Conceptualizing the three dimensions of Inter-Organizational Communities of practice

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Abstract

The paper describes and analyzes the way in which a particular case company stimulated the development of communities of practice as a vehicle for encouraging product and process innovation. Some unique features of these communities were explored. In particular the involvement of retired engineers and the inclusion of external parties were both found to contribute to the effectiveness of these communities. More specifically, the effectiveness of these communities were discussed in relation to three dimensions – structural, strategic and technological. Analysis of these three dimensions was useful in examining the role played by these communities within the case company. The paper concludes by considering the lessons for managers that can be drawn from this analysis.

1. Introduction and theoretical foundations

There is increasing recognition of the strategic importance of organizational knowledge. Numerous studies have investigated factors that enable and inhibit the mobilization and management of knowledge. For instance, von Krogh (1998) has reported the importance of care in relation to knowledge creation, while Nahapiet and Ghoshal (1998) have addressed the need for developing social capital to facilitate knowledge exchange and combination. Furthermore, some studies have investigated the characteristics and influence of organizational context where socially embedded (Nonaka and Konno 1998) and dispersed (Tsoukas 1994) knowledge can be managed to leverage competitiveness. In particular, the concept of "community of practice" (CoP) (Brown and Duguid 1991) has extended our understanding of knowledge as abstract, formal and individual to something, which is informal, collective and situated (Lave and Wenger 1991). The significance of CoP is reflected in the way in which tacit and experience-based knowledge is shared through story telling and social interaction; a collective learning approach which used to be under-emphasized by the mainstream of organization studies.

While prior studies have provided critical insights, our understanding of how firms can effectively mobilization their knowledge through organizing CoPs remains limited. It is argued by Brown and Duguid (1991) that a CoP emerges naturally when members of the community are intellectually and emotionally aligned. Little empirical evidence has been collected to conceptualize how a CoP can be designed and built as part of a specific organizational development project. Moreover, the concept of CoP has been investigated primarily in the context where community members rely on face-to-face interaction for knowledge sharing. However, theoretical insights related to the process and dynamics of CoPs remain under-developed. Specifically, how can social relationships be built up and maintained as a means of enabling knowledge exchange and combination, when community members are geographically dispersed? Moreover, previous studies have conceptualized a CoP as an informal group that evolves naturally within an organization. This raises the question of how far, if at all, a CoP can be nurtured inter-organizationally, in particular with external parties, such as customers and suppliers. Guided by the need to understand inter-organizational processes and dynamics within the context of a virtual CoP, the research reported in this paper was conducted to collect empirical evidence as a means of fulfilling the salient theoretical gap. In addition to the present section, the rest of the paper is structured into three parts, including research design and methods, case background, analysis and discussion, as well as conclusion and implications.

2. Research design and methods

The research is based on a 15-month case study of IEL[1] undertaken between 1998 and 1999. IEL was actively involved in encouraging product and process innovation, and more generally was concerned with managing and mobilizing enterprise knowledge for competitiveness. In order to

[1] The name of the case company has been disguised.

pursue these goals IEL implemented a corporate wide KM program. The research tracked this KM program and explored the process by which enterprise knowledge was mobilized and managed through the organization of CoPs. The lack of empirical evidence in the context of communities has inspired this study to adopt a grounded theory approach (Strauss and Corbin 1990) to form the foundation of the research.

The strengths of a grounded theory approach for theoretical advancement have been documented by studies in the area of information systems research, such as Orlikowski (1993) and Scott and Kaindl (2000). The rationale of using multiple data collection methods is not merely for the purpose of enhancing research reliability through triangulating the data (Denzin 1988). Also, it serves the aim of providing detailed insights into the studied phenomenon; ensuring the richness of the emerging theory through obtaining various perspectives on an issue through iteration (Strauss & Corbin 1990).

