Societal View on Knowledge Representation and Management: A Case Study of an ICT Consulting Company

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***Abstract*—This article tries to understand knowledge management issues in markets instead of within organizations past literature focuses. It examines different knowledge integration and representation issues while facing different communities of practice in knowledge markets. In institutionalized markets, the knowledge commodity will tend to represent and integrate knowledge for dominant communities of practice in the regions or country. The practical issues, such as legitimacy of knowledge representation, complexity and dependences of knowledge boundaries, conflicts of social identities, bias of government technology policy are addressed. This paper contributes towards more societal views to understand knowledge exchange, representation value generation issues in knowledge markets.**

Keywords-Knowledge Respresnentation; Knowledge Market; Comunities of Practices

I. INTRODUCTION

"Discussing logics for pushing ICT industry, and presenting to government project committee", "Surveying the CIO's IT spending practices and providing to the software and service vendors", "Facing the media and various kinds of industries, speaking the ICT trends and visions" [11].

This is the work of a knowledge-intensive company which resides in the interfaces between organizations and social communities, bridges perceptual and practical differences among diverse communities in order to integrate and represent distributed knowledge. It produces and sells their knowledge in knowledge markets.

Most literature on knowledge management focuses on knowledge transfer, create, innovate issues within organizations, but neglect knowledge management issues in markets [1]. In fact, organizations absorb a lot of knowledge from markets, such as market reports, industrial news or consulting company advisors or other organizations. These knowledge sources, such as consulting company, how they collect and manage knowledge? How they represent knowledge? How they package their knowledge as commodity?

In this article, we discuss how the knowledge as commodity and mediate various communities in knowledge markets. Using community of practice concepts, we illustrate knowledge integration and knowledge representation issues while facing multiple communities of practice in an ICT consulting firm. This paper seeks to contribute towards more societal views to understand knowledge exchange, value generation and management in knowledge markets.

In the following section, we first review literature of knowledge management and community of practice, and then propose an analysis framework. Second, we describe our methodology and contexts in our case. Third, the case story was illustrated using our research framework. Fourth, we present a discussion and fifth, we identify contributions, limitations and suggestions for future research.

II. LITERATURE REVIEW

The 'community of practice' has achieved prominence in the context of wider debates on knowledge, learning and innovation in organizations. Lave and Wenger [2] 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 Duguid [3] 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. It focuses on practices, people rather than systems, technology that traditional knowledge management consideration.

Collective knowledge is not only embedded in communities of practice within organizations but also between organizations [3][4]. The members of communities of practice 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. This is a kind of disciplinary, occupational or professional communities of practice; the knowledge is embedded in the networks, the broader structures [3][5].

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III. RESEARCH FRAMEWORK

Based on the community of practice literature, we build up our framework (see Figure 1). Using this framework, we can examine knowledge representation and knowledge integration issues while facing multiple communities of practice in their different knowledge markets.

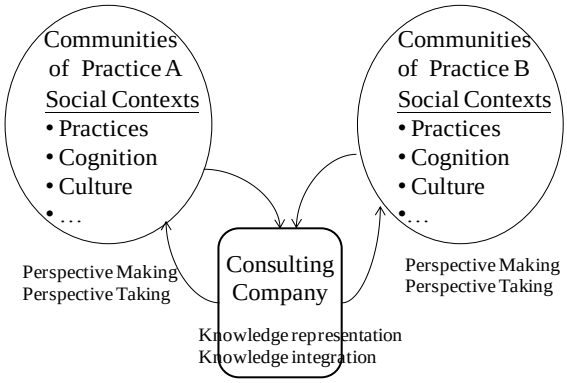

Figure 1. Research Framework

IV. METHODOLOGY

This researcher's fieldwork in the ITR 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. In addition to the spontaneous, informal interviews that regularly occurred while the field researcher was observing the work. The interactions and dialogues among the participants were recorded in field notes, and the reflections of the practices also included [10].

After half-year observation, the researchers find interest topic about why the consultants of different practice teams generate knowledge differently. Semi-structured questions of formal interviews were addressed the consultants to ask the questions that allowed they provided their practices in acquiring, transferring, and generating knowledge. These questions include: How they interact with different communities of practice? How they generate new ideas or knowledge? How they inscribed the knowledge into their publications? All the interviews were tape recorded and translated to transcripts.

V. CASE STUDY

A. Case Contexts

The case company in this study is a well-known industry research and consulting firm, ITR institution. ITR 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, ITR gets an irreplaceable status in Taiwan, and even all over the world. [6]

The institution divides the practice teams based on the product types, including such teams as PC, consumer electronic, network and communication, mobile communication, software and application, etc.

There are two kinds of main practices of ITR institution. One is the research reports they publish to their subscriber, called 'Product Practices'. Second are the consulting projects to customers, called 'Project Practices'.

