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Managing Knowledge in Project-based Organizations

A Cultural Perspective

Julkaisun nimike

Tietämyksen hallinta projektiorganisaatiossa – kulttuurinäkökulma

Tiivistelmä

Tässä tutkimuksessa tutkitaan projektiorganisaatioiden tietämyksen hallintaa organisaatiokulttuurin näkökulmasta. Projekteissa on lähes poikkeuksetta mukana ihmisiä, joilla on laaja kirjo erilaista ammattitaitoa ja erilaisia taustoja liittyen kansalliseen kulttuuriin, organisaatiokulttuureihin ja ammatilliseen kulttuuriin. Nämä ihmiset työskentelevät yhdessä projektien puitteissa tietyn ajanjakson verran suorittaakseen tiettyjä ainutkertaisia, ennustamattomia ja vaikeita tehtäviä. Näiden ominaispiirteiden vuoksi projektipainotteisissa yrityksissä tarvitaan erityinen lähestymistapa organisaation tietämyksen hallintaan ja oppimiseen. Tämä lähestymistapa poikkeaa vallitsevista strategioista. Tässä väitöskirjassa tutkitaan miten edellä mainitut kulttuuriin liittyvät kysymykset (kansallinen kulttuuri, organisaatiokulttuuri ja ammatillinen kulttuuri) vaikuttavat tietämyksen hallintaan projektipainotteisissa yrityksissä. Tutkimuksessa tarkastellaan myös erilaisia tekijöitä, jotka vaikuttavat tietämyksen hallinnan onnistumiseen tai epäonnistumiseen projektipainotteisissa yrityksissä. Kirjallisuuskatsauksen jälkeen toteutettiin online-kysely projektipainotteisissa yrityksissä. Tavoitteena oli löytää vastaukset seuraaviin kysymyksiin:

1. Miten organisaation kulttuuri liittyy tietämyksen hallintaan projektipainotteisessa organisaatiossa?
2. Minkälainen on organisaation kulttuurin ja tietämyksen hallinnan suhde suomalaisissa projektipainotteisissa organisaatioissa?
3. Mitkä tekijät ovat ratkaisevan tärkeitä tietämyksen hallinnassa suomalaisen projektiliiketoiminnan kontekstissa?

Tutkimuskysymyksiin vastataan viiden artikkelin avulla. Artikkelit 1 ja 2 vastaavat ensimmäiseen tutkimuskysymykseen. Artikkelit 3 ja 5 vastaavat toiseen tutkimuskysymykseen ja artikkeli 4 vastaa kolmanteen tutkimuskysymykseen. Tutkimus osoittaa, että organisaatiokulttuurin ominaispiirteet vaikuttavat merkittävästi tietämyksen hallintaan projektipainotteisissa organisaatioissa. Organisaatiokulttuurilla on myös merkittävä vaikutus tietämyksen hallinnan toimintoihin projektiluontoisissa ympäristöissä. Tutkimuksessa ilmeni myös, että kannusteiden ja soveltuvan tietojärjestelmän puute ovat merkittävimpiä esteitä projektien tietämyksen hallinan onnistumiselle. Projektipäälliköiden tulisi huomioida organisaatiokulttuurin ominaispiirteet edistääkseen tietämyksen hallintaa projekteissaan. Heidän tulisi laatia houkuttelevia kannustinjärjestelmiä, jotta projektin henkilöstö osallistuisi tietämyksen hallintaan ja ideoisi uusia toimintatapoja ja mahdollisuuksia. Ennen tietämyksen hallinnan kehittämistä tulisi myös varmistaa, että käytössä on tehokas ja käyttäjäystävällinen tietojärjestelmä.

Asiasanat

tietämyksen hallinta; projektinhallinta; organisaatiokulttuuri

Title of publication

Managing Knowledge in Project-based Organizations: A Cultural Perspective

Abstract

The study scrutinizes knowledge management (KM) in project-based organizations from the perspective of organizational culture. Projects almost invariably involve a variety of diversely skilled people from different national, organizational, professional and cultural backgrounds. These people come together for a specific period of time to accomplish certain unique, unpredictable, and complex objectives. These distinctive characteristics mean that project-based firms require a particular approach to knowledge management and learning activities that differs significantly from the prevailing strategies. This dissertation explores the way in which these distinctive cultural issues (national, organizational, and professional) influence KM in project-based firms. The study also examines various factors that influence the success or failure of KM initiatives in project-based companies. After a literature review, an online survey was conducted in project-based organizations to find the answers to the following research questions:

1. How is organizational culture associated with knowledge management in project-based organization?
2. How is the relationship between organizational culture and knowledge management in Finish project-based organizations?
3. What factors are critical for knowledge management initiatives in Finnish project-based organizations?

Five articles are proposed to answer these three research questions. Articles 1 and 2 are intended to answer the first research question and articles 3 and 5 are related to the second research question. The remaining article 4 answers the third research question. It appears from the findings that organizational culture has prominent effects on KM in project-based organizations and organizational culture also has a moderate to significant relationship with knowledge management activities in project environments. The study also finds that a lack of incentives and the absence of an appropriate information system are the most significant barriers to successful KM initiatives in projects. Project managers should fully concentrate on organizational culture artefacts in order to press forward KM practices in their projects. Project managers should formulate an attractive incentive package to encourage project members to participate in KM initiatives and to suggest ideas for new KM opportunities. They should also ensure that an effective user-friendly information system is in place before introducing KM initiatives.

ACKNOWLEDGEMENTS

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Abbreviations

KM Knowledge Management
MNC Multi National Company
PM Project Management
PBC Project-based Company
PBO Project-based Organization
PMAF Project Management Association Finland

ARTICLES

1 INTRODUCTION

This chapter starts with the background of this study, followed by the conceptual framework and objectives and research questions of the study. Finally, the structure of the whole research report will be described.

1.1 Background

Project-based organization (PBO) refers to a variety of organizational forms that occupy the formation of temporary systems for the performance of project tasks (Lundin and Söderholm, 1995; DeFillippi, 2002). PBOs have established ever-increasing interest in recent years as an emerging organizational structure to integrate diverse and specialized intellectual resources and expertise (DeFillippi and Arthur, 1998; Hobday, 2000; Gann and Salter, 2000; Keegan and Turner, 2002; Lindkvist, 2004; Prencipe and Tell, 2001). Topical attention in the emerging knowledge economy has reinforced the vision that project organizations need to organize their knowledge resources more efficiently. Project-based organizations can avoid traditional barriers to organizational change and innovation, since each project is presented as a temporary, relatively short-lived, phenomenon (Sydow et al., 2004). Taken together, a commitment to effective knowledge management (KM) in the context of a project-based business strategy is rising as a potent means of establishing and sustaining competitive advantage. However, as Love et al. (2005) have noted, KM is often considered a sub-optimal task within these organizations because knowledge is created in one project, and then subsequently misplaced because project-based companies (PBC) often lack organizational mechanisms for the knowledge acquired in one project to be transferred and used by other projects (Koskinen and Aramo-Immonen, 2008). This study intends to explore the knowledge management phenomenon in project-based organizations.

Since knowledge is constantly considered a significant asset for firms at a time of global competition, organizations are becoming more knowledge intensive and are hiring minds more than hands (Omerzel and Antoncic, 2008). Knowledge is now universally recognized as a critical competitive asset, and interest in KM has increased in most companies. Although the benefits of KM have long been recognized in PBOs, the effectiveness of knowledge transfer varies considerably among these organizations. The ability to manage what they know is often constrained by their capabilities with respect to creating, valuing, absorbing, and sharing knowledge. KM in project-based organizations is also a complex task. This is because project teams often consist of people with diverse skills, working together for a limited period of time; indeed, a project team often includes mem-

bers who have never worked together previously and do not expect to work together again (Burns and Stalker, 1961). In these circumstances, effective KM is complex, but essential. It is not surprising that corporate spending on knowledge-management initiatives has increased significantly in all forms of business (including project-based business) in the present decade (Ithia, 2003). Organizations are implementing a range of initiatives to identify, share, and exploit their knowledge assets in accordance with a knowledge-based view of the firm in which knowledge is acknowledged as a key sustainable competitive resource (Kogut and Zander, 1992). Nevertheless, many project-based businesses lack the expertise to handle their knowledge assets (especially those gained from the experience of previous projects); indeed, most knowledge-management initiatives in project-based firms have failed for a variety of reasons (including technological, cultural, knowledge content, and project management reasons) (Chua and Lam, 2005). This study is also going to address cultural issues that effect knowledge management initiatives in project-based organizations.

Organizational culture represents the basic, taken-for-granted assumptions and deep patterns of meaning shared by organizational participation and manifestation of these assumptions (Slocum, 1995). The failure of many knowledge management systems is often as a result of cultural factors rather than technological oversights. However, culture, by its very nature, is a nebulous subject with a variety of perspectives and interpretations. Knowledge is largely people-based and the cultural characteristics of different groups of people play a key role in successful KM (Ciganek et al., 2008) and the subsequent development of competencies within an organization (Argote and Ingram, 2000). The ability to create, share, and absorb knowledge among dispersed organizational members of varied cultural backgrounds is thus an essential requirement for success in project-based businesses, and previous studies have confirmed that culture can play a significant role in facilitating or hindering knowledge sharing in culturally diverse teams (Usoro and Kuofie, 2006). However, because projects almost invariably involve a variety of experts of diverse cultural, organizational, and professional backgrounds bound together in one project with time and money constraints, KM becomes a tricky undertaking, but currently effective management of knowledge has also turned into a category of vital tasks in project teams (Kang, 2007). In this study, I will take a step further to elaborate how knowledge management is a tricky task in project-based environments, particularly from the cultural perspective.

The composite and unpredictable environment of projects generates serious challenges for project managers and project-based organizations. Knowledge represents one of the key project capabilities that enables projects and project-based

organizations to deal with these challenges. Knowledge transfer across projects moves knowledge from project sources to project recipients with the objective of improving performance and capabilities (Landaeta, 2008). Management of knowledge within projects is considered the source of some intangible argument or unawareness, which has impacts on both the intellectual contribution to a project's objectives and the development of the learning competency skills of project participants. Perhaps, then, an important and primal contribution to achieving deeper understanding of these practices in project team settings involves an examination of how we conceive them within projects. Such an examination may result in confrontation with biased or limited perspectives of these activities, and may consequently challenge how one approaches KM activities within projects (Sense, 2008). The current study is also one attempt to obtain an additional deep understanding of individual behaviors towards knowledge efforts in project-based organization.

1.2   Conceptual framework

Project management (PM) has turned into a regular mode of business (Björke-gren, 1999). There are different factors that have influenced the emergence of PM as an approach for conducting business related activities include global competition, compression of the product life cycle, new product development, corporate downsizing, outsourcing, increased customer focus, and innovations in information technology. Such changes have prompted the need for companies to remain competitive and to manage more effectively the knowledge that they have acquired and accumulated from their projects (Fernie et al., 2003). This will, however, necessitate a certain organizational culture support. If knowledge is managed effectively, it can help to decrease project time, improve quality and customer satisfaction, and minimize delivery times. The KM, whether explicit or tacit, is a necessary prerequisite for project success in today's dynamic and changing global environment (Love et al., 2005).

According to Love et al. (2005), achieving knowledge utilizing to learn from failures or successes that have occurred in projects is vital for the long-term sustainability and competitiveness of business. Learning from project experiences can engender communities of practice within organizations and possibly between organizations where a strategic alliance exists, whose purpose is to create a cycle of application, assessment, reflection and renewal. A culture that is able to harness knowledge as a transferable asset and can be used to enhance future projects, and in certain cases expand the scope of an organization's project capability, can and

should be created. This is the basic instance that is being investigated in this study.

With growing levels of internationalization and globalization, strategic alliances and mergers and acquisitions initiate project teams that mostly consist of members from different national and organizational culture backgrounds, and as a result the growing heterogeneity within project teams may obstruct knowledge transfer (Sackmann and Friesl, 2007). But the capability to generate, transfer, and store knowledge within an organization determines the organization's abilities in terms of market expansion and strategic resources allocation. The organizational efficiency directly relates to the knowledge generated and possessed by the organization members. Those organizations that can generate and effectively manage their own unique knowledge tend to have more stable and less imitable competitive advantages (Ma and Wang, 2008).

In the light of the above arguments the present study areas under exploration are connected to several theoretical disciplines (see Figure 1). This study investigates knowledge management practices inside the wide field of project management and at the same time the focal point of the research is also organizational culture.
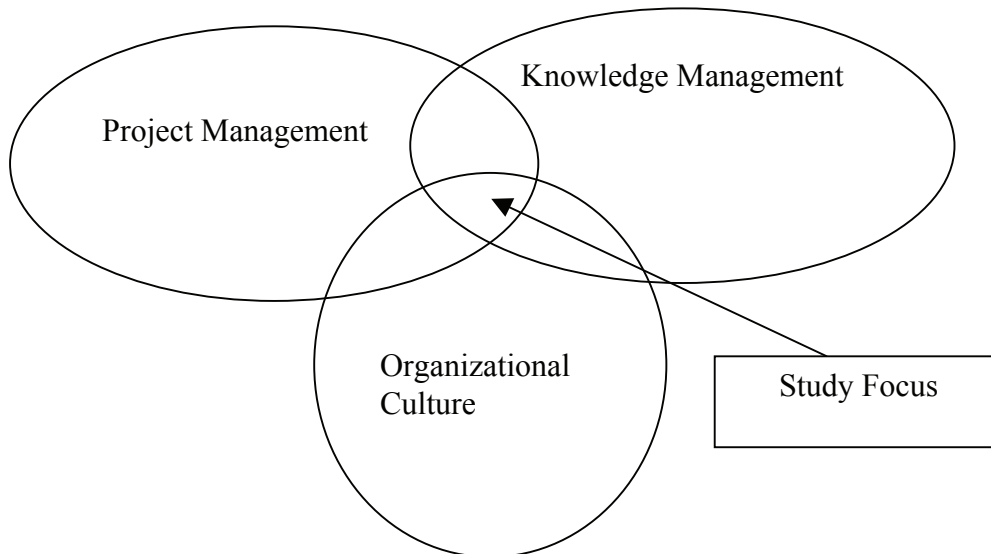
Figure 1.   Conceptual framework under exploration

1.3 Objectives and research questions

This study aims at increasing understanding about how knowledge can be managed and utilized in project-based organizations by keeping in mind cultural issues. Previous and current research on knowledge management from a cultural perspective particularly in the project work context is of a very preliminary level; however, it has already introduced and thrown light on this management theme. But a deeper understanding is needed to properly manage and utilize knowledge in such organizations because proper KM is essential for the competitiveness of future projects, as advocated by many researchers (Chua and Lam, 2005; Love et al, 2005; Sense, 2008)

Thus, the objective of this study is to analyze and understand different concepts related to knowledge management and the key features of project business knowledge as compared to the knowledge of traditional organizations. For this purpose, the study applies theoretical and empirical evidence in examining the research questions. A more detailed description of the objectives is provided in the following set of research questions, which will be answered in the study.

- How is organizational culture associated with knowledge management in project-based organizations?

- How is the relationship between organizational culture and knowledge management in Finnish project-based organizations?

- What factors are critical for knowledge management initiatives in Finnish project-based organizations?

By justifying the research objective I would say that it is essential to extend a further understanding of the individual behaviors whereby people can create and share knowledge within any setting if they seek to react efficiently to the challenges and opportunities of composite business and social operating environments. Specifically, with projects and project teams playing key roles in knowledge creation in organizations, and with the growing exercise of them to achieve a diverse and often complex set of technological and cultural changes that would otherwise be less accessible by the organization, there is a requirement to better understand these KM practices and their interaction within a project setting specifically from a cultural point of view.

1.4   Structure of the thesis

This dissertation consists of two parts. The rationale of Part I is to provide a synopsis of the study. Part II brings in the five consecutive and corresponding research papers regarding the focus of the study. Part I of the dissertation consists of five chapters: Chapter 1 introduces the research area, objective and research questions of the study, and lastly the structure of the thesis. Chapter 2 presents a literature review of the main areas of this study, including knowledge management, project management and organizational culture. Chapter 3 presents the research strategy and methodology by describing variables, data collection and analysis process. Chapter 4 introduces and summarizes the research papers individually along with questionnaire data analysis. Chapter 5 explains the conclusion and contribution of the dissertation by pointing out the limitations of the present study and future research directions. Part II includes the research papers relating to the research focus discussed in Part I. More specifically, the structure of the dissertation is described in Table 1.

Table 1. The structure of the thesis

Part I: Overview of the dissertation
1. Introduction
Description of the background, research areas, objectives and research questions
2. Literature Review
Concepts of knowledge management, project management and organizational culture
3. Methodology
Explanations of research design and positioning, variables along with data collection and analysis process
4. Findings and summaries of the publications
Questionnaire analysis results and individual snapshot of all the papers
5. Conclusion
Justification of the dissertation and managerial contribution of the papers and overall thesis
Part II: Publications
Publication 1
Knowledge transfer in project-based organizations: An organizational culture perspective
Publication 2
Cultural impacts on knowledge management and learning in project-based firms
Publication 3
Role of organizational culture for knowledge sharing in project environments
Publication 4
Critical factors for knowledge management in project business
Publication 5
Organizational culture and knowledge management: An empirical study in Finnish project-based companies

2   LITERATURE REVIEW

This chapter includes up to date review of literature. Firstly, it will shed light on the theme knowledge management by approaching it with regard to present study. Secondly, it will elaborate other research theme project management that is also in focus for this study. Thirdly, it will explain the concept of organizational culture with detailed discussion by other theorists. Finally, it will portrait a figure to elaborate the focus of present study with regard to previous studies.

2.1   Knowledge management

In this first sub-portion of the chapter definitions of knowledge and KM are given. Then it will differentiate data, information and knowledge along with knowledge transfer and sharing. It also elaborates knowledge activities and relation between knowledge and learning. In last, it will explore KM processes and wind up with its current challenges.

2.1.1   Definitions

Davenport and Prusak (2000) define knowledge as a fluid mix of framed experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experience and information. Knowledge often becomes embedded in documents or repositories and in organizational routines, processes, practices, and norms. Knowledge is also about meaning in the sense that it is context-specific (Huber et al., 1998). Jennex (2006) extends the concepts of context also to include associated culture that provides frameworks for understanding and using knowledge. Eventually, it can be concluded that knowledge contains information, but information is not necessarily knowledge. Knowledge has become an important theme in organization studies (Kubo and Saka, 2002). There is a growing interest in the way organization's process and create knowledge (Lahti and Beyerlein, 2000; Ndlela and Toit, 2001). The knowledge foundation of companies is gradually seen as underlying a firm's performance, and the role of organizational culture within this framework is seen as strongly associated with a firm's competitive performance (Lai and Lee, 2007).

Alavi and Leidner (1999) define KM as a systemic and organizationally specified process for acquiring, organizing and communicating both tacit and explicit knowledge of employees so that others may make use of it to be more effective and productive. However, KM is an action discipline; knowledge needs to be used and applied in order for KM to have an impact. We also need measurable impacts

from knowledge reuse in order for KM to be successful. Decision making is something that can be measured and judged. Organizations can tell if they are making the same decisions over and over and if they are using past knowledge to make these decisions better and more quickly. Also, decision making is the ultimate application of knowledge. In other words, KM is the practice of selectively applying knowledge from previous experiences of decision making to current and future decision making activities with the express purpose of improving the organization's effectiveness (Jennex, 2005).

KM importance has made out an exponential growth over the last 5-7 years. Whilst KM could be dismissed as yet another in a long line of management fads, the fundamental problems it seeks to address are, it is argued, more enduring (Swan and Scarbrough, 2001). These centrally concern the difficulties of transferring, diffusing, storaging, and innovating knowledge in the context of new structural forms of organization. Their effectiveness in these activities, relative to the competition, determines performance. But the efforts of many companies to manage knowledge have not achieved their objectives, and there is a growing sense of disenchantment among executives about the practicality of trying to enhance organizational knowledge.

Jantunen (2005) states that knowledge is posited in an organization as a strategic asset which can help the firm maintain its competitive ability in a turbulent environment. KM has such strategic value that organizations should include it as one of the key pillars of their human capital strategy (Liebowitz, 2004). Liebowitz (2004) suggested that KM strategy should be used to complement other strategic initiatives such as competency management, performance management and change management. KM can help to capture, share and leverage knowledge before it leaves the organization. A successful project manager constantly supplements the system of acquiring knowledge with his or her vision. Therefore, organizations combine their knowledge, broaden it and create new innovative ideas (Lassen, 2007).

KM in many ways is more of an art than a science (Liebowitz, 1999). It is the process of creating value from an organization's intangible assets. In simple words, KM refers to sharing and leveraging knowledge within an organization and outwards towards customers and stakeholders. According to Liebowitz (2004), however, many organizations do not have a systematic approach to sharing and leveraging knowledge internally and externally. In any growing field, the art often precedes the science until various methodologies, techniques, processes and tools are developed to underpin the field. This has certainly been the case

with KM, as there has been a blurring of the true meaning of data, information, knowledge, expertise, wisdom and beyond (Liebowitz, 1999).

2.1.2   *Data, information and knowledge*

The relationship of data, information and knowledge is usually confused. However, by making distinction, data is unprocessed raw facts and information consists of meaningful aggregations of data. Knowledge involves a person using his or her perception, skills, and experience to process information—thus converting it into knowledge (Ajmal & Koskinen, 2008). In other words, data represents facts or observations out of context that are, therefore, not directly meaningful (Zack, 1999). They are the raw material of higher order constructs (Bierly et al., 2000). Information results from replacing data within some meaningful content, often in the form of a message (Zack, 1999). Knowledge is something more than information (Beijerse, 1999). It is closer to action (Davenport and Prusak, 1998; McInerney, 2002). It is an organized and transformed combination of information, assimilated with a set of rules, procedures and operations learnt through experience and practice (Bhatt, 2001). Knowledge is increased through interaction with information, typically from other people (Clarke and Rollo, 2001).

Knowledge is classified as explicit and tacit knowledge (Nonaka and Takeuchi, 1995). Explicit knowledge is easy to articulate, capture and distribute in different formats. Tacit knowledge is unspoken and hidden (McInerney, 2002). It is difficult to capture, codify, adopt and distribute tacit knowledge; because individuals cannot easily articulate this type of knowledge (Bhatt, 2000). It can be thought of as the know-how that is acquired through personal experience (Perez and de Pablos, 2003). Tacit knowledge has been appraised as an inimitable competitive advantage (Lubit, 2001).

2.1.3   *Knowledge transfer and sharing*

Knowledge-transfer or knowledge-sharing is an ever more popular expression in the literature as writers attempt to highlight the human aspect of knowledge management. There is often a distinction made between knowledge transfer that occurs naturally or informally, and that which takes place in more formalized routines. Davenport and Prusak (1998), highlight the difference between the more formalized transfer mechanisms such as documents, databases, intranets and groupware, and informal exchanges which are more casual events that usually take place face to face i.e. in conversation. Song (2001) indicated that through effective knowledge sharing, organizations can improve efficiency, reduce train-

ing cost, and reduce risks due to uncertainty. Bartol and Srivastava (2002) defined knowledge sharing as individuals sharing organizationally relevant information, ideas, suggestions, and expertise with one another. Connelly and Kelloway (2003) further indicated that knowledge sharing is a set of behaviors that involve the exchange of information or assistance to others.

In the literature knowledge sharing is seen in two ways. For some theorists, knowledge sharing is largely seen as part of exploitation (e.g. McElroy, 2003) and others consider it part of the exploration phase (e.g. Swan et al., 1999). Exploitation refers to the processes where existing knowledge is captured, transferred, and deployed in other similar situations. Exploration, on the other hand, involves processes where knowledge is shared; synthesized and new knowledge is created (McElroy, 2003).

2.1.4 Knowledge activities

Always knowledge has vital competitive advantage for any organization (Lai and Lee, 2007). However, growing competition, continuous changes and mergers in industries have made the risk of losing valuable knowledge, due to transfer or termination of employees (Gunnlaugsdottir, 2003). Therefore, organizations must protect their knowledge base and take steps to exploit effectively both the internal and external knowledge which is of relevance to their operations and make it explicitly accessible to their employees.

The rationale of knowledge activities in organizations is to ensure development and stability of performance by protecting critical knowledge at all levels, applying existing knowledge in all relevant circumstances, combining knowledge in synergistic approach, attaining relevant knowledge continuously, and rising new knowledge through continuous learning that builds on internal experiences and external knowledge (Bourdreau and Couillard, 1999). Knowledge activities seem to be more directly explained to learning behaviors, activities or processes rather than knowledge management (Lai and Lee, 2007).

Usually, the essential activities for knowledge can be understood as being of four categories, transferring, diffusing, storaging, and innovating of domain knowledge (Chua, 2004). Knowledge transferring refers to the identification and acquisition of knowledge either through exploitation, exploration or codification (Manor and Schulz, 2001). Knowledge diffusing refers to the flow of knowledge from one part of the organization to other parts. If this process is not properly managed, valuable sources of knowledge in the organization will remain local or fragmentary, and internal expertise under-leveraged. Knowledge storaging refers

to the articulation of tacit knowledge into formats such as prescriptions, manuals or documentation that are comprehensible and accessible to others (Sanchez, 1997). Knowledge innovating refers to the refinement of existing knowledge into new knowledge to achieve improvement in efficiency and effectiveness.

Knowledge activities can be seen as actuators for inspiring the development of new knowledge to accomplish the vision and standards through identifying, capturing, reusing and leveraging relevant knowledge. However, whether concerning individuals or groups, adopting new meaning structures and modifying associated behaviors require time and effort, especially causes from cultural barriers (Lai and Lee, 2007).

2.1.5   *Knowledge and learning*

The concept of KM (Nonaka and Takeuchi, 1995; Davenport and Prusak, 1998) and the learning organization (e.g. Senge, 1990; Huber,1991; Garvin, 1993) have significantly influenced the way in which organizations transform themselves in the wake of external or internal change being imposed upon them (Sethi and King, 1998).

Garvin (1993) defines a learning organization as an organization skilled at creating, acquiring and transferring, knowledge and modifying its behavior to reflect new knowledge and insights. In the similar vein, Watkins and Golembiewski (1995) suggest that a learning organization is one that involves creating systems which put in place long term capacities to capture knowledge to support creation, and empower continuous transformation. Clearly, the underlying objectives of KM and learning organization are akin, as they seek to improve business performance, and deal with data-information-knowledge and the processes for acquiring, referring, storing and sharing the content in an organizational setting. KM is therefore best viewed as a subset of the learning organization (King and Ko, 2001).

Using knowledge gained to learn from failures or successes that have occurred in projects is vital for the long-term sustainability and competitiveness of business. Learning from projects experiences can engender communities of practice within organizations and possibly between organizations where a strategic alliance exists, whose purpose is to create a cycle of application, assessment, reflection and renewal. A culture that is able to harness knowledge as a transferable asset and can be used to enhance future projects, and in certain cases expand the scope of an organization's project capability, can and should be created.

The need of new knowledge particularly incase of project depends on the novelty and uniqueness of the product being created (Pohjola, 2003). However, it is often argued that the processes involved in delivering the final outcome are similar, even though a project (the project team composition, product to be produced, etc.) is unique (Love et al., 1999). Most projects, therefore, do not need to start from scratch inasmuch as they can utilize existing process and learn from the experiences acquired from previous projects. The effectiveness of this cycle will invariably be dependent upon the mechanisms for learning that are implemented throughout a project's life cycle. However, a well-designed organization structure, incentive schemes and management processes are crucial in assisting organizations to shape their knowledge assets into competences (Willem and Scarbrough, 2002).

2.1.6   KM processes

In general, the following steps are followed to symbolize the returning model of KM processes.

Create knowledge: the knowledge comes largely from the experiences and skills of the employees. Knowledge is created as people determine new ways of doing things or develop know-how. Sometimes if the knowledge is not residing in the organization, external knowledge is brought in, for example, technology transfers that take place from the research laboratories to the business organizations.

Capture knowledge: the knowledge that is created needs to be stored in its raw form in a database. Most organizations use many different types of knowledge repositories to capture the knowledge (Wang, 2002).

Refine knowledge: innovative knowledge must be placed in context so that it is to be actionable. This is where human insights or tacit knowledge is captured and refined along with explicit knowledge (Herschel et al., 2001).

Store knowledge: codification of tacit and explicit knowledge helps in making the knowledge understandable and which can be used later on.

Manage knowledge: knowledge must be kept contemporary to be reviewed to verify that it is relevant and accurate. Thus, most fortune companies have well defined departments that actually take care of keeping the knowledge contemporary.

Disseminate knowledge: knowledge must be made available in a useful format to anyone in the organization who needs it anywhere and anytime. Liebowitz (2005)

introduces KM process cycle that consists of four major steps as mentioned above. He explains that knowledge is identified and captured, shared with others, applied in the combination with existing applicable knowledge, and then created in the form of new knowledge, which is then captured and continues as noted in Figure 2.
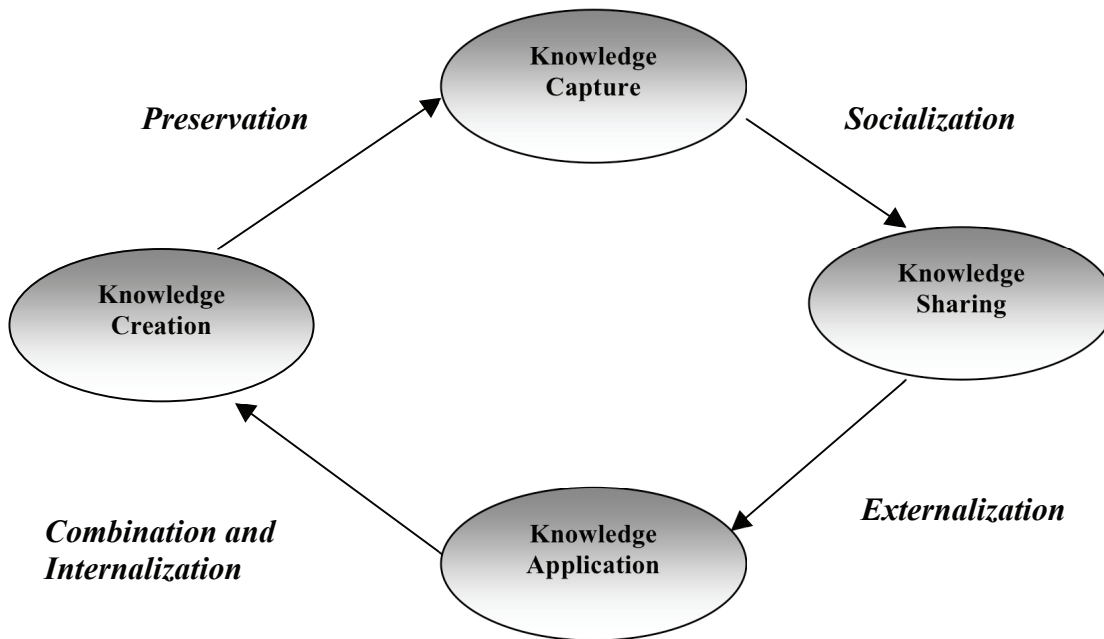
Figure 2.   The cycle for knowledge management (source: Liebowitz, J., 2005)

Nonaka and Takeuchi's (1995) KM model that consists of Socialization-Externalization-Combination-Internalization (SECI) model can be included as part of the KM cycle. Once key knowledge has been has been identified and codified in some way, a socialization effect occurs resulting in knowledge sharing. Knowledge resulting from this knowledge-sharing experience becomes externalized, resulting in an application of the knowledge. This knowledge is then combined with other knowledge that the individual possesses, as well as internalized along with the individual's worldviews and value hierarchy. This should hopefully result in new knowledge being created, which then needs to be preserved as it becomes captured and the cycle begins again.

2.1.7   *Knowledge management challenges*

A recent study by Kalkan (2008) has exposed a wide range of KM challenges that have certain concerns for global companies having different organizational structures. Cultural adaptation is the most prominent amongst the others. Figure 3 provides an overview of all the challenges listed here.
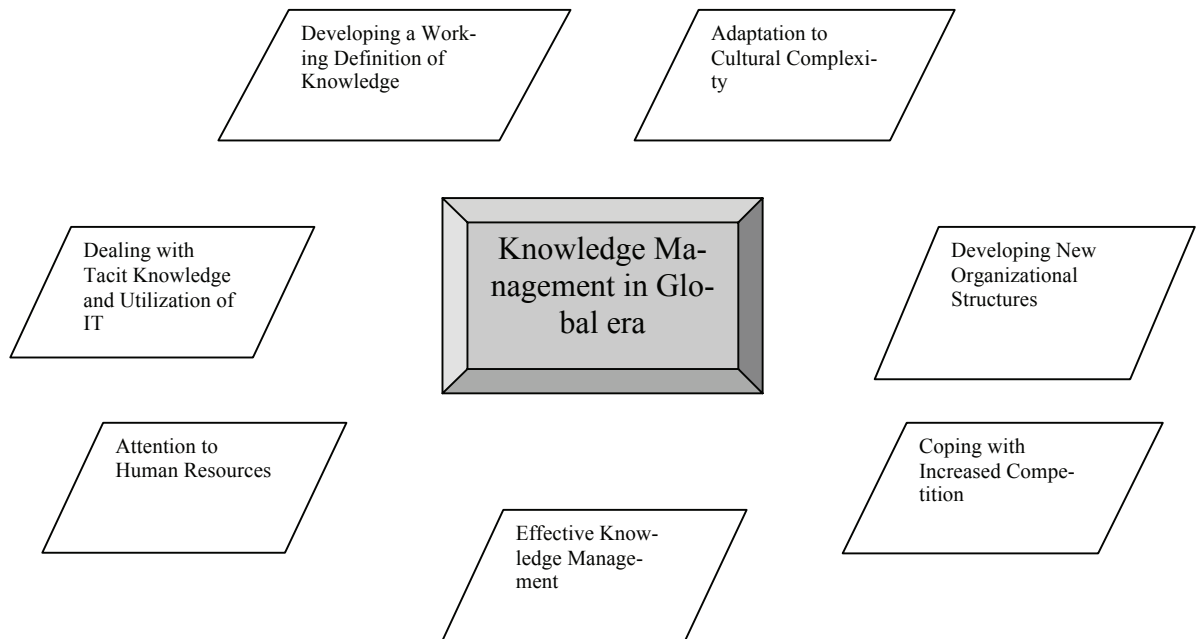
Figure 3.   KM challenges in global business (source: Kalkan, V. D., 2008)

Organizations have to develop a working definition of knowledge. It is a necessity to distinguish between data and information on the one hand and knowledge on the other. This is essential for the knowledge construction stage especially. Otherwise, the organization will treat data, information, and knowledge by the same way. Knowledge will become undervalued. Therefore, utilization of knowledge resources will become impossible. The organization will waste resources by substituting distinct efforts such as data warehousing architecture plans and IT advancement programs for KM initiatives. Not developing a working definition of knowledge is a critical error contributing directly too many errors and failures in the knowledge-management process (Fahey and Prusak, 1998). However, Kalkan (2008) explains that defining knowledge differs among various types of organizations and even among different branches or departments of the same oganization. In general, the challenge is to define what constitutes knowledge in the organization at the beginning of the knowledge management initiative so as to be

able to develop further initiatives of KM based on an operational knowledge definition. For this reason, management should encourage social interaction and dialogue in the organization. This will enable sharing insights, – though indirectly and often in an unintended and informal manner – generate inputs for defining, and so will enrich the defining process.

