

Integrating Knowledge across Organizations: The role of Social Capital

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Abstract

Inter-Organizational collaborations in different forms are rife for several reasons including the rapid assimilation of new and specialized knowledge into the organization. IT projects involving multiple organizations are one such form of inter-organizational collaboration. Knowledge required for the implementation of these projects exists in different entities within each organization involved in the project and hence have to be integrated. The process is fraught with challenges since organizations are intrinsically different and may possess distinct knowledge bases. Prior research has indicated that social capital, a resource based on social relationships, positively influences inter-organizational relationships and knowledge integration. The aim of this study is therefore to identify the roles through which social capital can be leveraged to manage collaborative IS projects, viewing them from an inter-organizational and knowledge integration perspective. Using the case-research strategy a four-organization collaborative IS project is studied and findings indicate three roles of social capital during the various stages of a collaborative IS project.

Keywords: Knowledge integration, Social Capital,

Suggested track: Knowledge sharing within and across organizations and cultures e.g., in off-shoring arrangements

Introduction

Organizations have acknowledged knowledge as a strategically significant resource (Grant, 1996) and the importance of building knowledge intensive organizations. Knowledge intensive organizations require multiple forms of expertise (Tenkasi & Boland, 1996) that may not always lie within their own boundaries (Ciborra & Andreau, 2001). Collaborations are one way through which organizations acquire such expertise (Simatupang, 2002) and serve as a vehicle for the rapid assimilation of new and specialized knowledge into the organization. IT projects represent a form of collaborative project where software companies/software solution providers are engaged by clients to develop/implement software solutions. The project requires knowledge relevant to the project, to be integrated across the collaborating organizations [20].

The process of knowledge integration is challenging as knowledge is often dispersed, differentiated and embedded (Pan et.al, 2001), more so in collaborative projects, since organizations are intrinsically different in physical characteristics (operations, business and size) and social traits (culture and priorities) and may have conflicting interests.

Time and again, the importance of social capital for knowledge integration (e.g. Huang et.al, 2001) as well as for building inter-organizational relationships (e.g. Kale et.al, 2001) has been emphasized, leading us to believe its potential influence on knowledge integration in collaborative projects. Social capital is considered the resource embedded within (e.g. trust, norms, collective identity) relationships possessed by individuals and social units (organizations and their employees) (Nahapiet & Ghoshal, 1998). Although prior studies have indicated an influence of social capital on knowledge integration, several issues like the exact nature, extent of influence and specific aspect of social capital that is influential, are yet to be understood. *This study therefore attempts understand the exact role of social capital in integrating knowledge across organizations.* This is accomplished through an in-depth case-study of a collaborative project embarked upon by three organizations that were logistics partners for seven years through a supply chain IT integrator. The extreme diverse profiles of the participating organizations and the potential social capital among them owing to their long-term association make an interesting case for this study.

Theoretical Background

The theoretical foundations for this study come from the literature on Knowledge integration and Social Capital. The discussion of social capital also serves to build a framework of social capital necessary for the evaluation of knowledge integration in collaborative projects.

2.1 Knowledge Integration

Prior literature has provided two major views on Knowledge integration; as a mechanism of applying knowledge (Grant 1996) and as the synthesis of disparate specialized knowledge into situation specific systemic knowledge (Alavi & Tiwana, 2002). In his work on knowledge integration, Grant (1996) examines the role of direction, routines and specialized task teams in knowledge application. Grant also called for study of knowledge integration processes. Huang et.al, 2001 address this call and adopting a definition of knowledge integration as ongoing collective processes of constructing, articulating, and redefining shared beliefs through the social interaction of organizational members (Huang et.al, 2001), identify key knowledge integration processes. This study adopts such a process perspective of knowledge integration and conceptualizes it as the process of combining disparate specialized knowledge, applying the combined knowledge and the assimilating the applied knowledge. In collaborative projects knowledge integration has to extend beyond organizational boundaries and it involves the integration of different forms of knowledge (e.g tacit, explicit) embodied in the different entities across the different organizations (documents, processes, employees etc.). The process therefore requires participants to contribute relevant knowledge that is then applied to the context or situation and the applied knowledge has to be assimilated by the affected organizations. This is achieved through continuous interaction between the organizational representatives (e.g. meetings, discussions) within the project structure (e.g. procedures, guidelines, project deliverables).

Although essential, the process of knowledge integration involves the challenge of integrating cross-functional knowledge (e.g. process knowledge and software knowledge for software implementation) and of knowledge that is often dispersed, differentiated and embedded (Grant, 1996; Pan et.al, 2001) in different entities. According to Grant (1996), knowledge integration in organizations may be considered as a “hierarchy of integration” (Grant, 1996). At higher levels of the hierarchy, broader span of specialized cross-functional knowledge is integrated and knowledge integration is most complex when wider span of knowledge is being integrated (Grant, 1996).

The process is also plagued by organizational representatives constantly trying to balance their own organization’s interests with that of the collaboration’s goals, which might make them guarded in participating in the knowledge integration process. In other words, organizational representatives may be unclear of how much and what organizational knowledge they can reveal without compromising their organization. This is healthy from the organization’s perspective but may prevent knowledge relevant for the project from being contributed. The complexity is compounded by the fact that there could be conflicting interests between the organizations.