Prior to the interviews, a 3-month on-site observation was undertaken to familiarize the authors with the organizational characteristics, including the nature of the business, the social setting structure, culture, and business processes. In addition, 25 semi-structured and 12 follow-up interviews were conducted each lasting on average 90 minutes. In conjunction with semi-structured interviews, informal interviewing via telephone and emails were conducted for reaching overseas interviewees. Further on-site observation, including more informal interviews, was spread over an overall period of 9 months to acquire first-hand knowledge of the KM implementation program and to allow the researchers to constantly engage with the researched and make sense of the observed phenomena. Additionally, data were collected from documentation, including letters, written reports, administrative documents, newspapers, company archives, as well as information stored in the company intranet.

The data collected from the above four sources were filed, summarized, grouped, and categorized. The preparation formed the basis for data analysis, which involved systematically analyzing the data through the open, axial, and selective coding phases suggested by Strauss and Corbin (1990). Open coding aimed to discover concepts and categories from the data based on their conceptual similarities and differences. Concepts and categories emerging from the open coding served as the basis for the axial coding where the primary aim was to generate interconnections between these themes by building a paradigm model. Finally, the similarities and differences between categories and concepts were further explored and refined during the stage of selective coding for the purposes of generating a story line and grounding the theory. Theoretical sampling techniques, namely open, relational and discriminate sampling, were used to ensure the density of the emerging theory (Strauss and Corbin 1990). The iterative process between coding and sampling was ended when theoretical saturation was reached (Glaser 1978).

3. Case background

The case company, with more than 60,000 employees worldwide, provides products, both standard and custom-built engines, and consulting services to corporate clients in over 70 countries. More than 60,000 employees across the globe generated sales turnover in excess of $8 billions during 2000 alone. In addition to the centralized head office functions, IEL is structured based on two divisions, notably Manufacturing and Consultancy. Each division serves four product categories, including power generation, transport, infrastructure, and gas and oil. Each division has its own support functions, such as finance, accounting and human resources that report directly to Head Office. Due to its need to integrate knowledge across product categories to create technological solutions for clients, the Consulting Division practices on a project-by-project basis and is less concerned with the formal structure compared to the Manufacturing Division. Constant product and process innovation is encouraged, reflecting the corporate culture which advocates the strategic importance of creativity as a means of continuous renewal and differentiating IEL from its competitors. As one interviewee recalled, *"maintaining a leadership in technology has always been our central concern and obviously that has a great impact on our strategic development. One of the main objectives of our R&D is to continuously improve our products and keep one step ahead of our customers' expectations*

In addition to the need for continuous improvement through process and product innovation, the purpose of initiating the KM program in IEL was seen as an attempt to systematically codify pattern-registered know-how and technological solutions, as well as to purposefully avoid such knowledge sharing across the organization. As one interviewee explained: "*We are paid by our clients to come up with technological solutions that are pattern-registered under their names. Legitimately, they can sue us, if the same or even similar solutions are provided to different clients…. KM for us means more than just saving time and effort, it is a means to prevent potential legal disputes*". Therefore, even though organizational members were constantly engaged in the generation of new knowledge, they were constrained in applying the knowledge in other business activities, unless IEL owned the patent rights.

Initiated in late 1997, the corporate-wide KM program was aimed at leveraging its innovation capability by effectively managing and mobilizing in-house expertise. A team with 23 representatives from virtually every function was formed to organize and manage the design, planning and implementation of the KM program, and later became the basis of the Corporate Knowledge Center (CKC). In addition to the 9 full-time members, the team had 14 part-time members whose primary role was to promote the program and disseminate the concept of KM. In addition to running both conventional and on-line workshops, meetings and training programs, the team was also responsible for the following three areas. First, it needed to build a website on the firm's intranet to promote the concept and awareness of KM. Second, it needed to initiate "K-Bank" a web-based corporate-wide knowledge directory to facilitate employees searching for categorized expertise and identifying patent-registered technological solutions which were previously documented only in paper form. Third, it had to plan, design and organize product-based learning and innovation communities across the organization.

