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COLLABORATIVE AND EMBEDDED : KNOWLEDGE BOUNDARIES OF AN ICT CONSULTING FIRM

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Abstract

Knowledge is not embedded in organizations' boundaries but their collaborative networks cross organizations. The paper indicates knowledge boundaries are formed by their respective social contexts, relationships and practices of networks through participative observing two practice teams of an ICT consulting firm. To emphasis, the teams' perspectives, knowledge structures, knowledge values, identities, teamwork styles are affected by their knowledge boundaries. The implication of knowledge boundaries on key topics in teams' knowledge governance, professional service firms' market entering strategies, and national knowledge innovation issues are discussed. This research provides a new direction to take industry seriously in the knowledge management of IS research.

Keywords: knowledge management, collaborative network, knowledge boundary.

1 INTRODUCTION

After Outsourcing IT infrastructures, then outsourcing knowledge? Recently NASSCOM (National Association of Software and Services Companies, India) claims the next emerging outsourcing service is Knowledge Process Outsourcing (KPO) that outsources marketing, engineering, R&D, legislation, or other knowledge-insensitive activities to professional service firms. Is knowledge, especially the management knowledge easy to be created or innovated cross organizations?

The most traditional knowledge process outsourcing activities are management consulting services. The consulting firms get profits through articulate, diffusing, or generating knowledge to clients (Werr and Stjernberg, 2003). Most scholars' work consider the global consulting firms or distinguished consultants can create 'fads', become the management 'gurus' or as a witchdoctor to generate and disseminate new management fashions (Clark and Salaman, 1996; Czarniawska and Mazza, 2003). They argue the consultants' works are distinctive, and can improve the organization's problem-solving and renewal processes, even alter the managers' beliefs, attitudes and feelings towards their suggestions. Although this analysis appears to be commonly accepted in the relevant literature, there remain important questions that are not sufficiently answered or even considered

First, researchers direct most attention at the strategies and contributions of the 'creators' of management knowledge and its diffusion episode, while the recipient managers are often conceived as passive adopters or as relatively powerless victims of management fashions. Therefore, more attention should be given to the 'interactive nature of the processes and the extent to which "popular" ideas are actually taken on and applied by managers' and how they are treated when being 'applied' (Sturdy, 1997; Waston, 1994).

Second, the professional services, like the consulting services, are often location bound (Boddewyn, Halbrich, and Perry 1986). The consultants' key decisions depend on client relationships and localized knowledge, strategic decision making cannot separated from local management (Gluckler, 2005). The consultants, the carriers of knowledge, are dialectically tied to the world of their clients (Sturdy, 1997).

Third, management consultancies are not all of the same kind and diffuse identical ideas. Large service providers of US origin, like Mckinsey, are often seen as an equivalent for consulting as a whole (Kipping, 1999; Crucini, and Kipping 2001). However, the consultants are "specialized areas of expertise"; they can focus on corporate strategy services, operation management, human resources management, marketing, R&D or information technology practices (Ciampi, 2008). They solve different organizations' problems and disseminate different types of knowledge. That is, if we focus on other consulting practices, except business strategy or IT strategy consulting service, are the fashions or new ideas still easy to be created?

Most IS literature discusses knowledge management issues in organization (Schultze and Leidner, 2002), but less focus on knowledge creation or innovation cross organizations. Chiasson and Davidson (2005) claims that industry is an important concept, IS researchers should consider industry seriously when developing and testing theory. Thus, this study uses the participation observation methodology tries to understand how an ICT consulting company accumulates, disseminates, or generates knowledge in industries or organization fields? What are the differences of knowledge when joining in different external collaborative networks?

In the following section, we first review the literature of management consulting and knowledge management. The second section proposes a research framework based on concepts of network of practice. This framework provides an interpretive schema that can be used to structure and guide the analysis of data drawn from our case data. The next, we explore our findings and analysis. In our conclusion and discussion section, we address the proposed research questions and offer implications for knowledge management field.

2 LITERATURE REVIEW AND FRAMEWORK

2.1 Knowledge and Consulting Firms

Management consulting company is a knowledge system (Werr and Stjernberg, 2003). It generates, disseminates, transfers or translates management knowledge to clients and makes profits. According to Kennedy Information's 2007 annual survey on the global consulting market, the industry reached about 285 billion dollars market revenue, and in the next four years, it is expected to see an annual growth rate higher than 7%.