2.2 Social Capital

Literature on inter-organizational networks suggests that conflicts between collaborating organizations can be reconciled by building social and inter-personal relationships between partners (Kale et.al, 2001; Liebeskind et.al, 1996). Such relationships tend to curb opportunistic behaviour of alliance partners and oblige them to work towards the goal of the collaboration. Studies on knowledge integration (Pan et. al, 2001) have indicated that social interaction within a project team provides an opportunity for relationships to foster and thus enhances the knowledge integration process. Social capital is the asset that resides in social relationships [Walker et. al, 1997]. It shapes the level of coordination, develops cohesion within the structure, aligns stakeholders to the collectives' goal and reduces the time and effort associated with developing an agreement in the network (e.g., Huang et.al, 2001). Social capital can therefore be potentially significant for integrating knowledge across organizations in a collaborative project. But the exact nature and contingencies of its influence on knowledge integration in this context is yet to be comprehended.

The discussion of social capital in various contexts including communities, economies, nations, organizations and the debate on its exact form, types, definitions (Adler & Kwon, 2002) required us to identify the specific aspect of social capital influential in the context of knowledge integration in collaborative projects.

2.3 Social Capital framework for knowledge integration across organizations Nahapiet & Ghoshal (1998) define social capital as the resource embedded within, available through, and derived from the network of relationships possessed by an individual or social unit. They categorized social capital into structural, cognitive and relational dimensions and illustrated their influence on four variables (anticipation of value, motivation of individuals, ability of organizations, and access to parties) that facilitate the creation of organizational knowledge. Adler & Kwon (2002) organized these variables into an opportunity, motivation and ability schema(OMA) and called them the sources of social capital, suggesting that all three sources are essential for social capital to exist. Although the three dimensions of social capital, suggested by Nahapiet & Ghoshal(1998) is comprehensive the OMA schema was chosen as a framework for this study since it brings out the inter-organizational dynamics (e.g. organizational motivation) in the context of collaborative projects. This schema would also be able to explain what constitutes social capital in a collaborative project. Further an OMA analysis can be conducted to obtain the perspective of each organization and hence can explain each of their actions in common terms.

The OMA schema

Adler & Kwon(2002), summarized the extant literature on social capital illustrating that although there are several aspects and forms of social capital one thing common is that there is a underlying social structure for any form of social capital to exist. This social structure can emerge from market relations, hierarchical relations or social relations. For social capital to exist in these structures three sources need to be present: *opportunity, motivation and ability* (OMA). The following paragraphs discuss the three sources and their enablers as suggested by Alder & Kwon. Considering the context of collaborative project the discussion also highlights other potential enablers for the sources of social capital.

Opportunity: It reflects the accessibility for social capital transactions. For e.g. If A does a favour for B because he is a close friend, their friendship/ties has served as an *opportunity* for the social capital transaction. Ties/relationships therefore serve as a basis for the members to cooperate and exchange favours. It can also be provided by the structure (e.g. organization, a network of members, a community or as in this case the collaborative project). Grant (1996) also supports that the firm with its members and their social relationships provides a structure and hence an opportunity for knowledge integration.

Motivation: It reflects the enticements contributors have to participate in a social capital transaction or to help recipients even in the absence of immediate or certain returns. For this study it includes the motivation to be part of the collaborative project and to contribute to the knowledge integration process. Although Adler & Kwon(2002) suggested that motivation comes from trust that members within the structure have on each other, considering the context of collaborative project, *motivation* also depends on factors like perception of benefits of the project , the perception of effort involved in the process and cost incurred due to the project.

Ability construes the competencies and resources that members possess to be able to contribute to the social capital. For e.g. organizations need to have the competence to comprehend the knowledge being shared so as to contribute requisite knowledge. *Ability* comes from resources and competencies that the members possess, shared jargon that they may have which makes it easier for them to comprehend each other and hence help each other and shared beliefs (Nahapiet & Ghoshal, 1998). In the current context, *ability* may also arise from prior experience the organization in similar projects, the organizational culture towards IT, capability in understanding the technology etc.

Based on the OMA schema, social capital for this study is conceptualized as the resource created by the presence of OMA and that facilitates action towards the goal of the structure.

Research Methodology

Using the case research strategy this study examines an inter-organizational collaborative project involving four organizations. The case research method was deemed suitable for this study for the main reason that the context of study (collaborative project) and the phenomenon of knowledge integration are tightly interweaved (Yin, 1994).

Data was collected 4 months after the collaborative project went live. Primary source of data was semi-structured, face-to-face interviews, lasting for 60 minutes on average, with representatives from each of the four organizations holding different roles within the project team to obtain a variety of views, as well as to verify facts provided by each organization with their partnering organizations (Table 1). Questions asked were open ended. Interviews were tape-recorded in consideration of the reporting media (Walsham, 1995a) and the taped interviews were transcribed as soon as possible with the author's notes (Walsham, 1995a).