The learning and innovation communities were developed out of pre-existing product development committees that had previously been used in various parts of IEL. Many interviewees perceived this as a useful development since it essentially represented a more systematic attempt at managing and mobilizing dispersed product-related knowledge across the firm. Each community focused on a particular range of products and had both internal and external members with a range of expertise, including design, components, engineering, manufacturing and testing. In addition to the involvement of suppliers and service providers, three or four retired engineers acted as part-time consultants to each community inputting their expertise accumulated from their 25 or 30 years' of experience. Each of the retired engineers in turn chaired the community meeting depending upon the expertise required for the particular meeting. Even interviewees with considerable experience found that presenting ideas in front of these retired engineers, could be an 'incredible experience' which was described as *constructive*", "*useful*" and "*beneficial*", yet "*frightening*", "*nervous*" and "*uneasy*". One of the interviewees described how, "*when they nod their heads and say 'well done', you know that you have done a remarkably good job*". The decision to involve retired engineers in the community was aimed at achieving two goals. The first was to avoid losing strategically valuable knowledge. The second was to demonstrate the company's commitment to their employees. From the perspective of the retired engineers, participating in these communities provided them with much more than just the financial rewards received from the company, including salary, company car, share option, and free holiday. They also appreciated the respect that this represented and found satisfaction from the involvement and recognition. Recognition was tangibly demonstrated by the fact that these retired engineers were provided with designated parking spaces.

The relationships that developed within the communities were found to be different to the relationships that developed through the formal departmental working arrangements. In particular the way expertise was perceived and managed was different. One of the retired members who had worked for the company for 32 years noted that: "*I might well be the guy in charge of the community, but I try very much not to be the guy in charge. I try very much to be the guy that is underpinning, reinforcing, inspiring and lifting the community rather than being in charge and being dogmatic and in command…. They are extremely bright and extremely capable people. Each of them has at least one or two or maybe more skills, abilities and strengths that are far greater than mine. So the challenge for me is keeping up with them, because they are really good individually and they are brilliant as a team. And it is a great challenge to have. It is like holding back of pack of horses rather than trying beating a donkey to make it move*".

The communities provided an environment where internal and external experts from a range of backgrounds were able to exchange ideas and articulate valuable lessons, or "*best practice*" in interviewees' terms, for production and process improvement. For instance, one discussion centered around understanding why they were experiencing engine failures during testing. Discussion considered how this might be due to the way in which the raw materials used to build the engine had not been processed according to the original specification. This suggestion ultimately helped to solve the problem.

Lessons learned by one community were shared with other communities and served as a benchmark for these other communities. Moreover, the involvement of suppliers and service providers in these communities was found to be useful to effectively integrate external knowledge and improve competitiveness through the development of closer partnerships within these external parties. In particular, the increasing involvement of external parties was reflected in the growing number of collaborative projects with suppliers and service providers.

4. Analysis and discussion

Derived from the process of open coding (Strauss and Corbin 1990), knowledge exchange and combination was found to be stimulated through the inclusion of internal community members with distinctive and complimentary expertise. In addition, however, the contribution of suppliers and the involvement of the retired engineers significantly improved this process of knowledge exchange and combination. Also, building and maintaining social relationships within the community was important, as was the influence of organizational context. These different processes were found to shape the way in which the knowledge generated from each community contributed to the refinement of organizational knowledge.

Building upon the outcome of open coding, the second phase of analysis- axial coding- aims to generate a paradigm model which portrays the relationships between various categories by elaborating casual conditions, phenomenon, context, intervening conditions, action/interaction strategies and consequences (Strauss and Corbin 1990). One question that emerged during the analysis was to appropriately identify the core phenomenon, which is broad and general yet precise enough to conceptualize the dynamics taking place within these CoPs. Through the progress of the analysis, in particular during the phase of selective coding (Strauss and Corbin 1990), the findings suggested that the core phenomenon of the study was not merely the process of inter- and intra-organizational knowledge integration within the community. Rather, it is a phenomenon of alignment between community members. The term alignment is used here to refer to a continuous process through which community members communicate their ideas, exchange their perspectives, integrate their expertise and share their emotions as a means of fulfilling personal objectives and collective goals. The following discussion conceptualizes the phenomenon of alignment based on three dimensions, namely structural, strategic and technological dimensions. The importance of a social dimension was also clear from the results. However, the study by Brown and Duguid (1991) has provided a detailed account of these social processes, which reflected those observed in IEL. Therefore, here we will focus only on the other three dimensions.