Literature on consulting firms and management knowledge they created draws on four perspectives (See Table 1). First, it considers consultants as "Management Glues" or "Witchdogs" (Clark and Salaman, 1996; Czarniawska and Mazza, 2003) that can generate innovation knowledge for the enterprises. Consultants use their methodology, management theories, specific techniques, skills or "grey-hair" consultants' experiences to achieve the clients' organization's objectives or improve performance. Through this perspective, it argues that knowledge become competing resources for consulting company (Simon and Kumar, 2001). During 1990s, "business process reengineering" was the most popular and "fashion" management knowledge that consulting companies generated. Later, many failed cases provoked to reflect on the creation or generation of the consultant's theories or techniques can really bring the performance to companies.

The second perspective argues that management consultants are rhetorics. Through their language skills or impression management, consultants convince clients that knowledge generated by the consultants is useful to organizational performance (Clark and Salaman, 1998; Kieser, 1997). Clark and Salaman (1998) argue that the core skills of management consultants are to create and maintain the compelling illusion in order to convince customers of their quality and value. Other scholars even considers that consulting companies legitimize their knowledge and become a kind of myth, then client company believes that all the knowledge transferred by consultants can improve the organizational performance or transformation (Berglund and Werr, 2000; Kieser, 1997). Berglund and Werr (2000) points out that the management consultants legitimize the knowledge provided by them through the rationality myth and normative/pragmatic myth, to persuade customers to embrace their experiences and methodologies.

The third perspective emphasizes knowledge that consultants generated as commodity. The consultants commoditize knowledge and then sell it to any clients in different industries. This kind of literature regards consulting firms as sale channels of knowledge or knowledge "brokers" (Eljk, Flensburg & Willmot, 1991; Suddaby, and Greenwood, 2001). While studying a system development consulting company, Eljk, Flensburg and Willmot (1991) show that the case company transforms the information system development methodology to a commodity and makes it acceptable to customers. Suddaby and Greenwood (2001) also argues that management consultants are technology brokers that apply same knowledge to solve different industries' problems.

The above three perspectives neglect the consultants' relationships with clients and their influences. In fact, more and more research literature focus on the importance of cooperative relations between clients and consultants (Glucker and Armbruster, 2003; Glucker, 2005). As Gluckler explores the market entry strategy of consulting industry, he explains that the consulting industry faced with the situations, such as unbounded profession, unbounded service lines and product standards, uncertain transactions and so on, so it has to rely on customers' trust and long-term relationships (Glucker, 2005). Ackroyd and Lawrenson (1996) also argue that the knowledge value generated by the consulting company is not from innovations, but markets. Strudy (1999) argues that recipient managers are often conceived as passive adopters or as relatively powerless victims of past literature, but in his study, he found most consulting companies sell in-secure solutions to fulfill their costumers' needs.

In addition, these three perspectives consider the knowledge as object that can be easily transferred to another organization or another industry and not impacted by social contexts. However, many studies

on consulting markets in various countries show that the social contexts do impact the creation and dissemination of knowledge (Faust, 2003; Gammelseter, 2003). While studying Norway's consulting industry, Gammelseter (2003) found the consultants is embedded in the Norway's institutional environments. Faust (2003) also argues that consultants are deeply rooted in the industry environments, personal networks of consultants, and media relations when he studied the consulting industry in Germany. Kipping (1999) studies how the U.S. consulting firms entered the Western Europe market during 1920-1990, he found that American consulting companies, such as Mckinsey consulting company got opportunities to enter the Western Europe because of many large American multinational manufacturing producers entered Western Europe in the 1950s. However, the American consulting firms must also deeply establish the local relation networks and local knowledge. Therefore, while studying the knowledge generated or disseminated by consultants, the relation networks, the institutional environments, industry contexts and local knowledge must be considered at the same time.