Table 1: Interviewee details (The number in the bracket indicates the number of interviews with the respective people)

Organization	Interviewees
XL	Managing director(3), Account manager(2), Business development manager(3), IT manager(1)
MF	Logistics manager(Project manager for this project)(2), Shipping manager(1),Shipping supervisor(1), Warehouse manager(1),Warehouse supervisor(1)
FF	Director (1) ,Operations officer(2)
HU	Director(1), Operations supervisors(2)

Interviews were coordinated by the Managing Director of XL, the IT service provider for the project in case. He also acted as the key informant in providing insider insights to understand the hierarchies of power and authority (Glesne, 1995). He also provided us with documents including written reports, letters of correspondences, newspaper articles and trade study reports relevant for the study, which served as the second major source of data for this study. The third source of evidence was on-site observations made during site visits and plant tours of all the organizations. Physical artefacts such as the types of office equipment, computers and the interaction patterns among employees at various levels were noted.

The study adopts the interpretivist paradigm, which argues that access to reality is contingent upon social attributes such as language, shared meanings and artifacts (Orlikowski & Baroudi, 1991; Walsham, 1995a, 1995b; Klein & Myers, 1999). Klein & Myers (1999, p.69) note, interpretive research “attempts to understand phenomena through the meanings people assign to them”. For data analysis, the transcribed interviews were coded chronologically and then with a pattern/theme over several iterations. Finally key knowledge integration activities were identified and based on their nature and chronological occurrence was categorized into three phases: Planning and Negotiation; Design and Implementation; Post-implementation. Activities that contributed towards the process of knowledge integration as defined earlier were chosen as knowledge integration activities. Each phase was then analyzed using the OMA schema to elicit the key roles of social capital.

The Case

Background of the organizations

The project in case involved the design and implementation of a web-based collaborative supply chain platform by a supply chain solutions provider, ChemXlog Pte Ltd (XL), for a three-partner logistics community to carry out their logistics activities (e.g. Order management, shipment tracking, document exchange). The logistics partners had been business partners for seven years now. One of them was a manufacturing firm (MF) and the other two were its logistics service providers, a freight forwarder (FF) and a haulier (HU). FF coordinates shipping and haulier services for MF while HU provides the trucks for moving shipping containers to and from the port. The diverse background of these organizations is summarized in table 2.

Table 2: Organizations' background

Collaborative Partners	Background and Nature of Business	Use of IT Prior to the Project
Supply-Chain integrator (ChemXlog Pte Ltd.)(XL)	Small IT firm that develops and implements collaborative logistics solutions for private communities. The parent company is a major logistics company.	High
Manufacturer(MF)	One of the manufacturing facilities of a Japanese MNC. It employs 150 people and is a major client for the two logistics service providers	High. Use legacy systems and had experience with a JDEdwards system
Freight-Forwarder(FF)	A small firm, incorporated in 1995 with annual turnover of S\$1.5m. Coordinate with haulier for servicing clients logistics activities	Minimal. Accounting package and e-mailing
Haulier(HU)	A small firm, founded in 1987, and annual turnover of \$6m. Owns a fleet of trucks and containers that are coordinated manually	Minimal. Only for word processing and e-mailing

Relationships between the logistics partners before the project

Prior to the initiation of the project, the logistics partners had good working relationships with each other. HU's director maintained that the logistics business is all about trust and it is very important to have good working relationships with partners since you trust the other party with goods worth millions of dollars. XL's business development manager affirms:

“Actually MF's shipment is executed by a company called Central Express.FF is only playing the middleman. MF refuse to go to Central Express direct because they treasure goodwill with FF”.

The nature of their business demanded extensive interaction on a day-to-day basis, over telephones, through faxes and meetings. FF's operations officer gave a pattern of their interaction:

"MF call us up to tell how many containers they need. We will do booking of vessels, pickup and delivery of goods for them and give them what they need. Other info is communicated by phone or fax. Fax is of course for confirmation and any amendment".

For the actual pick-up of the containers FF would inform HU about the details of the pick-up and request for trucks for specific dates. HU would then fax the truck/container information back to FF and coordinates with MF for the actual date of pick-up of goods.

Motivation for the project

Although none of the logistics partners indicated any inter-organizational issues in the logistics operations, MF had several internal inefficiencies ranging from inter-departmental miscommunications, documents getting lost, extra payments being made at the port for delayed pick-up etc. and so wished to streamline their processes. MF's logistics manager said:

"They[HU] just bring us the containers and on the container door they'll put a slip that'll have the information: sales order, destination point. It's very manual. If you identify the wrong batch of goods, you've got a big problem".

"People were denying having received instructions and blamed that as a reason for delays and mistake which is common in warehouse communications".

MF also believed that since everything is going paperless its time they moved away from fax and phone operations. They brought in XL to provide a web based collaborative platform so that they could conduct business with their logistics partners online. Although MF never raised any issues with FF or HU, XL's account manager provided a different perspective to their relationship:

"These companies understood each other's business processes well in theory but were not following up to do certain things. Documents were getting lost, faxes unacknowledged, things not done.... there were lots of problems. In fact one of the primary reasons why they are bringing us is that there are too many unwritten rules. Everything is based on understanding. There are too many incidents of finger pointing, dissatisfaction with one another. So this system would enforce the business rules."