No matter what kinds of work, the consultants collected data from specific industry, market data or other kinds of knowledge through face-to-face interviews, questionnaires or focus group methods. Then, they represent the knowledge, such as industry situations, market opportunities, trends, through market surveys or industry reports.

Their subscribers, customers or media read their publication and understand current and future market intelligences. The ITR institution or their consultants also try to enrich their influences in different communities of practice through their knowledge and publications.

B. Product Practices

Producing reports about the ICT trends and applications is main practices of ITR institution. Through understanding current situations of ICT industries, consumers or enterprises' intention to invest ICT, ITR consultants analyze the current situations and predict the future for customers in vary communities of practice.

Basically, ITR faces two industry communities: One is the well-known information and communication technology OEM (Original Equipment Manufacturing) industry. These vendors manufacture products for brand companies, such as HP, Dell and earn profits from their low manufacture costs (called 'OEM' community for short).

The other is information application and software industry (called 'Application' community for short) in Taiwan market. These companies sell their IT services or software products to enterprises in Taiwan.

While facing different communities, ITR practice teams (called 'OEM' practice team, 'Application' practice team) produce different reports, and encounter different knowledge management and representation issues.

1) 'OEM' Practice Team

'OEM' practice team faces major global information and communication technology OEM manufactures in the world. These manufactures produce products for global brand enterprises, such as HP, Dell and SONY. Most of these OEMs headquarters locate in Taiwan and compete orders from global brands. 'OEM' practice team's consultants analyze the shipment values and average selling prices by quarterly, and regularly provide reports to ITR institution's customers.

Noticeably, these companies manufacture major information and communication technology products in the world, such as NB, PC (i.e. 90% quantities produced by these companies). Global or domestic securities firms and

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investment institutions are interested in purchasing these reports. Thus, the profit of 'OEM' practice team is stable. However, the institution also encounters intense competition from other consulting companies.

For 'OEM' industry community, ITR institution's position is neutral, and it provides reliable statements for securities, investors or media. But, the shipment values, quantity or average selling prices in reports are not as important reference sources for 'OEM' community itself. A senior consultant who left ITR institution and worked for an OEM manufacturer said:

"For us, shipment quantities in reports are not important! We are more interested in understanding the movements of other manufacturers!"

However, since 'OEM' practice team's quarterly reports on shipment values, shipment quantities of the manufacturers will influence stock market and economic in Taiwan and even represent global ICT boom. Also, it faces challenges from other competitors. Thus, consultants should be cautious about the numbers and trends they write in reports. In researcher's participant observation, consulting managers of the practice team seriously examine the sources of each consultant's numbers, trends and their reasons to shipment forecast. These reports should clearly define the logic of shipment forecast or trends. A consultant describes their logic of forecast:

"The logic of forecast is based on global market, product trends and movements of major global brand companies to analyze impacts on shipment quantity and average selling prices of OEM products."

2) 'Application' Practice Team

'Application' practice team faces local software and IT services companies in Taiwan. These companies are not valued by shipment quantity like 'OEM' industry community, and they cannot compete in global market. Competition information in the community is not so important. For them, it is critical to understand their clients' intention to buy their products or services. Consultants of practice team analyze market situations through market surveys or focus group methodology.

Since 'Application' community refers to small and medium firms, in comparison to manufactures in 'OEM' industry community, most of the firms in 'Application' industry community cannot afford to purchase these reports. Therefore, 'Application' practice team consultants tend to engage more government projects to earn more profits. Due to less time in product practice, consultants usually exploit reports from engaging in government projects. Thus, ITA's clients usually complain reports do not meet their requirements. A business representative of ITR institution suggests that,

"We have been complaining about it. We expect the consultants to write more reports fulfill the clients' requirement instead of exploiting reports from government projects engagement."

However, for 'Application' practice teams' consultants; it is also not easy to integrate knowledge related to various consumers or enterprises' intention in different industries. Thus, the profits of these reports are low and also competitors are few.

ITR institution is neutral identity for 'OEM' industry community; however, it plays semi-official role for the firms in software and application community; the local small software and IT services firms expect to strive for some funds or influence government technology policy from ITR institution. A 'Application' practice teams' consultants indicates,

"Most of our interviewee s are the senior managers, such as general managers or CEOs. They are more familiar with their own industry than we young people! They are willing to spend time in talking to us since we represent the government. They would like to provide the suggestions of policy to government or understand funds opportunities from government through us! "

A CEO of a firm in software and application industry community suggests,

"I know that you are not the major decision makers (government policy), but I believe that I can try to convince each person in order to enhance the possibility to change government policy! "

Based on the above, the knowledge representation and knowledge integration issues are different when dealing with different communities in varies social environments.