Knowledge disseminated in Consulting Work	Knowledge Epistemologies	Consultants' Role	Literature
Innovation	Knowledge as Theory/technique/strategic resource	Management Glue, Witchdog	Clark and Salaman(1996); Czarniawska and Mazza(2003); Simon and Kumar(2001)
Rhetoric, Symbolic	Knowledge as Symbolic or Myth	Dramaturgical metaphor	Berglund and Werr(2000); Kieser(1997); Clark and Salaman(1998)
Commoditization	Knowledge as Commodity	Knowledge Channel/Broker	Eljk, Flensburg & Willmot(1991); Sarvary(1999); Suddaby, and Greenwood(2001)
Collective	Knowledge as Practice	Collaborative Participant	<u>Macro Level</u> (country, industry level): Faust(2003); Gammelseter(2003) <u>Meso Level</u> (between teams and industries): This paper

Table 1. Knowledge Epistemologies in Management Consulting Literature

Thus, this paper argues that the knowledge generated by consultants is the collective knowledge of clients, prospects, media, or other interested groups, and influenced by local social and political contexts. Unlike Gammelseter (2003), Faust (2003) who analyze from the country level, this paper try to analyze the interactions between the different consulting teams and their network communities from the meso level. That is, we consider knowledge is situated in practices and the consultant's role as a participant in the collaborative networks (See Table 1). Next, this paper will establish a research framework based on the concepts of network of practice.

2.2 Network of Practice

The 'community of practice' has achieved prominence in the context of wider debates on knowledge, learning and innovation in organizations. Lave and Wenger (1991:98) define the 'community of practice' as following:

An activity system about which participants share understandings concerning what they are doing and what means in their lives and for their community. Thus, they are united in both action and in the meaning that action has, both for themselves, and for the larger collective.

Brown and Dugout (2001) also claims the knowledge shared and produced through the prism of practice, the way which work gets done. That knowledge is emergent and arise after the individuals begin to engage in collective practices (Spender, 1996). Within organization, the distinct collective work practices, such as technicians, engineers or claims professors make different communities of practices, which share, create distinct knowledge and identities (Brown and Dugout, 2001; Tagliaventi

and Mattarelli, 2006). The communities of practices provide: 1. Effective loop of insight, problem identification, and knowledge production. 2. Repositories for the development, maintenance, and reproduction of knowledge. 3. Community members provide for one another social affordances that scaffold knowledge creation in practice. 4. The organization adaptability is a significant determined by communities of practice. The different communities of practices create distinct embedding circumstances and the knowledge sticks to (Brown and Dugout, 2001).

But the collective knowledge is not only generated in community of practices within organizations but in ‘network of practices’ between organizations (Tagliaventi and Mattarelli, 2006). The substitution of the term ‘network’ for the term ‘community’ implies that relationships within a network are weaker than those among the members of a community. The members of network of practices did not work side-by-side or meet face-to-face in everyday practices but create and share the professional knowledge through conferences, workshops, newsletter, web pages and the like. It is a kind of disciplinary, occupational or professional networks of practices.

2.3 Research Framework

Based on the perspective of Gammelseter (2003), Faust (2003) and the concept of “network of practice” (Lave and Wenger, 1991; Brown and Dugout, 2001), the study establishes a research framework (See Figure 1). As Figure 1 shows, consultants of different teams exchange and generate different knowledge within different network of practices. Members of the network of practices include media, customers, prospects, or other informal networks. They play roles of communicative validation of knowledge, localized sense-making or gate-keeping (Fraust, 2003; Gammelseter, 2003). The interaction between consultants and the entire network community is also influenced by social contexts, such as country, industry, political or institutional environments. Thus, the authors can analyze the practices in different network of practices, and find out what and why the different knowledge generated and shared and the social impact on the consulting organization and their networks of practices (See Figure 1).

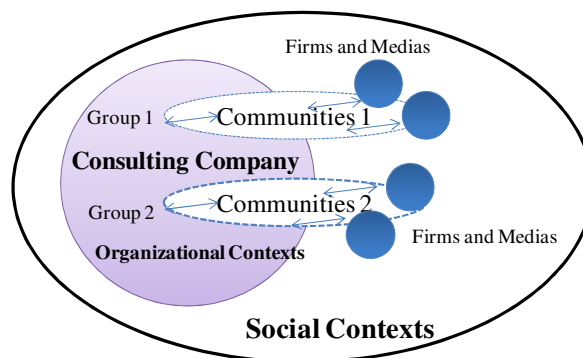


Figure 1. Research Framework

3 RESEARCH METHODOLOGY

3.1 Research Site

The purpose of this study is to examine an ICT industry research and consulting firm’s practices. Previous studies less focus on this kind of consulting company; but in fact they have the assignable impact on the company strategies in the industry. Industry consulting firms investigate the market or industry situations, lead the new trends and predict the future; through publishing reports, conferences, speech as well as the consultant's intervened activities, the firms create knowledge and insights to influence the company's decision makers. Famous international ICT industry consulting firms, including IDC and Gartner, have a major impact on the global or regional ICT industries and companies.

