One could compare this information with the amount of self-reported knowledge sharing done in project teams and at the organizational level.

Task Characteristics

Task Characteristics that could affect knowledge sharing include the creation/search costs involved in looking for reusable knowledge, intellectual property rights and the time pressure involved in conducting searches. The extent to which these affect actual knowledge sharing activities will be tested using the survey.

Conclusion

The research presented in this paper emphasizes the role of group dynamics, organizational identification and intrinsic, as well as extrinsic factors, in serving as motivation to share and reuse knowledge. However, the qualitative data gathered in the scope of my research is limited in its ability further explain the phenomenon of knowledge sharing in corporations. In order to go

beyond the propositions that arose from my interviews and observations, the research team involved in this project will utilize the survey instrument and try to gain more insights on the relationships involved in factors that impact knowledge sharing. In addition, further studies can be conducted across organizations with varying structures to assess the impact of organizational culture and composition on knowledge sharing. Also, future research can focus on knowledge sharing outside of the realm of the software industry. Perhaps these studies can examine knowledge sharing in the context of academia. In this industry, professors would benefit greatly from collaboration on projects, but they are not always motivated enough to share their knowledge.

There are many industries, contexts and perspectives that are yet to be examined in the field of knowledge sharing. The possibilities and insights that future studies may hold, prior research, as well as the current competitive global economy, stress the need for continued research on knowledge sharing.

Appendix A – Interviews

Interview 1

Person 1 discussed from her experiences that people who are in development centers other than Bangalore buy-in to KM much quicker than the people who are at the main headquarters. Infoscions at the headquarters know that their seniors and project leaders are all right here and so if they need any information or knowledge, they can just shoot an email out or drop by their offices. These Infoscions don't feel the need to rely on a formal KM resource. However, she says, that those Infoscions who are not at the headquarters feel in some sense more vulnerable and isolated from the rest of Infosys. Thus, they are more willing to actively utilize KM resources such as KShop. She also mentioned that these on-site Infoscions and Infoscions who work at development centers outside of Bangalore often feel that they are left behind and not given the same attention as those Infoscions at the main headquarters.

Person 1 also discussed a little bit about the culture of Infosys. She commented that it is extremely informal and that one does not hesitate to call his or her seniors by their first names. Infoscions at all levels are very approachable. She stated this type of culture was very different from those found at most Indian companies.

Interview 2

The second interview was Person 2, a project manager with the Europe Infosys practice. Person 2 heads up teams that work in areas where there is little existing knowledge. When projects are complete, his team creates reusable artifacts of knowledge that can be looked up on European portal accessible through Infosys' Intranet by subsequent teams. Person 2 said that his teams create these knowledge artifacts so that later teams do not have to "re-invent the wheel".

He also said that culture plays a significant role in knowledge sharing at Infosys. In Australia and the US, people are at the forefront of technology, while in Europe there is a more laidback approach where they use methods that have already been tested and are resistant to change. These cultural differences must be taken into account because in Europe, for example, there would be more resistance to new initiatives such as Knowledge Management.

He indicates several problems with the current setup of KShop which is the Intranet site where Infoscions access previously created bodies of knowledge.

- Email and public folders in Outlook are more immediate and Infoscions in his perspective are more accustomed to email than KShop.
- KShop is not an eye-catcher and it does not demand attention. It is a static medium.
- Bad integration between knowledge on portal/satellites (i.e. the Euro portal for the Europe practice) and knowledge on KShop. Most people on his teams use the Euro portal for knowledge, and he posts artifacts for the most part only on the Euro Portal. This is the biggest problem with KShop from his point of view.

Interview 3

Persons 3 and 4 are both project managers in the Canada, Northeast US region. They discussed the current restructuring that Infosys is undergoing. At the moment, Infosys is structured by regions, such as CENA (Canada and East of North America) and WENA (West North America). The new plan, which is supposed to be implemented next week, will structure divisions so that the US will be one region and further divisions will be made by product lines. For example, a retail firm in West of the US and a retail firm in the North of the US will now be put in the same

group called Retail. This will allow for better communication and sharing between groups in similar industries.

Person 3 discussed a group called IBCS, Infosys Business Consulting Services, which uses its own portal. They have been reluctant to merge their portal with KShop because they feel the security of their documents in their portal will be compromised. This group generally keeps to themselves and is not well known by Infoscions in the other divisions.

Person 3 also said that differences in Knowledge sharing in various groups exist because of differences in high-flux v. low-flux groups, highly experienced group members v. low experience group members and high travel group members v. low travel group members. In addition, different project leaders can dictate different knowledge sharing cultures within the project teams.

With regards to factors that cause Infoscions to create reusable software modules, they indicated that the following factors affect managers and developers when they consider knowledge sharing:

1) Visibility – increased creation of reusable artifacts, etc. will increase the reputation of that project manager and his/her team members.
2) Ability to retain knowledge in situations where team members may leave.
3) Saves time and effort in the long run.
4) Time pressures lead one to explore all options in looking for information and knowledge. Creating reusable modules adds to the options available.
5) Often PM's have team members that are not so experienced and they must be trained. Reusable modules can aid in this process.

6) Other benefits, in terms of cost and productivity that a project manager may accrue from knowledge sharing.
7) Thrill of creating reusable artifacts.
8) Proving yourself to your project manager and team members.
9) Competition – Some Project Managers create a competition amongst team members to see who can create the most reusable artifacts. This competition is reflected in appraisals of team members made by Project Managers.
10) Mindset to share is inherent in some developers.
11) Recognition/Visibility to Project Manager and Peers. Frequent submissions and incidences of knowledge sharing will increase visibility and could increase one's chances of going onsite, which is a big milestone for new entrants to the firm. The Indian software industry is very competitive. Thus, there is also a need to prove oneself to peers at Infosys and other software companies in the company. Going onsite would be one big way of proving oneself.