As a constituent of social complexity, cultural complexity global companies experience implies some managerial and organizational interventions to organizational culture. Because organizational culture is a key element of managing organizational change and renewal, inappropriate culture is generally regarded as the key inhibitor of effective knowledge sharing (McDermott and O'Dell, 2001). Therefore, organizations have to move towards a knowledge-oriented culture by every means possible. A knowledge-oriented culture, challenges people to share knowledge throughout the organization. At the same time, it is a culture of confidence and trust. Confidence and trust are required to encourage KM practices in the organization.

In fact, tacit knowledge is very difficult to articulate because it is highly situated in the context and to abstract it from its context of application would mean to lose much of its intrinsic meaning and value (Kakabadse et al., 2001). However, it is tacit ness that makes knowledge difficult to imitate and therefore an important organizational resource for sustaining competitive advantage (Grant, 1996). Organizations, in spite of the recent emphasis upon tacit knowledge, seem reluctant to deal with it. Therefore, a more explicit emphasis must be exhibited. Programs enabling and encouraging tacit knowledge sharing must be supported by management and focus on tacit knowledge should not deemphasize the importance of IT implementations. An effective balance between focusing on tacit knowledge and utilizing IT should be achieved.

KM accomplishment is likely to be significantly dependent on having competent and suitably motivated people actively participating in the process (Hislop, 2003). Thus, effective human resources management strategy must be implemented. Attracting and keeping people with abilities, behaviors and competencies that add value to the firm's knowledge stock must be targeted. In the opinion of Kalkan (2008) this requires effective recruitment, selection, training, development and compensation policies. Building trusting and meaningful relationships within the organization also supports human resources policies enabling improved organizational knowledge management. An effective flow of dialogue must be achieved, and especially informal knowledge sharing practices must be encouraged by management.

At one hand, different organizational structures like Hierarchical-bureaucratic structures, though they generate useful outcomes in some organizational settings and under specific circumstances, are considered to prevent knowledge sharing and utilization. But on the other hand they also impose limits to learning, generation of new knowledge, knowledge dissemination and, as a result, innovation. Thus, developing new organizational structures is a complex issue offering a wide variety of solutions for differing organizations. The requirement of developing a new organizational structure must be balanced with the crucial need for company business.

In a fast emerging global era, coping with increased competition is one of the most significant challenges of KM faced by companies at present. In intense worldwide competition the firms have to take new actions responding to environmental demands, pressures, and challenges almost every day. Prompt reaction strategies have become prevalent because of the intensity of the competition. Consequently, a stress between the nature of KM and accelerating pace of change occurs and it requires practical and worldwide applicable solution should be proposed in response to this problem. Overall, specific KM programs should be designed as flexible as possible. But the framework and main principles of KM initiative must be soundly structured in order to internalize KM as a crucial process in the organization.

However, to surmount the complexities of KM challenges impose; organizations must adopt the essential approaches and activities suitable to their business nature. Appropriate, timely and careful responses are important for successful KM initiatives.

2.2   Project Management

In this second sub-part of the chapter the terms project and PM are defined. Then it follows with the discussion of project-based organization and project business. It comes to an end with combining projects and knowledge management theories.

2.2.1   Project and project management

A project is a temporary organization to which resources are assigned to undertake a unique, novel and transient endeavor that involves managing the inborn uncertainty and need for integration in order to deliver valuable objectives of transformation (Turner and Miller, 2003, p. 7).

The term project management refers to the application of knowledge, skills, tools, and techniques to project activities and processes in order to meet or exceed stakeholders' needs and expectations with respect to that project. The term project management is also sometimes used to describe the organizational approach to the management of ongoing operations (PMBOK 2004).

According to British Standard in Project Management BS6079 (1996), project management is the planning, monitoring, and controlling of all aspects of a project, and the motivations of all those involved in it, to achieve the project objectives on time and to the specified cost, quality, and performance.

Since projects are often self-contained, temporary and complex tasks, they do not easily fit into routine organizational processes and frequently involve devoted modes of organization and specific management practices and techniques (Grabher 2002). Several studies of project organization and management deal with these particular aspects of projects by illustrating them as comparatively short term and fluid activities that are set against a more permanent and static organizational background (Prencipe and Tell 2001).

Projects, as short-term organizations engage substantial knowledge dispensation. In transformational projects, teams of individuals from diverse professions with different dedicated knowledge work collectively under time and budget constraints to create a new product, process, or service. From this perspective, one might say that a project manager's primary task is to manage expired knowledge bases of the team members and stakeholders so that they combine in the best possible way to successfully accomplish their assignment. Team members individually and collectively have to learn new knowledge, transfer their knowledge to others, and create new shared understandings at the right times and for the right cost. Thus, the notions of KM and learning are extremely related to the success of any project (Reich, 2007).

2.2.2   *Project-based organizations*

Project-based organization (PBO) refers to a variety of organizational forms that involve the creation of temporary systems for the performance of project tasks (Sydow, et al., 2004). Clearly, a PBO incorporates the meaning of an organizational structure specially formed for a temporary period to enable a project-based organization carry out a specific task. In wide expressions, project-based organizations are economic companies that structure their activities around a number of relatively discrete projects that can be treated as separate organizational entities. These projects are temporary coordination systems in which diversely skilled spe-

cialists work together to accomplish complex and innovative tasks in a predeter-mined period of time (Grabher, 2002).

In comparison to the matrix, functional, and other forms, the PBO is one in which the project is the key unit for production organization, innovation, and competi-tion. While the PBO is generally used in private manufacturing enterprise, it is also deployed in other public and private organizations, as well as the legal pro-fession, consultancy firms, marketing, and advertising.

PBO has a substantial interdependence of different kinds of knowledge and skills, the complexity and unpredictability of many tasks and problems, and the time-delimited nature of project goals and, often, of employment. Though, there are also significant variations in the kinds of products and services offered by PBOs, and the inputs used. Project outcomes, for instance, can be at variance in terms of their customization, vagueness of specification and degree to which customers co-produce them. They are also relatively distinct, tradable, predictable, competence critical and technologically constant (Breschi and Malerba, 1997). However such deviations have major propositions for the management of such companies and their capacity to generate unique combined capabilities (Casper and Whitley, 2004). Moreover, the variety and interdependence of inputs vary significantly between PBOs, particularly the knowledge and expertise. Although these kinds of variations affect the complexity of project organization and coordination costs because they need more coordinated efforts to overcome this issue.

KM in project-based organizations draw attention to the fact that the process of knowledge capture, transfer and learning in project settings rely very heavily upon social patterns, practices and processes. Usually, the knowledge created through the effort to resolve problems during a project is retained by the project members who will be able to use and apply this knowledge in future projects. Launching an effective KM initiative to capture this knowledge, sharing it and using it even after the disbanding of the project team should be made a priority (Dulaimi, 2007).

2.2.3   *Project business*

Projects related research is expanding its view towards wider aspects of project business. From the recent years the significance of project business is increasing because all private firms and public organizations are adopting project-based business approach as part of their business strategy. While existing studies ana-lyze projects, firms, and business, and practitioners increasingly refer to project business, the concept of project business is still uncovered.

Artto and Wikström (2005) define project business as the part of business that relates directly or indirectly to projects, with the purpose of achieving objectives of a firm or several firms. This definition refers to multiple projects and multiple firms. Indeed, both projects and firms are organizational entities that represent relevant players in the business context. Artto and Kujala (2008) present the project business framework that shows managerial application with a single and with several firms' perspective, and with a single and with several projects perspective that may cross one or several firms' business activities. The project business framework illustrates four distinctive areas like: (i) management of a project; (ii) management of a project-based firm; (iii) management of a project network; and (iv) management of a business network. Figure 4 provides an overview of these terms.

	One Firm	Many Firms
One Project	Management of a project	Management of a project network
Many Projects	Management of a project-based organization	Management of a business network

Figure 4.   Framework of project business (Artto and Kujala, 2008)

The above mentioned areas in the figure differ as to whether the focal point of the management is a project, a project-based organization, a project network, or a business network. The management of a project is an area which is well known, and it is typically maintained that project management consists of the broad areas of knowledge (or processes) that all include the procedures, methods, and tools that are characteristic of project management: project integration management, scope management, schedule management, cost management, resource and personnel management, communication management, risk management, procurement management, and quality management (Artto and Kujala, 2008).

Lindkvist (2004) argues that a project-based organization is a firm that performs most of its work in projects and mostly stresses the project dimension rather than the functional dimension of its organizational structure and processes. Hobday (2000) compares project-based and project-led organizations: according to Hobday, project-led organizations are firms in all types of industries that undertake projects as a growing part of their operations, even while their primary productive activity might be volume-based or operations-oriented, while project-based organizations organize most of their internal and external activities in projects.

In general, a project involves a number of organizations during the implementation stage. Consequently, the network perspective is most applicable when considering a project as a group of multiple firms or organizations (Eloranta et al., 2007). However, some actors participate in a project network cause uncertainties that are often due to network effects such as reliance on other actors, interest differences, singular identities, missing information, information irregularity within the network, social and institutional risks, network risks, trying to behave rationally, and risk management procedures that do not fit into a networked context (Eloranta et al., 2006).

Business networks are bigger than before because of outsourcing, liberalization and de-regulation, the challenge of complexity and scattering of various special capabilities to several organizations, technological convergence, solutions in information and communication technologies, and digitization. The business relationships in the permanent business network of firms affect the composition of those firms that are selected to participate in a project, and vice versa - the projects and their temporary networks have an impact on the permanent business network (Ahola et al., 2006; Artto et al., 2008). Firms may take part in different projects in diverse roles, and each project may have a separate set of actors (Eloranta et al., 2006; Eloranta, 2007). Moreover, a project supplier firm's delivery scope may vary in those numerous parallel projects that the supplier firm engages in (Cova et al. 2002). Interests and goals between business actors or non-business actors in the business network can be controversial, conflicting or competitive, which may introduce barriers to a project's activities, or political behavior that complicates the implementation of a project in a place where different parties try to use their power to impact the project so that it will be in harmony with their business interests (Lamberg et al., 2008).

2.2.4 Projects and knowledge management

Projects as short-term structures refer to groups comprising a blend of different specialist competences, which have to achieve a certain goal or carry out a spe-

cific task within pre-set limits as to costs and time. Such a view is enlightens the temporary and multidisciplinary nature of project features that primarily contribute to shaping the possibilities as well as the obstacles for generating knowledge and accumulation of learning action (Sydow et al., 2004). Although the success of project-based organizations may in reality depend upon decentralized team working and the actions of relatively autonomous project managers (O'Dell and Grayson 1998), harmonization within and across organizations is often critical to make sure that the knowledge gained in a particular project is stored for use in other projects or that project-based organization practices are improved over time.

Uncertainty is one of the PM conditions, and managing this uncertainty is dependent upon the information and convenience of the existing knowledge. KM enables project team members to reduce rework and squeezes the time that it takes to plan project execution. Additionally, providing the right knowledge to the right person at the right time allows for better power over the project during the project's lifecycle by reducing uncertainty (Lierni and Ribiere, 2008). DeFillippi and Arthur (1998) say that project-based businesses challenge several assumptions of current strategic management theory. They explain that one view of strategic management theory is that organizations build up and control core competencies or key resources over time but question how a project-based organization can accumulate its core competencies when it rents all its human capital and how tacit knowledge and knowledge transfer can unfold without a constant cadre of experienced personnel. Then the second belief of strategic management theory is that firms create competitive advantage through their possession and use of non-imitable resources but the question then is how a project based company can create competitive advantage when its knowledge-based resources are embodied in highly movable project participants. Then the third belief is that competencies are accumulated through firms competing to recruit and develop human capital: so how is this human capital assembled, and what market and social processes facilitate its identification, evaluation and selection for project- based activities?

However, projects as a means to systematize operations have turned into increasingly widespread sources in the public as well as the private sector. Yet project-based organizations face many challenges to achieving project effectiveness (Ruuska and Teigland, 2009). Since they are unique, goal-oriented systems, where technical, procedural, organizational, and human elements are incorporated, they are therefore composite in their nature (Frame, 1995). According to Kasvi et al (2003), all projects have numerous potential outputs, which are not necessarily all intentional all the time, but have to go through certain processes that always require specific knowledge. For example a product (tangible or intangible) delivered to an internal or external customer, and the project knowledge

related to the product, its assembly and use contain three types of knowledge: (i) technical knowledge concerning the product, its parts and technologies, (ii) procedural knowledge concerning usage of the product and acting in a project, and (iii) organizational knowledge concerning communication and collaboration. Project members are not only organizationally but also geographically dispersed. They have diverse backgrounds and may speak several languages. For instance, in order to develop a new product, a company may bring in people from suppliers, clients and universities. But projects are temporally limited, and the people involved, and the lessons learned, are dispersed when the project ends. Often people change even during a project. Sometimes it is difficult to find people who have been involved in a project from its beginning. In an environment of employee empowerment and information decentralization which is typical of project organizations, this results in organizational knowledge fragmentation and loss of organizational learning.

One of the major challenges of project management is the inconsequential and twisted accumulation of knowledge. The content and quality of the knowledge created vary, as well as the ability of organizations to utilize it. Knowledge management in a project can be categorized into four groups of activities (Kasvi et al, 2003):

- Knowledge creation- like collection, combination and refinement

- Knowledge administration- like storage, organization and retrieval
  Knowledge dissemination- within and outside the project

- Knowledge utilization and productization- like integration into products and decisions, and application in other projects.

Moreover, there are two basic strategies for managing project knowledge. The codification strategy is based on codifying the knowledge and storing it in artifacts and databases where it can be accessed. In the personalization strategy, the knowledge is tied to persons who develop it and it is shared by personal interaction. As the main focus in KM concentrates on ICT tools and explicit knowledge (codification), face-to-face interaction (personalization) needs to be strengthened.

A personalization or social approach to KM is particularly vital in project learning activity since it is the activity through which tacit knowledge is exposed and shared. In contrast, the technical or codified approach to managing knowledge is intrinsically incomplete in exposing and sharing the tacit knowledge attained by the project participants (Sense, 2007).

Different forms of knowledge exist within and across individuals and teams in projects. The most important form of knowledge in projects is tacit knowledge. Tacit knowledge is developed and internalized by individuals over a long period of functioning time. In addition, when tacit knowledge is made explicit, it becomes the foundation of new knowledge such as concepts, images, and written documents (Teerajetgul and Chareonngam, 2008).

Project contexts offer a variety of interesting possibilities for exploring knowledge-related issues. It would appear that projects provide excellent preconditions for creating new knowledge. Projects involve the development of new products or services to be carried out by a highly autonomous multifunctional or multidisciplinary team. The relative absence of hierarchy and the diversity of frameworks involved should provide fertile soil for creativity and innovation (DeFillippi 2001). The need to come up with new, more or less customized solutions, within a strictly limited period of time, means that project settings present unique possibilities to learn more about time pacing and promotion of knowledge development processes (Lindkvist et al. 1998).

While projects work well and people learn a lot during their execution, there is a risk that the wheel in the organization, in the network or in the field, will be reinvented over and over again. In order to bring about inter-project learning and learning across organizational levels, firms or inter firm collectivities may, however, use a variety of strategies and means for knowledge transfer. They may adhere to a codification or a personalization strategy (Hansen et al. 1999) or make a choice from the multitude of alternative means for inter-project learning suggested by Prencipe and Tell (2001).

It should be noticed that the 'transfer' of knowledge and learning between organizational and inter-organizational levels is far from being a straightforward matter. For example, individual learning may simultaneously be a matter of organizational learning, where project members typically move from project to project. Similarly, firms may encourage informal, spontaneous processes of knowledge exchange, and make no a priori attempt to transform individual learning into organizational learning.

Looking at knowledge integration in cross-functional projects is important because firms are progressively relying more and more on this type of organization. This is primarily because such projects do not require an extreme adaptation of existing organizational structures, yet have proved to be helpful to firms in their attempts to manage complex organizational tasks (De Meyer, 1998). Although cross-functional project teams are frequently formed on the principle that this will allow for the joint banding of some specialized expertise from different organiza-

tional units, our understanding of how knowledge is integrated within this specific context remains limited (Huang et al., 2001). Exploring these processes of knowledge integration within cross-functional projects is therefore important.

According to Huang and Newell (2003), knowledge integration in the context of cross-functional project implementation is a process of engaging organizational members through the promotion of project benefits and the management of social networks. An organization's embedded practices, past integration experience and social capital plays a key role in shaping the level of coordination that in turn influences the efficiency and scope of integration. In particular, the development and development of social capital within and beyond the project team is critical, as is the encouragement of project facts during the creation of common knowledge.

Knowledge integration has also been identified in many studies as a significant component in innovation and learning (Okhuysen and Eisenhardt 2002). It can be viewed as the synthesis of specialized knowledge into situation-specific systemic knowledge (Alavi and Tiwana 2002). Scarbrough et al. (2004) explain that knowledge integration within a project involves overcoming barriers to the flow and transfer of knowledge arising from pre-existing divisions of practice among team members. In an analysis of knowledge flows in cross functional settings (Carlile 2002), such barriers have been referred to as 'knowledge boundaries', with three different types of boundary arising from divisions in practice: a syntactic (language) boundary, where the flow of knowledge is inhibited by the lack of a common language rules between the individuals or groups involved; a semantic (meaning) boundary, where relevant groups are unable to share knowledge because they bring different interpretations to it; and a pragmatic (practice) boundary, where the flow of knowledge is constrained by differences supplied in the practices and interests between groups and individuals (Scarbrough et al., 2004).

2.3   Organizational Culture

The latest studies have drawn significant attention to organizational culture. For instance, Jassawalla and Sashittal (2002) explain distinctive features of highly innovating supportive cultures and recommend how organizations might build up such cultures. Moreover, Lin and Lee (2004) assess the factors that influence employees' motivation towards KM practices. The results show the main determinants of enterprise KM behavior are the motivating intentions of senior managers in specific organizational cultures. In the following pages we will examine organizational culture in detail.

2.3.1   *Concept of organizational culture*

Tyler (1871) was the first to provide a formal description of the term 'culture'. He defined the term as that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society. Triandis (1972) viewed culture as an individual's characteristic way of perceiving the man-made part of one's environment. It involves the perception of rules, norms, roles, and values and it influences interpersonal behavior. Kilmann et al. (1985) indicate culture to be a common philosophy, ideology, values, belief, hypothesis and norms for mankind. Culture means the invisible power concealed behind concretely visible things which influences people's behavior in society.

Steven (1989) explains that organizational culture is something similar to the culture of the society in which the organization operates. This view considers organizational culture as a micro-culture within the culture of a given society or nation. However, today's large organizations distributed across the world have developed their own specific cultures, embedding various cultural features of the societies and nations in which they operate. These organizations constantly struggle to develop their own and unique cultures with a sense of unanimity throughout their distributed divisions. Lemken et al. (2000) portray organizational culture as the sum of shared philosophies, assumptions, values, expectations, attitudes, and norms that bind the organization together. These cultural features of an organization may deviate from the cultures of their respective societies.

According to Schein (1996), culture is a pattern of basic assumptions - invented, discovered, or developed by a given group as it learns to cope with its problems of external adaptation and internal integration that have worked sufficiently well to be considered legitimate and, thus, to be taught to new organizational members as the accurate way to recognize, think, and sense in relation to those problems. Hofstede (1994) defines culture as a collective programming of the mind that differentiates members of one group from other. Uttal (1993) defines it as a system of shared values (what is important) and beliefs (how things work) that interact with a company's people, organizational structures, and control systems to produce behavioral norms. Davis and Devinney (1998) provide the view that organizational culture is an evolutionary tool and it defines the way business is carried out, the nature of conduct with external publics, how internal publics interact, how individuals are developed, the roles and norms of performance, and the atmosphere of work. Jones et al. (2006) describe culture as a system of shared values that produce the attitudes and behaviors of members of the organization.

However, organizational culture is seen as a shared rationalization and understanding of organizational events that develops over time. Denison (1996) suggests that culture refers to the deep structure of organizations which is rooted in the values, beliefs, and assumptions held by organizational members. These shared cultural assumptions are subconscious, powerful, and group phenomena that do not change rapidly. The organizational culture evolves over time as the glue that holds the organization together. Culture, as a system of shared values and assumptions, is critical to any organizational activity. It dominates how organizations function, how employees interact, and how decisions are made. Culture represents a core set of values governing the attitudes that employees adopt toward change and their approaches to the introduction of something new.

2.3.2   *Organizational culture and performance*

The major rationale for the widespread acknowledgment of organizational culture resides in the argument that certain organizational cultures lead to greater organizational monetary performance (Ogbonna and Harris, 2000) and also t the success and failure of TQM implementation approaches (Kekäle, 1998). Numerous studies illustrate that the performance of an organization is dependent on the strength to which the cultural values are extensively shared (Denison, 1996; Knapp, 1998; Kotter and Heskett, 1992). The assertion that organizational culture is associated with performance is found in the perception that culture can cooperate in building competitive advantage (Scholz, 1987). Krefting and Frost (1985) suggest that organizational culture may create competitive advantage by defining the boundaries of the organization in a manner which facilitates individual interaction and/or by limiting the scope of information processing to the appropriate levels. In the same way, it is argued that widely shared and strongly held values enable management to predict the employees´ reactions to certain strategic options, thereby minimizing the scope for undesired consequences (Ogbonna, 1993; Ogbonna and Harris, 2000). Theorists also argue that sustainable competitive advantage arises from the creation of organizational competencies which are both superior and imperfectly imitable by competitors. To this end, it is argued that the "uniqueness quality" of organizational culture makes it a potentially powerful source of generating advantage over competitors. Indeed, many commentators have advised organizations and researchers to exploit the multiple advantages which could be offered by culture rather than focusing on the more tangible side of the organization (Johnson, 1992; Prahalad and Bettis, 1986). In general, the literature on organizational culture is rich and diverse. According to Lai and Lee (2007), much of the richness is founded on the claim by many researchers that culture is linked to organizational performance. While some theorists have ques-

tioned the universality of a culture-performance link, sufficient evidence exists to suggest that organizational culture is associated with organizational performance.

2.3.3   *Organizational culture and KM*

The current operationalization of the knowledge economy requires many organizations to recognize knowledge as a vital source to obtain sustainable competitive advantage (Davenport and Prusak, 2000; Drucker, 1988; Skyrme, 1999; Teece, 1998). This recognition has resulted in passing on the intentional significance to KM and commencing formal KM programs in many organizations. In the last few years, several theories have been put forward for practicing KM. But, given the theoretical nature of the subject matter, there is little consensus on the components and ways of knowledge management. Davenport and Prusak (2000) suggest that organizations should take a hard look at their culture before launching a knowledge initiative. Several other authors support this notion and advocate that organizational culture should be the focal point of KM programs (Bock, 1999; Krogh et al., 2000; Nonaka and Takeuchi, 1995; Rastogi, 2000). Despite this widespread recognition of organizational culture as a core factor in the KM arena, very little is known about creating an effective culture for knowledge management. Many unanswered questions remain regarding the meaning and content of organizational culture itself (Gupta and Govindarajan, 2000; DeLong and Fahey, 2000; Louis, 1983; Martin and Siehl, 1983). According to Oliver and Kandadi (2006), a culture is not something an organization has; a culture is something an organization is. The issue of defining culture is not new and arises from old arguments in anthropology, sociology and archaeology and this continuing debate over the definition of culture, addressing the cultural factors towards effective knowledge management, becomes a complex issue for organizations. However, some organizations have proved more successful than others in their KM efforts, often citing their inherent culture as the central aspect behind their success (Hackett, 2000).

2.3.4   *Organizational culture and knowledge activities*

People are the key component to knowledge activities; hence the type of culture existing in the enterprise is very crucial to knowledge activities (Lai and Lee, 2007). Davenport and Prusak (2000) highlight that as enterprises interact with their environments; they absorb information, turn it into knowledge and take action based on it in combination with their experiences, values and internal rules. Enterprises that are serious about knowledge foster an environment and culture that support continuous learning. Culture is a basic building block to knowledge

activities. It must be considered when introducing new knowledge activities, because it affects how the enterprise accepts and fosters them (Ndlela and Toit, 2001). If knowledge activities are to be an integrated aspect of how work gets done in an enterprise, it must become an integrated aspect of the culture. It should be addressed in the enterprise's mission, vision and goal statements, as well as emphasized in enterprise-sponsored training and enterprise communication in order to ensure successful implementation of knowledge activities.

Creating a knowledge friendly culture, one of the most crucial factors of success for knowledge activities, is very difficult. It requires strong leadership and a change of both attitudes and behaviors (Lin and Lee, 2004). When knowledge activities are introduced properly, with concurrent efforts to manage change in the enterprise, great things can be achieved. It enables enterprises to be more competitive, and to do more in a shorter period of time (Lai and Lee, 2007).

2.3.5 *Knowledge culture*

The existing literature in KM constantly accentuates the inseparable relationship between organizational culture and knowledge management (Davenport and Prusak, 2000; Krogh et al., 2000; Nonaka and Takeuchi, 1995). Despite this emphasis on the crucial role of organizational culture in knowledge management, there is a lack of clarity on how to influence and develop knowledge culture in organizations. Oliver and Kandadi (2006) refer to knowledge culture in terms of representing a way of organizational life that enables and motivates people to create, share and utilize knowledge for the benefit and continuing success of the organization.

There is a wide array of factors and concepts which are considered to influence elements for the creation and development of knowledge culture. These include organizational structure, people, rewarding systems, leadership, business processes and information systems (Drucker, 1999; DeLong and Fahey, 2000; Gupta and Govindarajan, 2000; Wenger et al., 2002). However, there are limited descriptions about how various individual elements influence knowledge culture. Likewise, certain literature on the subject tends to categorize KM programs, theories and frameworks towards a particular track or organizational element. These tracks include process orientation, people orientation and technology orientation (Lewis, 2002; Natarajan and Shekhar, 2000; Nissen et al., 2000; Remus and Schub, 2003). According to Oliver and Kandadi (2006), the development of knowledge culture needs consideration of multiple organizational elements, but there is a lack of evidence about how various organizational factors can be managed for developing the knowledge culture. For instance, it is difficult to find

proven concepts and theories in the current literature demonstrating effective organizational structures for KM.

Culture is normally defined by anthropologists in such a way that, even if human beings are not explicitly specified, the possibility of any non-human possessing culture is made impossible in practice (Pacanowsky and O'Donnell-Trujillo, 1983). Oliver and Kandadi (2006) have discussed aspects such as organizational structure (of people), reward strategies (for people), leadership (by people), trust (in people) and infrastructure (for people) as disparate factors influencing knowledge culture. They adopted this people-centered approach for achieving clarity and precision in studyin**g** the role of organizational culture in KM.

A pro-knowledge sharing culture in any organization must have a well-built set of core values and norms that encourage the sharing of information and active participation of employees in the process (Goh, 2002; Hult et al., 2004). This culture of sharing and participation involves employees seeing knowledge as an organizational asset to be shared wherever it is needed by other employees. As this culture of sharing emerges, KM efforts prosper because there is a greater exchange of information about what exists, what works, what practices have major problems, and what solutions have been successfully applied.

Chase (1997) found that existing organizational culture stalled the thriving implementation of knowledge sharing strategies because it reinforced the notion that knowledge belonged to specific employees and should not be seen as an organizational asset. A culture that promotes the sharing of information and active participation of employees will result in the development of specific routines that prop up KM. By creating a culture that encourages sharing, employees see knowledge as an asset to be shared with others, rather than as just belonging to them. This cultural perspective helps knowledge-seeking employees to access information about new practices that they obtain from their colleagues and about the best ways to do so (Gordon and DiTomaso, 1992).

2.4   Present research focus and previous empirical studies

Various studies have provided empirical and subjective findings on KM practices in project-based organizations: Table 2 below provides a snapshot of some recent studies. Likewise, there are also quite many studies which support the idea that culture has a critical role to play in KM practices (see Table 3). In addition, we are also able to find some studies that elaborate the effects of culture on the im-

plementation and overall success of projects (e.g. Table 4), but no study could be found that has focused on knowledge management practices in project-based organizations from a cultural perspective, in particular the relationship of culture with knowledge activities in project environments, how culture effects KM practices; whether cultural elements are correlated with knowledge activities; and what factors including culture are critical for KM initiatives in such organizations since these are temporary combinations of diversely skilled people who come together for certain objectives from different cultural backgrounds. So it is essential to consider cultural aspects for any strategy that is going to be launched in a project-based organization. This study is also one attempt to reflect on cultural issues related to KM practices in projects (see Figure 5).
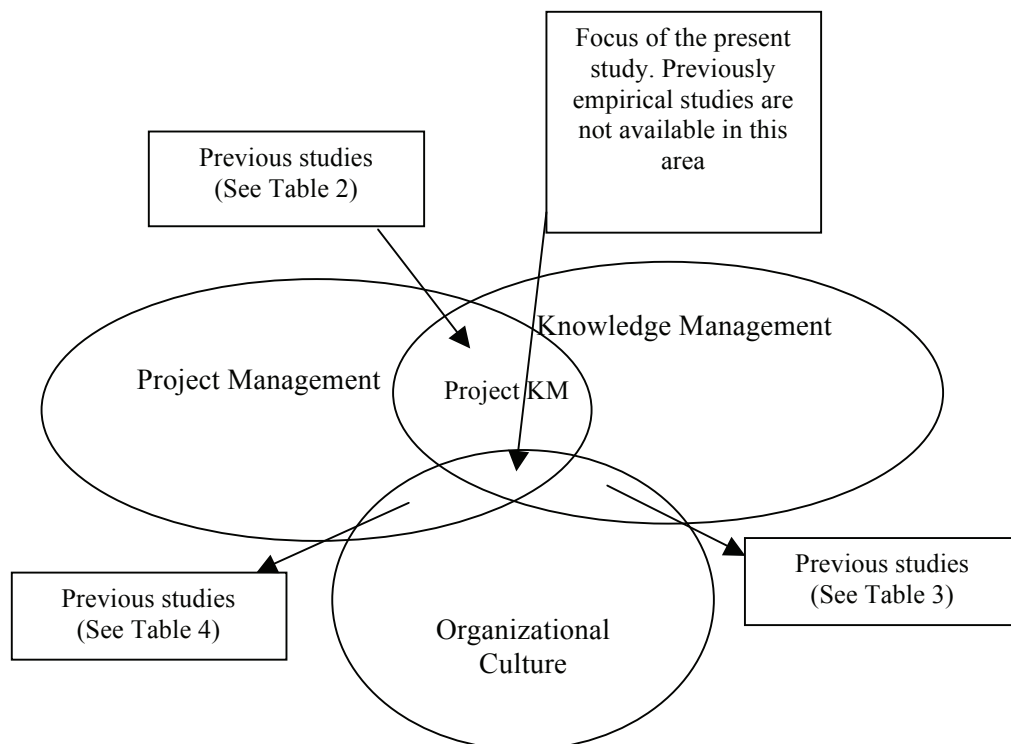
Figure 5.   Focus of present study in light of previous studies

Table 2.   Previous recent studies of KM in projects

Author(s), Year & Title	Methodology	Findings
Teerajetgul et al. (2009) Key knowledge factors in Thai construction practice	Both qualitative and quantitative approaches were employed. The focus group interview with 16 project managers was conducted to gather in-depth information related to practice of project KM. This data was used to develop the questionnaire to explore key knowledge factors. The questionnaire was sent to 103 participants in 70 construction projects. The survey data were analyzed by factor analytic techniques to identify key knowledge factors influencing on-site project works.	Analysis showed that there were six key knowledge factors: (1) visionary leadership, (2) reward or incentive, (3) collaboration, (4) trust, (5) information technology, and (6) individual competency or skills.
Sense, (2008) Conceptions of learning and managing the flow of knowledge in the project-based environment	A conceptual study that discusses a broad and relevant literature on KM with the context of project business.	Project teams must recognize and follow a more socially oriented path in their learning and KM activities. Within project members, their project practices and the organization of the project environment should become the focal points of attention and action.
Ma et al. (2008) Knowledge sharing in Chinese construction project teams and its affecting factors	A quantitative approach was used with self-administered questionnaires. Data were collected by surveying 222 project managers Regression analysis was then used to explore the relationship between different factors and the willingness to share knowledge.	Explicit knowledge promotes knowledge sharing while tacit knowledge creates barriers to knowledge sharing in project teams. Moreover, trust is positively related to knowledge sharing but justice, leadership style, and empowerment do not influence whether employees will share knowledge among themselves in project teams.
Lierni & Ribiere (2008) The relationship between improving the management of projects and use of KM	A quantitative method was employed by developing a survey questionnaire. Data were collected from 99 project managers randomly se-	The exercise of KM practices has a positive influence on the improvement of the management of projects. Shared repository of project artifacts, lessons learned and best practices repositories and docu-

	lected from the list of worldwide members of the project management institutes. Further, it was analyzed with statistical tools.	ment and content management systems seem to be the most frequently used KM tools and practices by project managers.
Reich, (2007) Managing knowledge and learning in projects: a conceptual framework and guidelines for practice	Qualitative approach was utilized by conducting interviews with 15 senior project managers. Interview contents were based on one model that was extracted from intensive literature review.	There are four knowledge categories vital to the success of projects: Process knowledge, Domain knowledge, Institutional knowledge, Cultural knowledge. Knowledge-based risks in projects can be categorized as: Inputs-a project's knowledge inputs. Process-a project's governance. Process- a project's operational phases plan, design, build/configuration, and implementation. Outputs-a project's delivery and its closeout.
Kang, (2007) Testing impact of knowledge characteristics and relationship ties on project performance	Data were collected from personal interviews based on a structured survey of project managers in a knowledge-intensive firm. The data were analyzed using a multiple regression model.	Project performance was positively related to frequency and closeness of source and difficulty of knowledge element
Boh, (2007) Mechanisms for sharing knowledge in project-based organizations	A case study methodology was chosen to examine accurate characterization of knowledge-sharing mechanisms used in project based organizations to integrate their experience and expertise. In case studies further interviews approach was utilized.	Knowledge sharing is not only restricted to individualized personalization mechanisms and institutionalized-codification mechanisms. Different portfolio of knowledge-sharing mechanisms is suitable for organizations with different size, geographical dispersion and job nature. Depending on their characteristics, organizations should use a different portfolio of knowledge-sharing mechanisms.
Enberg, et al. (2006) Exploring the dynamics of knowledge integration: acting and interacting in project teams	A qualitative approach was considered by conducting interviews and discussion meetings in the case project. The interviews and meetings were equipped with tape recorder.	Project managers should facilitate interaction through meetings and artifacts, it is often more efficient to rely on tacit routines and individual work. With high frequency and homogeneity, project work may be successfully undertaken without much communication or interaction between project members. Important PM function in assuring knowledge integration is to appreciate the learning dynamics of their specific project context.