The case in this study is a well-known Taiwan industrial research and consulting firm, M institution. M institution is belonged to a legal body of financial group, which was established by Taiwan government more than 20 years ago, as a push for Taiwan ICT industry as well as an important think tank. Just because of the neutral role of the institution, and the importance of the Taiwan ICT industry in the global ICT supply chain (more than 80% ICT products of the world are made by Taiwan companies; Einhorn, 2005), M institution gets an irreplaceable status in Taiwan, and even all over the world. Although the company's position can not be replaced, in the need of the policy to gradually reduce revenue proportion from government (currently the proportion between the revenue from industry companies and government is 6:4) and the internationalization objective, it is also faced with the difficulties of transition. The institution divides the practice teams based on the product types, including such teams as PC (NB), consumer electronic, network and communication, mobile communication, software and application, etc.

A basic description of M institution's consulting process is a prerequisite to understanding how knowledge was shared, transferred or generated. The work of the M institution's consultants include: industry research, market surveys, report publication, industry consulting projects, education and training. Industry research and market surveys are primarily to collect specific industry, market information or other kinds of knowledge through face-to-face interviews, questionnaires or focus group methods. The knowledge they created will be presented in seminars or published to their journal. The institution publishes their reports or articles, which were divided to different 'programs' charged by different teams and ordered by different customers. Several reports will be published every month and seminars will be hold occasionally. Industry consulting projects develop marketing or product strategies for customers according to their demands and schedules.

3.2 Data Sources

One of the researchers began his study at M institution by observing and working in the N team (network and communication) four to five days a week. After a few months in the N team, there is an opportunity to transfer to S team (software and application), and the researcher began to work in S team about half year. All of the two teams were comprised of 10 members and one manager. The team members mostly have MBA degree with 2-3 years working experience to more than 10 years.

This researcher's fieldwork in the M institution comprised observing different members each day and working alongside many of them, interviewing the industry vendors, discussing the interview results, reviewing the survey results or presentation files, publishing reports, presenting in the seminars, responding to the customers, prospects or medias. The interactions and dialogues among the participants were recorded in field notes, and the reflections of the practices also included.

In addition to the spontaneous, informal interviews that regularly occurred while the field researcher was observing the work. The field researcher quested for different questions about how the consultants acquire knowledge. How they interact with their external communities? How they interact with the media? And how they generate new ideas or knowledge?

Other important sources of data were the published reports, meeting minutes of interviews with industry vendors, customers' lists, formulas to count the market value that each of the teams used to support and perform their consulting work. These documents were used to support and validate the above observation and interviews (Yin, 1994). Also, the historical books about the M institution were collected.

3.3 Analysis

The researchers followed a grounded theory approach of comparison and contrast (Glaser and Strauss, 1967) in analyzing the data. This approach entailed an iterative process of theoretical sampling, comparing and contrasting examples from the data to build theoretical categories which were then compared and interrelated to form the basic of this paper. The researchers analyzed data and adjusted categories periodically throughout the fieldwork to confirm the test categories and further focus our

study. The researchers reanalyzed field notes and documents to determine how the understandings and practices of the networks of practice differed, and the impact the knowledge that consultants generated.

4 FINDINGS AND ANALYSIS

4.1 Findings

Spender (1989) argues that knowledge is embedded in industry recipes. In the same way, the knowledge that the two teams generate is embedded in their different network of practices. After attending a seminar of N team hold, a new colleague in S team, who worked for world' top five consulting firm before, said, *“Their perspectives are all from big vendors”*. They predict the market trends according to the actions and strategies of large brand companies. Similarly, when the field researcher participated in the N team’s work, and predicted the market trends, a senior member of N team also said, *“Watch major brand companies, for example, see how Apple, Nokia, Sony do, and what kind of products they develops, then the market trends will be there!”*. But, S team is different. The team members must carefully review the applied situations of different industries. S team manager said, *“You have to observe different ICT applied situations in different industries, and then you can generate useful knowledge”*. Thus, the knowledge creation structures of N team and S team are different; one is based on the technology push, the other is demand pull. Also the knowledge that two teams generate is used to solve different kinds of problems. After analysis of the company’s ‘best award’ presentation slides of seminars, we find most slides of N team presented are to answer the questions like what is, and what will be and S team are how to do.

