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KNOWLEDGE TRANSFER WITHIN AND ACROSS ORGANIZATIONAL BOUNDARIES - A CASE STUDY IN THE CONSTRUCTION INDUSTRY

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Knowledge transfer is essential for an organization to be competitive and successful. However, as projects are temporary, knowledge is often bound to the individuals in projects rather than to the core organizations. The main research question for this article is: How can collaboration be used in order to transfer knowledge from one project to another within an organization or with other organizations within a project? To do this, a theoretical framework of recent literature concerning knowledge management and transfer is used, as well as a case study about an urban development organization working with a rather unique collaboration structure in order to maximize the knowledge transfer from and between different actors. Our method of research has been interviews with a divisional manager and two project managers at an urban development organization. Results from our case study indicate that in the planning phase, knowledge transfer includes collecting feedback and information as well as using a central knowledge platform. During the production phase, face-to-face communication is the most important form of knowledge transfer. After each project, evaluation is essential to collect the experience of collaboration and identify planning errors. Our findings also show that most knowledge transfer occurs at an informal level. The study concludes that several factors affect knowledge transfer in a construction organization. The most essential are the media in which knowledge is transferred and the way information is stored. Taking all factors into consideration, an organization with a decentralized structure and an open and broad-minded culture enables successful knowledge transfer.

Keywords: construction industry, knowledge objects, knowledge transfer, learning boundaries, project organizations.

INTRODUCTION

In the construction industry, projects are delivered by temporary project organizations, put together from different groupings such as design and construction teams. This means that the knowledge in construction companies tends to be contingent, situational, and otherwise bound to individual and local practices (Styhre & Gluch, 2010). The uniqueness and short-term orientation of temporary project organizations creates obstacles in knowledge management that may hinder the development of routines and organizational memory. Knowledge management in an organization implicates the creation, storing, using and sharing of knowledge (Lindner &Wald, 2011). To achieve successful knowledge management, knowledge must be transferred

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to other parts of the organization, enabling effective project performance and successful project delivery to clients (Gangcheol et al. 2011).

Construction organizations often have a lack of natural mechanisms of learning which makes the transfer of knowledge difficult, usually due to geographically dispersed projects or intercultural project teams (Lindner &Wald, 2011). The focus on deliverables in projects and the long-term perspective of knowledge management may often create conflicts of goals, thus making knowledge transfer a lower priority. Knowledge transfer is the process where ambiguous and complex routines are reconstructed and stored in a way that they can be adapted and used in future projects (Hui-Min, 2009). In practice however, projects are not commonly thoroughly reviewed at the end (Williams, 2008). The purpose of this article is to study why knowledge transfer is important, what makes it difficult in practice, as well as discuss solutions to the problems with knowledge transfer that often arise in the construction industry. The main research question for this article is: How can collaboration be used in order to transfer knowledge from one project to another within an organization or with other organizations within a project? To do this, a theoretical framework of recent literature concerning knowledge management and transfer is used, as well as a case study about an urban development organization working with a rather unique collaboration structure in order to maximize the knowledge transfer from and between different actors.

THEORETICAL FRAME OF REFERENCE

Knowledge is a key factor for many organizations (Lindner & Wald, 2011) and is used in organizations' everyday practice. Handling knowledge may be seen as an ongoing social accomplishment (Styhre & Gluch, 2010). The transfer of knowledge between organizations and within an organization is a complex phenomenon that is an important factor (Easterby-Smith et al., 2008) for an organization to retain its competitiveness (Hui-Min, 2009). The process of knowledge transfer consists of several steps that start with the creation of knowledge, for example from individual experience. After knowledge creation follows the use, transferring and sharing, and finally the storage of knowledge in a way that it is easy to retrieve for further use (Lindner & Wald, 2011). Further down the theoretical framework, we discuss how knowledge is created, knowledge transfer in practice and, finally, factors influencing knowledge transfer.