4.1 Structural Dimension

The structural dimension reflects the rationale for setting up the learning and innovation CoPs. In parallel with the formal divisonalization of expertise and business processes, these CoPs characterize a distinctive structure that permits the collaboration between organizational members involved in different aspects of the same product. These individuals would not normally collaborate. The organization of communities was thus about encouraging the development of new structures, which facilitated collaboration within IEL, in particular within the Manufacturing

Division which previously operated predominately on a regional basis. Within the Consultancy Division, a more project and ad hoc based operation, was found to benefit from getting access to the expertise embedded in the Manufacturing Division through these CoPs. The advantage created by these communities is not simply about breaking free from the formal departmental boundaries to facilitate top-down, bottom-up and lateral communication as advocated by the notion of the "boundaryless organization" (Ashakas, et al. 1998). Rather, it is to create another layer of boundary within which organizational members are grouped to perform a specific set of tasks. This echoes the empirical study by Newell *et al*. (2001) that exposes the myth of the boundaryless organization and demonstrates the utility of constructing and reconstructing organizational boundaries to provide an essential context and necessary meaning.

Learning and innovation communities share some similar characteristics with the concept of "project-based organization" (e.g. Turner and Keegan 1999). However, it is vital to recognize that there are conceptual differences too. First, a project-based organization advocates a temporary arrangement and emphasizes flexibility in coping with customers' needs. By comparison a CoP is a rather permanent structure. Second, organizational members involved in a project might have rather limited prior collaborative experience with others and virtually no expectation that they will work together again in the future (Javenpaa and Leidner 1999). However, a CoP has members who develop interdependencies as the community evolves. Third, community members are constantly engaged in the same category of products, in contrast to project-based teams, which may often perform different tasks based on changing clients' demands and requirements. Therefore, community members can learn from repeated activities (Weick and Roberts 1993), unlike project teams who are faced with irregular and often one off events (March, Sproull and Tamuz 1991).

4.2 Strategic Dimension

Another dimension of alignment derived from the analysis relates to the strategic value and importance created by a CoP, in particular through involving external parties, such as suppliers and service providers. The strategic dimension is characterized by the growing interdependence between the case company and its suppliers and service providers in sharing resources and collectively developing strategic competitiveness. For instance, an increasing number of pilot projects were initiated with suppliers and service providers, and were mainly financed by IEL. In addition some of the suppliers were able to get access to IEL's cutting edge testing facilities, which were beyond the suppliers' financial and technological capabilities to build themselves. In return, suppliers and service providers were required to participate in various communities and product development projects in order to contribute their expertise. The importance of developing partnerships with suppliers and service providers has been highlighted (e.g. Inkpen 1998; Kogut 1988). In particular, the conceptual argument of the resource dependence perspective (Pfeffer and Salancik 1978) is useful in rationalizing the motivation of suppliers and service providers in their participation within the learning and innovation communities.

Internally, the need for and strategic importance of initiating these CoPs is reflected in the way in which process and product innovation capability could be sustained and enhanced. Prior to the initiation of the learning and innovation communities, each division performed a set of predefined tasks, and then passed the outputs from these tasks on to the next division. For instance, a typical flow of tasks would start from Marketing (who receive the order), R&D (for justification evaluation), Engineering (for product and engineering drawings), Manufacturing to Testing (ensuring the engine quality) before delivering the final product to the customer. There were limited mechanisms in place to ensure that problems encountered by one division could be shared with others. The learning and innovation communities were critical for information sharing, as echoed by the product innovation literature, such as Combs (1993). Moreover, these communities were found to enhance process innovation by involving engineers across the entire product cycle, rather than having each specialist focus only on a specific segment. In other words, process and product innovation capability was developed and enhanced by the CoPs.