The Project

The implementation of the collaborative platform spanned over a year. For clarity of data presentation and analysis the project is categorized into three phases: Negotiations and Planning, Design and Implementation and Post implementation. The key milestones for each of the phases are elicited in table 3.

Table 3: The three phases

Phase	Goals
Negotiations and planning phase	Achieving 'buy-in' of all organizations for the project, high level requirements gathering, negotiating project costs distribution, project planning
Design and implementation phase	Detailed requirements gathering through prototype building and refinement. System implementation
Post implementation phase	User training, getting users to adopt the system, reconfiguring work practices and continuous system review

Phase 1: Negotiations and planning

Choice of XL

XL was chosen as the supply chain integrator, owing to their strong background in IT and logistics. They were accredited to provide logistics IT solutions to all the organizations in the chemical hub in Singapore and their parent company is a logistics giant in Singapore giving them a strong logistics background. XL's Managing director proudly said,

"We do have people behind us with the strong logistics background that we can talk to, to work on developing the software".

Another reason for the choice was that they were one of the only three companies in Singapore that could link their solutions to TradeNet. TradeNet was the system that all companies had to go through for their shipping activities for online filing of trade documents. The company can do it via the web portal, or purchase a software that connects directly to TradeNet when information is submitted. Since XL could provide this software MF did not have to purchase it separately. MF's logistics manager confirmed this:

"We chose XL because of their background; their association with SembCorp. But one thing I like about XL's solution was that: For every shipment that you export out of Singapore, you need to make an outward declaration. We do this through TradeNet. XL's solution allowed us to connect straight to TradeNet".

Challenges in convincing the service providers

XL was then introduced to MF's service providers with the onus of convincing them to accede to the system. The difficulty in the task was obvious, given the two service providers were cost conscious traditional firms with limited IT awareness. MF's shipping manager revealed that HU

"had only 1 email address for the whole company",

while, FF's director was quick to confess,

"Computers stuff? I'm not good at that".

The limited awareness created in them a resistance to change and complacency with current state of operations. XL's account manager comments,

"They[service providers] do not want to change the way they do things. Even for their scheduling operations, they do not want to improve on their processes. Some of them they have their emails printed out for them, they don't even want to meddle with the system. They're not receptive to change."

Their low readiness to buy-in was exacerbated by the fact that the system entailed additional work processes and additional costs for them. They would have to follow the manual process for their other clients and use the system just for this client. FF's director said

"I don't see any benefits from the system; in fact, it is additional work for us. Our only motivation was that it was the request of our major client".

HU's director echoed the feelings:

"For us, we don't see the savings today. It's more of incurring extra expenditure. The cost of employing such system on large scale is quite exorbitant for my (company) size. At this time, It's extra cost, extra man-hours for getting into the system."

He also summarized the distinct perceptions for and against the system that created tension between them,

“The basic directions are quite different. XL is very eager to solicit business, trying to put everybody on board the system. FF’s attitude and direction are just like ours. We don’t see immediate interest or savings. On the contrary, we incur more expenditure and more work. Of course there will be some arguments and conflicts in terms of charges. But in terms of the system, we have no problem. XL have the expertise in providing the software”.

The Buy-In

The buy-in of the service providers was not easy. It took three months of meetings, presentations and a detailed feasibility study that quantified and qualified the value propositions before they agreed. XL also got them the grant from the Singapore government that helps SME’s pay for such projects. This was important since MF insisted that the service providers share the costs for implementing the system and the service provider’s claimed they had limited resources to spare. To achieve the buy-in XL also tried to build good relationships with them, as their business development manager said:

“For marketing purposes, the first few meetings, we don’t just talk about business. We want to make them comfortable, make sure we enjoy each other’s company and build relationships.”

The service providers confided that they acceded to the system partly due to their vulnerable strategic position, considering MF was a major client and with the hope of having long-term business from them. FF’s director said,

“Linking up with the manufacturing firm [through the system] locks us in a long-term relationship”.

XL’s business development manager held the view that:

“The service providers acceded to the system because they felt obliged to payback MF for the 7 years of business”.

Although the service providers’ did not favour the project they understood MF’s need for the system. HU’s operations officer remarked,

“They [MF] have a lot of departments and they can’t run up and down, for faxes or phones etc.”

During this phase XL preferred meeting each of the partners individually since they had to customize presentations and cost -benefits analysis for each of them.

Phase 2: Design and Implementation

After getting the green signal from the service providers, XL built a prototype of the solution with the requirements from the partners. They then constantly refined the prototype by adding

requirements to it through constant iterations of building and requirement gathering through several collective meetings. XL's IT manager said,

"During the implementation stage, we go through many rounds of prototype refining. Finally, the modules are launched one by one. Normally we'll involve all the parties. We'll need to iron out what documents they need to process and we'll have to go through things a few rounds. It's very common for them to forget certain things. So at the end, we'll make them sign. Going through the thing several times will ensure that that's the thing they want and they have added all the other requirements they would need."