Newell, et al. (2006) Sharing knowledge across projects: limits to ICT-led project review practices	A qualitative investigation of 13 unrelated projects across six organizations, operating in different sectors (healthcare, public services, utilities, automotive, construction, and biosciences). The unit of analysis was the project. The study used interviewing techniques to better understand the ways in which projects transfer knowledge and lessons learnt to other like groups within the firm.	Knowledge captured is not deemed useful and/or project teams lack awareness that there is knowledge that could be useful to help them improve their processes. Developing personal networks to facilitate cross-project learning may be more effective than, or at least a necessary complement to, project documents and codified lessons learnt (an ICT approach).
Love, et al. (2005) Management of knowledge in project environments	Collection of different chapters, which are based on different research methods like conceptual, theoretical and case studies with interviews and surveys etc.	The management of knowledge in project-based organization is becoming a prerequisite to sustain a competitive advantage. With out management support and effort to manage knowledge during a project's life cycle can lost once a project is completed. However, knowledge sharing and learning can lead to project success and improved business performance.
Bresnen, et al. (2004) Embedding new management knowledge in project-based organizations	Case study method by conducting 3 meetings and 14 interviews as well as feedback sessions where data were validated by the participants.	Project-based organization's features like decentralization, short-term emphasis on project performance and distributed work practices are critically important in understanding the shaping and embedding of new management practice. Diffusion and embedding of new management knowledge in project-based organizations is influenced by a complex interplay between structural conditions within the organization and existing PM practices.
Koskinen, (2004) Knowledge management to improve project communication and implementation	Deep conceptual analysis by going into root theories of KM and PM.	In investment and delivery projects the utilization of explicit and codification type of KM processes play a significant role and in R&D projects tacit knowledge is abundant and personalization type of KM process is a necessity.
Sydow, et al. (2004) Project-based organizations,	This study basically falls in 'view point' category of the articles.	Projects provide preconditions for creating new knowledge. Successful performance at project level

embeddedness and repositories of knowledge		may have counterproductive effects at another level; suggest that the analysis of the project-knowledge connection would benefit from a multi-level approach considering a variety of contexts: generation of new knowledge as well as the accumulation of learning may take place within and between project teams.
Kasvi, et al. (2003) Managing knowledge and knowledge competencies in project organizations	Case study method was utilized by interviewing 24 participants of project case. The interviews were semi-structured with about 80questio ns and lasted from 45 min to 2 h. The interviewers were allowed to modify the questions as the situation warranted.	To let a project to learn, both substance and context knowledge must be managed throughout the whole project process. Mainly systematic project KM is needed, if project organization is to be turned into a learning organization and filter results and lessons from one project and deliver them into another.
Huang & Newell (2003) Knowledge integration processes and dynamics within the context of cross-functional projects	A comparative study of four cases was conducted. Further, Four sources of evidence were used to collect the data; observation, semi-structured interviews, informal dialogues and documentation to ensure the richness of the findings and for the purpose of triangulation.	Knowledge integration in the context of cross-functional project implementation is in essence a process of engaging organizational members through the promotion of project benefits and the management of social networks. Also, organization's embedded practices, past integration experience and social capital plays a key role in shaping the level of coordination that in turn influences the efficiency and scope of integration. In particular, the development and nurturing of social capital within and beyond the project team is crucial, as is the promotion of project awareness through the creation of common knowledge.
Bresnen, et al. (2003) Social practices and the management of knowledge in project environments	The research was case study with interview-based and semi-structured in format. Interviews were conducted with seven managers. All interviews followed a pre-designed protocol based on a six-page schedule Each interview lasted approximately an hour and was tape-recorded.	Processes of knowledge capture, transfer and learning in project settings rely very heavily upon social patterns, practices and processes in ways which emphasize the value and importance of adopting a community-based approach to managing knowledge.

Snider & Nissen (2003) Beyond the body of knowledge: a knowledge-flow approach to PM theory and practice	An approach of conceptual analysis was adopted but this analysis is intensively based on literature review.	Knowledge flow is a critical factor in project's success. Knowledge flow is discussed from three perspectives: knowledge as solution, knowledge as experience and knowledge as socially created. Knowledge as solution emphasizes the real-time transfer of knowledge among practitioners who are seeking to solve problems the knowledge as experience describes knowledge as being obtained and accumulated for future use and knowledge as socially created emphasizes knowledge as being created and shared through interpersonal social relationships.
Disterer, (2002) Management of project knowledge and experiences	A conceptual study by pointing out some barriers of KM in projects and also some suggestions to foster KM activities in project organizations.	Effective application of traditional PM tools is necessary but no longer sufficient because projects depend heavily on the right combination of knowledge and experiences, therefore dissemination and usage of existing knowledge is critical. Failures must be seen as opportunities to improve rather than to blame people involved. Therefore the basic tasks of PM must be supplemented by important activities of KM.
Prencipe & Tell (2001) Inter-project learning: processes and outcomes of knowledge codification in project-based firms	A qualitative technique is used to collect data from a field study of six firms. Further, three interviews per firm were conducted. Interviewees covered a corporate manager, a project manager, and a practitioner. Interviews were semi-structured and lasted about 90 min.	First, firms rely primarily on people-embedded knowledge mostly emphasize experience accumulation processes and knowledge transfer through people-to-people communication. Second, firms that start implementing mechanisms for project-to-project learning based on the knowledge articulation process, involved in the advanced development of ICT-based tools to support their project-to-project learning.

Table 3.   Previous recent studies of KM and culture

Author(s), Year & Title	Methodology	Findings
Ciganek, et al. (2008) Organizational culture for KM systems: a study of corporate users	A quantitative approach was employed by constructing a questionnaire and analyzing it with statistical tool.	Organizational culture does significantly influence the factors that lead to the acceptance of KMS. Managers should strive to foster a more results-oriented and open communication environment in the workplace.
Usoro & Kuofie (2006) Conceptualization of cultural dimensions as a major influence on knowledge sharing	Theoretical investigation by reviewing previous literature.	It expresses that knowledge sharing to be a function of organizational and societal cultural factors and there is a high positive relationship between organizational culture and knowledge sharing.
Oliver & Kandadi (2006) How to develop knowledge culture in organizations? A multiple case study of large distributed organizations	Case study method was utilized in six large distributed organizations to investigate KM practices and associated organizational culture by conducting semi-structured interviews with managers.	The study identified ten major factors affecting knowledge culture in organizations, as leadership, organizational structure, and evangelization, communities of practice, reward systems, time allocation, business processes, recruitment, infrastructure and physical attributes.
Jones, et al. (2006) Exploring knowledge sharing in ERP implementation: an organizational culture framework	A multi-site case study of firms that have implemented ERP systems by examining eight dimensions of culture and their impact on how ERP implementation teams are able to effectively share knowledge across diverse functions and perspectives during ERP implementation with series of semi-structured interviews with 36 people across four firms.	Results show that knowledge sharing does not "just happen" but understanding how cultural dimensions influence knowledge sharing is vital for practitioners. It is significant to recognize that other factors such as leadership, technology, organizational change, and the evaluation and administration of knowledge management may also influence knowledge sharing. However, it could be argued that these all occur within the broader context of organizational culture.
Lucas, et al. (2006) How reputations, culture, and incentives influence knowledge transfer	Quantitative method was used by administering a questionnaire and analyzing data with statistical tool.	It was found that culture and reputation have significant positive effects on knowledge transfer.

Lucas, (2006) The role of culture on knowledge transfer: the case of the multinational corporation	Case study of a multinational corporation to look at various aspects of culture and its impact on MNC knowledge practices.	Knowledge transfer efforts are most likely to be successful if the parties are culturally aligned and when this is missing, success is highly dependent upon home office directives and support.
Park, et al. (2004) Critical attributes of organizational culture that promote KM implementation success	Study was based on quantitative approach. A questionnaire was developed and sent to 44 organizations but answered by 26 companies. Then, different statistical methods were employed to analyze the data.	Cultural attributes such as sharing information freely, working closely with others, team-oriented work, trust, fairness, and enthusiasm have moderate to high positive correlation with the success of KM technology implementation.
McDermott & O'Dell (2001) Overcoming cultural barriers to sharing knowledge	Conceptual framework with some industrial examples.	Overcoming cultural barriers to sharing knowledge has more to do with how companies design and implement their knowledge management initiatives than with changing their culture.
DeLong & Fahey (2000) Diagnosing cultural barriers to knowledge management	Conceptual framework based on practical experience and observation of authors that provides basic and important picture of knowledge and culture.	Culture and particularly subcultures form assumption about what knowledge is, and, hence, which knowledge is worth managing. Culture develops relationships between individual and organizational knowledge. Culture creates the environment for social interaction that eventually determines how effective an organization can be at creating, sharing, and applying knowledge. Culture outlines the processes by which new organizational knowledge with its accompanying uncertainties is created, legitimated, and distributed.

Table 4.   Previous recent studies of PM and culture

Author(s), Year & Title	Methodology	Findings
Barry, (2009) Systematic biases and culture in project failures	Qualitative case studies by conducting 22 interviews to identify systematic biases and culture that cause project failures.	Organizational and project culture may play an important role in creating an environment within which systematic biases emerge, which finally lead to project failures.
Suda, (2006) The meaning and importance of culture for project success	Conceptual framework to discuss cultural implications for project outcomes.	Project managers have many opportunities to create and shape a project culture in purposeful ways by aligning it with the organization's lead culture to make healthy team climate and set the stage for ensuring project success.
Nummelin, et al. (2005) The influence of cultural effects on different project types	Qualitative case studies of two different types of multinational projects	Differences in perceptions lie in the divergent intensity of cooperation and differences in business logic between the two projects.
Shore & Cross, (2005) Exploring the role of national culture in the management of large-scale international science projects	Uses the evidence from two case studies by conducting semi-structured interviews.	Culture plays an important role in how managers think and how they make decisions. However, an understanding of culture is a useful tool in the management of international collaborative projects.
Chevrier, (2003) Cross-cultural management in multinational project groups	A comparative study of three international project groups was conducted by using interview method.	Project managers encounter cross-cultural differences, they often do nothing and consider that it is legitimate not to talk about them. In most projects there is a strong need for integration between members; several solutions cannot be developed at the same time and close coordination is compulsory.

2.5   Summary

An individual's knowledge and experiences from previous projects are key resources for later projects as they smooth the progress of innovative and interdisciplinary tasks (Dainty et al., 2005). Towards the end of any project, competencies, lessons learnt and skills built up by the members of the project team should stay

within the executing organizations and should be accessible for upcoming projects. In contemporary practice, when a project is completed, its project team members pull out and disperse, so that existing knowledge can no longer be accessed. Project team members keep their knowledge and experience as individual knowledge, which they can use in future. Obviously, the most essential factor hampering the successful achievement of a project is the insufficiency of skilled personnel (Teerajetgul et al., 2009).

The aptitude to manage and use the knowledge of the project members is an extremely important consideration. The utilization of knowledge in organizations is more and more seen as a basis for enhancing competitive advantage (Gold et al., 2001; Belassi and Tukel, 1996). Challenges as a result lie in the means of managing knowledge resources and capabilities, contributing to project success and sustaining organizational competitiveness. Various studies show the value of knowledge management in improving both organization and project performance. Previous research has found that organizational creativity that depends on KM is critical for improving organizational performance (Gold et al., 2001; Lee and Choi, 2003) because knowledge is one of the most important resources for both managerial decision-making and the competitive advantage of any organization. Knowledge is information, which has been used and becomes a part of an individual's experience base and behavioral patterns (Awazu, 2004; Daventport and Long, 1998). Individuals, however, have differing knowledge-based capacities and experiences, thus leading to different problem solving processes and decision-making. The emergence of information and communication technology has set in motion a new signal of knowledge management for industrial organizations, technology management, strategic management, and organizational theory, but still the soft side of KM is widely ignored. In particular, the cultural dimension for managing knowledge efficiently needs to be addressed.

Knowledge has a number of dimensions, including the explicit, implicit, and tacit (Krogh et al., 2002). Tacit knowledge is an important factor in work and workplace learning. Existing empirical research on tacit knowledge has been technologically driven, and there is a need to explore the people dimension (Polanyi, 1966), which is explored in this research. Nonaka and Takeuchi (1995) classified human knowledge into two kinds. One is explicit knowledge that can be articulated in formal language including grammatical statements, mathematical expressions, specifications, manuals, and so forth. This kind of knowledge can thus be transmitted across individuals formally and easily. The other, which is a more important kind of knowledge, is tacit knowledge, which is hard to articulate with formal language. This more or less refers to personal knowledge embedded in individuals and involves intangible factors such as personal belief, perspective,

and values which are strongly connected with national, organizational and professional culture. But this individual and human aspect of knowledge management has not often been addressed. Thus, the key focus of this present study is to understand the human aspect of KM, particularly in project environments.

Project management skills consist of technical and personal skills. A technical skill is considered the ability to use tools, techniques, and specialized knowledge to execute a method, process, or procedure. On the other hand, personal skills encompass attributes of leadership, negotiation, communication, and problem solving (Teerajetgul et al., 2009). In this context, leadership covers three main areas: project, technical, and team leadership. Many dimensions for communication by the project manager often require the skills of writing, speech, and listening. Finally, problem solving skills encompass a combination of problem definition and decision-making related to problems by applying relevant knowledge that have already occurred (Edum-Fotwe and Mccaffer, 2000). However, in the project management field there has been limited work devoted to knowledge management activity and particularly the human side of managing knowledge in this wide area. This study objective is to identify key human elements such as cultural issues related to managing knowledge in project-based organizations.

3   METHODOLOGY

This chapter contains the sub-headings research strategy and questionnaire development and design which elaborate more specifically survey research and questionnaire design and content issues. It ends with a description of the data collection and analysis processes like sampling, together with information on the respondent companies.

3.1   Research strategy

This research is explorative and aims at providing understanding of the contemporary business fields. It discovers and captures realities about knowledge management within the context of project-oriented business by focusing on cultural elements. A variety of research methodologies have been used in the field of project management, including both qualitative and quantitative (Sandhu, 2005). This study makes use of a quantitative approach to carry out the empirical part of the study since it is appropriate in dealing with, for example cause and effect thinking, reduction to specific variables, questions and hypotheses, exercise of measurement and testing (Creswell, 2003). Moreover, a quantitative approach is also appropriate for present study because this approach works best to recognize factors that influence final outcomes (i.e. factors that effect project KM initiatives in our case), the value of involvement (i.e. cultural elements in our case), or understanding of the top predictors of outcomes (i.e. organization or project culture in our case) (Creswell, 2003).

3.1.1   *Survey research*

To collect the required data a survey instrument was used rather than interviews. In fact, it was used to obtain wider background facts on the research area, which had not been covered previously. Survey research is a valuable and applicable method for conducting research on strategy related issues (Slater & Atuahene-Gima, 2004). In addition data collected through a survey tests a specified question. Moreover, the use of a survey approach provides an opportunity to test existing facts in a precise manner, and to evaluate fundamental associations (John & Phil, 1997). This method provides a depiction of the overall phenomenon, problem, or issue by questioning a cross section of a population at a specific moment in time (Ghauri & Grønhaug, 2005). Furthermore, survey research enhances the generalizing ability of the results from a sample to a population, leading to the ability to deduce some characteristics and behaviors of the population.

The survey research method was selected for this study because it involves examination of a phenomenon in a wide variety of natural settings that clearly defines variables by explaining their expected relationships. It aims at discovering and capturing realities about the organizational culture (as first variable) and knowledge management (as second variable) within the context of project-oriented businesses. In fact, survey research is a mean of gathering information about the characteristics, actions, or opinions of a large group of people, referred to as a population (Tanur, 1982). According to Pinsonneault & Kraemer (1993), the survey research method is most appropriate when: (i) the central questions of interest about the phenomena are "what is happening?", and "how and why is it happening?" Survey research is especially well-suited for answering questions about what, how much and how many, and also questions about how and why; (ii) control of the variables is not possible or not desirable; (iii) the phenomena of interest must be studied in their natural setting (iv) The phenomena of interest occur at the current time or the recent past.

In a nutshell, surveys conducted for research purposes have three distinct characteristics. First, the purpose of a survey is to produce quantitative descriptions of some aspects of the study population. Survey analysis may be primarily concerned either with relationships between variables, or with projecting findings descriptively to a predefined population (Glock, 1967). Survey research is a quantitative method, requiring standardized information from and/or about the subjects being studied. The subjects studied might be individuals, groups, organizations or communities; they also might be projects, applications, or systems. Second, the main way of collecting information is by asking people structured and predefined questions. Their answers, which might refer to themselves or some other unit of analysis, constitute the data to be analyzed. Third, information is generally collected about only a portion of the study population a sample but it is collected in such a way as to be able to generalize the findings to the population, like service or manufacturing organizations, line or staff works groups, departments.

3.2   Questionnaire design and variables

Kerlinger (1986) defined questionnaire design as item arrangement and structure for investigation of research questions. The questionnaire basically is a communication instrument to obtain opinions from respondents. How to correctly measure the attitudes of the respondents is the essential issue for questionnaire development. In the mean time, the questionnaire should fully represent the research formation or model. The wording of the items included in the questionnaire and their scales for answers are all important in terms of the measurement.

The present study questionnaire is derived from previous relevant literature and surveys in an approach that is logical for the respondents (John & Phil, 1997). Most of the objects in the questionnaires are derivative or adapted from prior studies such as (Alavi & Liedner, 1999; Argote & Ingram, 2000; Bartol & Srivastava, 2002; Beijerse, 1999; Chase, 1997; Chevrier, 2003; Delong & Fahey, 2000; Disterer, 2002; Fahey & Prusak, 1998; Foster, 1962; Hofstede, 1994; Jennex, 2006; Kang, 2007; Kotter & Heskett, 1992; Lee & Choi, 2003; Love et al., 2005; Nonaka & Takeuchi, 1995; Oliver & Kandadi, 2006; Reich, 2007; Schein, 1996, 2000; Suda, 2006). The decisive factor for creating questionnaire items is that the items have to take into account the input constitution of the study (John & Phil, 1997). Thus, this study takes questionnaire items primarily from the above mentioned studies because all of them focus either on KM practices from a cultural point of view or take into consideration the nature of project business and KM activities. To ensure content validity some researchers reviewed the early versions of the questionnaire and advised further refinement of it by adding and subtracting some of its items.

The questionnaire employed for this study contains three sections. The first section is about *organization culture,* which is defined as the *first variable* of the study. The second section is about *knowledge a management activities;* that is defined as the *second variable*. The third section concerns the model of six critical success factors for knowledge management activities in project environments. Before all these three sections, at the beginning of the questionnaire, there are some questions related to the respondents´demographic information and their companies' characteristics, along with a description explaining the study objectives.

To recognize the potential correlation of organizational culture with knowledge management activities in a project work context, 5 items related to the first variable (organizational culture) have been adopted. Subsequently, the 5 items related to the second variable (knowledge management) have been adopted (Figure 6). All the items are rated on a five-point Likert-type scale, representing 1 = strongly disagree, 2 = disagree, 3 = not sure, 4 = agree, and 5 = strongly agree.

Factor analysis was also conducted to look at inter-correlations among the items in order to determine that the given item is measuring the same underlying dimension that is wanted from it. (Field, 2005).
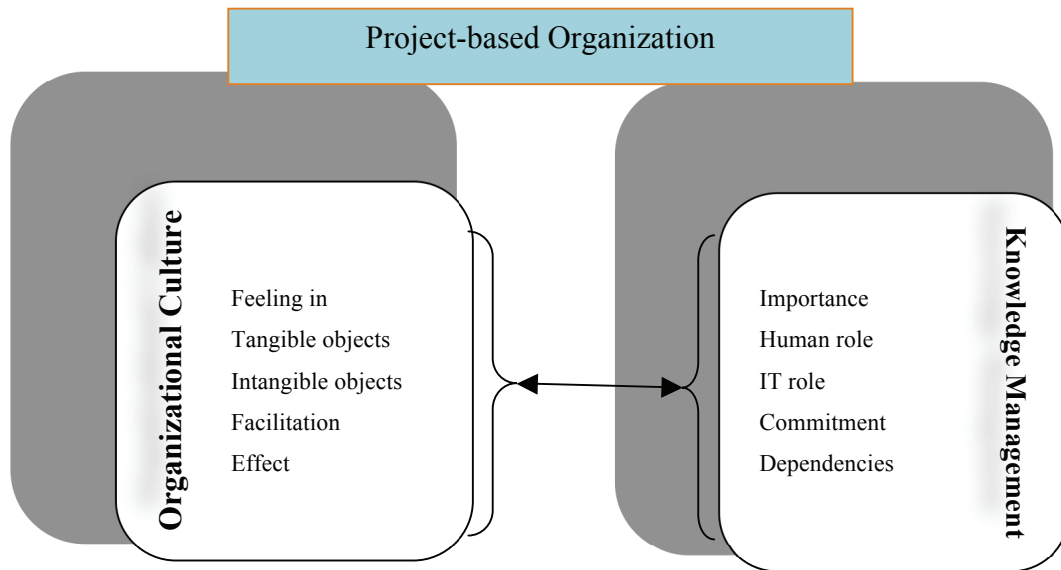
Figure 6. Organizational culture and knowledge management

To determine the potential critical factors for KM initiatives in project environments the respondents were asked to what extent they think that factors like familiarity with KM, coordination among colleagues, incentives for knowledge efforts, authority to perform knowledge, systems to handle knowledge, and cultural support, are supporting or hindering KM initiatives in their organization or in a particular project (Figure 7). These critical factors were also conceptualized on the basis of a prior literature review (Davenport & Long, 1998; Ryan & Prybutok, 2001; Moffett et al, 2003; Connnelly & Kelloway, 2003; Chua & Lam, 2005; Yeh et al, 2006). Then this conceptual model of the factors that influence the success of KM initiatives in a project-based context was operationalized in the present study.
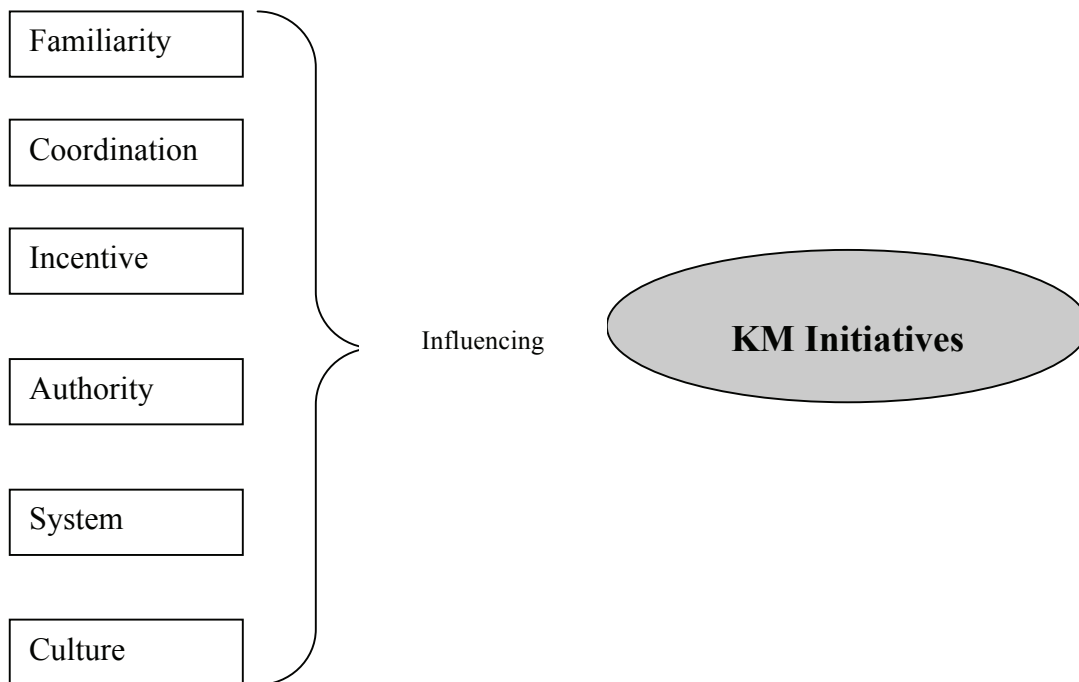
Figure 7.   Critical factors for KM in projects

However, the first research question of the thesis: 'How is organizational culture associated with knowledge management in project-based organization?' was responded to theoretically.

3.3   Data collection

Sampling means taking a portion of elements in a population as representative of that population (Kerlinger, 1986) in order to collect data and draw conclusions that are inferred for the population from the sample results. Whether a sample is representative or not will affect the results of the research. The sample of this study is identified from the data-base of project-based companies that is compiled by the Project Management Association Finland (PMAF).

The sample had to fulfill the following criteria: firstly, the company had to be operating in a project-based environment either in the manufacturing or service sector. Only project-based companies were selected because the unit of analysis was project-based organization. Secondly, the respondents should have worked or be working as project managers or assistant managers who were directly respon-

sible for the outcome of a project. They were chosen as being the most knowledgeable people in the projects who could make available all the data required for the phenomenon under study (Slater & Atuahene-Gima, 2004).

From the set criteria, 60 small, medium and large companies were identified as qualifying for this study. Among these 60 firms, a further 45 companies were randomly chosen, and from these 45 firms 400 project managers or assistant managers were identified to send this study questionnaire to. Thus, the final sample was 45 small, medium and large project-based companies with 400 project managers or assistant managers who could be accessed by e-mail to obtain the required data. The sample was also carefully scrutinized for any recurrent response bias using *t*-tests. The respondents and non-respondents were compared in terms of their experience, their company size, and annual turnover. No statistically significant discrepancy was found. Hence, there was no response bias to be found in the final sample.

To enhance the quality of the data, weekly follow-up e-mails explaining the objectives of the study were sent on three consecutive weeks. A total of 41 questionnaires were answered with a response rate of 10.25 percent.

The characteristics of the respondents who have participated in the study and answered the questionnaire are summarized below in figures 8 to 10.

Figure 8 describes the sector-wise number of responses. From 41 responses 15 came from service sector companies and the remaining 26 responses were from manufacturing sector companies.
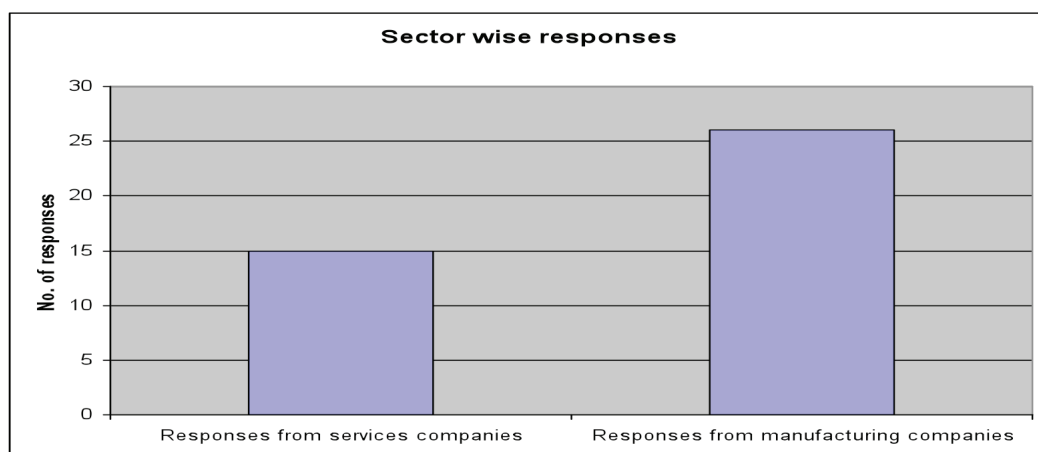
Figure 8.   Sector-wise responses

Half of the responses came from companies with more than 1000 employees and 9 responses came from companies with more than 100 but less than 1000 employees. 12 responses came from companies which had fewer than 100 employees. For more details see Figure 9 below.
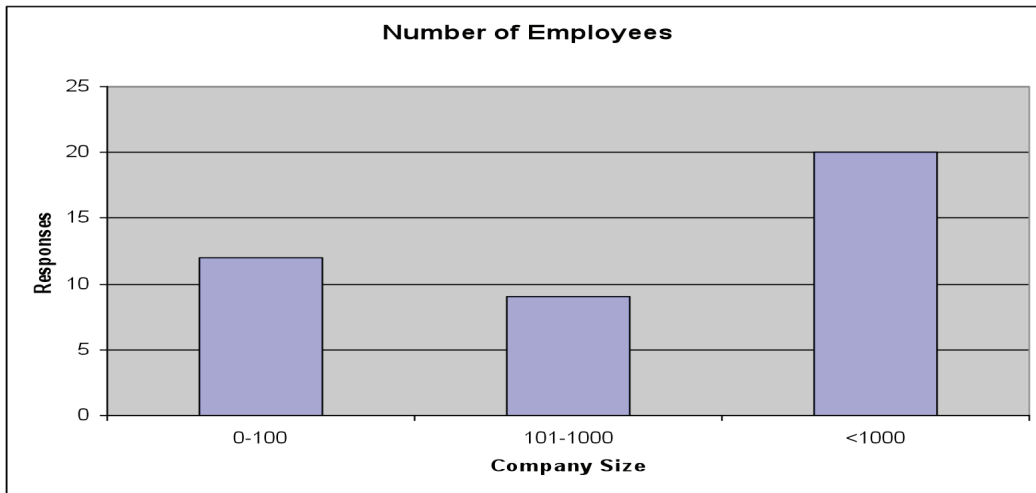
Figure 9.   Size of the respondents´ companies

Almost two thirds of the respondents were from companies which had been in operation from more than 26 years. 11 respondents were from companies with 11 to 25 years work experience and only two responses came from the companies with less than 10 years experience. See Figure 10.

Figure 10.   Companies' operational experience

3.4   Data analysis

The data analysis phase was initially started by checking the content and construct validity. The content validity is adequate once an accurate process is employed to build up the measurement instrument (Slater & Atuahene-Gima, 2004). Since all the sub-items of the variables used in this study have been adapted from previous studies for further analysis, there is a strong argument in support of their being legitimate. Moreover, construct validity that sets up the measure to attain the attribute or feature that it is supposed to attain was also observed. Construct validity involves the scope of a variable not being broad; otherwise it may capture aspects of other variables that are not projected to be captured, creating complexity in elucidation of the findings (Slater & Atuahene-Gima, 2004). Construct validity in the present study was achieved by carrying out a wide-ranging review of the literature and by employing measures that had been built up and utilized by prior studies.

The focal points of analysis of the present study are recapitulated in Figures 6 & 7 (see section 3.2). As can be seen from Figure 6 firstly the present study aims to investigate the relationships between organizational culture and knowledge management in project-based organizations. Secondly, it also aims to determine critical factors for knowledge management initiatives in a project-based organization as shown in Figure 7.

To examine the relationship of organizational culture and knowledge management the survey data were analyzed mainly by using quantitative methods such as comparing means and correlation analysis with the help of SPSS and MS Excel.

Then in order to determine critical factors for knowledge management initiatives in a project work context, data with respect to each of the six proposed factors were analysed by using MS Excel, measuring the 'average' score, referring to the mean score for a given factor from the 41 responses, and 'variance', reflecting the degree of dissimilarity in the responses, and 'weight', calculated by dividing the average response to a given factor by the sum of the average responses of all factors (see section 4.1 for details).

4   FINDINGS AND PUBLICATION SUMMARIES

This chapter starts with an overview of all five papers by presenting their findings and extends its scope by discussing every paper in turn in more detail in terms of methodology and implications. Then it links all the papers with regard to the basic thesis research questions, questionnaire content and data analysis. Finally, it presents the authors´contribution to each paper.

4.1   Results of the questionnaire data analysis

As has been mentioned in previous sections this study aims principally to determine the potential relationship of organizational culture with knowledge management practices in Finish project-based organizations.

Table 5 shows the mean and standard deviation values of the items asked in the questionnaire in order to illuminate this issue. In light of the descriptive statistics below it can be seen that most of the respondents agree that they feel the presence of organizational culture in projects, and the majority of them believe that it is typically felt in the form of intangible objects. But some of the respondents also feel it in tangible objects. They recognize that organizational culture has a positive effect on knowledge sharing, and it enables project members to perform knowledge management in several ways. Similarly, the role of people is considered to be imperative for knowledge management activities when compared to the role of information technology.