Interview 4

The fourth interview was with Person 5, a developer at Infosys. He said that there are three main things he uses to share knowledge:

- KShop
- The Domain Competency Group website – contains very simple documents that explain domain-related matters in common terms; also contains more advanced documents.
- The Technical Bulletin Boards on Outlook

He explained that all three of these were very important since Infoscions move around to new groups a lot and don't have all the experience needed for every project. He stated that he has used KShop at least once for every project he has worked on so far. He says that he hasn't made any submissions because he has been onsite in London for two years where they don't have access to Sparsh. He is active on the technical bulletin boards, which are usually accessible onsite. He generally applies to queries immediately and says his reasons for responding are:

- Answering technical queries helps him collate his own thoughts regarding a particular project or topic.
- Increased visibility; you can get to be known as an expert in a particular area.
- Incentives, KCUs, provided for submissions to KShop and DCG website.

At the beginning of a project, there is a lot of pressure to begin and get things done on time; thus, most submissions are made at the end of the project. The project leader assigns one person on the team to write a Body of Knowledge at the end of the project. The BOK consists of a description of the project, the work that was done and what new things were learned. This assignment becomes part of his/her appraisal.

He said that changes in the KCU scheme don't really have that much of an affect. Knowledge sharing is not simply due to KCUs. These are minor incentives for Infoscions, many of whom work abroad and make money in pounds and dollars. More motivation comes from the increased recognition, growth and better appraisals that result from sharing.

Interview 5

Another interview was conducted with Person 6. He said that generally during the project there is not enough time to submit documents. However, each person in his project team is required to

create one document related to his or her specific work on that project. The KPrime in that group is responsible for coordinating this.

He said that publication of one's document in KShop is a big motivation for why people make submissions to KShop. Also, it is strongly encouraged to share by his department. In addition, sharing is done through a project website that members of his team have developed specifically for their project-related matters. This website also has a newsletter that documents are often submitted to. Person 6 stated that there is a "Push" factor involved in sharing knowledge. Since all members of his group know that it is required of them to contribute something, people can't say at the end that they didn't have enough time. He also mentioned that often one deterrent to sharing knowledge is that a person is working on something abstract that he or she can't necessarily write about.

Interview 6

The next interview was with Person 7. The profile of his group is very different from that of Infosys as a whole. Many of its members are MBA's or are from the Big Five. Only about one-third of the group's members match the typical Infosys profile. This group developed their own portal because they felt that customizing KShop to their own needs would take too long and with their own portal, they would be able to restrict access. The portal consists of case studies, submissions, profiles of people in the group and their methodology. Regarding this portal, he said that access to most documents on the site is restricted to allow only members of the group.

Right now the group is experiencing a problem of not enough people submitting documents to the portal. Person 7 said that everyone is withdrawing, but making no deposits. People visit the portal and may utilize a document or two, but they haven't reached that key inflection point

where they realize its utility and visit, as well as submit, on a regular basis. There is also no monetary incentive to submit documents. People in the group are seeing it as an extra thing they have to do. In addition, people often just go directly to other members of the group when they need information. In this way, knowledge sharing is people-driven, not process driven.

There are currently 4-5 people in the ES group working on fixing this problem. They want to help people realize that the site is useful and worth visiting. Also, they want to use the site for staffing purposes and have people post the latest profiles of themselves on the website. They are motivating people to keep their profiles updated by tying this to appraisals and making whether or not they updated their profile recently an item to be checked off by the evaluator. Finally, Person 7 stated that the push to share documents on ES' portal must be a downward push from the Business Managers at the top. Right now however, the group is growing very rapidly and most of the managers spend must of their time "fire-fighting".

Interview 7

I also interviewed Person 8, a Senior Project Manager and Person 9, a Project Manager. Person 9 said that when you join a company like Infosys, where many processes are already in place, previously created knowledge and templates are a good place to find information. He said that whenever they try to do something new, they first see what is already there by going through KShop and templates. Also, they send out emails to other people in the group to see if they can get a hold of old drafts and proposals. Some of this knowledge can be used directly, while some of it has to be tailored by them.

Person 9 said that people often have trouble codifying or quantifying their knowledge enough to write a document on it. In addition, people have tight project schedules and often do not have

time to sit down and create documents for submission. Also, retaining Knowledge is a way of differentiating oneself from others; sharing this Knowledge will take away that distinction. Person 8 said that KShop also offers points, KCUs, but this isn't really a big motivating factor.

Person 9 said that authenticity of Knowledge on KShop is a big factor. Currently, there is a push throughout Infosys for Infoscions to publish documents in journals and present them at national conferences and forums. This encourages people to create quality documents and put more effort into creating them.

Person 9 said that true researchers enjoying sharing knowledge just for the sake of it. However, this is not so in business. Having knowledge in a business environment translates into competition. Thus, Infoscions must be pushed to share knowledge and Infosys is now realizing this and making knowledge sharing a part of its processes.

Interview 8

This interview was conducted with Person 10. He said that the more the KM Group thinks, the more they come to the realization that incentives are not the right way to go. Analysis shows that people are sharing knowledge to align with incentives rather than to contribute to the knowledge repository. A separate group of Infosys, the Communication and Product Services Group, CAPS, has a knowledge sharing portal that has restricted access. It operates on different basis than KShop as a whole because CAPS has a culture of sharing, not just incentives. The number of documents that come out of CAPS is as high as the rest of the organization put together. The difference is that the people are using the content and are happy to use the content.

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