Knowledge creation

Knowledge is often divided into two different categories: tacit and explicit knowledge. Tacit knowledge is the kind of knowledge that is difficult to explain but is basically known by heart, for example riding a bike. Explicit knowledge is knowledge that could be explained, documented and easily transferred to another person (Clegg et al., 2008). The process of transferring knowledge between tacit and explicit knowledge includes four major movements. Knowledge creation in this context is often referred to and explained by the SECI-model, developed by Nonaka and Takeuchi: socialization, externalization, internalization, and combination (Gangcheol et al., 2011).

Socialization (tacit to tacit) comes from just being around other people usually through mentorships, apprenticeships and includes rules of behaviour, codes of conduct. The person who is learning learns without ever thinking about its meaning. Externalization (tacit to explicit) is done by formulating concepts and creating models

to be able to explain how something works. Combination (explicit to explicit) is for example how the organizations learn from conversations, meetings and written documents. Internalization (explicit to tacit) occurs when something is learned and then repeated over and over again for a long period of time. People stop thinking about their actions and do them automatically, often referred to as learning by doing (Clegg et al., 2008).

The most difficult movement of the knowledge process is externalization. Explicit knowledge can be stored in documents and databases, but tacit knowledge cannot. This becomes a problem for many organizations as tacit knowledge is rooted in the actions of the employees and is very valuable if transferrable to the entire organization (Lindner & Wald, 2011).

Knowledge transfer in practice

Linking individual perspectives of knowledge to an organizational level is one of the main challenges of knowledge transfer. If an organization wants to use lessons learned in future projects, the knowledge needs to be transferred from the individual to the core organization. The achievement of this is called organizational memory and is what most organizations desire as part of their development (Lindner & Wald, 2011). A challenge when transferring knowledge from the individual to the core organization is that all individuals represent and interpret knowledge in different ways (Cacciatori, 2008). This aspect of knowledge transfer is difficult in itself to achieve. To transfer knowledge from one organization to another is even more difficult as different organizations have their own cultures and processes, which create multifaceted boundaries that complicate knowledge transfer (Easterby-Smith et al., 2008).

Working in projects may complicate some aspects of knowledge transfer, even if it could be beneficial in some cases. Projects are commonly unique and temporary which means there is often a lack of standardized routines. Without standardized routines it is very difficult to receive continuity in core organizational learning and knowledge transfer (Williams, 2008). Many authors point to the value of having reviews as milestones during the project rather than only at the end, as cited by Williams (2008):

"Valuable learning experiences take place at the beginning of the project, but are not captured until the post project review at the end."

Most project-based organizations are lacking a functioning system for transferring knowledge and are relying on the informal networks and the social channels of the employees when sharing knowledge within the organization (Styhre & Gluch, 2010). In practice the means of this communication is direct contact, phone calls and e-mail. The formal mechanisms the core organization provides are often not used as frequently as the informal ones (Styhre & Gluch, 2010).

Essential for successful knowledge transfer is a culture that is positive towards new knowledge (Lindner & Wald, 2011). Such a culture may result in project team members that are motivated to teach, learn, and trust in knowledge from other people. It is also important to have a tolerant environment within the project and organization. There should be a high degree of openness, cooperation, and a positive attitude towards mistakes. In such an organization, it is easier for project team members to tell their co-workers and supervisors when something goes wrong (Lindner & Wald, 2011). The organization is then able to reflect over the mistake and limit the risk of

doing similar mistakes in future projects. The team members should, in addition, get time for participating in knowledge transfer activities.

Learning boundaries and knowledge objects

The degree of knowledge transfer is influenced by several factors, of which many are interrelated. Knowledge management should be centralized in an organization as it thereby will be easier to legitimate the devotion of time and resources for knowledge transfer (Lindner & Wald, 2011). However, the organizational structure should be decentralized to enable both horizontal and vertical communication.