Table 5.   Descriptive statistics

Items	Mean	Standard Deviation	Items	Mean	Standard Deviation
Presence of OC in projects	4,32	0,65	Importance of KM in projects	4	0,77
Intangible objects represent OC	4,29	0,81	Importance of people in KM	4,46	0,63
Tangible objects represent OC	3,39	0,99	Importance of IT in KM	3,37	0,99
OC positive effect on KM	4,32	0,68	Members commitment for KM	2,71	0,87
OC facilitates KM	3,88	0,9	Outside dependency hamper KM	3,51	0,95

Table 6 shows that the feeling of organizational culture in the shape of tangible and intangible objects has a moderate to strong positive relationship with most KM elements, except for the role of IT in KM and project members´ commitment towards KM activities (e.g. row 3-4 & column 1-7). These results imply that OC cannot be embedded into IT systems and it should be a voluntary option to make members committed towards KM activities.

Since OC has a moderate to strong positive relationship with most KM elements (e.g. row 5-6 & column 1-7), then efforts to promote OC in projects can be made by putting emphasis on an open and no-blame culture by introducing KM activities into projects, for example empowering employees by making them more mobile.

Ultimately, the goal of OC presence in projects to promote KM should be that project managers might create a sense of culture for their employees to build an aptitude for knowledge transfer willingness among employees in PBO. However, according to the results the presence of OC in projects is not strongly correlated with KM activities (e.g. row 2 & column 1-7).

Table 6.   Correlation values of variables

		Importance of KM in project	Importance of people in KM	Importance of IT in KM	Members' commitment for KM	Outside dependencies hamper KM
Presence of OC in project	Pearson Correlation	,40(*)	-0,00	0,05	-0,23	0,26
	Sig. (2-tailed)	0,01	0,99	0,78	0,15	0,11
Feeling of OC as intangible object	Pearson Correlation	0,16	0,02	0,05	-0,02	0,03
	Sig. (2-tailed)	0,32	0,90	0,76	0,92	0,86
Feeling of OC as tangible object	Pearson Correlation	0,26	0,26	-0,22	-0,27	,52(**)
	Sig. (2-tailed)	0,10	0,10	0,16	0,09	0
OC has positive	Pearson Correlation	0,05	,34(*)	-,43(**)	0,12	0,20

effect on KM	Sig. (2-tailed)	0,77	0,03	0,00	0,47	0,2
OC facilitates KM	Pearson Correlation	0,29	,32(*)	-0,23	0,11	-0,04
	Sig. (2-tailed)	0,07	0,042	0,15	0,48	0,79

** Correlation is significant at the <0.01 level (2-tailed).

* Correlation is significant at the <0.05 level (2-tailed).

OC= Organizational culture, KM= Knowledge management

The second objective of the present study it is to determine the critical factors for successful KM initiatives in a project work context, as mentioned in the introduction and methodology sections earlier. In relation to this, Table 7 shows the detailed results with respect to each of the six factors which were derived from previous literature. Below, the term 'average' refers to the mean score for a given factor from the 41 responses. 'Variance' reflects the degree of dissimilarity in the responses. 'Weight' was calculated by dividing the average response to a given factor by the sum of the average responses of all factors.

Table 7.　　　　　Extent to which factors were perceived critical

	Familiarity	**Coordination**	**Incentive**	**Authority**	**System**	**Culture**
Average	3	3,19	3,63	2,73	3,39	2,85
Variance	0,85	1,26	0,94	0,80	1,24	1,37
Weigtage	0,16	0,17	0,19	0,14	0,18	0,15

Figure 11 thus demonstrates the degree to which each of the six factors was perceived to be crucial to KM initiatives or causing a barrier in the respondents' organisations. It is apparent from the results that a lack of incentives and the absence of an appropriate system are perceived to be the most significant barriers for successful KM initiatives in projects. The absence of coordination and a lack of familiarity with KM are less significant barriers. A lack of authority and the

absence of cultural support are considered to be the least significant barriers to the success of KM initiatives in projects.
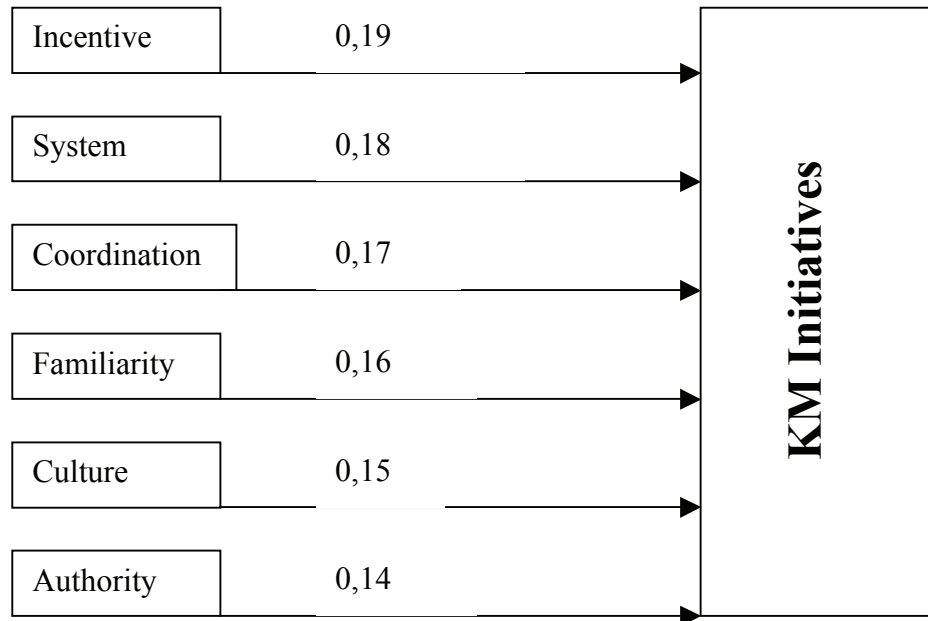
Figure 11.   Intensity of factor criticality

4.2   Overview of the papers

This section will summarize all the findings of the included papers in this dissertation. All the selected papers explain the basic framework and a general overview of knowledge management activities in project-based organizations from a cultural perspective. More specifically, each paper covers and elaborates a range of aspects of knowledge management in projects in cultural context. The collection of published papers for this dissertation is summarized in Table 8.

Table 8.   Summary of the publications

No & Publications	Title	Conceptual Focus	Purpose & Aim	Author(s)
Paper 1: Project Management Journal (PMJ)	Knowledge Transfer in Project-based Organizations: An Organizational Culture Perspective	Knowledge transfer Project-based organization Organizational culture	Looks into the process of knowledge transfer in project-based organizations from the perspective of organizational culture	Ajmal M.M. & Koskinen K.U.
Paper 2: The journal of information and knowledge management systems (VINE)	Cultural Impacts on Knowledge Management and Learning in Project-based Firms	Knowledge management National, organizational and professional culture Project business	To explore distinctive cultural issues (national, organizational, and professional) which influence KM in project-based firms	Ajmal M. M., Kekäle T. & Takala J.
Paper 3: International Journal of Project Organization and Management (IJPOM)	Role of Organizational Culture for Knowledge Sharing in Project Environments	Knowledge sharing Project environments Cultural elements	To explore the significance of organizational culture within project-based organizations and to know how it can assure knowledge sharing activities in projects	Ajmal M. M., Kekäle T. & Koskinen K.U.
Paper 4: Journal of Knowledge Management (JKM)	Critical Success Factors for Knowledge Management in Project-based Business	Knowledge management Success factors Project business	To identify and examine various factors that influence the success or failure of KM initiatives in project-based companies	Ajmal M. M., Helo P. & Kekäle T.
Paper 5: International Journal of Innovation & Learning (IJIL)	Organizational Culture and Knowledge Management: An Empirical Study in Finish Project-based Organizations	Cultural artifacts Organizational culture Knowledge management Project organization	To provide an empirical source for understanding how the cultural artefacts in project-based organizations affect the KM activities in projects related work context.	Ajmal M.M. & Helo P.

All five papers included in this dissertation have been linked with the core thesis research questions and accordingly the questionnaire data was used as empirical parts for these papers. Table 9 provides specific information about the linkage of the three thesis research questions, questionnaire data analysis and each paper.

Table 9. Combining questionnaire data, research questions and papers

Papers	Relation to thesis research questions	Linkage to questionnaire, data analysis
Knowledge Transfer in Project-based Organizations: An Organizational Culture Perspective	This paper responds to the first thesis research question ' How is organizational culture associated with KM in project-based organization?'	The research question was responded to theoretically and the theory analysis provided the basis for questionnaire development.
Cultural Impacts on Knowledge Management and Learning in Project-based Firms	This paper is also considered for the first thesis research question 'How is organizational culture associated with KM in project-based organization?'	It was also responded to theoretically and this theory overview helped a lot the questionnaire development.
Role of Organizational Culture for Knowledge Sharing in Project Environments	This paper was developed to answer the second thesis research question 'How is the relationship between organizational culture and KM in Finnish project-based organizations?'	To find the potential relationship of organizational culture with KM activities in project work contexts, correlation analysis with the help of SPSS was conducted and the respondents were asked to respond to 5 factors/items belonging to organizational culture and 5 about KM in projects.
Critical Success Factors for Knowledge Management in Project-based Business	This paper aimed to tackle the third thesis research question ' What factors are critical for KM initiatives in Finnish project-based organizations'	To expose the potential success factors for KM initiatives in project environments the respondents were asked to what extent they thought that factors like familiarity with KM, coordination among colleagues, incentives for knowledge efforts, authority to perform knowledge, systems to handle knowledge, and cultural support, are supporting or hindering KM initiatives in their organization or in a particular project.
Organizational Culture and Knowledge Management: An Empirical Study in Finnish Project-based Organizations	This paper was also developed a step further to answer the second thesis research question 'How is the relationship between organizational culture and KM in Finnish project-based organizations?'	More deeply, to find the potential relationship of organizational culture with KM activities in project work contexts, a correlation analysis by chi-square test with the help of SPSS was conducted and the respondents were asked to respond to five factors/items belonging to organizational culture and five denoted to KM activities in projects.

Table 10 also attempts to explain the originality, findings and method of analysis of each of the papers in a concise way.

Table 10.   Contribution of the publications

Papers	Novelty	Findings	Method of analysis
Knowledge Transfer in Project-based Organizations: An Organizational Culture Perspective	Identifies obstacles to knowledge transfer in project-based organizations and emphasizes the importance of organizational and project cultures in this process	For effective knowledge transfer in project-based business, it is crucially important to prepare the organizational culture to accept, adopt, and utilize new knowledge-transfer activities	Literature analysis and reflection of the researcher
Cultural Impacts on Knowledge Management and Learning in Project-based Firms	Project culture is a synthesis of professional, organizational, and national cultures, which have deep concerns with KM efforts	KM in project-based firms has relatively little to do with technology; rather, the focus must be on the behavior and attitudes of people as determined by the professional, organizational, and national cultures from which they come	Narrative analysis of previous theories in present study
Role of Organizational Culture for Knowledge Sharing in Project Environments	Organizational culture facilitates employees in responding to unusual impediments related to knowledge sharing practices	Organizational culture significantly correlated with knowledge sharing activities in project companies	Statistical analysis: means, correlations
Critical Success Factors for Knowledge Management in Project-based Business	The study introduces a new model of critical success factors for KM initiatives in the context of project-based business	The study finds that a lack of incentives and the absence of an appropriate information system are the most significant barriers to successful KM initiatives in projects	Statistical analysis: means, frequencies
Organizational Culture and Knowledge Management: An Empirical Study in Finnish Project-based Organizations	It provides an empirical examination about relationships between organizational culture and KM in projects related work context.	It appears from the findings that the cultural artefacts of organizations have significant effects on KM in project-based organizations	Statistical analysis: Frequencies, correlations

4.3　Individual papers

Paper 1 – Knowledge Transfer in Project-based Organizations:
An Organizational Culture Perspective

This paper investigates obstacles to knowledge transfer in project-based organizations, with particular emphasis on the role of organizational culture. It begins with the meaning of knowledge and how it is created, then distinguishes between data (unprocessed facts), information (meaningful aggregations of data) and knowledge (information that is processed and filtered on the basis of an individual's perception, skills and experience). Knowledge involves assimilation by the human mind, whereas data and information do not. The paper also draws a distinction between explicit and tacit knowledge, i.e. that which is documented and that which is undocumented, often existing only in people's minds. According to the SECI model proposed by Nonaka and Takeuchi (1995) new knowledge is created by an interaction between tacit and explicit knowledge through the processes of socialization, externalization, combination and internalization. Other researchers claim that explicit knowledge is an extension of tacit knowledge to a new level, whereby it is "consciously known" and hence can be transferred to others.

The paper explains Snider and Nissen (2003) point of view on how project-related knowledge is transferred. It elaborates how project knowledge can be transferred in three ways. Firstly, as a solution – where knowledge is transferred on the job, i.e. when working on projects. In this view, managers facilitate knowledge flow by ensuring a selection of appropriate technologies and motivating individuals to use them. Secondly, as experience – where knowledge is transferred by capturing experiences (by documentation) for future reference. Here, the emphasis is on the flow of knowledge across time. An example of this is when knowledge is transferred from one project team to another. Thirdly, as socially created – where knowledge is transferred through interpersonal interactions (discussions, arguments and other informal communications). The challenges associated with this form of knowledge transfer are primarily in fostering an organizational culture that encourages informal communication. Although this may be considered outside the remit of a project manager's responsibilities, a project manager can help by fostering a communication-friendly culture within the project team.

Further, it points out the following obstacles to knowledge transfer in project-organizations:

- Project constraints leave little time and resources for effective documentation of knowledge.

- The existence of significant social and cultural barriers to knowledge transfer. These are things such as lack of openness, intolerance of failure, blame culture etc.

- Lack of motivation (or incentives) to undertake project reviews.

- Lack of leadership that accords enough importance to developing the organization's knowledge base.

The paper asserts that these issues boil down to inadequacies in the organizational culture. By putting it another way, the transfer of intrinsic knowledge (which exists in people's minds) can occur only in an organizational culture that supports it.

The paper also recommends that managers should concentrate on the following points to foster knowledge transfer in project-based organizations:

- Recognize different levels at which knowledge is generated - i.e. individual, group and organizational.

- Appreciate the role of organizational culture in promoting or hindering knowledge transfer between these levels.

- Understand the role that management plays in fostering a culture that facilitates knowledge transfer. Project managers have to deal with many different cultures (organizational, departmental and project team) and awareness of cultural differences can help managers find the cause of obstacles to knowledge transfer.

- Appreciate the challenges involved in transforming organizational culture.

- And finally, since projects are streams in which knowledge is generated, practitioners must understand the issues that need to be addressed to facilitate the gathering and preserving of relevant knowledge generated during project implementation. Some examples of these include communication modes between team members, what worked well in the project, what can be improved and how it might be improved.

The paper concludes with following three statements:

- Effective knowledge transfer can occur only if the organizational culture is open to accepting new knowledge transfer activities. Managers must therefore prepare the culture to accept, adopt and implement these activities.

- In addition to knowledge transfer, knowledge management is also about fostering an organizational culture that encourages the creation, sharing and utilization of knowledge.

- Project managers have to merge countless organizational, departmental and professional cultures into an effective project culture that promotes knowledge management.

Paper 2 – Cultural Impacts on Knowledge Management and Learning in Project-based Firms

The issues identified in Paper 1 are further explored in Paper 2 which links learning and KM in project based organizations. The paper starts with definitions of KM and learning organizations and explains that there is an obviously close correlation between the objectives of KM and the notion of a 'learning organization'. Both aim to improve business performance by acquiring, storing, and sharing knowledge in an organizational setting. It is important to note that it is possible to gain and refine knowledge from failures, as well as from successes. Such experiential learning typically produces 'rules of thumb', guidelines, and the like. This is particularly relevant to KM in project management, in which lessons learnt and guidelines of 'best practice' are essential if knowledge is to flourish.

The management of knowledge, whether explicit or tacit, is a crucial precondition for project success in today's dynamic and vibrant global environment. The knowledge gained from failures and successes can stimulate areas of practice within firms (and possibly between firms in a strategic alliance) through a cycle of application, assessment, reflection, and renewal. A culture that is able to harness knowledge as a transferable asset can enhance future projects and expand the scope of an organization's project capability. The temporary nature of projects means that they do not possess any 'organizational memory' in themselves. In contrast to corporate entities, which have a definite structure and established routines that enable them to absorb and retain knowledge, projects do not possess any natural knowledge-transfer mechanism. Deliberate management initiatives are

therefore required to create, capture, and transfer such knowledge. For example, the lessons to be learnt from a project can be consciously transferred by deliberate socialization among individuals before they leave the project.

The paper also illustrates how different cultural levels (professional, organizational, and national) can interact in the context of project-based business. To achieve harmony among the different cultural levels, a project requires a strong directional culture; however, to be successful, this requires a synthesis of cultures, rather than an attempt to unify the various cultures by coercion. It thus requires appropriate modes of co-operation and communication for the particular project at hand.

The paper concludes that knowledge management activities in project-based firms have comparatively little to do with technology; rather, the focus must be on the behaviors and attitudes of people as determined by the professional, organizational, and national cultures from which they come. In their efforts to implement effective knowledge management, senior management must give particular attention to these cultural issues, which are critical for the success of knowledge-management activities. There are a few things top management can do: (i) create a no-blame culture that is really the key - if people are to be open about their project knowledge, they must feel assured that there are no unfavorable consequences of openness; (ii) allocate sufficient time and resources for project post-mortems and documentation. There should be a rule, strictly enforced, that a project is not over until the knowledge gained is properly managed. If possible, the postmortem should be facilitated by a qualified facilitator who is not involved with the project; (iii) establish easy to reference project records - with unique reference to documentation of failures and what could have been done to avoid them (this is related to points (i) and (ii) above). Again, these are issues related to culture and they can only be changed by intensive efforts from the top management.

Paper 3 – Role of Organizational Culture for Knowledge Sharing in Project Environments

This paper undertakes a deeper empirical analysis of knowledge sharing activities in project environments by focusing on the role of organizational culture. In this paper the key rationale under exploration is to consider the significance of organizational culture within project-based organizations and to determine how it can assure that knowledge sharing activities would continue to be suitable in projects.

The paper describes howt project companies may be engaged in a number of projects at the same time. The administration of such projects is a challenging undertaking. Their heavy dependence on finance and time constraints requires that a large scale of diplomacy is granted to minor points. These projects are mostly interconnected, which demands knowledge sharing efforts amongst projects.

The paper further discusses four knowledge categories mentioned by Riech (2007), which are vital to the success of projects: first, *process knowledge* is the knowledge that team members and sponsors have about the project structure, methodology, tasks, and time frames. This knowledge allows a team member to understand his or her part in the overall project and to understand what is expected and when it is to be delivered. Second, *domain knowledge* — the knowledge of the industry, firm, current situation, problem/opportunity, and potential solutions (including technology and process): this knowledge covers three types business, technical, and production knowledge. Third, *institutional knowledge* is a blend of the history, power structure, and values of the organization. Fourth, *cultural knowledge* — it is noted that a project manager is required to understand how to manage people who have fairly unique cultural norms.

It also explains different dimensions of knowledge sharing mechanisms such as: (i) personalization versus codification, and (ii) individualization versus institutionalization with a project perspective. Personalization mechanisms are often assumed to be more ad hoc and informal, and codification mechanisms are assumed to be formal and involve the use of electronic databases. Individualization versus institutionalization distinguishes between mechanisms that enable the sharing of knowledge at the individual level, or at a collective level. The institutionalization dimension describes socialization tactics that are collective and formal in terms of the contexts in which organizations provide information to newcomers, while the individualization dimension describes socialization tactics that are individual and informal.

The result of empirical analysis discovered that organizational culture is likely to have a positive relationship with promoting knowledge sharing. It is interesting that the results of this paper showed IT to have a weak relationship with knowledge sharing activities as compared to people (organizational culture). The relationship with people, closely associated with organizational culture, is significantly correlated with knowledge sharing. This phenomenon might be explained by the fact that knowledge is basically embedded in the numerous human communities that compose organizations, as well as in organizational work practices, values, and systems and IT enables them to share knowledge, but if people are not willing to share their knowledge, then IT facilities will be useless. This result

confirms that organizational culture is an important predictor of the behavioral intentions of organizational members for knowledge sharing.

Paper 4 – Critical Factors for Knowledge Management in Project-based Business

This paper examines the critical factors that facilitate and/or impede knowledge-management initiatives in the context of project-based business. On the basis of the literature review, a conceptual model of the factors that influence the success of KM initiatives in a project-based context is proposed in this paper, the proposed model consists of six distinct factors:

- familiarity with KM;

- coordination among employees and departments;

- incentive towards knowledge efforts;

- authority to perform knowledge activities;

- system for handling knowledge; and

- cultural support.

Currently, knowledge is recognized as a critical competitive asset, and interest in knowledge management has therefore increased in most companies. At the same time, more firms are organizing their business in terms of projects; indeed, project-based business has become an accepted business strategy among the range of potential business strategies available to firms.

The results of the paper have revealed that the absence of incentives for employees who engage in KM initiatives was the most significant barrier to the success of such initiatives in the project-based firms studied here. The results suggest that senior management should offer suitable incentive schemes for employees to engage in KM initiatives if they want to increase the likelihood of success in such initiatives. The second-most significant barrier to success in KM initiatives was the absence of a proper system to handle knowledge in project-based organizations. The majority of respondents felt that there was no adequate system in their organizations to manage knowledge efficiently. It is apparent that appropriate KM systems in project-based businesses would be a significant factor in assisting KM initiatives to flourish. Such a system would facilitate the sharing of experience among employees through an integrated interface platform accessible to all inter-

ested participants in a project. A lack of coordination among employees and departments was the third-most significant barrier to KM initiatives, while a lack of familiarity was the fourth-most significant. It would seem that proper coordination among employees who are made familiar with the objectives and methods of KM would enhance the likelihood of success in KM initiatives.

Paper 5 – Organizational Culture and Knowledge Management: An Empirical Study in Finish Project-based Organizations

KM has emerged as an essential process for managing business not only in traditional organizations but also in PBOs because knowledge plays an important role in formulating and identifying the ability of an organization or project team to be resourceful. It is expressed that knowledge is an extremely people-dependent accomplishment and largely information technology-independent. People aspects are mostly linked with cultural concepts in organizational theories.

This fifth paper shows that each organization has its unique culture, which develops over time to reflect the organization's characteristics in two dimensions, as mentioned by McDermott and O'Dell (2001). The visible dimension of culture is reflected in the adopted values, philosophy and mission of the firm, while the invisible dimension lies in the unspoken set of values that guide employees' actions and perceptions in the organization. To comprehend culture involves understanding the distinction between formal and informal rules, and between the adopted and actual means of operation. An employee must identify and follow inside the concealed cultural norms and rules to carry on and flourish in an organization. Organizational cultures that prop up knowledge sharing can lead to more valuable accomplishments in organizations.

The paper extends its discussion by explaining Beijerse's view (1999) that in the past traditional economies used to depend on tangible assets such as land and capital, but present day economies treat knowledge as the key production factor on which competitive advantage rests. Employees always carry a wealth of valuable knowledge and experience into an organization. The paper continues with Schein´s arguments (1992) that organizational culture sets out the framework of relationships among employees to direct and interpret their attitudes and behaviors. He underlines that, within a culture, organizational artifacts (such as physical layout, technology, language, stories, rites, and norms) have a critical function since they reflect the deep-rooted values that determine the actions and behaviors of the employees in sharing knowledge within organizational networks. An artifact crops up within the unique types of relationships that are developed among the employees of an organization. Any type of cultural artifact is given meaning

by the founders and employees of an organization during their interaction and communication (Weick, 1995).

The results demonstrate that KM is not considered important in such organizations where its members feel that OC does not provide a sense of protection. However, people are considered important for KM in such organizations where its members feel that OC provides a sense of protection. It is also obvious from the results that KM is not considered important in such organizations where OC does not help to achieve the aims of the employees.

The paper concludes with saying that in order to manipulate the ability to manage knowledge the organizational culture can be focused so that employees are able to share their knowledge because this promotes openness and the acceptance of new ideas.

4.4   Papers' authors contribution

All five papers comprising this dissertation are the outcomes of cooperative efforts. For the purposes of evaluation of this thesis, clear distinctions need to be made as to who has done what. The research has been a process that has been principally undertaken by individuals cooperating and confronting mutual ideas. In any case, one division in this research is apparent in that all the empirical effort has been the individual contribution of the thesis author. Even so, a more detailed separation of the contribution for each paper is made in Table 11.

Table 11.   Individual contribution of each author

Paper	First Author	Co-authors	Contribution
1	Ajmal M.M	Koskinen K.U	This paper is a joint effort between two authors. However, the second author agrees that most of the work was done by the thesis author particularly in providing the core idea and developing the paper for presentation at ProMac-2006 and after that for further submission for publication in PMJ.
2	Ajmal M.M.	Kekäle T. & Takala J.	This paper is outcome of all authors' joint contribution but they agree that main contribution came from the thesis author. It was firstly published and presented at MIC'07 and then submitted to VINE: The Journal of Information and Knowledge Management Systems.
3	Ajmal M.M	Kekäle T. & Koskinen K.U	This is a joint effort by three authors. The prior theoretical version of this paper was published and presented at PICMET'08 by the thesis author. Later on, the empirical part was added by the first author. The co-authors constantly guided him in the development of the paper. After further developments it was submitted to IJPOM.
4	Ajmal M.M.	Helo P. & Kekäle T.	This is also the joint effort of three authors. The co- authors agree that the theoretical and empirical analysis was performed completely by the thesis author and the major contribution came from him since he was also presenter of this paper at the 11th IBIMA, but later on it was further developed for submission in JKM. It is forthcoming in early 2010.
5	Ajmal M.M.	Helo P.	The thesis author was responsible for the theoretical part as well as the data analysis. However, during the whole paper development phases very valuable review comments were made by the co-author to improve the quality of the paper, but both authors accept that the major contribution came from the thesis author. It has been accepted in IJIL and will be published in early 2010

5   CONCLUSION

Knowledge is considered a significant constituent for organizational performance (Chua and Lam, 2005) and now even a competitive edge for individual projects (Teerajetgul et al., 2009). It is mainly people-oriented and the uniqueness of groups of individuals, in the shape of organizational cultures, may play a key role in the factors that lead to either the approval or refusal of KM activities. This dissertation investigates cultural issues with regard to knowledge practices in the context of project work. The study findings suggest that a need for developing an organizational culture is evident for most project organizations to manage their knowledge. The development of competent knowledge sharing is essential if organizations are to learn from their experiences and be innovative. In order to systematically share the knowledge created in a project, the projects themselves must be analytically managed. There must be a systematic implementation of knowledge practices which are supported and protected by the mother organization culture (Ajmal & Koskinen, 2008). But in the implementation of KM practices a preliminary concern is the suitability and harmonization of the organizational structure to support knowledge sharing activities in projects because the circumstances of project-based organization create their own logic of action that poses particular problems for the embedding of knowledge associated with new management practice (Bresnen et al., 2004).

More specifically, the study findings have revealed that launching KM initiatives in project-based organizations has comparatively little to do with technology, but rather the focus must be on the behavior and attitudes of people as determined by the professional, organizational, and national cultures from which they come. This finding has confirmed the claim of Newell et al. (2006), who have also discovered that ICT-based strategies for capturing and transferring knowledge across projects are not all that useful. Those examples where transfer of learning was effective are much more heavily dependent on social networks and informal dialogue than on ICT. The limited use of ICT-based strategies and the importance of social networks for cross-project knowledge transfer have been found by others as well (e.g. Keegan and Turner, 2001). Therefore, in their efforts to implement effective KM, senior management must give particular attention to these cultural issues, which are critical for the success of knowledge-management activities.

Moreover, it is also necessary to examine organizational culture when investigating knowledge sharing because knowledge sharing is quite different from traditional information systems. Knowledge, which is information that exists in the minds of individuals, is inextricably linked to human values, and these come from culture. To develop a more results-oriented knowledge sharing culture, managers

need to encourage behaviors that are less risk averse, such as experimentation and exploration. Open communication plays a significant role in successful knowledge sharing practices.

5.1 Thesis contribution

The current study contributes to existing knowledge in both theory and practice. It consists of five original consecutive and complementary publications. In these publications, the role of the thesis author has been central by providing the main contribution in the form of the proposal of the problem studied and the concrete literary work along with collecting and analyzing of the data. A framework was employed in this study to assess relationships between organizational culture and knowledge management along with assessing some critical factors for KM initiatives, particularly in project-based organizations. Also some key steps in the light of the empirical findings are taken into consideration for the harmonizing of organizational culture with KM (see Figure 12).
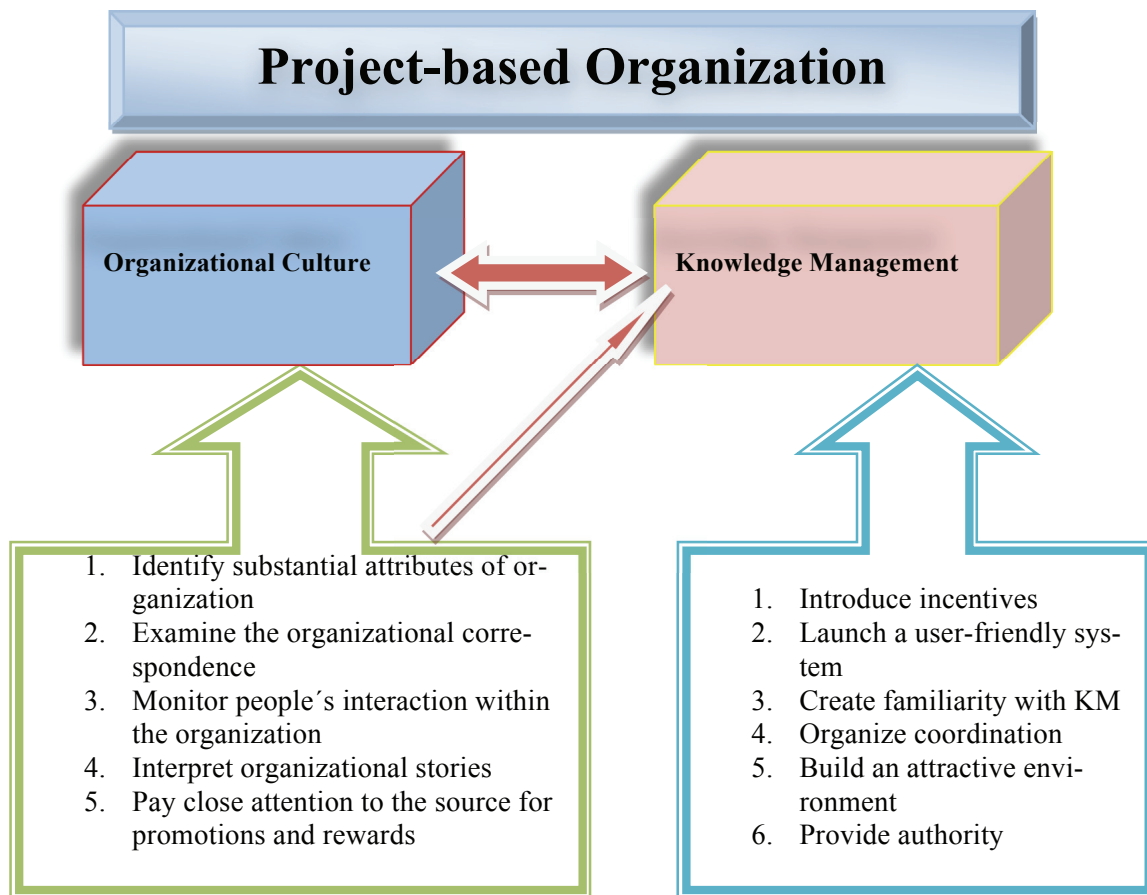
Figure 12.   KM framework with cultural perspective

The study framework is also consistent with the findings of Bresnen et al. (2003), who identified that the processes of knowledge capture, transfer and learning in project settings rely very heavily upon social patterns, practices and processes in ways which emphasize the cultural values. Understanding how the culture operates, and machinery behind the scenes that runs it, will let those within the organizational culture to be familiar with and reinforce the excellence, cut away the inefficiency, and in fact construct an environment that breeds and encourages KM activities among its members. However, to work out an organization's culture is highly interpretative, requiring assessment of both current activities and past history. The physical environment in which people work, as well as how people act and respond to KM strategies must be examined.

Furthermore, this study suggests that organizational culture builds a number of assorted concepts, policies, and conditions which have an effect on every level

organizational strategies, including KM. Organizational culture should emerge as one uniformity dominating the entire organization, but in reality this is hardly ever the case. Tangible objects are adjectives used to denote a culture in which the organization's core values and customs are widely held and widely shared within the entire organization. These tangible objects help to make an organizational culture strong or thick cultures within organizations. On the other hand, an intangible object of culture is one that is not widely shared within the organization. Still, within a strong organizational culture there are likely to be subcultures often aligned within specific departments or specially areas. In project environments it is not uncommon for norms, values, and customs to develop within a specific field or profession such as marketing, finance or operations. Similarly, countercultures can emerge within organizations that reflect a different set of values, beliefs and customs often in direct contradictions with the culture advocated by the top management. How pervasive these subcultures and countercultures are affects the strengths of the culture of the organization and the extent to which culture influences member's actions and responses to KM strategies.

This study has also examined the critical success factors for KM initiatives in project-based organizations. Drawing on the suggestions of various researchers in recent years (e.g. Davenport & Long, 1998; Ryan & Prybutok, 2001; Moffett et al, 2003; Connnelly & Kelloway, 2003; Chua & Lam, 2005; Yeh et al, 2006), the study has proposed a conceptual model of such factors. The findings of the empirical study have revealed that the absence of incentives and the lack of an appropriate system are the most significant barriers to successful KM initiatives in projects. A lack of inter-departmental coordination and unfamiliarity with KM were other significant barriers. A lack of authority to manage knowledge and an absence of cultural support were the least-significant barriers to successful KM initiatives in the project-based organizations studied here.