C. Project Practice

Another practice of ITR institution is government projects engagement. ITR helps to understand the industry and market situations in order to propose effective projects to solve industrial issues and problems. Regarding the role of ITR institution in the government projects, the output reports allow government policy makers to understand industrial problems and also convince the reviewers (neutral scholars and experts) to agree the projects' directions.

Since ITR institution is familiar with industry communities and knows how to represent the trends and gaps of industry, government policy makers or company want to get the government projects will very like to invite ITR institution in order to convince the reviewers to get projects. In the proposals, various companies which want to get the government projects must incorporate their original positions and demonstrate their logic of proposal to meet the industrial demand in order to persuade policy makers and reviewers. Thus, ITR institution tends to play the role as the main participant in knowledge integration and knowledge representation in the proposal.

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However, there will be the logical conflicts in knowledge integration and knowledge representation. Should ITR institution integrate or represent the project partners' logic? Or ITR integrate and represent real ICT knowledge and represent the real industrial logics?

Noticeably, when industry trend is negative, government projects for pushing this industry will be meaningless. Once, a junior consultant published a report that indicated a product would not be future trend. The statement was widely used by the press. The consultant also involves in a project to promote the product, and partners of the government project called to complain about his opinions. A senior consultant advised the junior consultant:

"The contents of report should be presented tactfully and we should be more careful about the products we are involving in promoting!"

Besides partners, the thoughts of different government departments will influence ITR's representation of government project reports. Some governmental departments intend to promote information communication technology hardware manufacturer industry in Taiwan, some expect to enhance the industries with inferior global competitiveness, and some suggest enhancing information technique application in different industries. The most significant ability of ITR institution is to integrate various kinds of knowledge and represent the different logics or reasoning to reviewers or decision makers in the projects.

ICT trends in reports must fulfill interests of project members, but not always the real industry trends or companies' needs.

VI. DISCUSSION

A. Dependent Relationships and Knowledg Integration

In this study, the ITR consultants face different demands from different communities of practice and encounter different knowledge management and knowledge representation issues (see Figure 2 and Table 1).

For instance, 'OEM' practice team's consultants provide international and local media and investment institutions to understand current situations of the major global ICT OEMs. Demand of international, local media and investment institutions for knowledge is upon shipment quantities, shipment values or average selling prices from 'OEM' manufactures. For consultants, being trust in 'OEM' industry community in order to obtain the related information will rely on their experience and relationship maintained with their informants. We call the knowledge dependent relationship is 'partnership dependences'.

With costs consideration, 'OEM' practice team's consultants usually collect competition information from less than ten major 'OEM' firms and integrate their perspectives on industry trends. Reports from 'OEM' practice team always take angle from big vendor's perspective that becomes constraint devices [7] represent the perspective of large OEM firms and screen small firms' opinions.

In comparison to 'OEM' practice team, 'Application' teams' reports are integrated knowledge related to ICT spending intentions and applications of thousands of small and medium enterprises. ITR consultants acquire information by significant questionnaire surveys from enterprises' ICT spending intentions and sell to software and application vendors, we call the relationship is transactional dependences (see Figure 2).

ITR's reports for software and application community will not be constraint devices representing large-scale enterprises. However, without sufficient resources to acquire perspectives from thousands of companies, consultants cannot produce reports with specific industrial perspectives. Thus, software and application teams' reports are not valued by software and application community which tends to have many complaints that not in depth analysis for software and applications community demands.

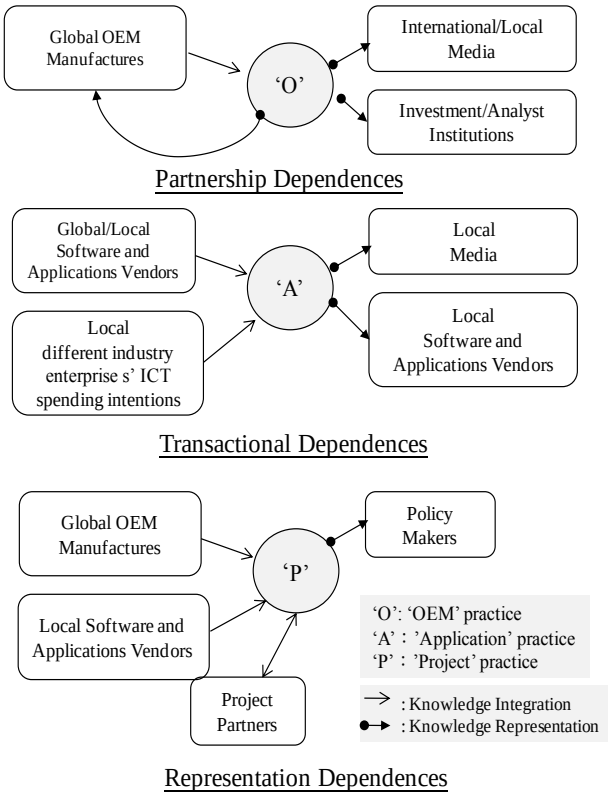

Figure 2. Three Different Dependent Relationships in ITR

The relationships between ITA consultants and industry community are representation dependences (see Figure2). The ITA consultants represent industry community' issues to policy makers. The project practice encounter issues that to represent project partners' interests not industry community's.