A high degree of absorptive capacity of the receiving group or organization is essential for successful knowledge transfer (Easterby-Smith et al., 2008; Bakker et al., 2011). The absorptive capacity is the receiver's ability to understand the value of, interpret, reflect upon, store, and use knowledge (Hui-Min, 2009). Interrelated to the absorptive capacity is the intra-organizational transfer capability. New knowledge is only fully usable if it is disseminated within the organization and easily accessible for the members (Easterby-Smith et al. 2008). The nature of the knowledge being transferred also plays a significant role due to how the knowledge should be used. All kinds of knowledge have different degrees of ambiguity and complexity and must be handled in different ways before being stored and disseminated (Easterby-Smith et al., 2008).

Learning boundaries can be barriers for knowledge transfer but at the same time be important for learning. Overcoming learning boundaries is a challenge during knowledge transfer between individuals, groups, and projects. However, overcoming obstacles generates a high level of learning (Scarbrough et al., 2004). It is important to identify and consider learning boundaries when analyzing the benefits and development of knowledge transfer within and between projects (Scarbrough et al., 2004). Boundaries can be small features that can have a great impact of knowledge transfer. Different individuals and groups might use different language, which hinder the flow of knowledge. They can also represent and interpret the knowledge in different ways due to different means, practices, and interests within a project.

Knowledge objects are often described as artifacts and memories of objects rather than a process. Organizations tend to be focused on good documentation during projects and processes. However the actual usage of the stored knowledge is relatively low, often due to low quality of indexing. Organizations use several types of objects to store knowledge, such as databases for explicit knowledge, project memory systems, and journals kept by the site manager. Also used are platforms, defined as "a set of prescribed processes, entities, operations and resources that are brought together when producing some relatively standardized output" (Styhre & Gluch, 2010). These types of objects standardize the processes in some way, which makes it easier to bring knowledge across projects. There are, however, some problems in implementing these objects fully into the construction industry. Construction organizations tend to have a strongly instituted principle to avoid standardized solutions and 'off-the-shelf designs' of buildings.

Most knowledge stored in objects is explicit or "codified", such as databases or documents. However, they should also handle the contexts and social processes behind the documents in order to transfer knowledge in a successful way. In order to retrieve and store this personalized knowledge, different procedures such as personal interaction and workshops are required (Lindner & Wald, 2011).

METHOD AND CASE DESCRIPTION

In order to examine how knowledge transfer within and between organizational boundaries functions in practice a case study was done. To collect information, three interviews with an urban development organization (UDO) were carried out with employees in different positions in the organization. One division manager and two project managers were interviewed with focus on the interviewees' work with knowledge transfer within and across projects. All interviews took place at UDO's office in a major city in Sweden; they were semi-structured and lasted for approximately one hour each. Finally, the findings from the interviews and the theories found in literature were compared in order to discuss the results and make conclusions.

UDO is an organization owned by the municipality, and its main mission is to develop old industrial areas in the central part of a major city in Sweden. The development includes the whole chain from the acquisition of land to the development of the area, and selling of properties. During the process, the focus is to create areas that are long-term and sustainable. To accomplish their mission UDO has designed a business model based on close cooperation with different property owners and contractors. This cooperation is carried out through mutual projects driven by shared incentives and goals.

The model (see Figure 1) starts with a qualification process where different property owners and builders are invited. UDO and the chosen actors establish a consortium in which they work together with the best interest of the area in mind, not knowing which lot they will be responsible for later on. The area is divided in lots and different types of housing and the actors decide together which lots each actor is going to buy and build. The consortium cooperates throughout the entire production phase. UDO has the managing role in the consortium and the project manager follows a project from planning until the area is populated.