In a nutshell the study has contributed to the concerns of organizational culture during the practice of knowledge management in projects by examining the relationships between organizational culture and KM. Organizational culture comprises the assumptions, values, norms and tangible signs (artifacts) of an organization. The results reveal that the sense of organizational culture in the shape of tangible and intangible objects has a moderate to strong positive relationship with most KM elements, excluding the role of IT in KM and project members' commitment towards KM activities. Those results imply that it might be that OC cannot be embedded into IT systems and there must be a concerted effort made to ensure the commitment of members towards KM activities.

5.2   Managerial implications

The present dissertation has several important implications for project managers who wish to initiate successful KM practices within their projects. They have to be able to operate in several, potentially diverse, organizational cultures. First, they have to interact with the culture of their parent organization as well as the subcultures of various departments. Second, they have to interact with the project's client or customer organization. Finally, they have to interact in varying degrees with a host of other organizations connected to the project. These organizations include suppliers and vendors, subcontractors, consulting firms, government and regulatory agencies, and in many cases, community groups. Many of these organizations are likely to have very different cultures. Project managers have to be able to read and speak the culture they are working in to develop strategies, plans, and responses that are likely to be understood and accepted.

In particular, it is important to recognize that knowledge sharing and learning in organizations is greatly influenced by the cultural values of the organization as a whole and of the individual members of the organization. The identification of viable means of ensuring that knowledge is produced and diffused across project boundaries and throughout the organizational hierarchy is a very important issue for project-based business. This requires a thorough understanding of the complexities of the organizational and professional cultures that guide and motivate people working in projects.

In projects higher management should always create a no-blame culture that is, in fact, the key if people are to be open about their project knowledge: they must feel assured that there are no unfavorable consequences of openness. Then the management must allocate sufficient time and resources for project post-mortems and documentation. There should be a rule, strictly enforced; that a project is not over until the knowledge gained is properly managed. If possible, the postmortem should be facilitated by a qualified facilitator who is not involved with the project. Finally, easy to reference project records must be established, with unique reference to the documentation of failures and what could have been done to avoid them. However, these are issues which are related to culture and, hence, can only be changed by intensive efforts from the top management.

Another important implication for project managers arising from the present study is that successful KM initiatives require appropriate incentives for team members and a user-friendly information system that facilitates the sharing and management of knowledge among all project participants. At the organizational level, people and processes must be the first priority for managers who wish to nurture a

'KM culture' in project-based business. The recognition and reward structure within the organization must encourage people to take part in KM activities, and such activities should be built into the daily working routines. Such activities as the sharing of lessons learnt, mentoring, applying knowledge capture/retention activities, exchanging stories, and sharing expertise should be encouraged as routine job-related activities. However, project managers must ensure that these KM initiatives are in alignment with the overall strategic goals of the parent organization. If specific KM initiatives appear to be incongruent with the strategic business goals of the organization, KM will be doomed to fail. In short, any KM plan must be carefully designed to be harmonious with the organization's prevailing culture.

The moral and budgetary support of senior management is essential for the success of any KM plan in project-based business. Because KM deals with a long-term vision of intangible assets, some managers can be unwilling to invest resources in this area, especially if budgets are tight and there are more pressing short-term needs. In these circumstances, the support of senior management is critical to successful KM.

At the team level, the project manager can help to create a team culture conducive to KM by transmitting appropriate values and beliefs to the team members. The aim is to inculcate agreed group norms regarding how decisions are made, how conflicts are resolved, how trust is built, and so on. Any differences in the assumptions and beliefs of subcultures regarding 'how we do things around here to succeed' can have profound implications for the success of projects. Managers who are aware of such 'sub-cultural differences' can avoid or minimize unproductive conflicts and misunderstandings. It is important for the manager to make a concerted effort to speak and listen in ways that take these differences into account. Attributing problems to another person's 'inflexibility' or 'stubbornness' is likely to polarize differences, escalate conflicts, and jeopardize the whole project.

In summary, effective KM requires the fostering of an organizational culture that encourages an awareness of the value of knowledge. In such a culture, managers recognize that business success requires not only knowledge generation, but also knowledge sharing, which must be nurtured with time and space. In attempting to foster such a positive view of KM, managers should not be discouraged by the commonly held belief that changing an organizational culture is a long, tedious, and difficult process; rather, they should be encouraged by the fact that a habit of knowledge sharing is more likely to come about through prudent managerial political activity (such as an effective reward and assessment scheme) than through a wholesale cultural 'revolution'. Then, managers should recognize that the role

played by technology in all of this is to be an enabling aid in supporting an appropriate culture for KM. Such a culture enhances the opportunities for personal contact and the exchange of tacit knowledge, which cannot effectively be captured in procedures or represented in documents and databases.

More specifically, in the light of the empirical findings of the study, the following steps, as mentioned above in Figure 12, can frequently help in identifying cultural characteristics which are associated with successful KM strategies of an organization:

* *Identify the substantial attributes of an organization*: i.e. what does the exterior structural design look like? What reflection does it express? Is it exclusive? What are the traditions concerning dress? What symbols does the organization use to indicate the right and grade within the organizations or projects? These tangible objects can shed light as to who has real power and knowledge within the organization.

* *Examine the organizational correspondence*: look at the annual reports, mission statements, press releases and internal newsletters. What do they illustrate? What principles are promoted in these documents? Do the reports highlight the people who work for the organization? Each emphasis reflects a different culture.

* *Monitor people's interaction within the organization*: is the interaction slow and methodological or urgent and unplanned? What rituals exist within the organizations? What values do they express? Meetings can give insightful information.

* *Interpret organizational stories*: through talking directly to people in daily conversations with co-workers, managers can gain a deeper sense into the organization's culture. Pay particular attention to the stories and anecdotes that are passed on within the organization; they often yield useful insights into the important qualities of the culture. Look for similarities among stories told by different people. The subjects highlighted in habitual stories often reflect what is important to an organization's culture. Recognize who the heroes and villains are in the organization. What do they suggest about the culture's ideals?

* *Pay close attention to the source for promotions and rewards*: are promotions based on accomplishments and performance or tenure and loyalty to the organization? What do people see as the keys to getting ahead within the organization? What contributes to downfalls? These last two questions can yield important insights into the qualities and behaviors which the organization honors, as well as cultural taboos, which can help the organization to obtain the status of a knowledge-intensive company.

By way of practice managers can assess how strong the dominant culture of an organization is and the significance of subcultures and countercultures. In addition, managers can distinguish and identify where the culture of an organization stands, in order to build a cultural profile for the organization. Based on this profile, decisions can be taken about specific customs and norms that need to be held on to, as well as those behaviors and actions that either violate or fit in with the norms of a firm foregrounding knowledge activities.

5.3   Validity and reliability of the study

There are several ways to describe validity and reliability in research. More specifically, validity is a further name for truth, and reliability expresses the degree of consistency with which the cases are agreed to be of the same kind by different observers or by the same observer on different occasions. Bryman and Bell (2003) define validity as a concern with the integrity of the conclusions that are generated from a piece of research, and reliability as the degree to which a measure of a notion is stable. When assessing the validity and reliability of a study, one has to apply different criteria to quantitative and qualitative research. All these criteria have been kept in mind while carrying out this study.

Numerous statistical methods have been used to test the reliability of this quantitative research. Validity, in turn, has been connected to the potential for generalization of the results. Thus, validity has been shown through applicable sampling. As this study was quantitative, the reliability of the questionnaire was measured statistically. For example, most of correlation values were at acceptable significance levels. The respondents and non-respondents had similar demographic backgrounds. Therefore, the answers should not be biased in this sense. The validity of the questionnaire was tested through the piloting process with targeted experts. Also random sampling was used when selecting the companies for the questionnaire survey. Furthermore, the validity of this study was also achieved by using multiple sources of evidence, including literature analysis, informal interviews with the project representatives, observations, and previous researchers' observations. The reliability of the collected data may also be seen as a problematic issue in this study. However, efforts were made to try to avoid errors in the reliability of the study. In fact, the survey was conducted by keeping in mind the actual situation in projects/organizations, and it is particularly difficult to repeat it in the exact same way. Therefore, this may have some effect on the reliability of this study.

5.4   Study limitations and future research

There are always various limitations in research, as in this study, too. This research was based on a survey which had a limited response rate. Due to this, the research may have certain limitations. The other limitation could be in terms of the respondents' same nationality. Most of the respondents were from one country, namely Finland. Furthermore, there may also be some limitations regarding the utilization of the most appropriate technique for data analysis in this study.

There are four main areas that have emerged during this study which justify more focused attention for future research. First, the relationship of culture with knowledge management activities in project-based firms should be further explored by conducting further case studies which could be accomplished by using a longitudinal research approach in order to get more complete evidence than in this study. A broader research topic could encompass the relationship of national, organizational and professional culture with KM.

Second, the impact of KM on project performance could be studied. For instance, what kind of impact KM has on individual project manageability, delivery and profitability and then what impact KM has on the collective level, namely on the overall manageability of the project-based organization.

Third, some manufacturing and service project-based companies could be studied more intensively and also separately from a KM and cultural perspective since this study was conducted in both manufacturing and service companies.

Fourth, another human soft aspect, namely the role of trust could be explored for the execution of KM initiatives in project environments. In particular, what kind/level of trust is needed for performing KM activities and how can trust affect project performance from the different project stakeholders' point of view?

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APPENDIX A: SURVEY QUESTIONNAIRE

Please provide the following information about yourself and your organization:

Your name: _____

Organization Name: _____

Position in the project (present or past): _____

How long has your firm been in operation? _____

Total number of employees in the organization _____

Estimated annual turn over in € _____

Questionnaire Outline: This questionnaire consists of three sections on A) Organizational Culture, B) Knowledge Management, C) Critical Factors

A: ORGANIZATIONAL CULTURE

Please input "√" in the response best applicable:

Scale:	1 Strongly disagree	2 Disagree	3 Not Sure	4 Agree	5 Strongly agree

Questions:	1	2	3	4	5
Organizational culture (power culture, role culture, achievement culture, support culture) can be felt in projects					
You can feel it in the shape of intangible objects (traditions, norms, values)					
You can feel it in the shape of tangible objects (dress, sitting arrangement, equipment used)					
Organizational culture has a positive effect on knowledge management in projects					
Organizational culture facilitates project members for knowledge management in projects.					
Organizational culture helps to achieve your aims					

B: KNOWLEDGE MANAGEMENT

Please input "√" in the response best applicable:

Scale	1 Strongly disagree	2 Disagree	3 Not Sure	4 Agree	5 Strongly agree

Questions:	1	2	3	4	5
knowledge management is considered important in your organization					
Human factor plays important role in KM					
Information technology plays important role in KM					
Project members are committed towards knowledge activities.					
Project knowledge is significantly hampered by dependencies outside the project.					

C: CRITICAL FACTORS FOR KM

To what extents are the following factors you beleive critical in your organization or in particular project when managing knowledge.

Please input "√" in the response best applicable:

Obstacles	1 Strongly disagree	2 Disagree	3 Not Sure	4 Agree	5 Strongly agree
Lack of familiarity					
Lack of interdepartmental coordination					

There is no incentive for managing knowledge					
Lack of authority to get information					
There is no system for managing knowledge					
Culture does not support for managing knowledge					

Knowledge Transfer in Project-Based Organizations: An Organizational Culture Perspective

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ABSTRACT ■

This conceptual paper investigates the process of knowledge transfer in project-based organizations from the perspective of organizational culture. The paper identifies obstacles to knowledge transfer in project-based organizations and emphasizes the importance of organizational and project cultures in this process. The study provides some suggestions for improving knowledge transfer in project-based organizations and notes the implications of the paper for project management.

KEYWORDS: knowledge transfer; project-based organizations; organizational culture

INTRODUCTION ■

Because the projects undertaken by project-based organizations (PBOs) are characterized by uniqueness, uncertainty, and complexity, PBOs are different from other business organizations in many respects. These differences extend to their requirements with respect to knowledge transfer.

Although the benefits of knowledge transfer have long been recognized in project-based organizations, the effectiveness of such knowledge transfer varies considerably among these organizations. The ability to manage what they know is often constrained by their capabilities with respect to creating, valuing, absorbing, and sharing knowledge. For this reason, an effective understanding of knowledge management—how PBOs utilize and integrate their dispersed knowledge—becomes essential.

Such knowledge management in project-based organizations is often a complex task. This is because project teams often consist of people with diverse skills working together for a limited period of time; indeed, a project team often includes members who have never worked together previously and do not expect to work together again (Burns & Stalker, 1961). In these circumstances, effective knowledge management is complex, but essential. Moreover, many "non-project businesses" are now adopting a "project-style" approach to their conduct of a variety of operational activities, and the influence of such "project-based" actions on the whole organizational performance is of increasing importance in a range of industry sectors. However, as Love (2005) has noted, knowledge management within projects is often suboptimal within these organizations because knowledge is created in one project, and then subsequently misplaced.

Organizational culture is the basic, taken-for-granted assumptions and deep patterns of meaning shared by organizational participation and manifestation of these assumptions (Slocum, 1995). The failure of many knowledge transfer systems is often as a result of cultural factors rather than technological oversights. However, culture, by its very nature, is a nebulous subject with a variety of perspectives and interpretations.

Against this background, the objective of the present conceptual study is to investigate knowledge creation and transfer in project-based organizations from the perspective of organizational culture. The research question addressed by the study is: How does organizational culture affect the process of knowledge transfer in project-based organizations?

Knowledge

The concept of "knowledge" can be distinguished from "data" (unprocessed raw facts) and "information" (meaningful aggregations of data). Knowledge

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involves a person using his or her perception, skills, and experience to process information—thus converting it into knowledge in the mind of the individual (Kirchner, 1997). Information thus has little worth in itself until it becomes knowledge as a result of processing by the human mind (Ash, 1998).

The process begins with *data* being organized to produce *general information*. The next stage involves this general information being sorted and structured to produce *contextual information* that meets the requirements of a specific group of users (such as project teams). Individuals then absorb the contextual information and transform it into *knowledge* on the basis of the individuals' experiences, attitudes, and the context in which they work. The final stage of the process is *behavior*; as Infield (1997) has observed, unless knowledge leads to an informed decision or action, the whole process is useless.

Knowledge can be categorized into: (i) tacit knowledge and (ii) explicit knowledge (Nonaka & Takeuchi, 1995). *Explicit knowledge* is documented, public, structured, externalized, and conscious; it has a fixed content that can be captured and shared through information technology. In contrast, *tacit knowledge* resides in the perceptions and behavior of human beings (Duffy, 2000); it evolves from people's interactions and requires skill and practice. According to Nonaka and Takeuchi (1995), it is often difficult to express tacit knowledge directly in words; in these cases, the only means of presenting tacit knowledge is through metaphors, drawings, and various forms of expression that do not involve the formal use of language. Tacit knowledge thus refers to feelings, intuitions, and insights (Guth, 1996); it is personal, undocumented, context-sensitive, dynamically created and derived, internalized, and experience-based (Duffy, 2000).

According to Nonaka and Takeuchi (1995), new knowledge is created by an interaction between explicit knowledge and tacit knowledge, facilitated through socialization and knowledge sharing. However, this does not imply a dichotomy between tacit knowledge and explicit knowledge; rather, the two forms of knowledge are mutually constituted (Tsoukas, 1996). According to Mooradian (2005), explicit knowledge is an extension of tacit knowledge to a new level. Tacit knowledge can thus be understood as knowledge that is active in the mind, but not consciously accessed at the moment of knowing. It grounds, enables, and produces the explicit knowing of individual people—such as the members of a project team.

Knowledge Flows

According to Snider and Nissen (2003), knowledge flow is a critical factor in an organization's success. These authors categorized such knowledge flow from three perspectives: (i) "knowledge as solution," (ii) "knowledge as experience," and (iii) "knowledge as socially created."

The first perspective, "knowledge as solution," emphasizes the real-time transfer of knowledge among practitioners who are seeking to solve problems or enhance operations. The key managerial issues in this perspective include the selection of an appropriate technology and the motivation of organizational members to use the system.

The second perspective, "knowledge as experience," describes knowledge as being obtained and accumulated for future use. According to this perspective, the principal flow of knowledge is across time, rather than across organizational or geographical space (as is the case in the "knowledge-as-solution" perspective). The emphasis is on capturing practitioner experiences so that others can have access to (and potentially learn from) these experiences. The rationale of this perspective is learning from mistakes and avoiding attempts to "reinvent the wheel."

Whereas the previous two perspectives see knowledge as a commodity that can be transferred to others, the third perspective, "knowledge as socially created," emphasizes knowledge as being created and shared through interpersonal social relationships. Managerial issues associated with this perspective are concerned with organizational design to enhance the development of interpersonal relationships. Members must engage in informal and unstructured communications to facilitate sense making, discussion, negotiation, and argument—which are central to the knowledge-transfer process. This perspective advocates a supporting organizational culture that encourages informal interactions between individuals to ensure that knowledge is created and transferred.

Project-Based Organizations and Project Management

Project-based companies are organizations in which the majority of products are made against bespoke designs for customers. These types of organizations can be: (i) stand-alone companies that make products for external customers, (ii) subsidiaries of larger firms that produce for internal or external customers, or (iii) consortiums of organizations that collaborate to serve third parties (Sandhu & Gunasekaran, 2004; Turner & Keegan, 1999).

The growing trend in project management is not a breakthrough of new ideas; rather, it is a revitalization of the discipline in a current business context. Project management is increasingly concerned with taking systems and processes that originated in the conventional paradigm of project management and applying them to general organizational theory. Whereas project management was previously regarded as a specialized management process with specific planning, monitoring, and control techniques that were applied to the operations of a few project-oriented industries (such as construction, engineering, and defense), it has now come to be regarded as an inclusive concept that can be integrated into a general

organizational effort to provide better quality to customers through effective intra-organizational integration and the optimal utilization of scarce resources. As a result, project management is now positioned as a complex managerial process among other organizational processes (such as knowledge management) that ensures an optimal balance between the internal organizational design of a firm and its emerging strategies.

Project Management and Knowledge Transfer

Knowledge management is of crucial importance to efficient project management. The growing complexity of project work means that an increasing number of technical and social relationships/interfaces must be taken into account by project managers in adapting knowledge and experiences from the daily work of a company and from earlier projects. Project team members frequently need to learn things that are already known in other contexts; in effect, they need to acquire and assimilate knowledge that resides in organizational memory. Their effectiveness in doing this determines their personal effectiveness, the project's effectiveness, and, ultimately, the company's effectiveness (Huber, 1991).

Within functional organizations, there are established departments and branches in which knowledge and experiences are acquired and stored. Project teams know that they can access this knowledge and experience from the documented records of a specific department, or from observing the competent employees and their working processes.

The situation is somewhat different in specifically project-based organizations because the team members of particular projects are the main transporters of knowledge and experiences of daily work. In the ideal case, the arrangements for transfer of knowledge and experiences from specific projects to the main organization are clearly

established by project management. In these circumstances, project-based organizations systematically identify and transfer valuable knowledge from current projects to subsequent projects. However, this ideal scenario is often not the case. In other words, project information is infrequently captured, retained, or indexed so that people external to the project can regain and apply it to future tasks (see also Weiser & Morrison, 1998).

A failure to practice effective knowledge management means that many project-based organizations are unable to appraise projects and learn from them. At its simplest, a failure to review a finished project means that the past errors are likely to be repeated. In some cases, project-based organizations can fail to learn from their mistakes for years on end. A broad range of reasons for this failure in knowledge management has been suggested—including organizational, technical, methodological, and cultural issues (Boddie, 1987).

It is not as though the concept of archiving and using learning histories is unknown in project-based companies. Indeed, in many companies it is considered good practice to create documented accounts of what has been learned in a project. However, according to Conklin (2001), even in companies in which this practice is normal routine, it is difficult to find instances of the resulting document actually being referenced in the next project. Alternatively, some project teams have attempted to capture their learning by videotaping their meetings; however, these teams often accumulate a staggering volume of recorded materials on tape (Conklin, 2001). The important pieces of data they require for subsequent projects are in there somewhere, but no one has the time to peruse all the recorded material and locate the relevant data.

It is thus apparent that project-based companies cannot create a useful memory store merely by capturing lots of data; rather, they must organize

these data in a manner that creates a coherent whole. This cannot be achieved as a "by-product"; that is, it cannot be relegated to the status of an extra task that is peripheral to the organization's main production process (Conklin, 2001). However, many of the people who work in project-based companies are bombarded by urgent problems and pressing deadlines and do not have the time to commit themselves to an explicit knowledge-management undertaking (Jashapara, 2004). It is thus apparent that project-based companies must find ways of preserving and utilizing their knowledge within the established practices of everyday teamwork.

In undertaking this task, project-based organizations require a clear understanding of the sorts of knowledge that should be included in an effective knowledge-management system. In this regard, Conroy and Soltan (1998) have identified three "knowledge bases" in project implementation:

- an *organization* knowledge base, which includes the knowledge specific to organizations and environments in which the projects are implemented;
- a *project-management* knowledge base, which includes the knowledge of the theory and application of project management; and
- a *project-specific* knowledge base, which includes specific knowledge acquired within the implementation of a particular project.

Although the knowledge produced within the implementation of a given project is categorized in this schema as "project-specific knowledge," Conroy and Soltan (1998) noted that the organization base and the project-management base are also developed during the implementation of any project. Conroy and Soltan (1998) divided such project-created knowledge into three general categories:

- *technical knowledge*, which relates to the techniques, technologies, work processes, costs, etc., that are involved

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in discipline-specific issues of the project;

- *project management knowledge*, which relates to the methods and procedures required for managing the implementation of projects; and
- *project-related knowledge*, which refers to knowledge about the customer and other people or entities that are of significance for the future business of the company.

Because this project-created knowledge is initially held only by project team members, it is necessary to identify, capture, and make this knowledge available to the organizational memory of the company.

Obstacles to Knowledge Transfer in Project-Based Organizations

Most project tasks are conducted under strict constraints of time and budget. In addition, team members from a completed project are usually needed for the next project, and their new team leaders therefore recruit them into new teams as soon as possible. Given these constraints, it is rarely possible for all team members to undertake a systematic review of a completed project and document the knowledge and experiences derived from it.

Furthermore, there are significant individual and social barriers that prevent the articulation and documentation of knowledge and experiences (Disterer, 2001, 2002). In particular, barriers exist with regard to the honest and open analysis of failures and mistakes; the open and productive atmosphere that would facilitate the articulation and analysis of errors is rarely present in most project-based organizations. This is unfortunate because successful projects demonstrate only that the methods that were employed were adequate for that specific task, whereas failed projects are likely to yield more valuable knowledge. Unfortunately, more effort is required to expose what mistakes can teach (Boddie, 1987).

Motivation to undertake a proper review is also a problem. It is apparent that the organization as a whole can benefit if individual employees can make use of the knowledge and experiences of their colleagues in previous projects. However, these synergies among employees can only be fully established and developed if *all* employees are willing to take part in the knowledge exchange. Unfortunately, these potential benefits to the organization are not readily apparent to individual employees, who are inclined to ask: "What benefit is there in it for me?" In short, there is insufficient individual motivation to document the lessons learned.

There is also often a lack of leadership in according sufficient importance and status to proper knowledge management. Although most methodologies recommend particular work packages for securing knowledge and experiences, the fact is that these processes are often not included in the overall project plan (Liikamaa, 2006). It is not surprising that team members do not perceive effective knowledge management as being significant if the project plan does not explicitly assign sufficient time and resources to this aspect of the project.

In many ways, these problems reflect inadequacies in *organizational culture*. Knowledge transfer involves communication among people, and although technology can handle the communication of already explicit knowledge, the communication of intrinsic knowledge (and the creation of new knowledge by the transformation of information into knowledge) requires social interaction and human cognition. Any analysis of knowledge transfer thus requires the culture of the organization to be taken into consideration.

In summary, the above discussion has shown that knowledge cannot simply be stored (Gopal & Gagnon, 1995). Knowledge resides in people's minds, rather than in computers ("CSFI Knowledge Bank," 1997). Unlike raw

material, knowledge is not coded, audited, inventoried, and loaded in a warehouse for employees to use as needed. It is scattered, messy, and easy to lose (Galagan, 1997). In this regard, Allee (1997) identified 12 characteristics of knowledge in noting that:

> . . . knowledge is messy; it is self-organizing; it seeks groups of people; it travels on language; it is slippery; it likes carelessness; it is in shape of experiments; it does not grow forever; it is a social phenomenon; it evolves organically; it is multi-modal; and it [requires] the flow of data/information.

It is therefore necessary to develop effective multidimensional means of facilitating the input of (and access to) information (Mayo, 1998). It is also necessary to develop effective ways of sorting the useful from the useless (Schaefer, 1998). To achieve these things, it is necessary for project-based organizations to develop an organizational culture that coordinates and facilitates knowledge transfer.

Organizational Culture and Knowledge Transfer

An organization's culture consists of the practices, symbols, values, and assumptions that the members of the organization share with regard to appropriate behavior (Schein, 2000; Wilson, 2000). Such a culture is holistic, historically determined, and socially constructed; moreover, it exists at various levels in the organization and is manifested in virtually all aspects of organizational life (Hofstede, Neuijen, Ohayv, & Sanders, 1990). According to Denison (1990), an organization's culture serves as a foundation for its management system and practices. Because the organization's culture provides norms regarding the "right" and "wrong" ways of operation, organizational culture stabilizes the firm's methods of operation.

Organizational culture thus ultimately determines how decisions are

made, and how staff members respond to the environment (Ott, 1989). In the words of Schein (2000, p. xxiv), organizational culture represents: ". . . the deeper level of basic assumptions and beliefs that are shared by members of the organization, which operate unconsciously in the environment." It has been described as a "social force" that motivates people to act in a particular manner (Gundykunst & Ting-Toomey, 1988). In the opinion of Kilmann, Saxton, and Serpa (1985), culture is to the organization what personality is to the individual—themes that provide meaning, direction, and mobilization.

An awareness of the organization's culture increases the likelihood of learning becoming a natural process in the organization. This is because a proper awareness of the organization's culture involves the identification and recognition of the tacit assumptions and beliefs that are embedded in the organization (Schein, 2000). Recognizing and questioning these basic assumptions enhances the capability of the members of the organization to engage in so-called "double-loop learning" (Argyris & Schön, 1978). An organizational culture that is based on a commitment to truth and inquiry empowers individuals to: (i) reflect on their actions, (ii) consider how these actions can contribute to problems, (iii) recognize the necessity for change, and (iv) perceive their own roles in the change process (Senge, 1990). In terms of project management, such "double-loop learning" (or "generative learning") is likely to occur only if the project design encourages team members to question institutional norms (Ayas & Zeniuk, 2001).

Organizational culture thus has the potential to constrain or facilitate knowledge creation and transfer within an organization. According to West (1997), the two fundamental dimensions of organizational culture are: (i) flexibility versus control and (ii) internal orientation versus external orientation. Greater flexibility is characterized
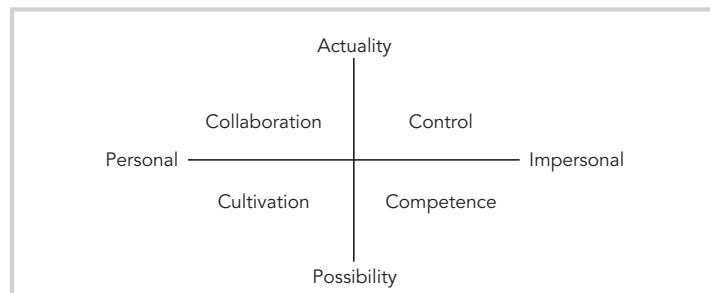
Figure 1: Four core cultures.

by "flatter" organizational structures, decentralized decision making, and minimal specialization of jobs, whereas greater control is characterized by hierarchical structures, centralized decision making, and a large number of specialized jobs with a proliferation of job titles. Rigid and formal structures can promote mere functional efficiency, but this is often at the expense of collaborative and innovative activities.

External forces also shape organizational culture because organizations necessarily reflect the national, regional, industrial, and occupational cultures within which they function. In some cases, these can take the form of religious dogma and political ideology. An organization's culture can thus reflect many beliefs that do not originate from within the organization.

In the management literature, there are many different typologies of organizational culture. For example, according to Schneider (1994), it is possible to identify four distinct "core cultures" on the basis of: (i) what each culture focuses on ("content") and (ii) how each culture makes decisions ("process"). As illustrated in Figure 1, this can be depicted in terms of two axes: (i) a vertical axis indicating content ("actuality" or "possibility") and (ii) a horizontal axis indicating process ("personal" or "impersonal").

According to Schneider (1994, p. 77):

. . . the qualities and characteristics associated with the content and

process axes are organizational and cultural preferences or central tendencies . . . [and as such] are not exclusionary—having a preference for one does not preclude involvement in the other.

In other words, placing an organization in a particular quadrant does not mean that the culture of the organization is exclusively of a particular type. For example, an "actuality" organization does not deal exclusively in facts, nor does a "possibility" organization ignore facts; rather, one style *predominates* in how the firm works.

The four "core cultures" illustrated in Figure 1 can be characterized as follows:
• *Control core culture* is concerned with ensuring certainty, predictability, safety, accuracy, and dependability.
• *Competence core culture* is concerned with achievement, gaining distinction by being the best and/or having the highest quality; this is a culture of unique products and/or services
• *Collaboration core culture* is concerned with affiliation and synergy in a culture of unity and close connections; this culture is concerned with tangible reality, actual experience, practicality, and utility; however, its decision making is people-driven, organic, and informal.
• *Cultivation core culture* is concerned with meaningfulness, self-actualization, and enrichment; this culture is concerned with potential, ideals, beliefs, aspirations, inspiration, and

Knowledge Transfer in Project-Based Organizations
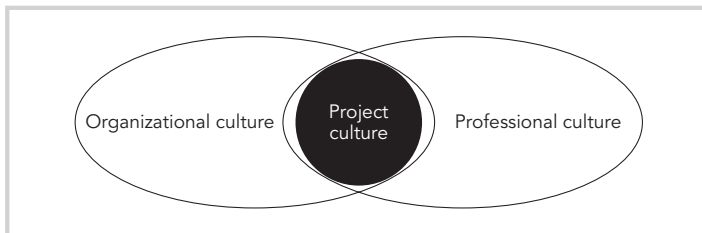
Figure 2: Project culture (Ruuska, 1999).

creative options; its decision making is people-driven, open-minded, and subjective.

Understanding the culture of an organization is critical to running successful projects. However, individuals, project teams, and organizations can seldom be categorized into one particular type of organizational culture because they typically represent mixtures of several cultural patterns. Nevertheless, shared values and a unified vision are vital for projects because they provide the focus and energy for knowledge creation. Although adaptive knowledge creation is possible without vision, generative knowledge creation occurs only when people are striving to accomplish something that matters deeply to them. The whole notion of generative knowledge creation can appear to be abstract and meaningless unless people become enthused about a shared vision to which they are committed.

The situation is complicated in project management because a project involves several experts working in various fields. Different professions typically have their own cultures and ways of working, which are not necessarily in harmony with one another or with the prevailing culture of the whole project (Ruuska, 1999). According to Wang (2001), a professional culture shapes a professional community by ensuring that the members of the profession think and behave as the profession requires. Because a profession is not limited to a particular organization (or even a particular industry or nation), its

professional culture exists across boundaries.

To achieve harmony in these circumstances, a project requires a strong directional culture, as illustrated in Figure 2.

This requires a synthesis of cultures, rather than an attempt to unify the various professional cultures; it thus requires appropriate modes of cooperation and communication for the project at hand.

Promoting Knowledge Transfer in Project-Based Organizations

An organization consists of several levels in which knowledge can be initiated (Crossan, Lane, & White, 1999; Nonaka & Takeuchi, 1995). For convenience, these levels can be differentiated as the individual level, the group level, and the organizational level.

- *Individual*: According to Simon (1991), knowledge originates with individuals and is then transferred to other levels of the organization.
- *Group*: Knowledge transfer at the group level can be understood as a social process (Simon, 1991), which provides an opportunity for an exchange of ideas (Hall, 2001).
- *Organizational*: Knowledge can then be transferred and institutionalized in the wider organization (Crossan et al., 1999). This knowledge alters the beliefs and assumptions of the organization, and ultimately transforms the organization's prevailing procedures and systems.

According to Schein (2000), any difficulties in knowledge transfer between

these levels are primarily related to the "psychological climate" of the organization, which, in turn, depends upon the culture of the organization. According to this view, the biggest challenge for knowledge transfer is not technical (which can be overcome with IT systems), but cultural ("Knowledge Management," 1997; Koudsi, 2000). In particular, there is often a prevailing attitude that *holding* information is more important than *sharing* it (Anthes, 1998). In one study ("The People Factor," 1998), culture was perceived by 80% of those surveyed as the biggest obstacle to effective knowledge transfer.

Many project-based organizations are attempting to facilitate knowledge management by utilizing databases of customers, products, and services to share and distribute information. However, organizations that attempt knowledge management without an effective managerial support structure often discover that their investment in knowledge management fails to deliver the expected benefits (Goh, 2002; Nahm, Vonderembse, & Koufteros, 2004). The project manager has a crucial role in creating a team culture that facilitates the development of project goals and group norms with respect to decision making, conflict resolution, and so on. In doing so, project managers often have to deal with several different cultures simultaneously. They typically work within the core culture of their own organization, and also have to work with the subcultures of various departments within the organization (such as research and development, marketing and sales, and manufacturing) and with the core cultures of external organizations. Each of these has its own ways of doing things (Suda, 2006). Effective communication with these various subcultures and external cultures is necessary to develop plans and strategies that will be accepted by all, while avoiding practices that violate the beliefs and values of any.

Managers who are aware of cultural differences can avoid or minimize

unproductive conflicts and misunder-standings. For example, the nature of communication in research-and-development projects is different from that in standardized delivery projects, and it is therefore important for managers to take these differences into account. If managers are not aware of such cultural differences, they might attribute difficulties to a coworker's inflexibility or stubbornness, which is likely to polarize differences, escalate conflicts, and increase the difficulties of completing the project.