Interestingly, the knowledge value of two teams respect is also different. For N team members, since they grasp most of world’s network and communication products’ shipment volume, prices that is paid much attention by investment banks, securities firms, media, and the industry companies, N team’s members must be sensitive to the market price, formal or informal information, and technology development direction. In N team’s survey review meeting, the manager detail asked *“Where the numbers are come from?”* *“What is your prediction logic?”* But S team main revenues are from government consulting projects, they have to do well in the project control and communication with government officials. The ways of teamwork between members of two teams are also different. Most S team’s works are consulting projects, which require members to cooperate. And N team’s members are responsible for different products respectively, so they have to separately accumulate and generate the technology and industry knowledge of different network and communication products. Different teams’ members also have different identities of their jobs. N team members regard themselves as industry analysts to understand the industry situations and technology trends. But S team’s members consider themselves as consultants to help domestic company transformation. The teams’ knowledge and practices differences are summarized in the Table 2.

	N Team	S Team
Perspectives	Big Vendors (ICT markets are decided by the brand vendors)	Applied Enterprises (ICT markets are decided by different applied industries and enterprises)
Knowledge Structure	Technology Push	Demand Pull
Problem Solving	What is, What will be	How to do
Team’s Identity	Analyst	Consultant
Team’s Knowledge Value	Industry Expertise	Project Handling Skill
Team’s Teamwork	Independent	Collaborative

Table 2. Knowledge and practices differences between N and S teams

4.2 Analysis

When the field researcher transferred from N team to S team, S team's manager said, "*The thinking logic here(S team) is different from N team!*" Why are they different? How do the differences form? Carlile (2004) argues the knowledge differences come from the relational property of the knowledge. Just as in this case study, N team and S team depend and expose to different communities. N team contacts global network and communication hardware manufactures, so it has to pay attention to their shipment status and price changes reflecting industry trends; the knowledge need of entire communities is volume, price information and product technology trends. As for S team and their communities, the how to apply different technology in the specified industry is of great importance. Although such a view can explain the knowledge differences in problem solving (What is/What will be and How to do), but it can not explain why there are different perspectives and knowledge structures in different teams (See Table 2).

As Zerubavel (1991) says, "*It is important to see knife for what it is and not to be fooled into thinking that entities are the way they are just because the knife happened to cut it up that way*". Such differences are not just affected by the relationships of communities, but also created by everyday practices of the communities. In the past, organizational sociologists do the research on the organization strategy, they point out that there were different knowledge structures in their strategy making between global headquarters and local regions in a global organization because of their everyday practices (Regner, 2003; Yanow, 2004). From two different teams in this case, it also can be explained that the division result of the world's ICT industry supply chain system causes their different perspectives and knowledge structures (See Figure 2).