This phase lasted for about six months and involved abundant inter-organizational interaction to design the GUI's and workflows for the system. The process required each of the logistics partners to understand the questions posed by XL and also to be able to chart workflows of their business processes that would be built into the system. There were two major issues in this stage: 1) Resolving issues on GUI's and workflows 2) Understanding each other's domain knowledge

Resolving issues on GUI's and workflows

Each organization wanted the transition from the current manual system to the online system to be as smooth as possible and tried to bargain for a GUI suiting them, thus resulting in conflicts. XL confirmed:

"We had problems like one side wants validation, the other party doesn't think it's the standard practice and so on. But they had no problems when it came to IT. The only issues were ironing out details like what fields to include since there's no one fixed business rule."

Although they needed some moderation from XL to resolve conflicts the partners were cooperative in resolving issues amongst themselves and also exhibited a consideration for others' requirements. A user from FF very understandingly quoted,

"Some may want to see more information and some may think the lesser I see, the lesser problems".

Even XL patiently went through rounds of amendments. They were also accommodative of small changes.

"Usually if they have minor changes, we'll try to accommodate. Only if their requests are really out of the original scope, then we'll have to rework the figures."

To make the process of resolution easier XL held collective meetings at this stage. Even FF's operations officer said it was good to have collective meetings

"All of us sit together to discuss so that whatever problems we encounter, everyone can make a say since it involves all parties?"

Sharing and Understanding each other's Domain knowledge

In terms of understanding each other's domain knowledge and interacting with XL for stating requirements, this stage was surprisingly smooth considering the diverse functional backgrounds of the organizations. XL's knowledge of logistics was a tremendous help. FF however mentioned that they had some problems conveying their requirements to XL although they agreed on XL's expertise in logistics and was also understanding of their predicaments. FF's director said what the problem was and how they resolved them.

"They are indeed very well versed with logistics but we [FF] are not a logistics company.. So it might not suit us. I think we have different points of view. Operationally, sometimes XL may not understand what we want. So we go through quite a number of rounds of amendments. Communication breakdowns... I don't blame XL because they may have spoken to HU who say something, then they go to MF and they'll give a different perspective and when it reaches us, we'll have our own say on the matter. In the end, what we needed was for all to sit down together and iron things out".

This was despite the fact that MF was also very cognizant of this issue of different perspectives and their logistics' manager said :

"For us, we have to be specific, what values to populate TradeNet and what values to be sent to the shippers. FF would take the quantities and order related values from us to make a booking. So the specifications we give to XL for the system will directly affect our service providers."

On the issues of sharing business information, each of the partners was comfortable and trusted each other and XL in revealing their business information. FF said

"Oh, actually we do have some confidential information like freight charges where it's between MF and us and we do not want the HU to know. We asked XL to block this information from them."

MF had signed a non-disclosure agreement with XL. The extent of trust is also made evident by the fact that XL's parent company is a logistics giant and the service providers' being in a similar business did not feel threatened by that. HU's director said

"They promised us they wouldn't disclose anything. Yeah, I think that's ethics."

Phase 3: Post Implementation

System implications

After the system was implemented, although MF and FF did not see any change in relationships because of the system, HU's director who always believed in relationships and personal touch commented,

"I don't see many changes, in fact, if I do see changes, it's for the worse, and not for the better. The haulier service is very personal. So we see each other, there's some bonding effect and you become friends. But your relationship tends to drift when you look into the computer instead of talking to the person. So that's how I feel."

The initial adverse feelings of the service providers' directors towards the project suddenly took a U-turn. FF's director was pleased and felt locked in a long-term relationship with MF. HU's director said the system enhanced their customer orientation but added:

"Well, it's our first experience, a new experience doing transactions through the web. It is just a little different getting orders from the web. But the good thing about the system is you make fewer mistakes, whereas if you go through the phone system, sometimes you do more chitchatting and get carried away and miss some important points and make mistakes. Pros and cons involved. The con is that you lose personal touch."

Everyone at the MF rolled out a list of the benefits of the system. To quote one relating to the warehouse communication problems

"The system actually made everything clearer. Previously there would be problems of someone sending another a document and the receiver could claim that he didn't receive it. Now, it's all in the system and is much easier to track. We even resorted to making each other sign for documents received, though we are just sitting a partition away! It was so ridiculous! But now, we can make updates and everyone involved can see the changes. We do not have to make multiple copies for distribution."

System Usage

In terms of using the system all the department supervisors were comfortable using the system but they had a tough time getting their forklift drivers to use the system. The warehouse supervisor said:

“ I’m alright. For my warehouse guys, they are more resistant. Those forklift drivers do manual labour. You ask them to use the computer and they tell you they can’t do it. It’s very common. Some of the forklift drivers’ reaction to doing computerized updating was: “I don’t want to touch this thing!”. But we force them. (Laughs...) We tell them times are changing; now it’s different from “last time”. Did your relationship with them turn tense? Initially, but after a while they understand.