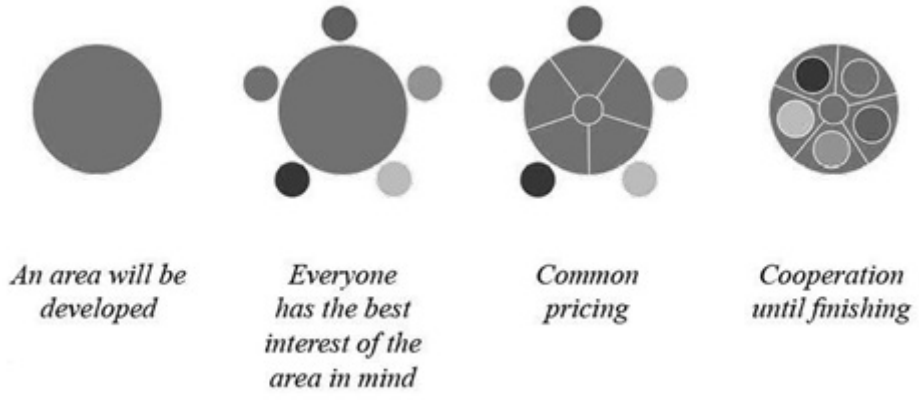

Figure 1: UDO's conceptual model

RESULTS FROM THE CASE STUDY

To be able to transfer knowledge successfully, it is important to value experience according to the interviewees at UDO. The Urban Development Organization has worked with its mission for over twenty years and many of the employees have been working at UDO for a long time. For example, the division manager was involved in the creation of their model in the beginning. During this time they have gotten to

know the construction industry in the city, formed business relationships and created networks.

Knowledge transfer in the planning phase

Collecting feedback and distributing information are two important factors at UDO in the beginning of a new project. A lot of time and effort is spent at an early stage to investigate pros and cons from previous projects since experience is the key of project evolvement. An essential part of their communication is to involve the affected stakeholders. Internet is an important tool since most information is distributed through UDO's website and blog. To inform the public, 3D-models of the projects are often used as a way of giving the locals a picture of future development.

UDO uses a project-common platform to handle all documents included in a project. By using a shared platform, it is easier to keep information updated and current since there are no transformations of documents between different systems. Instead of sending e-mails, information is uploaded by UDO and the different actors to the platform, which leads to fewer misunderstandings. In addition to the platform, UDO manages it so that the consortium is able to meet regularly to exchange ideas and experience, usually every third week. In the beginning of a project, meetings are held more frequently and as the project evolves, the meetings are held less often.

Knowledge transfer within UDO is often managed internally. To make changes to the more educated staff, education and coaching may go on for several years. For example, one division manager will retire in a few years and his successor has already been chosen. These two now work closely together in order to transfer routines, relationships and market knowledge to the new division manager. Some knowledge is also bought externally, however UDO is not obligated to use the same consultants as before in order to pursue development and knowledge transfer. Apart from this, knowledge is sometimes collected by visiting colleagues at different locations.

Knowledge transfer in the production phase

According to all interviewees, in order to enable knowledge transfer in production, it is important to have regular meetings. There are basically two different kinds of continuous meetings, which are usually held once a month. The first mostly covers checkups on different levels to see that the project is developing according to the planned schedule and cost. The second is held to ensure a safe working environment. Both of these meetings are a good way of communicating both errors and successes of a recent project.

All interviewees agree that the best way to communicate is face-to-face. Personal meetings have always been very frequent but nowadays, with new technical solutions of communication, video conferences and video-calls have become more common. According to the project managers, these new media of communication are not as effective as personal meetings. The division manager has therefore made arrangements so that the project managers are able to meet every second week to share their thoughts, ideas and reflections with each other. Protocols are written during the meetings; however these do not include experience-specific knowledge.

In one of UDO's current projects, all companies involved are based in the same city. According to the project manager, this is an advantage because of the possibility to have more frequent personal meetings. In advance of the meetings, the project manager prepares an agenda in which information is distributed among the participants. During the meeting, all actors of the consortium are able to ask questions

and share experiences with each other. To gather all parties frequently is often a necessary procedure to make sure that the project and future projects develop in a satisfactory way.

As already stated, personal meetings were considered the best way to communicate and UDO organizes formal meetings with a decentralized structure for experience sharing. However, according to the project managers, most knowledge transfer occurs at an informal level. Coffee breaks, lunches and just passing by each other in the corridors are the most frequent methods of transferring knowledge. Thus, it is important to have the staff located in the same building to retain this way of communicating.