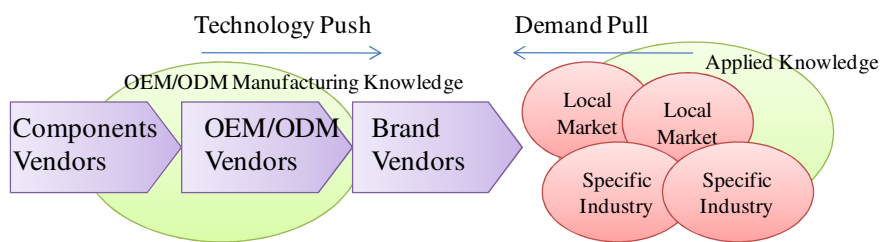


Figure 2. *The Knowledge and Practices in Global ICT Supply Chains*

N team contact ICT hardware OEM / ODM manufacturers, in particular, product managers. They are faced with the daily work orders for brand manufacturers and the product manufacturing, so their daily accumulated knowledge is the market price changes of components or terminals, the development of product technology and the situation of brand manufacturers. Therefore, they naturally consider the views of brand manufacturers. As for OEM / ODM makers, the regional market or specific industry knowledge is not cared or accumulated, and thus the knowledge structure based on the seller-led technology push comes into being. As for the community which S team contacts, most are application vendors in the regional market of Taiwan, their everyday work is how to sell products into different industries, so they accumulate knowledge of specific industries, and form the knowledge structure led by the buyers (applied industries) demand pull. As for the consultants of N team and S team, they should not only sell necessary knowledge to them, but also share with them the relevant knowledge. These different knowledge systems can be verified and corrected by different members of communities, regardless of the manufacturers of these industries or the media, securities analysts, and even government officials. In this case, except through the seminars or conferences, in regular or unscheduled vendor interviews or project consulting process, knowledge structure or perspectives can also be validated or confirmed constantly to accord with the knowledge field. Knowledge structure or perspectives may not become nosed out by team members, but through the principle of the conventional validation, the difference of the knowledge fields can be strengthened. For example, as the manager of N team verifies or confirms the presentations or reports of each team member, he verifies again and again the logic of the inference, "*the global market → technology trends → brand manufacturers' strategies → future trends*". The knowledge they generate implies the

big vendor perspective, technology push, and solves what is / what will be problems. But the S team manager often asked his team members should tell stories and contexts, or insights while doing presentation slides or reports. The hidden agenda is applied enterprise perspective, demand pull, and how to do problem solving.

However, the knowledge differences caused by the different relationship or practices of these two communities are primarily caused by the social contexts of the entire industrial environments in Taiwan. Just because the case company chooses Taiwan as their knowledge production base, and Taiwan is the global headquarters of ICT OEM / ODM manufacturers; the cases company has the quasi-neutrality and trust relationships; all of above make N team to provide important global ICT product shipment information and technology trends. For S team, there are less large-scale ICT application enterprise in Taiwan, or large brand vendors' headquarters (such as, large-scale financial service enterprise, large-scale software company or hardware brand manufacturer). Thus the lack of these industry supports and knowledge-sharing, S team finally relies on government projects to counsel the transformation of small local software companies.

As a result, N team and S team's knowledge are embedded in various collaborative networks, and the differences of the knowledge derive from the social contexts, collaborative network relationships and practices (See Figure 2, Table 3). Such differences in knowledge also form knowledge boundaries between different networks of practices, thereby affecting the differences among teams' identities, knowledge value, as well as teamwork, teams' shared cognition of in the consulting organization (See Table 2).

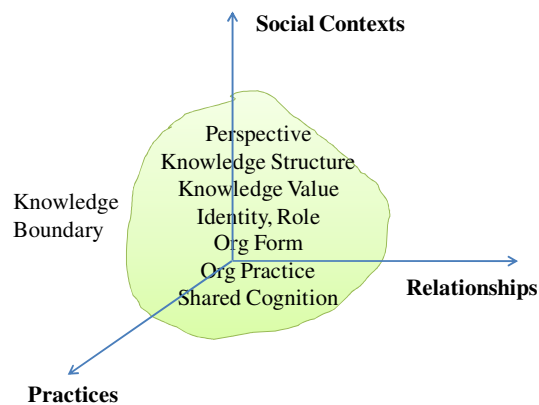


Figure 3. Social Contexts, Relationships, Practices form Knowledge Boundary

	Knowledge Boundary of N team	Knowledge Boundary of S team
Social Contexts	Global ICT OEM/ODM vendors in Taiwan Half-Official role of the case company	Less Big Brand or ICT Applied companies in Taiwan Half-Official role of the case company
Relationships	Trust, Neutral Unit and Global Companies Industry Information/Knowledge Sharing	Government Unit and Local Companies Industry or Company Transformation
Practices	Global ICT OEM/ODM Hardware Manufactures	ICT Software/Hardware Local Market Applied Enterprises

Table 3. Knowledge Boundaries of N team and S team

5 DISCUSSION AND CONCLUSION

This article makes use of the theoretical framework of the network of practices to analyze deeply how industry consultants create, spread or absorb the knowledge of industry vendors or customers. The paper investigates the past research on the knowledge created by management consultants, which was regarded as the skills owned by consulting companies, innovation, even the myths of knowledge created by the consultant. Instead, the paper argues that the knowledge is embedded in the collaborative networks of consulting firms, industry vendors, and the media. According to the

observation of different teams in an organization, this study does further analysis, and finds that the knowledge differences constructed by different collaborative networks or network of practices derive from different knowledge boundaries formed by social contexts, relationships, practices. Through this case study, further discussion can be made on the knowledge creation and teamwork of professional service firms (PSFs), and even the knowledge clusters of entire industry or whole country.