According to Abell and Oxbrow (1997), three areas require particular attention by management in seeking to establish an effective organizational knowledge culture: (i) preparing the organization, (ii) managing knowledge resources, and (iii) organizing knowledge for competitive advantage. However, transformation of an organizational culture is difficult to accomplish (Roth, 2004). Smaller organizations and recently established organizations are easier to change than larger, older organizations that have a well-established corporate culture and an inflexible managerial style (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004).

Certain questions must be addressed in gathering and preserving knowledge at different stages of a project (Disterer, 2002):

- How is communication conducted among various members of the project team?
- What elements have improved the progress of the project, and which have slowed it down?
- What types of knowledge from the project can be forwarded to others?
- What is the progress of the project tasks during different stages?
- Which issues are critical for successful acquisition of project knowledge?
- What can be performed well and what can be improved in the next project?
- What are the particular complications during a project that can inhibit knowledge collection and preservation, and how can these be managed?

From the above discussion, it is apparent that knowledge management in project-based business has a higher probability of succeeding if managers:

- begin with the premise that organizations are living social systems;
- assess and identify the organization's core culture, and align the project with it; and
- recognize that all organizations have a core culture and that the project culture must function in accordance with the organization's core culture.

Conclusions

The conclusions of this paper can be summarized as follows:

First, for effective knowledge transfer in project-based business, it is crucially important to prepare the organizational culture to accept, adopt, and utilize new knowledge-transfer activities.

Second, knowledge management is not just about transferring knowledge; rather, it is about fostering an organizational culture that facilitates and encourages the creation, sharing, and utilization of knowledge.

Third, project managers must merge several different organizational and professional cultures into one project culture that promotes effective knowledge management.

The identification of viable means of ensuring that knowledge is produced and diffused across project boundaries and throughout the organizational hierarchy is a very important issue for project-based businesses. This requires a thorough understanding of the complexities of the organizational and professional cultures that guide and motivate the people working in projects. ■

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CULTURAL IMPACTS ON KNOWLEDGE MANAGEMENT AND LEARNING IN PROJECT-BASED FIRMS

Mian M. Ajmal, Tauno Kekäle, and Josu Takala

Abstract

Purpose – Projects almost invariably involve a variety of diversely skilled people from different national, organisational, and professional cultural backgrounds. These people come together for a specific period of time to accomplish certain unique, unpredictable, and complex objectives. These distinctive characteristics mean that project-based firms require a particular approach to knowledge management (KM) and learning activities that differs significantly from prevailing strategies. This paper explores the way in which these distinctive cultural issues (national, organisational, and professional) influence KM in project-based firms.

Design/methodology/approach – The paper first looks at the general issues of KM and the 'learning organisation'. Secondly, the study discusses the more specific issue of KM in project-based firms. Thirdly, the paper explores national, organisational, and professional cultures in the context of project-based business. Finally, the paper draws the three preceding sections together to discuss the managerial implications of dealing with cultural issues in fostering KM in project-based firms.

Findings – It is apparent that culture has a most significant influence on the KM capability of an organisation. The moral and budgetary support of senior management is essential for the success of any KM plan in project-based business.

Practical implications – At the organisational level, people and processes must be the first priority for project managers who wish to nurture a 'KM culture' in project-based business. At the team level, the project manager can help to create a team culture conducive to KM by transmitting appropriate values and beliefs to the team members.

Originality/value – The paper helps the practitioners and academics to understand the complexities of cultural issues during KM initiatives in the context of improving project performance.

Keywords: knowledge management, learning, project-based firm, culture

Paper type Conceptual paper

1. Introduction

In recent decades, tasks within companies are increasingly being handled in the form of *projects* that require flexibility, innovation, and interdisciplinary cooperation. The

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uniqueness, uncertainty, and complexity that characterises such project-based business requires specialised approaches to knowledge management if project-based firms are to be successful while operating in a variety of cultures with diverse workforce combinations.

Because knowledge is largely people-based, the cultural characteristics of different groups of people play a key role in successful knowledge management (Ciganek et al., 2008) and the subsequent development of competencies within an organisation (Argote and Ingram, 2000). The ability to create, share, and absorb knowledge among dispersed organisational members of varied cultural backgrounds is thus an essential requirement for success in project-based business, and previous studies have confirmed that culture can play a significant role in facilitating or hindering knowledge sharing in culturally diverse teams (Usoro and Kuofie, 2006). However, because projects almost invariably involve a variety of experts of diverse cultural, organisational, and professional backgrounds bound together in one project with time and money constraints, knowledge management becomes a tricky undertaking.

Against this background, the present theoretical study explores the impact of cultural issues on knowledge management in project-based business. The remainder of the paper is organised as follows. The next section discusses the general subject area of knowledge management and the learning organisation. The paper then explores the more specific question of knowledge management in the context of project-based business. This is followed by a discussion of cultural issues in terms of national culture, organisational culture, and professional culture. The managerial implications of the preceding three sections are then discussed. The paper concludes with a summary of the main findings of the paper and suggestions for future research.

2. Knowledge management and the learning organisation

Davenport and Prusak (1998) described 'knowledge' as a blend of experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experience and information. Nonaka and Takeuchi (1995) classified knowledge into two types: (i) 'explicit knowledge' and (ii) 'tacit knowledge'. The former is the knowledge contained in books, manuals, and reports; as such, it is relatively easy to identify, retain, articulate, and share. In contrast, the latter consists of intuition, feelings, perceptions and beliefs; as such, it is often difficult to identify, retain, articulate, and transfer. According to Nonaka and Takeuchi (1995), tacit knowledge is the basis of creativity and innovation.

Alavi and Leidner (2001) defined knowledge management (KM) as the systematic process of acquiring, organising, and communicating the knowledge (both tacit and explicit) of organisational members so that others might make use of it to be more effective and productive. Effective KM requires the selective application of knowledge from previous decision-making experiences to current and future decision making with the express purpose of improving the organisation's effectiveness (Jennex, 2005). In this regard, tacit knowledge typically requires greater attention to the question of contextual circumstances if the information is to be utilised effectively in KM (Jennex and Olfman, 2006).

Garvin (1993) defined a 'learning organisation' as one that is not only capable of creating, acquiring, and transferring knowledge, but also able to modify its behaviour to replicate new knowledge and insights. In a similar vein, Watkins and Golembiewski (1995) contended that a 'learning organisation' is able to create systems that ensure long-term capabilities to capture knowledge and thus empower continuous transformation.

There is obviously close correlation between the objectives of KM and the notion of a 'learning organisation'. Both aim to improve business performance by acquiring, storing, and sharing knowledge in an organisational setting. According to King and Ko (2001), KM is best understood as a 'subset' of a 'learning organisation'.

The knowledge that is created and captured within the 'learning organisation' can be applied to appropriate individual, organisational, and inter-organisational processes (Liebowitz and Megbolugbe, 2003). Moreover, the recursive relationships that exist among project data, information, and knowledge enable organisations to utilise the knowledge that has been gained to plan for future projects (Liebowitz and Megbolugbe, 2003). This latter point was reinforced by Spiegler (2000, p.3), who summarised the relationships as follows:

> Yesterday's data are today's information, which will become tomorrow's knowledge, [which] in turn, will recycle down the value chain back into information and into data.

Liebowitz (2005) incorporated the notions of 'data', 'information', 'knowledge', and 'organisational processes' into a coherent model of KM, as shown in Figure 1. According to the model, *data* are organised into actionable *information*, which is then transformed into *knowledge*. When knowledge is learned and embedded into individual and organisational processes, the value of that knowledge to the individual and organisation increases significantly.
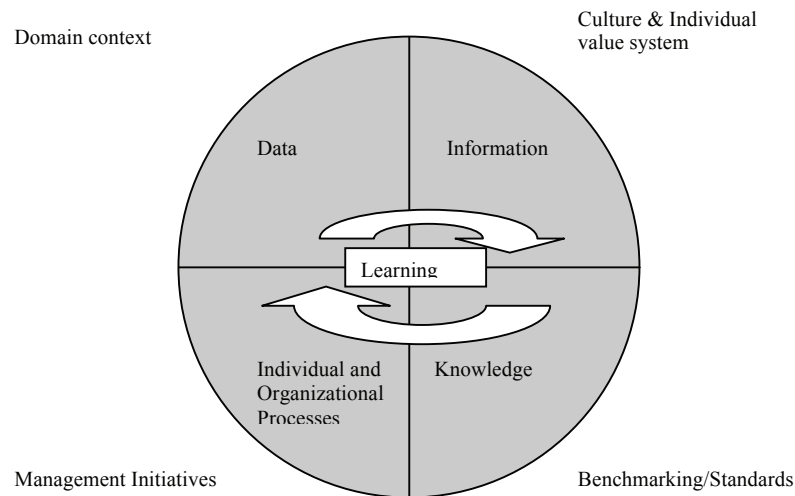
Figure 1: Knowledge management model (Liebowitz, 2005)

Knowledge must have a context if it is to be useful to an organisation; therefore, as shown in Figure 1, so-called 'ecological factors' surround this knowledge cycle. These include: (i) domain context; (ii) culture and individual value system; (iii) management initiatives; and (iv) benchmarking standards. The inclusion of these 'ecological factors' in the model indicates that learning is affected by context, culture, value systems, and individual perceptions. Moreover, management initiatives and benchmarking standards determine how such learned knowledge is utilised in the organisation.

It is important to note that it is possible to gain and refine knowledge from failures, as well as from successes. Such experiential learning typically produces 'rules of thumb', guidelines, and the like. This is particularly relevant to KM in project management, in which lessons learnt and guidelines of 'best practice' are essential if knowledge is to flourish.

KM is an 'action discipline'; that is, knowledge needs to be applied if KM is to have a measurable impact, and effective *decision making* is the ultimate application of knowledge (Jennex and Olfman, 2006). The success of KM is dependent on providing the appropriate knowledge to those that need it, when it is needed (Jennex and Olfmann, 2006). In this regard, Jennex (2006) noted the importance of context and culture on effective re-use of knowledge. Usoro and Kuofie (2006) also emphasised that knowledge sharing is always conducted within a certain cultural context that determines how the recipient interprets the information that he or she receives. In particular, in face-to-face com-

munication, voice cues and body language are crucial to the meaning that is attached to shared information.

3. Knowledge management and project-based firms

In general terms, project-based firms (PBFs) are commercial entities that organise their activities around numerous self-contained projects that can be treated as separate organisational entities. Each of these projects involves a temporary system of coordination in which diversely skilled specialists collaborate to accomplish complex and innovative tasks in a predetermined period of time (Grabher, 2002). The key characteristics of a PBF are therefore: (i) significant interdependence among different kinds of knowledge and skills; (ii) complex and unpredictable tasks and problems; and (iii) time-delimited project goals (and, often, time-delimited employment). Projects are generally discrete, tradable, and technologically continuous (Breschi and Malerba, 1997; Tushman and Anderson, 1986).

Despite these common factors, PBFs use a variety of inputs to provide a wide range of products and services. Projects can vary in terms of their customisation, specifications, and the degree to which clients co-produce them. Such variations have significant implications for the management of PBFs and their ability to produce distinctive collective capabilities (Casper and Whitley, 2003).

Managing through projects has become a standard mode of doing business and a distinctive business strategy (Björkegren, 1999; Prencipe and Tell, 2001). The emergence of project management has been encouraged by such factors as greater global competition, shorter product life cycles, the need for new product development and innovations, a tendency towards corporate downsizing, greater use of outsourcing, increased customer focus, and rapid developments in information technology. In response to such factors, project-based firms have been forced to improve their management of the knowledge that they acquire and accumulate from their projects (Davenport et al., 1998; Joyce and Stivers, 2000; Fernie et al., 2003). If such knowledge is managed efficiently, it can be used to decrease project time, improve quality and customer satisfaction, and minimise delivery times.

The management of knowledge, whether explicit or tacit, is a crucial precondition for project success in today's dynamic and vibrant global environment. The knowledge gained from failures and successes can stimulate areas of practice within firms (and possibly between firms in a strategic alliance) through a cycle of application, assessment,

reflection, and renewal. A culture that is able to harness knowledge as a transferable asset can enhance future projects and expand the scope of an organisation's project capability.

The amount of new knowledge needed to run a project depends on the novelty and uniqueness of the product being created. However, even if the details of a given project (team composition, product to be produced and so on) are unique, the essential processes involved are usually similar (Love et al., 1999). Most projects do not require a PBF to start from 'scratch', and most can utilise existing processes and knowledge acquired from previous projects. Despite this, well-designed KM processes can be crucial in assisting firms to shape their knowledge assets into specific new competencies (Willem and Scarbrough, 2002).

Projects must always be completed within a specified period, which makes the harnessing and re-use of knowledge a necessity. Without the re-use of existing knowledge and/or the ability to create new knowledge from existing solutions and experiences, PBFs are forced to create new solutions to every problem, which is clearly inefficient. Nevertheless, the desirable re-use of knowledge can become problematic if personnel leave a project before its completion, or if the project is a temporary assemblage of experts who are diverse in terms of geographical dispersion, expertise, or working methods (Kasvi et al., 2003). In these circumstances, knowledge can be lost once a project is completed and the experienced personnel are then absorbed back into their own firms and engaged in other projects.

The temporary nature of projects means that they do not possess any 'organisational memory' in themselves. In contrast to corporate entities, which have a definite structure and established routines that enable them to absorb and retain knowledge, projects do not possess any natural knowledge-transfer mechanism. Deliberate management initiatives are therefore required to create, capture, and transfer such knowledge. For example, the lessons to be learnt from a project can be consciously transferred by deliberate socialisation among individuals before they leave the project.

The management of knowledge in PBFs is thus becoming an important issue in establishing and sustaining a competitive advantage. Without an appropriate organisational culture during a project's life cycle, valuable knowledge assets can be irretrievably lost once a project is completed. This results in a fragmentation of organisational knowledge and impaired organisational learning (Kotnour, 2000). The identification of critical knowledge and the ability to utilise it is an increasing challenge for every project-based organisation (Kasvi et al., 2003). There is a growing realisation that successful project

management requires accumulated organisational knowledge and the ongoing development of individual and collective competencies (Willem and Scarbrough, 2002).

4. Cultural issues

In the most general terms, the term 'culture' refers to the 'way of life' of a group of people (Foster, 1962). In a similar vein, Hofstede (2001) defined culture as an intangible collective of characteristics that distinguishes one group, organisation, or nation from another. From the perspective of the individual, Tylor (1977) described 'culture' as a complex whole that includes the knowledge, beliefs, art, law, morals, customs, capabilities, and habits that are acquired by an individual as a member of society.

Culture presents itself at different levels (Trompenaars, 1998). These include a 'national culture', a 'regional culture', an 'organisational culture', and a 'professional culture' (Schein, 2004; Trompenaars, 1998). Each of these is multidimensional—embracing a sense of belonging in association with others, a sense of achievement, feelings of security and self-esteem, and so on (Kahle et al., 1988). However, because society as a whole (and organisations within it) are continuously changing, there is no static 'culture' that is universally applicable at all times and in all situations.

The culture of an organisation, which has a significant influence on how, why, when, and by whom things are done, is determined by a variety of factors. These include: history, ownership and leadership, size, technology employed, type of business activity, external environment, markets, and the people involved. Hofstede (2001) contended that a mixture of 'inclusive values' and 'exclusive values' creates a specific organisational culture, and that this mixture varies from country to country according to differences in national culture.

Whatever its origins, an organisational culture reflects certain universally held assumptions about the organisation. As a consequence of their experiences within the organisation, the members of the organisation share these assumptions, which are then manifested in their behavioural patterns, expressed values, and observed organisational artefacts (such as structure, rules of conduct, dress codes, layout, rituals, and so on) (Ashkanasy et al., 2000; Sathe, 1983).

When newcomers join an organisation, they bring with them a system of values, attitudes, and expectations from the culture of the surrounding society, the culture of their educational institution, the culture of their profession, and the cultures of other organisations in which they have worked (Louis 1980). In the specific case of project-based business, when external experts join work groups that consist of members of their own pro-

fession, the pre-existing values of the professional culture that they have internalised are likely to be validated and enhanced. If a small group of such like-minded professionals is employed, a professional 'subculture' is likely to develop and co-exist with the primary organisational culture. In these circumstances, organisational cultures are best understood as consisting of interlocking 'nested subcultures' (Martin and Siehl 1983). Indeed, even if an individual is the only representative of a given profession within the organisation, that individual's participation in external professional activities, reading of professional journals, and expectations in terms of professional peers are all likely to reinforce professional 'subcultural values' (even if they come into conflict with the organisation's core culture).

Professional subcultures thus often form within organisations, and the particular values, beliefs, and practices of a given profession can assume significant weight as a means of authorising attempts to achieve positions of power relative to other groups and legitimising professional goals and actions. Depending on the circumstances, such professional subcultures might serve to maintain the status quo, refine existing belief systems, or even transform the prevailing organisational culture.

As Schein (1999) has pointed out, an individual cannot actually 'create' a new culture; at best, an individual can provide the initiative for a culture to evolve. Nevertheless, over time, through new ways of doing things, an organisation can come to embrace a different set of assumptions and novel ways of looking at things. This requires a degree of tolerance and 'cultural flexibility' in accepting the new ways of doing things. In some cases, particular parts of the organisation might have to operate by different norms from those of the conventional organisational culture. Tolerating the use of reflective practices in project work can be a crucial first step in the evolution of a culture that is conducive to learning.

Figure 2 illustrates how different cultural levels (professional, organisational, and national) can interact in the context of project-based business. To achieve harmony among the different cultural levels, a project requires a strong directional culture; however, to be successful, this requires a *synthesis* of cultures, rather than an attempt to unify the various cultures by coercion. It thus requires appropriate modes of co-operation and communication for the particular project at hand (Ajmal and Koskinen, 2008).
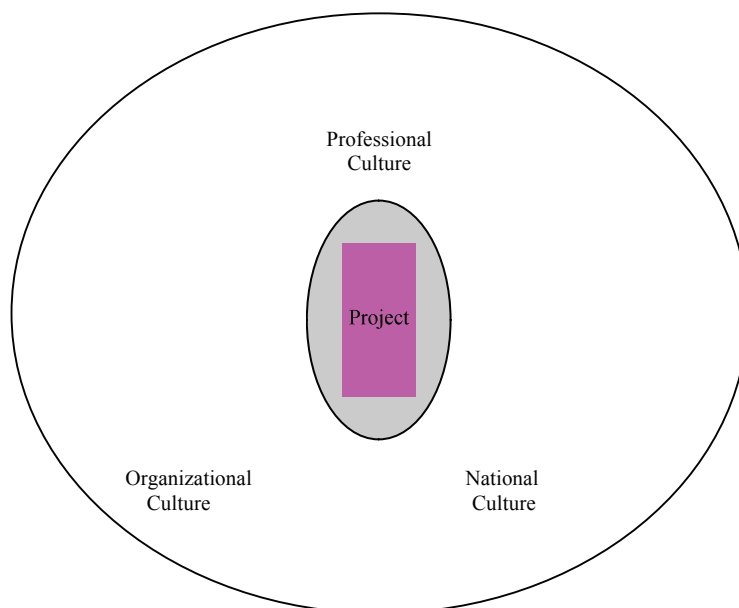
Figure 2: Synthesis of cultural levels in a project

5. Implications

The preceding discussion of knowledge management and cultural issues has significant implications for project-based firms that aspire to be a 'learning organisation'. In particular, as recent research has demonstrated, it is important to recognise that knowledge sharing and learning in organisations is greatly influenced by the cultural values of the organisation as a whole and of the individual members of the organisation (Li et al., 2007; Jennex, 2005). Indeed, it has been said that 80% of KM is concerned with people and process/culture, and that only 20% is concerned with technology (Liebowitz, 1999). In this regard, Love et al. (2005) have contended that technology is merely an *enabler* for sharing knowledge (in the form of internet, intranet, information systems, online communities, and so on), whereas the more important (and difficult) aspect of effective KM is concerned with people, process, and culture.

It is thus apparent that culture has a most significant influence on the KM capability of an organisation. Indeed, according to Zakaria et al. (2004), knowledge is filtered through cultural lenses, whether or not the participants are aware of such 'cultural filters'. Moreover, Usoro and Kuofie (2006) have recommended that management attention to the 'cultural lens' should extend beyond the organisational level to the national level, especially for global teams incorporating a variety of cultural contexts.

At the organisational level, people and processes must be the first priority for managers who wish to nurture a 'KM culture' in project-based business. The recognition and reward structure within the organisation must encourage people to take part in KM activities, and such activities should be built into the daily working routines. Such activities as sharing of lessons learnt, mentoring, applying knowledge capture/retention activities, exchanging stories, and sharing expertise should be encouraged as routine job-related activities. However, project managers must ensure that these KM initiatives are in alignment with the overall strategic goals of the parent organisation. If specific KM initiatives appear to be incongruent with the strategic business goals of the organisation, KM will be doomed to fail. In short, any KM plan must be carefully designed to be harmonious with the organisation's prevailing culture.

The moral and budgetary support of senior management is essential for the success of any KM plan in project-based business. Because KM deals with a long-term vision of intangible assets, some managers can be unwilling to invest resources in this area, especially if budgets are tight and there are more pressing short-term needs. In these circumstances, the support of senior management is critical to successful KM.

At the team level, the project manager can help to create a team culture conducive to KM by transmitting appropriate values and beliefs to the team members. The aim is to inculcate agreed group norms regarding how decisions are made, how conflicts are resolved, how trust is built, and so on. Any differences in the assumptions and beliefs of subcultures regarding 'how we do things around here to succeed' can have profound implications for the success of projects. Managers who are aware of such 'subcultural differences' can avoid or minimise unproductive conflicts and misunderstandings. It is important for the manager to make a concerted effort to speak and listen in ways that take these differences into account. Attributing problems to another person's 'inflexibility' or 'stubbornness' is likely to polarise differences, escalate conflicts, and jeopardise the whole project.

In summary, effective KM requires the fostering of an organisational culture that encourages an awareness of the value of knowledge (Hart, 2006). In such a culture, managers recognise that business success requires not only *knowledge generation*, but also *knowledge sharing*, which must be nurtured with time and space (Davenport & Prusak, 1998). In attempting to foster such a positive view of KM, managers should not be discouraged by the commonly held belief that changing an organisational culture is a long, tedious, and difficult process; rather, they should be encouraged by the fact that a habit of

knowledge sharing is more likely to come about through prudent managerial political activity (such as an effective reward and assessment scheme) than through a wholesale cultural 'revolution'.

Finally, managers should recognise that the role played by technology in all of this is to be an *enabling aid* in supporting an appropriate culture for KM. Such a culture enhances the opportunities for personal contact and the exchange of tacit knowledge, which cannot effectively be captured in procedures or represented in documents and databases (Hart, 2006).

6. Conclusion

This paper has presented some theoretical findings on the cultural aspects of knowledge management in project-based firms. In summary, the paper concludes that knowledge management activities in project-based firms has comparatively little to do with technology; rather, the focus must be on the behaviour and attitudes of people as determined by the professional, organisational, and national cultures from which they come. In their efforts to implement effective knowledge management, senior management must give particular attention to these cultural issues, which are critical for the success of knowledge-management activities (Jennex and Olfman, 2006). There are a few things top management can do: (i) create a no-blame culture that is really the key - if people are to be open about their project knowledge, they must feel assured that there are no unfavorable consequences of openness; (ii) allocate sufficient time and resources for project post-mortems and documentation. There should be a rule, strictly enforced; that a project isn't over until the knowledge gained is properly managed. If possible the postmortem should be facilitated by a qualified facilitator who is not involved with the project; (iii) establish easy to reference project records - with unique reference to documentation of failures and what could have been done to avoid them (this is related to points i and ii above). Again, these are such issues, which are related to culture and, hence, can only be changed by intensive efforts from the top management.

This study has initiated new ground in this vital, but largely ignored area of management. In future studies, the suggestions put forward in the present study could be operationalised by conducting empirical case studies on the impact of culture on knowledge-management activities in project-based firms.

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Role of organisational culture for knowledge sharing in project environments

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Abstract: This article aims to look at the relationship between organisational culture and knowledge-sharing practices in a project work context. The key objectives for this exploration is to consider the significance of organisational culture within project-based companies and to determine how organisational culture can assure that effective knowledge-sharing activities would be a permanent phenomenon in projects. An online survey was conducted to collect the data from project and assistant managers. The study attempts to find out the impact of organisational culture on knowledge-sharing activities, *i.e.*, it aids the practitioners in responding to unusual impediments related to knowledge-sharing practices in the quest for sustainable competitive advantage. The results show that organisational culture significantly (positively) correlates with the knowledge sharing in project-based companies. It is advocated that project managers should harmonise knowledge-sharing practices with organisational cultures in order for the practices to be supported and protected.

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1   Introduction

Managing through projects has become a standard mode of doing business and it has now been distinguished to shapevital parts of the business strategies of many organisations. (Björkegren, 1999). These projects are temporary coordination systems in which diversely skilled specialists work together to accomplish complex tasks in a predetermined period of time (Grabher, 2002). Technology-based and service-oriented companies operating in dynamic business environments increasingly organise their operational and development activities in projects (DeFilippi and Arthur, 1998; Gann and Salter, 2000; Grabher, 2002; Hobday, 2000). Companies that strongly privilege the project dimension and carry out most of their activities in projects are here referred to as project-based companies.

Nowadays, one of the most important factors in an economic and social order is knowledge, not so much labour, raw material or capital (*e.g.*, Drucker, 1994). In that respect, it is not surprising that project-based companies have also found that the traditional sources of competitive advantage, such as low cost, have made room for knowledge as the key source of such advantages. For example, in many technological project deliveries, the quality and sophistication of functions are more important sources of success than the price. From this, it follows that it is important for individuals and teams working for project-based companies to acquire and draw upon the knowledge created by other individuals and teams. This means that project-based companies have to consider organisational and team design features that facilitate intrateam development of new knowledge and post-project sharing of such newly created knowledge to other teams and organisational units of the firm.

Studies on organisational and project cultures have stressed the importance of such human factors as values, motivations and beliefs, and paved the way for more elaborate research on knowledge sharing in a project-work context (Koskinen and Pihlanto, 2008). In other words, an organisational culture that is able to harness knowledge and promote

knowledge sharing should be created. This means that continuous learning at individual, team and company levels should be embedded within the project-based company's organisational culture (Brown and Duguid, 1991).

However, knowledge, knowledge sharing and organisational culture are complex and multidimensional concepts. This means that there is a need for research on what sort of organisational culture is needed for effective and efficient knowledge sharing in different project-work contexts. Therefore, this explorative study aims to examine the relationship between organisational culture and knowledge-sharing practices in project-based companies.

The article is structured as follows: Firstly, it introduces the concept of a project-based company. Secondly, it describes the concepts of knowledge and project knowledge. Thirdly, it pinpoints the role and importance of organisational culture during the knowledge-sharing activities. Fourthly, knowledge sharing is discussed in detail; in particular, knowledge-sharing mechanisms in projects are analysed. Finally, it describes the research methodology and the results along with the conclusion of the article. All in all, this article attempts to answer the research question: 'Does organisational culture correlate with knowledge-sharing activities?' or 'How does organisational culture benefit knowledge sharing in different project-work contexts?'

2   Project-based company and project environment

Project-based companies are organisations in which the greater parts of their products are completed against made-to-order designs for clients. Such organisations may either be stand-alone, manufacturing products for external customers, or subsidiaries of larger firms making deliveries for internal or external customers. They may also be a group of organisations that act as a team in order to serve other parties (Turner and Keegan, 1999).

The governance of such companies in a project environment is a challenging task. Their heavy reliance on projects implies that a high degree of discretion is granted to lower levels. Since projects enjoy autonomy, they easily become separated from each other, with the risk of turning the company into a series of disconnected projects. This means that the project-based companies will tend to suffer from certain weaknesses, *e.g.*, bring about company-wide development and learning (Hobday, 2000) and difficulties in linking projects to firm-level business processes (Gann and Salter, 2000). Furthermore, individual projects typically comprise a mix of individuals with highly-specialised competencies, belonging to functionally differentiated worldviews (Dougherty, 1992), making it difficult to establish shared understandings of a common knowledge base (cf. Lindkvist, 2004).

Moreover, project-based companies have a tendency to be, not only strongly decentralised, but also quite loosely united (Orton and Weick, 1990). This also applies to the knowledge dimension. Significant portions of knowledge are distributed (Tsoukas, 1996) into a large number of local settings and a great extent of knowledge resides in individual members. Control in such a context must consider the organisation's primary reliance on its knowledgeable individuals, and its prospective flaws in dealing with issues of company integration and development.

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Projects, as a means to systematise operations, have turned into increasingly widespread sources in both public and private sectors. Yet project-based companies face many challenges to gain effectiveness (Ruuska and Teigland, 2009) because they are unique, goal-oriented systems where technical, procedural, organisational and human elements are incorporated. In other words, they are composite systems in their nature (Frame, 1995).

Recent research in the project management field has found that successful projects are those that are able to share knowledge (*e.g.*, Koskinen and Pihlanto, 2008). However, without a proper organisational culture during a project's life cycle, knowledge assets can be lost once a project is completed. This means that an inappropriate organisational culture results in organisational knowledge fragmentation and loss of learning (Kotnour, 2000). In other words, the identification of critical knowledge and ability to utilise it is a challenging task for every project-based company (Kasvi *et al.*, 2003).

So, against this background, this article tries to shed new light on organisational culture and knowledge-sharing issues in a project-work context.

3   Knowledge

Knowledge is an individual's perception, skills and experiences, which are all dependent on what experiences the individual's worldview contains (Koskinen and Pihlanto, 2008). Sarmento (2005), in turn, describes knowledge as the expert's opinion, skills and experience, resulting in a valuable asset that can be used as an aid in decision making. On the bases of these two definitions, it is possible to conclude that knowledge involves the individual combining his/her experience, skills, intuition, ideas, judgements, context, motivations and interpretations. The value of knowledge in project-based companies relates to the effectiveness with which these companies (and project teams within them) deal with their current activities and effectively envision and create their future.

There are many ways to categorise knowledge. A traditional way of categorising it is to make a distinction between data, information and knowledge. Data are seen as raw facts. They are symbolic representations of numbers, letters, facts or magnitudes. They are means through which knowledge is stored and transferred. Information, in turn, is the grouping of these outputs and placing them in a context that makes them valuable. (Ash, 1998). In other words, information is an aggregation of data that have meaning. Knowledge, in turn, is considered to be an individual's perception, skills and experience (Ajmal and Koskinen, 2008).

Another way to categorise knowledge is by whether the knowledge is tacit or explicit (Polanyi, 1966; Baumard, 2001). Tacit knowledge represents knowledge – and meanings – based on the experience of individuals. It is expressed in human actions in the form of evaluations, attitudes, points of view, commitments, motivation, *etc.* (*e.g.*, Nonaka and Takeuchi, 1995) It is usually difficult to express tacit knowledge directly in words, and often, the only ways of presenting it are through metaphors (*e.g.*, Tsoukas, 1991), drawings and different methods of expression not requiring the formal use of language.

Explicit knowledge, unlike tacit knowledge, can be embodied in a code or a language, and as a consequence, it can be communicated easily (Blackler, 1995). In other words, the meanings, representing explicit knowledge in the worldview, are rather clear and conscious, and therefore an individual can easily retrieve them from his/her worldview.

They represent knowledge in a narrow sense. The code may be words, numbers or symbols like grammatical statements, mathematical expressions, specifications, manuals and so forth (Nonaka and Takeuchi, 1995). For example, explicit knowledge implies factual statements about such matters as material properties, technical information and tool characteristics.

However, there is no division between tacit and explicit knowledge. Tacit and explicit knowledge are, in fact, mutually constituted (Tsoukas, 1996). In other words, they should not be viewed as two separate types of knowledge. This means that, for any explicit knowledge, there is some tacit knowledge. This implies that explicit knowledge is an extension of tacit knowledge (Mooradian, 2005). Hence, tacit knowledge is an enabling condition of explicit knowledge and of the sharing of knowledge.

4   Project knowledge

According to Reich (2007), there are four knowledge categories vital to the success of projects:

1   process knowledge

2   domain knowledge

3   institutional knowledge

4   cultural knowledge.

Process knowledge is knowledge that the team members and sponsors have about the project structure, methodology, tasks and time frames (Chan and Rosemann, 2001; Meehan and Richardson, 2002). This knowledge allows a project team member to understand his/her part in the overall project, to understand what kind of project delivery is expected to be achieved and when it is to be delivered. This kind of knowledge also allows a project team or subteam to self-organise since the team knows the outputs required and the time frames. The project team can, if authorised, decide how the work should be accomplished in the best way.

Domain knowledge is knowledge of the industry, firm, current situation, problem, opportunity and potential solutions (including technology and process). This knowledge covers three types of knowledge, which have been acknowledged in Chan and Rosemann (2001): business, technical and production knowledge. This knowledge is widened within and outside the project team. The project sponsor may be the most well informed about the industry and the problem or opportunity being tackled. Technical experts inside and outside the company have knowledge about the technologies that can be brought up. Project team members will have profound knowledge about the company and its business processes.

Institutional knowledge is a blend of the history, the power structure and the values of the organisation. This knowledge can be transferred by means of stories or anecdotes by insiders and observers of an organisation. It is not as much about facts as it is about how the facts can be interpreted to understand 'what is really going on'. This knowledge is particularly important for an external project manager or a vendor to access in order to get difficult problems dealt with and the key decisions made in the course of a project.

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Cultural knowledge means, for example, that a project manager is required to understand how to manage people, who are thought to have fairly unique cultural norms. However, in a broader context, with project teams being composed of many disciplinary groups (*e.g.*, organisational expansion experts, IT engineers) and people from many cultural backgrounds, the concept that cultural knowledge, both discipline based and national, might be important is a very useful idea.

Of course, there are many other types of knowledge needed within a project. The more complex and innovative the organisation, the problem or opportunity, or the technology within the project, the more significant it will be to organise, share and make use of these different types of knowledge.

5   Organisational culture

Studies on organisational culture have been able to underscore the importance of such human factors as values, meanings, motivations, symbols and beliefs, and paved the way for more elaborate research on knowledge sharing in a project-work context.