Therefore, complexity and relationship dependences of communities will result in different problems of knowledge integration and representation (see Table 1).

TABLE I. ISSUES OF KNOWLEDGE INTEGRATION AND REPRESENTATION IN DIFFERENT PRACTICES

Practices	Knowledge Integration and Representation Issues		
	Demand	***Integration Issues***	***Representation Issues***
'OEM' practice team	shipment values or average selling prices	trust	only represent OEM logics
'Application' practice team	enteprise' ICT spending intents in various industries	integrate various knowledge according to various industries	various reasoning and logics
'Project' practice	project partners' objectivies	integrate different knowledge to fulfill partners' reasoning	logics for partners' reasoning,not the industry logics

B. Power and Knowledge Representation

This study also demonstrates that knowledge representations could become the resource of power.

Regarding ITR institution' creation of report in project practice in this study, ITR institution consultants integrate various kinds of knowledge and represent the logic that fulfill the partners' interests. For example, represent the logic that promotes some kind of partners' technology development benefit to industry, but in fact, industry has developed similar technology.

Knowledge representation becomes the resource to gain projects. The knowledge representations are not reflection of practical knowledge, but creation of 'reality' [9]. Thus, resources and funds of government subsidized to project partners, and they might not the real practical demands for industry. Reports produced by project practice are no longer to communicate between policy makers and industry communities.

Likewise, 'OEM' practice, demand from media and analytical institutions for shipment numbers leads to knowledge representations of large ICT hardware OEMs. With long-term concern, knowledge representations become the habitual way to represent. An 'Application' practice team's consultant criticized one report from 'OEM' practice team, "It is totally from the perspective of OEMs, and cannot probe into real industrial problems". It is the obstacle for 'OEM' practice team to create knowledge with new perspectives.

However, intentions and perspectives from different industry enterprises' ICT spending are various, and thus, knowledge representations are inconsistent. It is not easy for ITR consultants to represent specific industry logic and get their legitimacy in software and application industry community.

Thus, knowledge representations are influenced by power of communities, consistency of knowledge representations and institutionalization of long-term relationship. Knowledge representation is not only a selection but also a deflection impact by social contexts.

C. Knowledge Management Implications

TABLE II. KNOWLEDGE MANAGEMENT IMMPLICATIONS

Knowledge Management Implications	
Consulting Company (knowledge supplier)	***Enterprise (knowledge consumer)***
1. design practice teams carefully on dependence and perspectives issues 2. join and get perspectives from different communities of practice 3. balance innovation and legitimacy perspective 4. watch social identity issues 5. employ different background employees	1. understand consulting company or other knowledge sources logics and their perspectives 2. balance absorbing knowledge from different knowledge sources and markets 3. collect more opinions and perspectives from other markets before important R&D or marketing decisions 4. employ different background employees

In this study, the reports represent the large OEM perspectives and powerful groups' interests that influence the government's technology policy. The way of knowledge representation and integration are impacted the institutionalized knowledge markets. Thus, knowledge suppliers and consumers should consider the issues and take strategies to solve problems (see Table 2).

For example, in consulting companies or knowledge suppliers, their managers should consider complexity, relationships, dependence of knowledge boundaries connected with practices while designing and creating reports.

The firms should also consider balance of innovative or legitimacy perspectives under market mechanism in social contexts. The publications or knowledge spanning different communities of practice in knowledge markets also emerge conflicts issues of social identities. The firms should deal with the social identities issues carefully.

The enterprise or knowledge consumers should examine logics of knowledge representation and other perspectives precisely to prevent losing other possible ICT applications or development opportunities.

VII. CONCLUSION

This study illustrates how knowledge as commodity selling in the market using communities of practice perspective. This study elaborates on why and how organizations produce knowledge commodity upon the influence of market mechanism and social contexts. Further, emerging issues such as knowledge integration and dependent relationships, knowledge representation and power in knowledge markets are worthy to address and further

This study is limited to the comparison between practices and teams in one organization. Because of studying one organization, which experienced a particular history and regional location, we are unable to provide a wider understanding of the contexts under which changes of boundary objects might occur.

However, our findings are potentially generalized to other knowledge markets in which knowledge goods creation, exchanged and institutionalized. Future research can conduct inter-organization study or comparisons, and probe into the roles, social identities, meaning, and knowledge representations, competing mechanisms of knowledge goods in various social contexts and knowledge markets.

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