MF handled the transition well, as the warehouse supervisor non-chalantly replied

“First thing we assign a leader to each section of the warehouse. So they are the ones who start first– he learns first and he is responsible for teaching the rest. Even for other warehouse operations that are different from before, e.g. bar coding and other tracking mechanisms we advise them to keep up with times by re-learning processes, or have obsolete skills and knowledge.”

MF also insisted that there be a trial period so that users can get comfortable with the system

“We told XL that we didn’t want the system to go live immediately. We allowed the users to practice using it for a week first before going live.”

There was also a merger of two departments consequent to the system implementation

“...the shipping department swallowed the sales co-ordination and customer service department. It makes sense because that department used to handle customer accounts and now with the new system in place, they could track the orders more accurately in the shipping department. So now we are merged into one entity – shipping department.”

Although they did a good job in getting manual labourers who had never seen computers before to use the system, they could not do much to get the service providers to update the system as well.

There were some issues at the service providers’ end, in adopting the changed work practices. There were delays in updating the system. MF’s warehouse manager said that he had to

telephone and remind the service providers to update the system, but at the same time was understanding about their slackness,

“they are hauliers and don’t just do our business and not all their customers use this system, its just us. So updating the system is out of their normal business procedures”.

Users at the service providers complained it was difficult to login every time and update. FF still used a dial-up connection and the slow speed caused the delays as well. They were more comfortable using the phone and fax as they can get an immediate conformation and felt that the system is not suitable for some events like truck break down, and that it was far more easier and efficient to use the phone for such circumstances. One user at the FF said :

“To me, operationally it is more efficient to do faxing or phoning because on the other side, the other party can radio their drivers straight away. So my side can confirm by faxing to the other party immediately too. Phones and fax machines are more accessible than computer systems. You cannot phone and confirm and amend things so easily with computers. Especially change of time for example, from 3 to 3.30. Or say if the vehicle breaks down. You can’t wait for someone to key into the computer telling everyone that the vehicle has broken down!”

XL did their part in helping users transition to the new system.

“...in the end, the ground users are the ones using the system. If they don’t use it correctly, or if they don’t use it at all, then the system becomes irrelevant. So we still need to rally the support from the lower layers. We have to build relationships with the ground users, talk to them, get to know them personally, even buy them pastries.”

Despite the issues, most users agreed the system was easy to use and that eventually they would get used to it. HU’s director said:

“We’re actually very service-oriented. We move forward with the customer. I guess we have no choice. So he (Eric) has to be the guinea pig, trial an error and learn first. It’s a matter of getting used to it after a while. The updating is quite simple”

The partners organized a review committee comprising of core users and project managers from all three organizations to address progressive issues in the system and to discuss further developments of the project. Despite that not all technical issues relating to the system were raised. Users raised a few technical issues with the system to XL mainly on the speed of the system, but did not reveal all because they didn’t wish to disrupt the community as one user from the FF said,

“We did mention some issues about the system being slow etc., as for the other changes, we didn’t raise them, since everybody seems fine with the arrangement now. We do not want to disrupt them”.

Discussion

The objective of this study was *to investigate the role of social capital on knowledge integration across organizations*. Social capital is defined as the resource created by the presence of OMA (opportunity, motivation and ability) and that facilitates action towards the goal of the structure. An OMA analysis of the three phases finds three roles of social capital in integrating knowledge across organizations. The analysis with key evidence is summarized in table 4.

The motivating role of social capital

The first finding of this study is that social capital during the initial phase of the project should be leveraged as a Motivator. In the case; in phase 1 the key activity was to get the buy-in of the three logistics partners for which each of them had to have significant *motivation* from the project. MF’s *motivation* was strong since they needed the system to reduce inefficiencies in their logistic processes and were therefore willing to acquire the necessary *ability* (resources) for the project. The service providers lacked *motivation* since they perceived no benefits from the system and would incur extra costs. The lack of *motivation* masked the value of prior ties and it took a long time to convince them. Their only *motivation* was the hope of long-term business from MF if they accede to the system. XL had no prior ties with the logistics partners but had a strong *motivation* (to sell the solution). To overcome the limitation they had in terms of ties, they spent time building relationships with the logistics partners as is reflected by their sales manager, *the first few meetings, besides talking about business we spent time trying to build a rapport with them*”. They also used their *ability* to prepare value assessments for each of the partners to motivate them for the project. The facts illustrate that if *motivation* is strong, *opportunity* can be created and *ability* can be acquired and that in the initial phase wherein “buy-in” (Haug et.al, 2001) of organizations has to be acquired for knowledge integration, *motivation (M)* is key. Social capital at this stage should therefore be leveraged as a motivator and the other sources of social capital should be used to enhance organizational *motivation*.