Organisational culture consists of assumptions, values, norms and tangible signs (artefacts) of organisation members and their behaviours. In practice, the members of an organisation sooner or later can come to sense the particular culture of their organisation. Then, although the culture is one of those factors that are difficult to express definitely, nevertheless everyone knows it when they sense it. Hidden rules and assumptions become an organisational culture as they are implemented over time. A strong culture guides behaviours in the absence of policies, procedures or advice from supervisors and managers.

Indeed, organisational culture contains the basic, taken-for-granted assumptions and deep patterns of meaning shared by organisational participation and manifestation of these assumptions (Slocum, 1995). The failure of many knowledge-sharing initiatives is often a result of cultural factors rather than technological oversights. In such cases, organisational culture can either facilitate or hinder knowledge-sharing activities. However, it is generally believed to be a main barrier to knowledge sharing (Grover and Davenport, 2001).

Several organisations are somewhat process-oriented and may have a conventional approach towards change and its related outcomes, using nominal attempts while preferring the use of existing or well-known methods (Hofstede *et al.*, 1990). In contrast, results-oriented organisations are risk taking and promote an environment that encourages and dynamically supports the use of innovative techniques for the survival and growth of the organisation.

Organisations that promote innovativeness and a willingness to try new things among their employees have been found to have better success with knowledge-sharing attempts (Ruppel and Harrington, 2001). Such organisations and their members typically seek to achieve a competitive advantage by regularly making novel changes and taking the inherent risks associated with those innovations. Thus, employees in a results-oriented organisation are likely to believe that, by knowledge sharing, they would enhance their job performance. On the other hand, knowledge sharing is unsafe from an individual's perspective because one's significance depends mostly on the knowledge one holds (Stenmark, 2000). A work atmosphere that is more process oriented would take knowledge sharing as a threat and to be less constructive (Ciganek *et al*., 2008).

When employees are asked to share what they know, they are likely to feel as if they have lost possession of the knowledge that they had previously controlled (DeLong and Fahey, 2000). Individuals tend to resist such knowledge-sharing practices because, when giving up power over their knowledge, they may perceive their worth as an employee to be minor, which is just transmitted by the logical fear that their job position has become exchangeable. In such situations, an organisation's culture is significant for knowledge-sharing practices (Ciganek *et al.*, 2008). In a risk-tending atmosphere, organisational members would be likely to have strong attitudes to control outcomes and will be less worried about the negative issues related to knowledge sharing. Accordingly, Ciganek *et al.* (2008) further describe that those employees who work in an environment that is characterised as an employee-oriented organisation would be more likely to believe that they have access to greater opportunities and resources to perform activities than in a pressure-filled, job-oriented environment. In the current study, we will have a deep look at what kind of organisational culture artefacts can be correlated with knowledge sharing particularly in a project context.

6   Knowledge sharing

According to Song (2001), through effective knowledge sharing, organisations – project-based companies in our case – can improve efficiency, reduce training cost and reduce risks due to uncertainty. And, according to Lee and Bai (2003), to consistently achieve planning objectives, 'knowledge sharing' is necessary in organisations.

However, Ruuska and Vartiainen (2005) mention two types of challenges in knowledge sharing that often arise in project-based companies. The first challenge is how to prevent the 'reinvention of the wheel' and share knowledge accumulated in one project with others. They further elaborate that the first challenge gives rise to the second challenge: how to enhance the communication of peers working in dispersed projects, as relationships in project-based companies are maintained cross-functionally. This may increase knowledge sharing yet at the same time isolate people from peers.

Connelly and Kelloway (2003) describe four predictors of employees' perceptions about knowledge-sharing cultures in organisations:

1   management's support for knowledge sharing

2   a positive social interaction culture

3   technology

4   demographics.

They further elaborate that the uncertainty about the leadership's commitment to knowledge sharing is the key challenge. That support must be encouraging rather than forcing; employees can receive suggestions on what and how much to share with their colleagues, but the final decision must always be up to them. In an organisation with a positive social interaction culture, both management and employees socialise and interact frequently with each other, with little regard for their organisational status. Certain demographic variables may also influence whether an employee will choose to share his/her knowledge. The size of the organisation may also be related to its knowledge-sharing culture. Individuals in smaller organisations are more likely to rely on

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each other and to interact with each other socially. The ages of employees and their career stages may also affect their knowledge-sharing behaviours. Experienced people may simply be more ready to share their knowledge because they know more and they know the right people in the organisation.

7   Knowledge-sharing mechanisms

Knowledge-sharing mechanisms can be categorised into formal and informal mechanisms for sharing, integrating, interpreting and applying know-what, know-how and know-why. To enable effective sharing of knowledge across projects in a project-based company, knowledge-sharing mechanisms are the means by which individuals access knowledge and information from other project sources. Table 1 shows know-what, know-how and know-why concepts, which can be also called knowledge levels.

Table 1   Knowledge levels

Knowledge level	Features	Practical examples
'know-what' It specifies what action to take when presented with a set of stimuli. For instance, a salesperson who has been trained to know which product is best suited for various situations will choose accordingly in a certain situation.	Least sophisticated variety Easy to apply Incorporated in many computer systems	In the insurance and banking industries, customer service representatives who use database systems to address customer questions about products ranging from dishwashers to latest digital TV sets.
'know-how' It is knowing how to decide on an appropriate response based on a diagnostic process, whether in sales, medicine or any other area. It permits a professional to determine which treatment or action is best.	Sophisticated variety Not easy to apply	In the above-mentioned example, when customer service representatives suggest the appropriate available option that is most suitable for the customers according to their requirements.
'know-why' It involves an understanding of an underlying theory and/or a range of experience that includes many instances of interactions and exceptions to the norms and conventional wisdom of a profession.	Most sophisticated variety Not easy to apply	Knowing that an unusually high level of sales might be due to an interactive effect – an influence of one factor that only operates at certain levels of another factor.

Source: King (2007)

Furthermore, Boh (2007) presents a framework that classifies the knowledge-sharing mechanisms used by project-based organisations. He describes different dimensions of knowledge-sharing mechanisms such as personalisation versus codification, and individualisation versus institutionalisation. Personalisation mechanisms are often assumed to be more *ad hoc* and informal, and codification mechanisms are assumed to be formal, involving the use of electronic databases. Individualisation versus institutionalisation distinguishes between mechanisms that enable the sharing of knowledge at the individual level and at a collective level. The institutionalisation dimension describes socialisation tactics that are collective and formal in terms of the contexts in which organisations provide information to newcomers. The individualisation dimension, on the other hand, describes socialisation tactics that are individual and informal. Figure 1 gives a snapshot of different dimensions of knowledge-sharing mechanisms.

Thus, on the basis of the discussion above, we are able to set a hypothesis to be tested by a statistical analysis: *The success of knowledge sharing in project-based companies is dependent on the company's organisational culture.*

Figure 1   A snapshot of different dimensions of knowledge-sharing mechanisms (see online version for colours)

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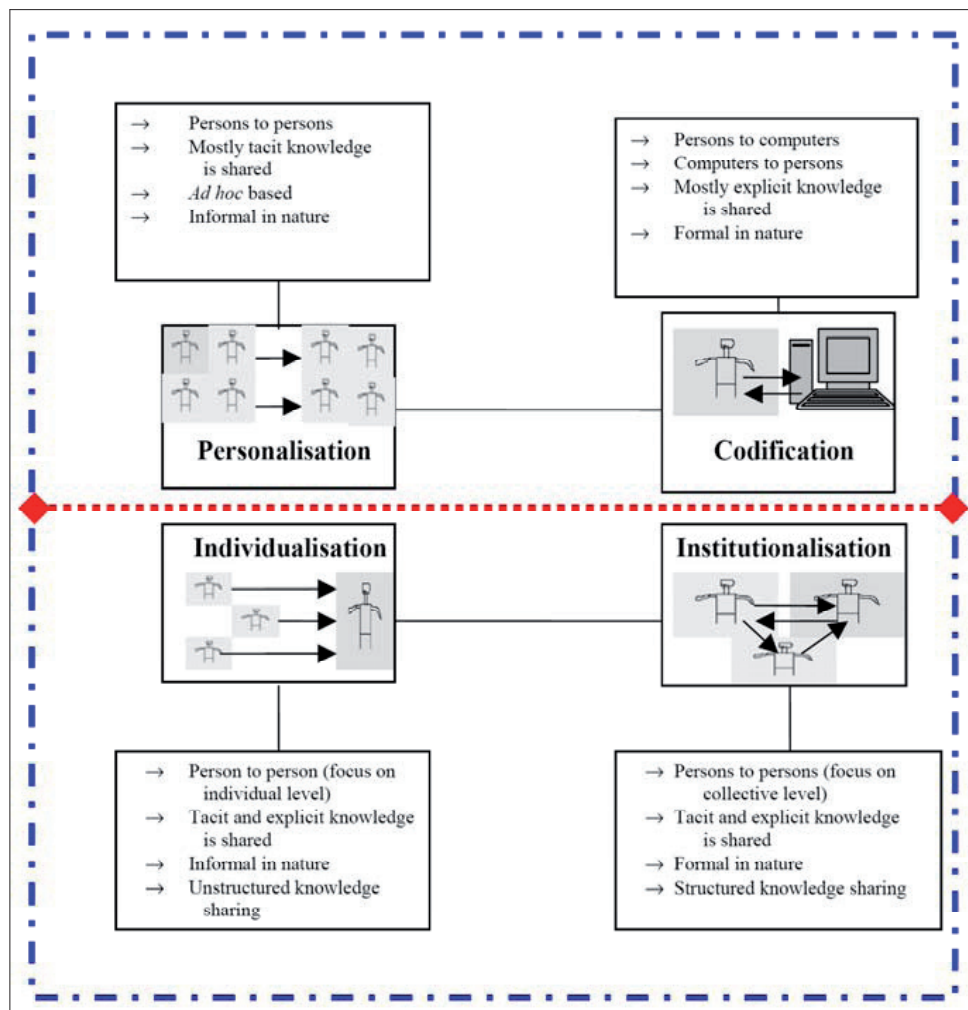
8   Method

The current study aims to provide comprehension in contemporary business management fields. The survey research method was selected for this study because it involves examination of a phenomenon in a wide variety of natural settings that have clearly defined independent and dependent variables by explaining their expected relationships. It seeks to discover and capture the realities about the organisational culture (as the independent variable) and knowledge management (as the dependent variable) within the context of project-based companies. It is more quantitative than qualitative. In fact, it was carried out to get wider background knowledge of the research area, which had not been covered previously. The survey research is a means of gathering information about the characteristics, actions or opinions of a large group of people, referred to as a population (Tanur, 1982). According to Pinsonneault and Kraemer (1993), survey research is appropriate in studies where:

- the central questions of interest about the phenomena are 'What is happening?' and 'How and why is it happening?' Moreover, survey research is especially well suited for answering questions about what, how much and how many, and to a greater extent than is commonly understood, questions about how and why.

- control of the independent and dependent variables is not possible or not desirable

- the phenomena of interest must be studied in its natural setting

- the phenomena of interest occur in current time or the recent past.

Surveys conducted for research purposes have three distinct characteristics. First, the purpose of the survey is to produce quantitative descriptions of some aspects of the study population. Survey analysis may be primarily concerned either with relationships between variables or with projecting findings descriptively to a predefined population (Glock, 1967). Survey research is a quantitative method, requiring standardised information from and/or about the subjects being studied. The subjects of study may be individuals, groups, organisations or communities; they may also be projects, applications or systems. Second, the primary way of collecting information is by asking people structured and predefined questions. Their answers, which might refer to themselves or some other unit of analysis, constitute the data to be analysed. Third, information is generally collected about a portion of the study population as a sample, but it is collected in such a way as to be able to generalise the findings to the population, like service or manufacturing organisations, line or staff work groups and departments.

In the light of the above arguments, we claim that in our study, where we are going to find the relationship of organisational culture and knowledge-sharing activity in projects, survey research is suitable because it fulfils the Pinsonneault and Kraemer (1993) requirements mentioned above.

8.1   Data collection and analysis

After the survey questionnaire was developed (see the Appendix), it was pretested by five experts in one of the target companies at the initial stage, and was further improved and developed on the basis of their feedback. The research sample comprised 45 large, medium and small Finnish project-based companies operating in both manufacturing

and service sectors, which were randomly chosen from the list published by the Project Management Association Finland (PMAF) in its website. The questionnaire was sent electronically to 400 project managers and project assistant managers working on different kinds of isolated projects in these organisations. A description of the study objectives was also included in the first page of the questionnaire. Moreover, weekly follow-up e-mails were sent for approximately three consecutive weeks. A total of 41 questionnaires were answered with a response rate of 10.25%. Among the 41 responses, 15 responses came from the service sector and the remaining 26 responses were from the manufacturing sector. Half of the responses came from companies with more than 1000 employees and nine responses came from companies with more than 100 but less than 1000 employees. Twelve responses came from companies with less than 100 employees. Almost two-thirds of the respondents were from companies operating for more than 26 years. Eleven respondents were from companies with 11 to 25 years of work experience and only two responses came from companies with less than 10 years of experience.

To recognise the potential relation between knowledge sharing and organisational culture in such organisation, respondents were asked to answer a total of ten questions. Five questions were about knowledge sharing and five were about organisational culture. All questions were rated by respondents on a five-point Likert-type scale, represented by 1 = strongly disagree and 5 = strongly agree.

Survey results were analysed mainly by using quantitative methods such as comparing means and correlation analysis by the chi-square test with the help of Statistical Package for the Social Sciences (SPSS). Looking deeply, we can say that chi-square is a nonparametric statistical technique that is used to determine if a distribution of observed frequencies differs from the theoretical expected frequencies. It normally uses nominal (categorical) or ordinal-level data; thus, instead of using means and variances, this test uses frequencies. Generally, the chi-square statistic summarises the discrepancies between the expected number of times each outcome occurs (assuming that the model is true) and the observed number of times each outcome occurs, by summing the squares of the discrepancies, normalised by the expected numbers, over all the categories (Dorak, 2008). Data used in a chi-square analysis should satisfy conditions, such as data should be randomly drawn from the population, reported in raw counts of frequency, one measured variable must be independent, observed frequencies cannot be too small and values of independent and dependent variables must be mutually exclusive.

In our study, organisational culture (as the independent variable) and knowledge management (as the dependent variable) data were randomly drawn from the population. The observed frequencies were at an acceptable level and the values were also mutually exclusive.

8.2   Results

Table 2 shows the mean and standard deviation values of all ten items asked in the questionnaire for both variables. Most of the respondents agree that they feel the presence of an organisational culture in projects, but it is typically felt in the form of intangible objects. Some of the respondents also feel it in tangible objects. They recognise that organisational culture has a positive effect on knowledge sharing and it facilitates

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the knowledge sharing of project members in several ways. Likewise, the role of human beings is considered imperative for knowledge-sharing activities as compared to that of information technology.

Table 2   Descriptive statistical values

Items	Mean	Standard deviation	Items	Mean	Standard deviation
Presence of OC in projects	4,32	0,65	Importance of KS in projects	4	0,775
Intangible objects represent OC	4,29	0,814	Human importance in KS	4,46	0,636
Tangible objects represent OC	3,39	0,997	Importance of IT in KS	3,37	0,994
OC has positive effect on KS	4,32	0,687	Members' commitment to KS	2,71	0,873
OC facilitates KS	3,88	0,9	Outside dependencies hamper KS	3,51	0,952

Notes: OC = Organisational Culture.
          KS = Knowledge Sharing.

As we can see from the descriptive results, majority of the respondents agree that they can feel the presence of an organisational culture in the project environments and, mostly, it is felt in the form of intangible objects and less in the form of tangible objects. A large number of respondents agree that organisational culture has not only a positive effect on knowledge-sharing practices but it also aids project members in sharing their knowledge with each other.

The respondents stress the importance of knowledge sharing in projects if project organisations want to be more competitive. They agree that more importance and attention should be devoted to humans for knowledge sharing than to IT. Most project members were not reluctant to share their knowledge with others. They do not agree that, sometimes, outside dependency in project environments hampers knowledge sharing.

Table 3 contains the correlation values of ten items; five belong to organisational culture and five to knowledge sharing. It is discovered from the correlation values that organisational culture is likely to have a positive relationship with promoting knowledge sharing. Unexpectedly, this study showed that IT has a weak relationship with knowledge-sharing activities as compared to humans (organisational culture). The relationship with the human factor, which is closely associated with organisational culture, is significantly correlated with knowledge sharing. This phenomenon might be explained by the fact that knowledge is basically embedded in the numerous human communities that constitute organisations, as well as in organisational work practices, values and systems. However, IT only aids them in sharing knowledge and until they become willing to share their knowledge, IT will be useless. Therefore, it might be said that organisational culture is a significant predictor of the behavioural intentions of organisational members for knowledge sharing, as Connnelly and Kelloway (2003) point out in their study.

Table 3   Correlation values of organisational culture and knowledge sharing

		KS VAR-1 (importance of KS)	KS VAR-2 (human importance in KS)	KS VAR-3 (importance of IT in KS)	KS VAR-4 (members' commitment to KS)	KS VAR-5 (outside dependencies hamper KS)
OC VAR-1 (presence of OC in projects)	Pearson correlation	,397(*)	−0,001	0,048	−0,229	0,256
	Sig. (2-tailed)	0,01	0,993	0,765	0,15	0,106
	N	41	41	41	41	41
OC VAR-2 (feeling of OC as intangible object)	Pearson correlation	0,159	0,021	0,05	−0,017	0,028
	Sig. (2-tailed)	0,322	0,895	0,757	0,915	0,864
	N	41	41	41	41	41
OC VAR-3 (feeling of OC as tangible object)	Pearson correlation	0,259	0,26	−0,223	−0,268	,522(**)
	Sig. (2-tailed)	0,102	0,101	0,16	0,091	0
	N	41	41	41	41	41
OC VAR-4 (OC has positive effect on KS activity)	Pearson correlation	0,047	,342(*)	−,430(**)	0,117	0,204
	Sig. (2-tailed)	0,771	0,029	0,005	0,467	0,2
	N	41	41	41	41	41
OC VAR-5 (OC facilitates KS activity)	Pearson correlation	0,287	,319(*)	−0,228	0,113	−0,042
	Sig. (2-tailed)	0,069	0,042	0,151	0,484	0,794
	N	41	41	41	41	41

Notes: OC = Organisational Culture.

KS = Knowledge Sharing.

VAR = Variable/Item.

** Correlation is significant at the 0.01 level (two-tailed).

* Correlation is significant at the 0.05 level (two-tailed).

9   Discussion and conclusions

Based on a conceptual analysis, we have described the concepts of the project-based company, knowledge, project knowledge, organisational culture, knowledge sharing and knowledge-sharing mechanisms. According to Olkkonen (1993), concepts are by their nature abstract notations or symbols and, with their aid, we are able to solidify structure and illustrate phenomena and their characteristics.

The empirical study was based on an online survey from the project managers and assistant managers. The primary objective was to discover how an organisational culture leads to the acceptance of knowledge-sharing activities. It is worth emphasising that in the empirical part of the study, data were collected from 45 project-based companies. According to Eisenhardt and Graebner (2007), a study of different companies is more able to provide rich evidence to support research conclusions, *i.e.*, has broader generalisability, than a single case study. Yet, while the results of the study have shown that an organisational culture plays an important role in successful knowledge-sharing activities, the generalisation of the findings may be partial by reason of the limited empirical study sample.

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In a nutshell, our claims in this article are as follows:

- Knowledge is constantly considered a major component for the performance of a project-based company and now even as a competitive edge for sole projects. Therefore, in order to systematically share knowledge created in a project, the projects themselves must be analytically managed. In other words, there must be a systematic implementation of knowledge-sharing practices supported and protected by the mother organisation's culture. From this, it follows that in the implementation of knowledge-sharing practices, an important concern is the suitability and harmony of the organisational culture to support knowledge-sharing activities in the projects.

- The capability of team members to share and use the knowledge within the project is extremely valuable. Still, challenges exist on the means of knowledge sharing for project success and sustained organisational competitiveness (Teerajetgul *et al.*, 2009). Various studies show the value of knowledge sharing in improving both organisation and project performance.

- It is necessary to examine organisational culture when investigating knowledge sharing in project-based companies. This is because knowledge exists in the minds of individuals and it is inextricably linked to human values. To develop a more results-oriented knowledge-sharing culture, managers need to encourage behaviours that are less risk averse, such as experimentation and exploration. Open communication plays a significant role in successful knowledge-sharing practices. To develop a more open communication culture, a number of strategies can be implemented.

- Based on the empirical study, it can be concluded that organisational culture is significantly correlated with the knowledge-sharing practices in project-based companies. This is evident from the correlation results, which strongly support the set hypothesis.

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Appendix

Questionnaire

Please input 'X' in the box best applicable to your response.

	1	2	3	4	5
Scale:	Strongly disagree	Disagree	Not sure	Agree	Strongly agree

Questions:	1	2	3	4	5
Organisational culture (power culture, role culture, achievement culture, and support culture) can be felt in your organisation.					
You can feel it in the shape of intangible objects (traditions, norms and values).					
You can feel it in the shape of tangible objects (dress, sitting arrangement and equipment used).					
Organisational culture has a positive effect on knowledge sharing in a Project-Based Organisation (PBO).					
Organisational culture facilitates project members for knowledge-sharing initiatives.					
Knowledge sharing is considered important in your organisation.					
Human factor plays an important role in knowledge sharing.					
Information technology plays an important role in knowledge sharing.					
The entire project team is committed to the knowledge activities.					
Project knowledge is significantly hampered by dependencies outside the project.					

CRITICAL FACTORS FOR KNOWLEDGE MANAGEMENT IN PROJECT BUSINESS

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Abstract

Purpose: The purpose of this study is to identify and examine various factors that influence the success or failure of knowledge management (KM) initiatives in project-based companies.

Design/methodology/approach: Following a literature review, the study proposes a conceptual model of six factors of potential importance to the success of KM initiatives. The model is then examined through an online survey of project managers and assistant managers from project-based businesses in Finland.

Findings: The study finds that a lack of incentives and the absence of an appropriate information system are the most significant barriers to successful KM initiatives in projects.

Research limitation/implications: The findings of the study may be restricted to generalize because of the limited empirical study.

Practical implications: Project managers should formulate an attractive incentive package to encourage project members to participate in KM initiatives and to suggest ideas for new KM opportunities. Managers should also ensure that an effective user-friendly information system is in place before introducing KM initiatives.

Originality/value: The study proposes a new model of critical success factors for KM initiatives in the context of project-based business.

Keywords: KM initiatives, critical success factors, projects

Paper type: Research paper

1. Introduction

Knowledge is now universally recognised as a critical competitive asset, and interest in *knowledge management* has therefore increased in most companies. At the same time, more firms are organising their business in terms of *projects*; indeed, project-based business has become an accepted business strategy among the range of potential business strategies available to firms (Prencipe and Tell, 2001). Taken together, a commitment to effective *knowledge management* in the context of a *project-based business strategy* is emerging as a potent means of establishing and sustaining a competitive advantage.

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It is therefore not surprising that corporate spending on knowledge-management initiatives has increased significantly in all forms of business (including project-based business) in the past decade (Ithia, 2003). Organisations are implementing a range of initiatives to identify, share, and exploit their knowledge assets in accordance with a knowledge-based view of the firm in which knowledge is acknowledged as a key sustainable competitive resource (Kogut and Zander, 1992). Nevertheless, many project-based businesses lack the expertise to handle their knowledge assets (especially those gained from experience of previous projects); indeed, most knowledge-management initiatives in project-based firms have failed for a variety of reasons (including technological, cultural, knowledge content, and project management reasons) (Chua and Lam, 2005).

The present study therefore attempts to identify and examine the critical factors that facilitate and/or impede knowledge-management initiatives in the context of physical project teams. The remainder of the paper is organised as follows. The next section presents a literature review of the key concepts of project-based business, knowledge management, and knowledge-management initiatives. Section 3 proposes a model of six critical success factors identified in the literature review. Section 4 presents the methodology and results of an empirical examination of the proposed model in the context of project-based organisations in Finland. Section 5 discusses the significance of the findings. Section 6 suggests certain implications for project managers flowing from the present study. The paper concludes with a summary of the major conclusions.

2. Literature review

2.1 Project-based business

A project involves a group of people working together with shared responsibilities and resources to achieve a collective mission. Briner et al. (1999) differentiated the membership of a project group into two groups: (i) 'visible members', who are organisational members involved with the project (although they are not necessarily permanent members of the project team); and (ii) 'invisible members' (such as subcontractors and suppliers), who are stakeholders in the project (even though they might not be members of the project organisation itself). The heart of the visible team is constituted by the core team, which is usually permanent while the project is being undertaken (but not necessarily full-time); other visible team members are temporary. It is thus apparent that the members of a project team might lack mutual social awareness, commitment to a common goal, shared performance norms, and equal liability for the outcomes (Mäkilouko, 2004).

Indeed, although most projects have quite specific overall goals or expectations, it is ultimately up to the project members to ascertain how any transient problems that arise in the project should be solved. In doing so, project members typically have a considerable amount of autonomy (within overall limits) (Lundin and Söderholm, 1995; Lindkvist and Söderlund, 2002).

Most project-based firms are engaged in several projects simultaneously. Such projects are typically large, expensive, unique, and high-risk undertakings that must be accomplished with an agreed level of performance within a prescribed timeframe and budget (Pinto and Kharbanda, 1995; Cicmil, 1997; Kerzner, 1998).

2.2 Knowledge management and project-based business

Alavi and Leidner (2001) defined knowledge management (KM) as the systematic process of acquiring, organising, and communicating the knowledge of organisational members so that others can make use of it to be more efficient and productive. Many organisations are launching KM initiatives with a view to: (i) improving business processes; (ii) making financial savings; (iii) generating greater revenues; (iv) enhancing user acceptance; and/or (v) increasing competitiveness (Chua and Lam, 2005). However, according to Yeh et al (2006), organisations that embark on KM initiatives must take account the varying conditions of corporate culture, workflow processes, and the integration of group members' knowledge. Moreover, because these factors can provoke internal opposition from organisational members, organisations that embark on KM initiatives require strong moral and budgetary support from senior management. These 'cultural issues' (of corporate culture, workflow processes, and the integration of group members' knowledge) are of particular relevance to project-based business in view of its reliance on teams that are typically made up of members from a wide variety of backgrounds.

In addition, the identification of *critical knowledge*, and the ability to exploit it, are particular challenges for project organisations (Kasvi et al., 2003). Because project teams are typically transient in nature, they lack a defined knowledge system and supporting culture to capture and retain knowledge as 'corporate memory'. As a result, critical knowledge assets can be easily lost once a project is completed and the team is disbanded. As Kotnour (2000) observed, this inevitably results in the destruction of organisational knowledge and impaired organisational learning.

Planned management efforts and incentives are therefore fundamental to the creation, capture, and transfer of knowledge in projects. For example, lessons learnt from the experience of a project can be consciously socialised among individuals before they

leave the project. In the absence of such planned KM initiatives, the experience gained from projects is incapable of enhancing organisational business processes in subsequent projects (Ajmal and Koskinen, 2008).

2.3 Knowledge-management initiatives

2.3.1 Objectives of KM initiatives

According to Wiig (1997), the objectives of KM initiatives are: (i) to enable an enterprise to act as intelligently as possible in securing its viability and overall success; and (ii) to otherwise realise the best value from its knowledge assets.

From a managerial perspective, there are four areas of emphasis for systematic KM (Wiig, 1997):

- top–down monitoring and facilitation of knowledge-related activities;
- creation and maintenance of a knowledge infrastructure;
- renewal, organisation, and transformation of knowledge assets; and
- leverage of knowledge assets to realise their value.

2.3.2 Assessing KM initiatives

The success of a KM initiative can be assessed on the basis of several different criteria. Davenport et al. (1998) suggested four criteria, as shown in Table 1. The applicability of these various criteria will vary according to the particular circumstances of a given KM initiative.

Table 1 Indicators of successful KM initiatives

Indicators	Justification
Resources Growth	growth in the resources attached to the project, including people and budget
Knowledge Content Development	development in the dimensions of knowledge content and usage (that is, the number of documents or accesses for repositories or participants for discussion-oriented projects)
Project Survival	the likelihood that the project would survive without the support of a particular individual or two, that is, the project is an organizational initiative, not an individual effort
Financial Return	evidence of financial return either for the knowledge management activity itself or for the larger organization

2.3.3 Factors affecting KM initiatives

Various researchers have provided different models of 'enablers' (success factors) and 'barriers' (failure factors) in KM initiatives. Table 2 lists some of the suggestions that have been made with respect to so-called 'enablers'.

Table 2: Enablers of successful KM initiatives

Authors and Publications	KM Enablers
Davenport et al. (1998) Successful knowledge management projects	(1) Technology infrastructure (2) Organizational infrastructure (3) Balance of flexibility, (4) Shared knowledge (5) Knowledge-friendly culture (6) Motivated workers (7) Means of knowledge (8) Senior management support, commitment.
Ryan and Prybutok (2001) Factors affecting knowledge management technologies: a discriminative approach	(1) Open organizational culture (2) Senior management, leadership (3) Employee involvement (4) Teamwork (5) Information systems infrastructure
Moffett et al. (2003) An empirical analysis of knowledge management applications	(1) Friendly organizational culture (2) Senior management leadership, commitment (3) Employee involvement (4) Employee training (5) Trustworthy teamwork (6) Employee empowerment (7) Information systems infrastructure (8) Performance measurement (9) Benchmarking (10) Knowledge structure
Connelly and Kelloway (2003) Predictors of employees' perceptions of knowledge sharing cultures	(1) Management support (2) Social interaction (3) Technology (4) Demographics
Yeh et al (2006) Knowledge management enablers: a case study	(1) Strategy and leadership (2) Corporate culture (3) People (4) Information Technology

Although the studies listed in Table 2 were conducted at different times in a variety of settings, it is apparent that the success factors that they identified are similar, even if the exact terminology differs from study to study. The study by Moffett et al. (2003) provides the most comprehensive general framework of enablers of KM initiatives enablers.

A list of 'barriers' (failure factors) has been suggested by Chua and Lam (2005) after analysis of five case studies of failed KM initiatives. As shown in Table 3, these barriers were divided into four categories: (i) technology; (ii) culture; (iii) content; and (iv) project management.

Table 3: Barriers to successful KM initiatives

TECHNOLOGY:- refers to aspects of KM infrastructure, tools and technology	
Connectivity	The technical infrastructure can not support the required number of concurrent access due to bandwidth limitation
Usability	The KM tool has a poor level of usability. KM users find the tool too cumbersome or complicated for use
Over-reliance	An over-reliance of KM tools lead to the neglect of the tacit aspects of knowledge
Maintenance cost	The cost of maintaining the KM tool is prohibitively high. The management intervenes and terminates the KM project
CULTURE:- refers the characteristics or properties of the knowledge itself	
Politics	KM initiative project is used as an object for political maneuvering such as gaining control and authority within the organization
Knowledge sharing	Staff does not share knowledge within the organization due to reasons such as the lack of trust and knowledge-hoarding mentality
Perceived image	Staff perceives accessing other's knowledge as a sign of inadequacy
Management commitment	The management appears keen to commence the KM project. However, when problems emerged, commitment to the KM project is quickly withdrawn
KNOWLEDGE CONTENT:- refers the characteristics or properties of the knowledge itself	
Coverage	The content is developed fragmentarily from different groups of KM users. Hence, cross-functional content can not be captured
Structure	The content is not structured in a format that is meaningful to the task at hand.
Relevance & currency	The content is either not contextualized or current to meet the needs of the KM users. It can not help KM users achieve business results
Knowledge distillation	There is a lack of effective mechanism to distil knowledge from debriefs and discussions. Hence, valuable knowledge remains obscured
MANAGEMENT OF THE INITIATIVE PROJECT:- refers to the management of the KM initiative as a project	
User involvement	There is a lack of KM user involvement in the project. Hence, besides not being able to secure user buy-in when the project is rolled out, the knowledge requirements of the users are poorly understood
Technical & business expertise	When the project is implemented, it lacks staff with the required technical and business expertise to sustain the initiative
Conflict management	Conflict occurs among stakeholders of the KM team but there is no attempt to manage it
Rollout strategy	The KM project does not have a proper rollout strategy. Specifically, the lack of a pilot phase mean that many teething problems that can be mitigated at the initial stage are left unchecked
Project cost	The overall cost associate with the KM project is in excess of what is originally anticipated

It will be noted from a comparison of Tables 2 and 3 that some factors appear as 'enablers' (success factors) in one table and as 'barriers' (failure factors) in the other. For example, the factor of 'technology' is listed as both an 'enabler' and as a 'barrier'. Simi-

larly, the factor of 'culture' appears in both tables. The explanation is that a given factor is not an 'enabler' or a 'barrier' *per se*; rather, the status of a given factor (as a 'success factor' or a 'failure factor') depends upon how it is managed. It is therefore more appropriate to refer to these factors as 'influencing factors' or 'affecting factors' with regard to KM initiatives, rather than as 'enablers' or 'barriers'. The key issue is the management or treatment of the factor under consideration.

3. Conceptual framework

On the basis of the literature review presented above, a conceptual model of the factors that influence the success of KM initiatives in a project-based context is proposed by the present study. As shown in Figure 1, the proposed model consists of six distinct factors:

- familiarity with KM;
- coordination among employees and departments;
- incentive for knowledge efforts;
- authority to perform knowledge activities;
- system for handling knowledge; and
- cultural support.