Knowledge transfer in the evaluation phase

To ensure a continuous learning and development of UDO and improvements for future projects within the organization, a lot of effort is put into evaluating each project. The experiences of the collaboration are collected and planning errors are identified. According to one of the project managers, planning errors can be detected during every phase of the project. New knowledge is stored in the project manager's memory and to some extent in meeting protocols. The division manager explained that UDO made an effort to create a categorized knowledge-database where it should be possible to make a word search and get information about previous experience of construction solutions, specific for their projects. However, the development of the knowledge-database has stagnated in an early phase and is not usable for the time being.

Every other year, a survey is performed with all actors in the consortium in a certain development area. UDO hires an independent organization to execute the survey and evaluate UDO's role and activities during a project. When the results have been compiled all actors and UDO have a workshop to discuss the results. Due to the project managers' and division manager's thoughts about the importance of face-to-face transfer, these surveys and workshops seem to be a good way to exchange experiences and develop processes within a project.

According to one of the project managers, it is the division manager who is responsible for the knowledge transfer from one project to another. The project managers will, however, apply their own experiences from previous projects when starting up a new one. The project manager feels that he does not always get enough response from his superiors when communicating feedback from a current or previously completed project. It may be difficult for the division manager to enable efficient knowledge transfer if there are no routines to document gained experiences. As long as there is no such documentation, the project development relies on the project manager's own experiences and tacit knowledge.

DISCUSSION

Knowledge transfer can be seen as a constant process of bonding and bridging between different actors. In general it is the face-to-face meetings that work best and the informal mechanisms are more effectively used than the formal ones (Styhre & Gluch, 2010). The project managers pointed that the informal meetings during coffee breaks or in the hallways are more useful for knowledge transfer that the formal meetings with agendas. At UDO, all employees have their offices at the same floor in the building and the kitchen and coffee machine is situated in the center of the floor. Unless they have a telephone meeting or such, the employees keep their doors open to

make it easier for their colleagues to drop by and ask questions. Thereby, UDO is encouraging and enabling informal meetings within the company and creating an open atmosphere.

Consortium and absorptive capacity

As stated in the result, a better knowledge flow between two parties will be enabled if they use the same languages and practices, have the same means and interests within a project, and to some extent share the same culture (Scarbrough et al., 2004). UDO is forming consortiums with other actors, which is a good way to create a common language and practices. A high degree of trust between the different parties, and a positive attitude towards mistakes when means and interest are shared, is important for successful knowledge transfer (Lindner & Wald, 2011). If the parties trust each other, they will have the courage to tell the others if they have a problem, which may then be identified and treated in an early stage.

To enable open communication between all parties and hierarchical levels within a project or organization, there should be a decentralized decision-making structure (Lindner & Wald, 2011). A decentralized structure increases an organization's absorptive capacity as new knowledge can be discussed, reflected over, and interpret to a larger extent. Reflection is crucial for knowledge to be successfully transferred and absorbed. If experiences are only reviewed and not reflected, there will probably not be any higher levels of learning generated. This is particularly important for projects where the knowledge needs to be stored in the core organization and used in the next project for not reinventing the wheel.

Storing knowledge

Knowledge and information in general need to be easily accessible for the involved actors to enable knowledge transfer. The knowledge transfer chain, from creation of knowledge to storing and retrieving (Lindner & Wald, 2011), is a good measure of success. UDO has many routines for the first parts of transferring and sharing the created knowledge but few natural storing and retrieving processes. An indication of this is that the project managers said that they keep most of the knowledge in their memories. In this case, they may be the only ones that have the specific knowledge and are able to transfer it. The future is hard to predict, and it is essential for UDO not to lose such knowledge. Another indicator is that the use of stored knowledge is low in general. This can depend on the type of knowledge that is stored or the actuality of the knowledge. At UDO, most of the stored knowledge is captured in protocols from meetings as meetings are a large forum for knowledge transfer. To be able to use explicit knowledge from protocols, these should be developed or divided into one formal part and one part for knowledge sharing and transfer.