4.3 Technological Dimension

The technological dimension relates to the use of ICT and its influences on the organization of a CoP. In addition to the availability of video-conferencing to all CoPs, day-to-day communication was based mainly on email and telephone. However, the interviewees suggested that one of the most critical technological advancements was the improvement of the product testing facility and software. This new facility not only increased the accuracy of testing, in particular on a specific part of the engine, such as turbine efficiency, but also permitted community members across the globe to simultaneously view the testing process. The advancement of software in conjunction with this facility meant that they were able to capture, produce and analyze information that had not been previously possible. The capacity to effectively generate information from testing and the possibility of making it available to all members was seen by one of the retired engineers as a vital way of developing engineers' sensitivity to the information because during community forums this information could be discussed and critical issues pinpointed. Two overseas engineers echoed this point. Previously they had only been able to obtain testing results; they had not been able to simultaneously know the details of the testing process. The advancement of the testing facility and software was seen by them as a vital step in encouraging a more comprehensive and thorough interpretation of testing results.

The importance of ICT in facilitating information sharing and learning has been reported by numerous studies, such as Scott (2000) and Walz, et al. (1993). However, the difficulty of sharing knowledge, in particular tacit knowledge, through the use of ICT has also been documented (e.g. Ciborra and Patriotta 1996). Such difficulties were evident in the present case prior to the advancements in the testing facility and software. The availability of detailed testing information was beneficial in improving the accuracy of testing, in particular by simultaneously sharing such information across a community. More importantly, the availability of information provided a critical basis to enhance engineers' sensitivity towards the interpretation of testing information. This suggests that tacit knowledge might be difficult to share through ICT. However, without the use of ICT, the process of sharing and refining tacit knowledge was more problematic in the present case. Despite the fact that the importance of ICT in facilitating knowledge sharing is clear in IEL, the contribution and assistance of experienced engineers, particularly the retired ones, was found to be equally vital. The following section will outline the social dimension observed within the learning and innovation communities.

5. Conclusion

The above discussion has elaborated details related to the creation of CoPs within IEL, and conceptualized the phenomenon of alignment within the context of a community. Three dimensions of alignment generated by the study have suggested that the process of knowledge integration and creation with a CoP context is not merely an intellectual activity. Instead, it is an activity that is characterized by the alignment of social, structural, strategic and technological processes. Based on Brown and Duguid's (1991) observation, it is clear that a CoP emerges naturally. However, empirical insights collected by this study have demonstrated how CoPs can be planned, organized and nurtured as part of organizational development initiatives. In particular, the involvement of external parties, such as suppliers and service providers, has indicated a new way of organizing a CoP, which is not necessarily bounded within a formal organizational hierarchy. Moreover, based on the findings outlined above, it is evident that the way in which social interactions between community members take place is not necessarily limited to face-to-face. The use of ICT has enabled the creation of CoP within which community members exchange their experiences and ideas through video-conferencing or on-line forums. Furthermore, the study has also highlighted the potential importance and contribution of retired engineers to a CoP, as well as the enhancement of continuous process and production innovation.

In addition to the theoretical contributions, the study also has some managerial contributions. First, it provides an example of how a CoP can be organized as a compliment to the formal divisionalization of expertise. Insights generated from IEL can help organizations, in particular those with global operations, to reconsider the issue of how process and product innovation capability can be enhanced through the organization of CoPs. Second, knowledge loss caused by downsizing, retirement and turnover has inevitably become problematic for some organizations. The way in which retired engineers' experience and knowledge was incorporated in IEL has demonstrated a unique approach to strategically prevent knowledge loss caused by the retirement of personnel. Such an approach can be a useful and effective solution for organizations, which are gradually facing the problem of knowledge loss due to the retirement of personnel. Finally, the paper concludes with the point that more research efforts are needed to systematically investigate the issue of knowledge loss and how such an issue can be effectively managed.

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