5.1 Knowledge Boundaries and Market Entering Strategies

First of all, the knowledge created and spread by a management consultant firm or a professional service company is not only professional skills of the company itself, or created by experiences of “gray hair” management consultants; it must also rely on collaborative networks in the whole co-construction. This case is in the unique historical environment and established under special social context. However, for newly-emerging professional service firms, companies entering into new markets, or companies engaging in so-called knowledge process outsourcing, they must learn the local social context, local practices of the desired network of practices, as well as what kind of relationship suited to set up.

It is interesting that when a consulting firm or a professional service company join in a particular network of practices, many aspects of the organization or team will be affected, including its internal organizational forms, teamwork, identity, and the judgment of the knowledge value. This effect is not the so-called imitation, strategic response, or the legitimation myth (Scott, 2001), but situated constructed from the everyday practices in exchanging knowledge within the network of practices. Taking this case as an example, team cooperation work, knowledge value, or their different identities, are not imitating other companies, or affected by pressure from outside/inside the definition of what forms of organization or cooperation will be more suitable, but formed by the contact with different communities and do their everyday practices of the two teams. However, this behavior is not only a kind of social practices, but also economic behaviours in keeping with the cooperative network or knowledge value recognized by network of practices to make profits. This is also the so-called embedded economic behavior defined by a social economist, Uzzi (1997). However, this kind of behaviour is embedded not just in the inter-organization relationship, but also in the boundaries of knowledge formed by social contexts, relationships, and practices. That is, the knowledge as an enabler and constraint of behaviours.

In the future, further researches can study more on how economic behaviors are embedded in knowledge boundaries. What are the mechanisms? How economic behaviours can breakthrough the boundaries?

5.2 Technological Frame in Industry

Secondly, from this case, it can be seen that the result of knowledge division is caused by the global ICT supply chain division of labor. Such knowledge division is affected by the different knowledge needed in the different substantive work of the supply chain. OEM / ODM manufacturers take the technology development or brand vendors' actions as their knowledge of daily work, but local market sales teams consider the local marketing information, local applied situations as the knowledge source. However, when the practices of knowing can not be formed with the global market or other kinds of innovative application networks, even through the purchasing of foreign competitor's information or innovative application reports, there are still obstacles for the OEM/DOM manufacturers to break through the current knowledge boundaries and access new markets, and new position in the supply chain. To make matters even worse, once the key decision makers, organization collective knowledge structure or cognitive framework are formed, such as, the knowledge structure of technology push in this case, all decisions or actions will accord with such a knowledge structure or cognitive framework for judgments or actions, which will possibly make policy-makers misjudge the situation, ignore the user's views or industry condition, or make excessive investment. Orlikowski, and Gash (1994) proposes the concept of technological frame sharing knowledge within the organization, which can be further used to technological frame in industry level (Davidson, 2006).

The future IS research should further research about a variety of technological frames, and even myths of technology in the industry level. The national policy should be further considered.

5.3 Knowledge Governness and Information Technology

Thirdly, different teams within the organization embedded in the different network of practices can also cause over-embedded problems (Uzzi, 1997). This over-embedded condition of knowledge may make members, such as consultant teams in this case, unable to create different perspectives of knowledge or knowledge innovation. For example, in this case, N team manager leads N team with very strong and single perspective, and is trusted by external collaborative network members. However, he can also affect the team to create new perspective and innovation. Boland and Tenkasi (1995) points out that the information technology setting up different forms of forums will help different communities in the organization reflect on their views and accept others' viewpoints, so as to create new knowledge cooperatively. Future research on knowledge governance or how to design appropriate information technology to strengthen the team's viewpoints and work with other teams to create new perspectives, can further consider the mechanism design and its operation mode.

5.4 Limitations and Future Study

This article is only a start for IS research to examine network of practices, cross-organizations collaborative networks, and knowledge boundaries. In the future, researchers can further study the formation of boundaries, the institutionalization, the transition of ICT industry knowledge, as well as the role of information technology; they can also discuss how various departments of knowledge-intensive professional service firms interact with the external network of practices, the subject of cross-organizations knowledge innovation, as well as the role of information technology in the network of practices.

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