Researchers have talked about the motivating role of social capital in the form of trust and norms (Putnam, 1993) and in influencing knowledge activities like knowledge creation, knowledge exchange, knowledge assimilation (Nahapiet & Ghoshal, 1998; Yli-Renko et.al, 2001). But this study finds that the motivating role in the context of collaborative IS projects is significant during the initial phase to acquire the buy-in of the collaborating organizations. Further, most studies indicate that the motivating role of social capital is based on trust, norms and obligations between

members. Through the OMA framework this study could consider the largely disregarded influence of practical motivating factors like potential benefits, potential effort etc. that effect social behaviour of organizations. The implication of this finding is that at the initial stage of the project it is important to identify motivators for each participating organizations and plan project activities or social activities to enhance the motivators. Further research however is needed to examine what kind of activities and steps can be taken to motivate organizations and which one of the collaborating organization should undertake the responsibility of coordinating collective tasks. Research should also examine the interaction between OMA, so that *opportunity* (O) and *ability* (A) can be leveraged to enhance organizational *motivation* (M) at initial stages of the project.

The integrating role of social capital

The second finding suggests that social capital during the design and development activities of a collaborative IS project should be leveraged as an integrator. Following the buy-in, the case project activities involved integrating knowledge bases of the organizations through the organizational representatives. Based on the case it is seen that this phase was pretty smooth compared to the initial phase. The main factor was that all the organizational representatives had the requisite *ability* for the activities of this phase in terms of domain knowledge which was essential for this phase. *Opportunity* in terms of prior ties provided a shared understanding of each others' requirements which instilled a sense of cooperation between them. This is seen by the fact that although each of them wanted a GUI best suiting their organization they were understanding of the others' requirements and were willing to compromise. Activities of this stage did not incur much effort on part of the partners and their comfort with their domain knowledge as required for this phase, unlike in the first phase where they had to understand software and technology, made them downplay their lack of *motivation* in phase 1. The only motivator that was in play was trust in sharing their business information for the system implementation, which was present, as indicated in the case. The presence of requisite *abilities* for the activities in this phase helped in integrating the diverse knowledge bases. Social capital for design and implementation phases should therefore be leveraged to play the role of an integrator and *opportunity* (O) and *motivation* (M) should be used to enhance the *ability* (A) of the participating members to influence integration.

Social capital in the form of cognitive abilities influences knowledge activities through shared codes and languages between members (Nahapiet & Ghoshal, 1998) and also the *ability* of exchange partners for various knowledge activities like identifying, exchanging and assimilating knowledge (Yli-Renko et.al., 2001). This study demonstrates that social capital acts an integrator of knowledge across organizations due to the dominance of the *ability* source of social capital

enabled by not only shared language, shared understanding, but also basic resources and competencies as needed for the project. Secondly, the integrator role of social capital is significant during the stage of the collaborative project that involves system design or implementation. The implications of this finding are that in this stage of the project, social or project activities should cater to developing a shared understanding of issues between members and in developing skills that affect the *ability* requisite for this phase. Future research is needed to assess the role of individual team members' OMA and the influence of organizational factors on their activities in the team.

The facilitating role of social capital

The third finding of this study suggests that during the later phases of a collaborative IS project social capital should be leveraged to facilitate collective actions towards the project. The facilitating effect is apparent in the incidents in phase 3(post implementation). The slackness of service providers in using the system was overshadowed by the tolerance and understanding shown by MF in this regard. Although they had strong *motivation* to get the service providers' to use the system they would call them up and remind them to update the system and acknowledged that it would take time for them to get used to the system. Even the service providers, although had issues in using the system, agreed they would get used to it and were also very cooperative in not raising all issues in the review meetings except the important ones that would have implications for all. This phase saw a focus on collective actions with increased tolerance and cooperation both enabled by the *opportunity* source of social capital. Their ties facilitated the collective actions in this phase and the lack of *motivation* and *ability* (in the service providers) was tolerated. Social capital therefore played the role of a facilitator of collective actions in this phase enabled by the ties between the organizations. But what has to be noted is that the role of social capital as a facilitator is not significantly dominant throughout the project. This can be said based on the fact that the negotiations in phase 1 to convince service providers took so long despite their prior relationships.

Although prior studies indicated that social capital facilitates knowledge integration (e.g. Huang et.al, 2001) and collective action (Coleman, 1988; Leana & Van Buren, 1999) the significance of this finding is that it facilitates certain activities during certain phases on a collaborative project, considering that the facilitating effect was not effective during the initial phase of the project. The implication of this finding is that social capital towards the later stages should be leveraged for collective actions towards the project, like; building an identity towards the project, ensure progressive work on the system, facilitate users to adapt to the system. Research is needed to examine what steps can be taken to leverage the facilitative effect of social capital and how OMA can be used to enhance the facilitative effect.

Conclusion

In investigating the influence of social capital on knowledge integration across organizations this study has contributed to literature on knowledge integration, social capital and inter-organizational collaborations.

The study emphasizes the importance of a knowledge integration perspective. Collaborative projects, problem solving activities, new product development, software development etc. can all be viewed as knowledge integration processes since they serve as means to apply synthesized knowledge and hence a knowledge integration perspective of these processes will be insightful. The interaction between Knowledge integration and social capital has always been only indicated and through this empirical study the exact nature of that interaction in the form of three roles of social capital in the context of collaborative IS project are established. The varying roles demonstrate the dynamic nature of social capital which entails distinct management strategies.