Standardization of knowledge transfer

Standardized routines have an essential part in gaining continuity for knowledge transfer in organizations (Williams, 2008). UDO has several years of experience in planning and developing areas and has during that time established routines for the processes. They often use experience from earlier projects to standardize some parts in the next. Since UDO works with unique and temporary projects, standardization of all project processes is difficult to achieve.

The use of knowledge objects is another way of standardizing processes for knowledge transfer across and within projects. A common knowledge platform, as the one used in the consortiums or a knowledge database like the one UDO started to

develop, are good examples of objects for continuity in knowledge transfer. The consortium platform functions very well in order to transfer knowledge in comparison to the database. At all times, it is important to keep relevant data and documents updated. A problem with the database could be that if it is not updated regularly, implemented in the right way or easily searched for information, the users abandon it. However, if the users find that the database simplifies their work, they might start to use it more frequently. In the end, the knowledge database may become a cultural artifact that is used on a daily basis as a knowledge library. To realize this, it is necessary to make someone responsible for the knowledge database to make sure the content of the database is current and categorized in a way that makes information easy to find.

Knowledge transfer activities

Today UDO uses workshops to analyze feedback from their surveys but the possibilities are much greater. A workshop is a kind of meeting where parties meet and discuss in a less formal climate. This is a useful way of externalization when people meet face-to-face and everyone is able to talk openly. The informal climate makes it easier for the actors to understand the knowledge and the underlying interpretations and to turn the tacit to explicit knowledge. However, it is important to keep in mind that not all tacit knowledge can be externalized into explicit (Cacciatori, 2008). In this case the project manager may act as a debriefer because of his neutral position in the consortium. The knowledge and experience collected during the workshops can be transferred to the core organization if they are documented and stored in a knowledge database. One of the greatest challenges in knowledge transfer is the transfer from one individual to the organization. Individuals represent and interpret knowledge in different ways (Cacciatori, 2008). Having routines for document and store the outcomes of a workshop may be a good way to overcome that challenge. Each of the participants of the workshop can together discuss and formulate from their individual experience. It may thereby be easier to interpret by future users of the knowledge database.

By using workshops and frequent meetings, UDO has a good opportunity for successful knowledge transfer within the consortiums. As stated above, it may also be possible to transfer the knowledge and experiences to the core organization if properly documented and stored. To ensure a correct and consistent storing, one individual or small group should be designated as responsible for the knowledge database. The organ for knowledge management should be centralized (Lindner & Wald, 2011) and considered important within an organization. They should not only be responsible for storing knowledge but also to disseminate it within the organization. Moreover, they should be perceptive to feedback from the project managers and make sure that the stored knowledge is always up-to-date.

CONCLUDING REMARKS

This study has shown that there are several factors that affect knowledge transfer within and across organizational boundaries. It is impossible to point to one that is more essential for the organization than others; instead this paper has shown that a mix of several different factors is needed for success. In general, an open and broad-minded culture seems to be an important factor for enabling knowledge transfer in organizations. The case study as well as the literature study also points to informal face-to-face meetings as a good way to transfer knowledge. Therefore, it is important to have a decentralized structure, and a culture that allows informality.

Furthermore, the media in which knowledge is stored and transferred has shown to be very important. It needs to be designed in such a way that knowledge is easily found and thus easy to transfer. Knowledge must be available in both a short-term and a long-term perspective, which put high demands on the media used to be stable and flexible. Furthermore, it is not only important to know how something should be done. To know why something should be done in a certain way is as important as to know how to do it.

Knowledge transfer is a very broad term and so far relatively new in management studies. A single case study is probably not enough to grasp the full meaning and implications with knowledge transfer. However, this paper points to several important factors that should be taken into consideration. The case study also shows how a rather successful urban development office in Sweden works with knowledge transfer within and across organizational boundaries.

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