Adopting the view that interaction within a structure and the presence of OMA lead to creation of social capital a new definition of social capital is arrived at. The OMA schema allowed to elicit the dynamics in the context of inter-organizational collaborations and afforded analysis OMA from each organization's perspective. This dimension also suggests that any change in the structure and the OMA of the participants creates a change in the nature of social capital and hence in its effects. The schema can be used to study other knowledge processes (e.g. knowledge sharing, knowledge transfer) in other contexts like virtual teams, intra-organizational projects and value chains.

The study provides an insightful combination of dimensions to inter-organizational arrangements like collaboration, strategic alliances, joint ventures and the IT projects involving more than two organizations. Various processes of knowledge management have been studied in inter-organizational arrangements, but the concept of knowledge integration has not been addressed.

Managerial implications of this empirical study are equally significant. Organizations and project managers engaging in collaborative projects need to be aware that social capital emerges in a structure (project, collaboration etc.) and it can be leveraged to their advantage. The implications of this study are also to the numerous IS projects most of which are faced with several issues. The case study demonstrates how a knowledge integration view and social capital view may help unearth issues that may not be visible otherwise. Awareness of these issues can lead managers to come up with relevant strategies, techniques, and a procedure to better manage IT projects leveraging a resource that inheres in structures.

Future research needs to investigate, in-depth, the varying roles of social capital in distinct contexts, distinct events so as to identify contingencies of social capital's influence. Given the trend towards outsourcing IT projects considering the effect of social capital in these structural arrangements may be insightful to outsourcing projects. There is need to investigate how these findings can be made sense of in projects that do not follow a traditional life cycle and follow a parallel development or implementation process.

Phase	Knowledge integration activities	Absence/Presence of OMA	Effect on knowledge integration and Main role of social capital	Evidence(key quotes)
Prior to the project	<ul style="list-style-type: none"> • Business interaction 	<ul style="list-style-type: none"> • All three partners had sufficient OMA • Partnership provided the <i>opportunity</i> • Need for business provided the <i>motivation</i> • All had <i>ability</i> to provide the requisite service, reflected by 7 years of partnership 	<ul style="list-style-type: none"> • Good working relationships and seven years of partnership 	<ul style="list-style-type: none"> ○ “<i>Actually the manufacturer’s shipment is executed by a company called Central Express. The freight forwarder is only playing the middleman. The manufacturer refuse to go to Central Express direct because they treasure goodwill with the freight forwarder</i>” • “<i>We had good working relationships</i>”
Phase 1	<ul style="list-style-type: none"> • Achieving ‘buy-in’ • Cost negotiations • Project planning 	<ul style="list-style-type: none"> • ChemXlog had strong <i>motivation</i>(business) so created ties • Manufacturer had strong <i>motivation</i> (needed system to reduce inefficiencies)and <i>ability</i>(resources) • Service providers had no <i>motivation</i> (did not need the system and incurred extra costs)and <i>ability</i>(IT savvy resources, infrastructure, money) 	<ul style="list-style-type: none"> • Increased time taken to get buy-in of service providers despite prior relationships • MOTIVATOR 	<ul style="list-style-type: none"> • “<i>people were denying having received instructions and blamed that as a reason for delays and mistake which is common in warehouse communications</i>”. • “<i>I don’t see any benefits from the system; in fact, it is additional work for us, Our only motivation was that it was the request of our major client</i>”.
Phase 2	<ul style="list-style-type: none"> • Requirements gathering • System design and implementation 	<ul style="list-style-type: none"> • ChemXlog had strong <i>ability</i>(logistics domain knowledge and IT knowledge) • All three partners were strong in their own domain knowledge hence had <i>ability</i> • Their long term association made them aware and understanding of the others’ requirements (<i>ability</i>). 	<ul style="list-style-type: none"> • Smooth progress of phase • Reached consensus on GUI’s and workflows easily • INTEGRATOR 	<ul style="list-style-type: none"> • “<i>some may want to see more information and some may think the lesser I see, the lesser problems</i>”.
Phase 3	<ul style="list-style-type: none"> • System usage and review • Reconfiguration of work practices 	<ul style="list-style-type: none"> • Manufacturer had <i>motivation</i> (needed system) and <i>ability</i> (to handle change and reconfigure work practices). Were very tolerant and understanding with service providers’ slackness owing to the <i>ties</i>. • Service providers lacked <i>ability</i>(to handle change) and <i>motivation</i>(more effort) so were slack in adopting system but said they would get used to system and were cooperative by not raising all issues and disrupting the community, showed consideration for <i>ties</i>. • Review committee shows <i>cooperation</i> towards collaboration 	<ul style="list-style-type: none"> • Issues in adopting system by service providers • Tolerant and understating behaviour of manufacturers towards service providers’ slackness • Service providers cooperative by not raising all issue in system to review committee and by participating in review committee to discuss project progress and updates. • FACILITATOR 	<ul style="list-style-type: none"> ○ “<i>they are hauliers and don’t just do our business and not all their customers use this system, its just us. So updating the system is out of their normal business procedures</i>”. • “<i>we did mention some issues about the system being slow etc., as for the other changes, we didn’t raise them, since everybody seems fine with the arrangement now. We do not want to disrupt them</i>”.

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