Each of these factors is discussed in more detail below.
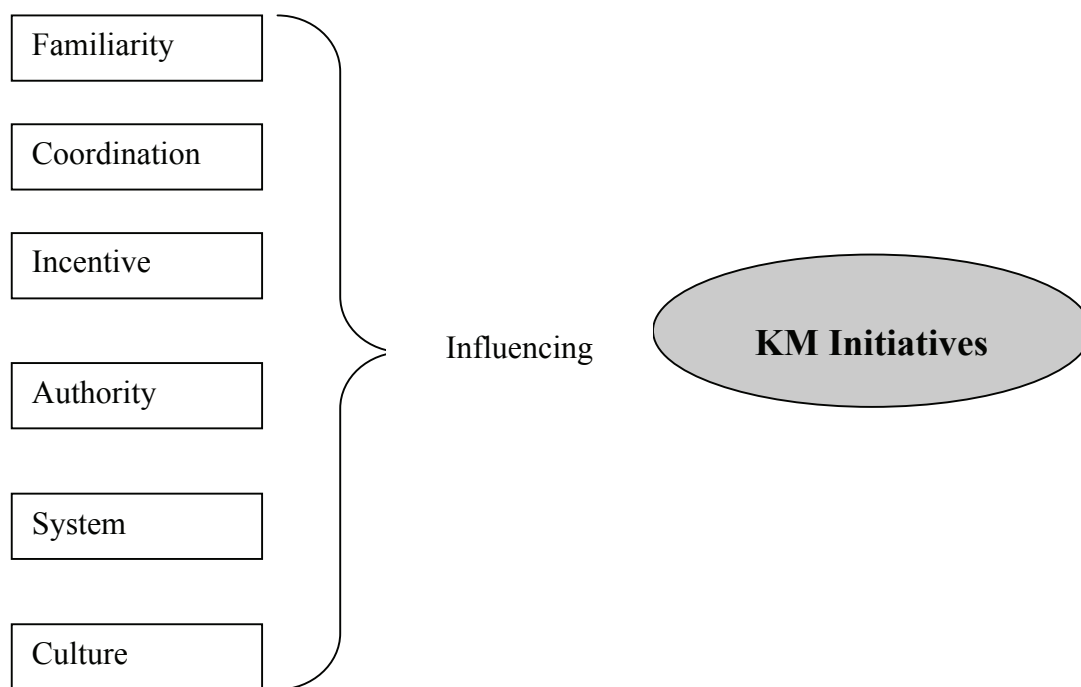
**Figure 1: Conceptual model of factors influencing KM initiatives in a pro-
ject-based context**

3.1 Familiarity with KM

If project-based organisations wish to initiate KM initiatives, they must ensure that members of the organisation, especially members of project teams, are familiar with KM and have a clear strategy for contributing to specific KM initiatives (Pieris et al., 2003). Familiarity with KM is essential for the success of KM inititatives in any organisation; indeed, if employees are not fimiliar with the notion and practices of KM, it is almost inevitable that the firm's KM initiatives will fail.

3.2 Coordination among employees and departments

A key element for success in any KM initiative is encouraging people to communicate and share their knowledge with others (Nonaka and Takeuchi, 1995). Coordination is required to bring together team members to share their best practices with each other. In terms of the well-known four-step model of knowledge creation suggestion by Nonaka and Takeuchi (1995), which included the steps of 'socialisation', 'externalisation', 'combination', and 'internalisation' (SECI), the factor of *coordination* proposed in the present model can be said to incorporate the steps of 'socialisation' and 'combination'.

3.3 Incentive for knowledge efforts

Many studies have suggested that incentive programs play a major role in the success of KM initiatives (Davenport et al., 1998; Jarvenpaa et al., 1998; Liebowitz, 1999; Alavi and Leidner, 2001; Massey et al., 2002). In the proposed model, an 'incentive' can be understood as any factor (financial or non-financial) that motivates people to adopt a particular action or to prefer one alternative to another. Incentives can be classified into three broad groups:

- *remuneration incentives:* material rewards (especially money) for acting in a particular way;

- *moral incentives:* adopting a particular choice because it is considered to be the 'right' (or admirable) thing to do, or because a failure to act in a certain way is likely to be condemned as improper.

- *coercive incentives:* adopting a particular course of action because a failure to act in this way will result in adverse consequences (or 'punishment').

According to Amabile (1997), an employee can be extrinsically motivated to achieve objectives (that is, offered incentives that are external to the work itself) or intrinsically motivated to achieve objectives (that is, obtaining personal satisfaction from doing the work). Adopting this classification of motivation, Osterloh and Frey (2000) contended that *intrinsic motivation* is especially significant in promoting knowledge creation and sharing in an organisation.

3.4 Authority to perform knowledge activities

Although the term 'power' is often used interchangeably with the term 'authority', their meanings differ. 'Power' refers to the ability to achieve certain ends, whereas 'authority' refers to the legitimacy of exercising that power.

Employees are the 'hub' of creating knowledge (Holsapple and Joshi, 2001) because knowledge is kept within the individual. It is therefore crucial that employees are not only motivated to create and share knowledge, but also *authorised* to share and utilise it within the organisation.

3.5 System for handling knowledge

According to Ruppel and Harrington (2001), knowledge should be understood as a *process*, rather than an asset. As such, to maximise the value of knowledge, organisations need to create an appropriate system to support the flow of knowledge in KM initiatives. The various parts of an effective KM system must have functional as well as structural relationships among them.

An effective KM system can be the most important KM enabler, but any system can be a barrier if it is not properly managed. In particular, a robust system of information technology facilitates the communication, collection, and re-use of knowledge in project-based organisations.

3.6 Cultural support

Every organisation's culture is distinctive, and this distinctive organisational culture distinguishes the members of one group from another (Hofstede, 1980). The concept of a distinctive organisational culture is especially important in project-based organisations because project teams frequently involve professionals from different cultural backgrounds.

Many studies have contended that culture is a key factor in determining the effectiveness of knowledge sharing (Chase, 1997). The culture of an organisation not only determines the type of knowledge that is managed, but also the value of that knowledge in providing a competitive advantage for the organisation (Long, 1997). According to Alavi and Leidner (2001), who undertook a survey of KM initiatives, the majority of successful initiatives were based on an appropriate organisational culture that was conducive to the collection and sharing of knowledge among the members of the organisation.

4. Empirical study

4.1 Sample and data collection

The research sample of the empirical study conducted to examine the proposed model consisted of project managers and assistant managers working on a variety of projects in Finnish project-based organisations of various sizes. The survey questionnaire was transmitted electronically to 400 potential respondents who were randomly chosen from a list published on the website of the Finnish Project Management Association. Follow-up emails were sent at intervals of one, two, and three weeks after the first contact. A total of 41 completed questionnaires were returned, which represents a response rate of 10.25%.

The first page of the questionnaire explained the objectives of the study. In subsequent sections, respondents were asked to use a five-point Likert-type scale (1 = 'strongly disagree'; 5 = 'strongly agree') to indicate the extent to which the presence or absence of the six factors of the conceptual model ('familiarity'; 'coordination'; 'incentives'; 'authority'; 'system'; 'cultural support') were *barriers* to successful KM initiatives in their organisations or in particular projects.

4.2 Results

Table 4 shows the detailed results with respect to each of the six factors. The term 'average' refers to mean score for a given factor from the 41 responses. 'Variance' reflects the degree of dissimilarity in the responses. 'Weight' was calculated by dividing the average response to a given factor by the sum of the average responses of all factors.

Table 4: Extent to which factors were perceived as barriers

	Familiarity	Coordination	Incentive	Authority	System	Culture
Average	3	3.195122	3.634146	2.731707	3.390244	2.853659
Variance	0.85	1.260976	0.937805	0.80122	1.243902	1.378049
Weight	0.159533	0.169909	0.193256	0.145266	0.180285	0.151751

Figure 2 shows the weights of the factors in graphical form, thus demonstrating the degree to which each of the six factors was perceived to be a barrier to KM initiatives in the respondents' organisations.
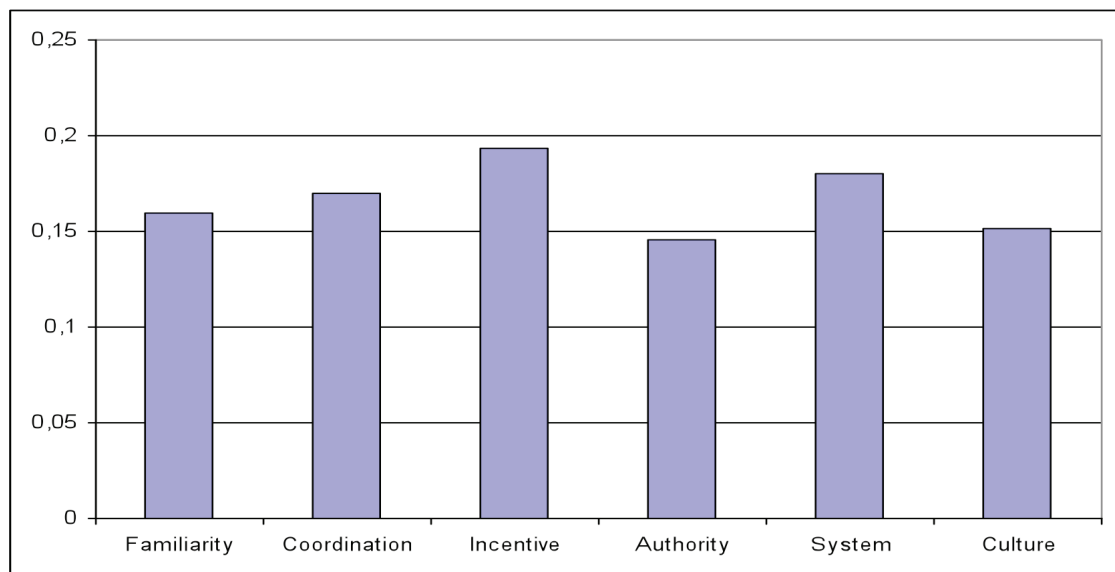
Figure 2: Weights of factors as barriers to KM initiatives

It is apparent from Figure 2 that a lack of incentives and the absence of an appropriate system were perceived to be the most significant barriers for successful KM initiatives in projects. The absence of coordination and a lack of familiarity with KM were of secondary importance as barriers. A lack of authority and the absence of cultural support were considered to be the least significant barriers to the success of KM initiatives in projects.

5. Discussion

The results of the study have revealed that the absence of incentives for employees who engage in KM initiatives was the most significant barrier to the success of such initiatives in the project-based firms studied here. The results suggest that senior management should offer suitable incentive schemes for employees to engage in KM initiatives if they want to increase the likelihood of success in such initiatives.

The second-most significant barrier to success in KM initiatives was the absence of a proper system to handle knowledge in the project-based organisations. The majority of respondents felt that there was no adequate system in their organisations to manage knowledge efficiently. It is apparent that appropriate KM systems in project-based businesses would be a significant factor in assisting KM initiatives to flourish. Such a system would facilitate the sharing of experience among employees through an integrated interface platform accessible to all interested participants in a project.

A lack of coordination among employees and departments was the third-most significant barrier to KM initiatives, while a lack of familiarity was the fourth-most significant. It would seem that proper coordination among employees who are made familiar with the objectives and methods of KM would enhance the likelihood of success in KM initiatives.

A lack of cultural support was only the fifth-most significant barrier identified in the present study. It is apparent that a lack of cultural support was not perceived by the present respondents as being as significant as many of the other factors. Nevertheless, cultural support remains a fundamental element in any successful KM initiative. A culture of mutual trust and assistance encourages team members to depend on one another and the information they share, thus increasing the likelihood that they will communicate openly and effectively to achieve their shared goals.

Finally, a lack of authority to perform knowledge activities was the least significant barrier to the success of KM initiatives. It is likely that the respondents perceived knowledge as a personal resource to use as they saw fit and that they therefore did not see any need for overt authority to share their personal knowledge. Nevertheless, it remains true that senior management should overtly encourage and authorise the sharing of personal knowledge in an attempt to enhance the skills and expertise of as many members of project teams as possible.

6. Implications for project managers

The findings of this study have several important implications for project managers who wish to initiate successful KM practices within their projects.

First, managers should formulate an attractive incentive package to motivate project members to engage in KM initiatives. Such an incentive system should also encourage members to suggest ideas for new KM opportunities for the project team.

Secondly, managers should arrange seminars or workshops to familiarise project members with the basic objectives and methods of effective KM. It is apparent that employees cannot make meaningful contributions to KM unless they are familiar with the aims and processes that it entails. These seminars and workshops should make team members aware that the knowledge they possess is a valuable resource that must be managed in a sophisticated way to benefit individuals, the team of which they are part, and the organisation as a whole.

Thirdly, KM without coordination is more than difficult; it is almost impossible. Project managers should always ensure interdepartmental coordination to manage their KM initiatives successfully.

Finally, managers need to foster an organisational culture that encourages participation in KM initiatives and assists all project members to perform their activities to the best of their ability.

7. Conclusion

This study has examined the critical success factors for KM initiatives in project-based organisations. Drawing on the suggestions of various researchers in recent years, the study has proposed a conceptual model of such factors. Six factors have been identified and included in the model:

- familiarity with KM;
- coordination among employees and departments;
- incentive for knowledge efforts;
- authority to perform knowledge activities;
- system for handling knowledge; and
- cultural support.

The findings of the empirical study have revealed that the absence of incentives and the lack of an appropriate system are the most significant barriers for successful KM initiatives in projects. A lack of inter-departmental coordination and unfamiliarity with KM were other significant barriers. A lack of authority to manage knowledge and an

absence of cultural support were the least-significant barriers to successful KM initiatives in the project-based organisations studied here.

The most important implications for project managers arising from the present study are that successful KM initiatives require appropriate incentives for team members and a user-friendly information system that facilitates the sharing and management of knowledge among all project participants. However the generalization of the findings may be partial by reason of limited empirical study sample.

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Organisational culture and knowledge management: an empirical study in Finnish project-based companies

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Abstract: The purpose of this paper is to provide an empirical source for understanding how the cultural artefacts in project-based organisations affect Knowledge Management (KM) activities. The paper primarily provides a theoretical investigation identifying the key concepts within the literature. Then, it follows an empirical analysis based on a questionnaire. Findings are obtained from the data analysis by applying statistical methods. It appears from the findings that organisational culture artefacts have significant effects on KM in project-based organisations. The study findings are restricted to Finnish project-based companies. Therefore, findings can be further tested within other group of companies situated outside Finland. Project managers should fully concentrate on organisational culture artefacts in order to press forward KM practices in their projects. This article offers various findings showing how organisational culture links with KM activities particularly in project-based environments.

Keywords: cultural artefact; organisational culture; knowledge management; innovation; learning; project organisation.

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1   Introduction

1.1   Background

Today, knowledge is the fundamental source of competition (Zack, 1999) and hence, Knowledge Management (KM) is an essential process for managing organisations. Projects are defined as temporary organisations with specific objectives, detailed tasks, restricted time, and budgets to deliver a service or product (Carrillo *et al*., 2004). Project teams, including the project managers and team members, are responsible for the execution of each project. Once a project is completed, project team members disperse from the project either for other job opportunities or get reappointed to other succeeding projects (Ajmal and Koskinen, 2008). Knowledge is embedded in such individuals and should be transferred among other project team members. With the passage of time, however, the value of knowledge can transform instantly (Kluge *et al*., 2001). Knowledge, competencies, and skills developed by the project team members therefore need to be applied directly during the course of execution, thus facilitating its preservation within the organisation following completion of the project, and thereafter, become available for use in subsequent projects. Owing to the limited scheduled time allocated for project execution, the speed of decision making is a crucial factor as it influences the effective actions and responses of distinct phenomena and problem solving. Therefore, knowledge gained and retained previously provides a means that allows project managers to employ a knowledge model and elucidate appropriate relations between the accessible knowledge and the current situation. However, successful knowledge creation, sharing and utilisation that lead to innovations depends on organisational culture (Chen-Kuo *et al*., 2008) and how it facilitates or hinders this process.

1.2   Objectives and research question

It is expressed that knowledge is an extremely people-dependent accomplishment and largely information technology-independent (Davenport and Prusak, 2000; Armbrecht *et al*., 2001). Knowledge plays an important role in formulating and identifying the ability of an organisation or project team to be resourceful. Thus, knowledge is a critical asset for companies in the era of global competition. Companies are becoming more knowledge-intensive and they employ brains rather than hands. Over the years, researchers have increasingly investigated organisational culture and its potential associations with organisational performance and effectiveness. According to several studies, organisational culture, more than any other factor, influences an organisation's ability to carry on and achieve something. If organisational culture is so imperative for companies, then how does it contribute towards knowledge activities in project-based companies?

This research aims at identifying the relationship between organisational culture and KM, as perceived by the project managers. Figure 1 illustrates the conceptual framework in which the notions of organisational culture and KM in project-based organisation perspective are to be adopted. In order to focus this research, the following research question is answered:

How does organisational culture in project-based organisations affect KM practices?

Organisational culture and knowledge management   3

Figure 1   Research focus
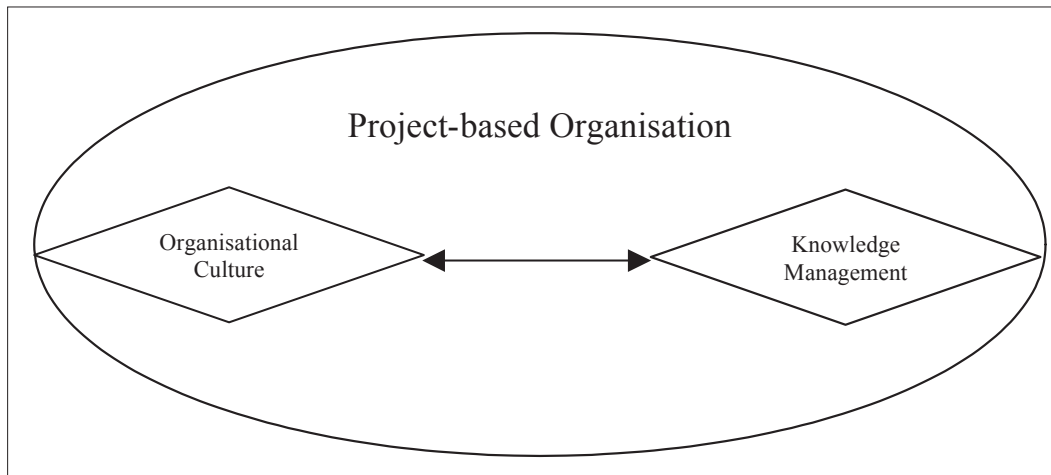
To attain the above objectives and answer the research question, this paper will be developed through the following steps. First, Section 2 reviews the most common deliberations used by the previous researchers for organisational culture and KM. The project and project-based organisation are likewise discussed by focusing on KM needs and the role of organisational culture for such organisation. Section 3 describes the data collection method along with data samples details. In Section 4, the research findings are shown and discussed. Finally, conclusions are summarised and the future research direction is recommended in Section 5.

2   Review of the literature

Knowledge is a significant topic in organisational studies and attention to the way in which an organisation creates and utilise knowledge is gradually mounting (Lahti and Beyerlein, 2000; Ndlela and Du Toit, 2001). The knowledge foundation of organisations is increasingly considered as shaping a firm's strategies to improve performance, and the role of organisational culture is regarded as being strappingly connected with this process particularly in a project-based environment. In the literature, organisational culture has been defined as the shared, basic assumptions that an organisation learns while coping with the environment and solving problems of external adaptation, and the internal integration that are taught to new members as the correct way to solve those problems (Park *et al.*, 2004). However, each organisation has its unique culture, which develops over time to reflect the organisation's identity in two dimensions: visible and invisible. The visible dimension of culture is reflected in the adopted values, philosophy and mission of the firm, while the invisible dimension lies in the unspoken set of values that guides employees' actions and perceptions in the organisation (McDermott and O'Dell, 2001). Helo and Kekäle (2006) have mentioned five different schools of research in organisational culture:

1   comparative research (*e.g.*, Hofstede, 1991; Trompenaars, 1994) that seeks to identify differences in cultures (typically on a national level)

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2 corporative research (*e.g.*, Hickman and Silva, 1984; Peters and Waterman, 1982) in which culture is observed as one of the products created consciously by the organisation

3 cognitive cultural research (*e.g.*, Schein, 1992; Hatch, 1993) that attempts to comprehend the cognitive, often unconscious, backgrounds to collective value choices and actions

4 symbolistic research (*e.g.*, Broms and Gahmberg, 1983) which generally deliberates on the creation and especially the maintenance of culture through organisational symbols, heroes and stories

5 psychodynamic culture research (*e.g.*, the post-structuralist work of Foucault presented in Tilley, 1990; or that of Barthes in Olsen, 1990), which sees culture as individuals' psychomental processes mirrored in their social relations.

However, a culture is considered practical only if it helps to strengthen organisational mission, purpose and strategy. Well-built cultural norms improve organisation efficiency. Every person recognises the consequence of actions to be taken and things to be done. A successful culture is required to not merely be capable of getting things done, but also be appropriate to the needs and aims of the employees. Organisational cultures can be taken like personalities that are undefinable, complex and paradoxical. To comprehend culture involves understanding the distinction between formal and informal rules, and between the adopted and actual means of operation. An employee must identify the concealed cultural norms and rules and follow them to carry on and flourish in an organisation. Organisational cultures that prop up knowledge sharing can lead to more valuable accomplishments in organisations. Edvinsson and Sullivan (1996) proposed a model that identified the importance of culture in managing knowledge. It suggests that culture is an element of the intangible structural resources that support knowledge sharing within organisations.

According to Davenport and Prusak (2000), knowledge can be defined as a fluid mix of framed experiences, values, contextual information, and expert insights that provide a framework for evaluating and incorporating new experiences and information. Knowledge originates and prospers in the minds of experts. In organisations, it often becomes embedded not only in documents of repositories but also in organisational routines, processes, practices, and norms. Iske and Boersma (2005) articulated that knowledge results from the interaction of someone's insights (past experiences, intuition and attitudes), information and imagination (generating ideas and visualising futures).

The most significant characteristics of knowledge are uniqueness and originality. Once knowledge is created, it cannot be imitated or substituted, which makes it a key strategic resource to business (Cabrera and Cabrera, 2002). Although in conventional KM the emphasis was placed on technology or the capability to build systems that efficiently manage and control knowledge, the emerging KM models involve people and stress on their actions. These KM models intend to construct such cultural artefacts in organisations and projects in our case where employees voluntarily share knowledge rather than keep it. One recent study by Al-Alawi (2005) has emphasised that KM initiatives are weak in most organisations because they are overstressed to deploy technology and ignore human, cultural and organisational development issues that are essential to any successful KM initiatives. Prior studies have exposed that a KM culture is the hardest success factor to build if it does not already exist in the organisation.

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Knowledge is an organisational asset. In the past, traditional economies used to depend on tangible assets such as land and capital; current economies, however, have developed to treat knowledge as the key production factor on which competitive advantage rests (Beijerse, 1999). Always, employees carry a wealth of valuable knowledge and experience to an organisation. In regular operating conditions, such crucial knowledge enables companies to generate planned profit levels in addition to enhancing market share (Liu *et al.*, 2006). However, in critical times, the availability, access and utilisation of such crucial knowledge can help to accomplish challenging undertakings in the shape of projects. Externally informed project stockholders in particular, are also becoming more well-read about the significance of knowledge that ultimately leads towards long-term product innovations. In fact, shareholders are now assigning to organisations values derived from approximations of the future value of organisation's current knowledge and KM competence (Housel and Bell, 2001).

Nonaka and Takeuchi (1995) believe that knowledge is a vibrant human process of mitigating personal faith towards the legitimacy. They maintain that innovative organisations constantly generate new knowledge when they actualise forums among individuals, in which they allow the creation and transfer of knowledge progressively from individuals to teams and within the whole organisation. In another angle, Schein (1992) describes that organisational culture sets the framework of the relationships among employees that directs and interprets their attitudes and behaviours. He underlines that, within a culture, organisational artefacts (such as physical layout, technology, language, stories, rites, and norms) have a critical function because they reflect in the deeply rooted values that determine the actions and behaviours of the employees to share knowledge within organisational networks. An artefact is cropped up within a unique type of the relationships that are developed among employees of an organisation. Any type of cultural artefact is given a meaning by the founders and employees of organisation during their interaction and communication (Weick, 1995).

Artefacts execute a crucial function within an organisational culture (Pettigrew, 1979; Schein, 1992). Pettigrew (1979) describes that the cultural artefacts of an organisation such as symbols, language, ideology, belief, rituals, and myths, comprise the forms, categories and images that interpret the people' surrounding environment to themselves. Moreover, Dandridge *et al.* (1980) argue that tangible or intangible cultural artefacts of organisations reveal an organisation's feelings, images and values. These artefacts can be the stories and myths, the ceremonial and ritualised events, the logo of an organisation, as well as its dressing code and sitting arrangements. These factors are reflected in three different ways within organisations like:

1   expressions of employees' experiences

2   as inspirational or non-motivating components within the work setting

3   as guidelines of stability or change for all employees (Dandridge *et al.*, 1980).

Besides, Higgins and Mcallaster (2004) indicate that organisational artefacts can become facilitators or serious hurdles, if they are ignored by the senior management in its endeavour to execute strategic decisions. Rafaeli and Vilnai-Yavetz (2004) likewise argue that the physical artefacts of an organisation make logic of positive or negative thoughts among employees that merge into their attitude with the passage of time.

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Wellman (2007) has introduced four methods or approaches to capture organisational knowledge. These four methods are:

1   culture

2   old pros

3   archives

4   processes.

He explains that culture is that set of behaviours and operating principles that nearly everyone knows, but which are not written. These social norms and behaviours sometimes capture within them the lessons repeatedly learned by the organisation. Nearly all large organisations have a group of old pros, those who have been around long enough to accumulate a great deal of experience about an organisation and its products, processes, environment, and capabilities. Organisations that become aware that valuable lessons have been overlooked often become frustrated and compensate by using archives to capture and retrieve what they have learned. Formal processes, when appropriately managed, can serve as both repositories and disseminators of lessons learned. At least one, and likely several of these methods are almost certainly present and very active in every organisation. The challenge is to recognise, understand, and effectively manage them.

However, a project-based company is frequently engaged in several projects all at once. Inside a project-based company, a sole project is a group of persons committed to a definite intention or aim. Projects normally involve vast, expensive, unique, and high-risk undertakings, which have to be accomplished by a preplanned sum of capital, surrounded by certain anticipated level of performance (Pinto and Kharbanda, 1995; Cicmil, 1997). Always, a key project requirement is also to be completed within a specified period, which demands the reuse and exploitation of knowledge. Without the reuse of existing knowledge or the ability to create new knowledge from existing solutions and experiences, project-based companies cannot be as efficient as they must be to operate in a competitive era. With the reuse of knowledge, project-based companies can learn to improve project planning and operations so that deliverables can be achieved on time. The reuse of knowledge and learning can become more problematic when the organisational culture is not supportive nor ready to help project members to create, share and utilise knowledge to deliver innovative outputs to their valued customers.

3   Methods

3.1   Data collection and analysis

Primarily, an online survey was made among 45 companies that were involved in the project business. The research sample comprised project managers and project assistant managers working on different kinds of projects in large, medium and small Finnish project-based organisations. The survey questionnaire was electronically sent to 400 project managers and project assistant managers of project-based organisations, which were randomly chosen from the list published by the Finnish Project Management Association on its website. A description explaining the study objectives was also included on the first page of the questionnaire. Moreover, three follow-up e-mails were sent approximately one, two and three weeks after the first e-mail. A total of

41 questionnaires were answered with a response rate of 10.25%. All questions were rated by respondents on a five-point Likert-type scale, with 1 = strongly disagree and 5 = strongly agree. To know the relationship of organisational culture with KM activities, ten different items were asked in the online questionnaire from the respondents.

Organisational culture: this variable was operationalised using five items adopted from prior research (Broms and Gahmberg, 1983; Hofstede, 1991; Schein, 1992). These items include the depiction of the intangible and tangible objects of organisational culture, then of the reflection of organisational culture in daily jobs along with the feeling of protection by them. Finally, respondents were asked to tell if organisational culture helps them achieve their aims.

Knowledge management: to measure KM practices in project-based organisations, five items were developed in this study. These items include questions about the importance of KM in surveyed organisations. The role of human factors and information technology in KM was then asked. In the end, the statement was made that humans (employees) are the essence of KM and they should be devoted more attention.

The chi-square statistical technique was used to make the data analysis. The chi-square is a nonparametric statistical technique used to determine if the distribution of observed frequencies differs from the theoretical expected frequencies. Chi-square statistics use nominal (categorical) or ordinal-level data; thus instead of using means and variances, this test uses frequencies.

Generally the chi-squared statistics technique summarises the discrepancies between the expected number of times each outcome occurs (assuming that the model is true) and the observed number of times each outcome occurs, by summing the squares of the discrepancies, normalised by the expected numbers, over all the categories (Dorak, 2008). Data used in a chi-square analysis satisfy such conditions as data should be randomly drawn from the population, reported in raw counts of frequency, measured variables must be independent, observed frequencies cannot be too small, and values of independent and dependent variables must be mutually exclusive.

4   Results

Data analysis results are shown in Tables 1 and 2. Table 1 demonstrates the frequencies of every item asked in the questionnaire and Table 2 explains the correlations of each factor.

Frequency results in table illustrate that with most of the items asked from the respondent, they agree and strongly agree except for one item that asks if information technology plays an important role in KM but almost 27% respondents disagree with this statement.

Correlation results in table show that there is positive relationship between intangibility of cultural artefacts in the organisation and KM importance. Moreover, these results also reveal that in organisations where the members feel the organisational culture in the shape of intangible objects, they also feel that human beings (employees) are important in KM. On the other hand, they feel that IT is not important in KM and they stress that employees should be given more attention because they are compulsory by reason of them being the essence of KM.

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Table 1   Frequencies

Organisational culture items				*KM items*			
You can feel organisational culture in the shape of intangible objects (traditions, norms, values)				*KM is considered important in your organisation*			
Frequency		*Valid percent (%)*	*Cumulative percent (%)*	*Frequency*		*Valid percent (%)*	*Cumulative percent (%)*
Strongly disagree	1	2.4	2.4	Disagree	2	4.9	4.9
Disagree	1	2.4	4.9	Not sure	6	14.6	19.5
Agree	22	53.7	58.5	Agree	23	56.1	75.6
Strongly agree	17	41.5	100.0	Strongly agree	10	24.4	100.0
Total	41	100.0		*Total*	41	100.0	
You can feel organisational culture in the shape of tangible objects (dress, sitting arrangement, equipment used)				*Human factor plays important role in KM*			
Frequency		*Valid percent (%)*	*Cumulative percent (%)*	*Frequency*		*Valid percent (%)*	*Cumulative percent (%)*
Disagree	11	26.8	26.8	Not sure	3	7.3	7.3
Not sure	7	17.1	43.9	Agree	16	39.0	46.3
Agree	19	46.3	90.2	Strongly agree	22	53.7	100.0
Strongly agree	4	9.9	100.0	*Total*	41	100.0	
Total	41	100.0					
Daily work routine has some reflection of organisational culture				*Information technology plays important role in KM*			
Frequency		*Valid percent (%)*	*Cumulative percent (%)*	*Frequency*		*Valid percent (%)*	*Cumulative percent (%)*
Strong disagree	1	2.4	2.4	Disagree	11	26.8	26.8
Not sure	3	7.3	9.8	Not sure	8	19.5	46.3
Agree	34	82.9	92.7	Agree	18	43.9	90.2
Strongly agree	3	7.3	100.0	Strongly agree	4	9.8	100.0
Total	41	100.0		*Total*	41	100.0	
Organisational culture provides a sense of protection to you in some issues				*Human factors should be devoted more attention because these are compulsory for KM*			
Frequency		*Valid percent (%)*	*Cumulative percent (%)*	*Frequency*		*Valid percent (%)*	*Cumulative percent (%)*
Disagree	2	4.9	4.9	Not sure	6	14.6	14.6
Not sure	7	17.1	22.0	Agree	16	39.0	53.7
Agree	29	70.7	92.7	Strongly agree	19	46.3	100.0
Strongly agree	3	7.3	100.0	*Total*	41	100.0	
Total	41	100.0					
Organisational culture helps to achieve your aims				*Human (employees) are essence of KM*			
Frequency		*Valid percent (%)*	*Cumulative percent (%)*	*Frequency*		*Valid percent (%)*	*Cumulative percent (%)*
Strongly disagree	1	2.4	2.4	Agree	20	48.8	48.8
Disagree	3	7.3	9.8	Strongly agree	21	51.2	100.0
Not sure	15	36.6	46.3	Total	41	100.0	
Agree	16	39.0	85.4				
Strongly agree	6	14.6	100.0				
Total	41	100.0					

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Table 2   Correlations

Statements		Value	df	Asymp. Sig (two-sided)	Observations
		Correlations			
You can feel organisational culture in the shape of intangible objects (traditions, norms, values) * KM is considered important in your organisation	Pearson chi-square	24.081	9	.004	13 cells (81.3%) have expected count less than 5. The minimum expected count is .05.
You can feel organisational culture in the shape of intangible objects (traditions, norms, values) * Human factor plays important role in KM	Pearson chi-square	2.634	6	.853	8 cells (66.7%) have expected count less than 5. The minimum expected count is .07.
You can feel organisational culture in the shape of intangible objects (traditions, norms, values) * Information technology plays important role in KM	Pearson chi-square	18.491	9	.030	13 cells (81.3%) have expected count less than 5. The minimum expected count is .10.
You can feel organisational culture in the shape of intangible objects (traditions, norms, values) * Human factors should be devoted more attention because these are compulsory for KM	Pearson chi-square	3.741	6	.712	8 cells (66.7%) have expected count less than 5. The minimum expected count is .15.
You can feel organisational culture in the shape of intangible objects (traditions, norms, values) * Human (employees) is essence of KM	Pearson chi-square	2.218	3	.528	4 cells (50.0%) have expected count less than 5. The minimum expected count is .49.
You can feel organisational culture in the shape of tangible objects (dress, sitting arrangement, equipment used) * KM is considered important in your organisation	Pearson chi-square	8.899	9	.447	14 cells (87.5%) have expected count less than 5. The minimum expected count is .20.
You can feel organisational culture in the shape of tangible objects (dress, sitting arrangement, equipment used) * Human factor plays important role in KM	Pearson chi-square	7.749	9	.560	14 cells (87.5%) have expected count less than 5. The minimum expected count is .39.
You can feel organisational culture in the shape of tangible objects (dress, sitting arrangement, equipment used) * Human factors should be devoted more attention because these are compulsory for KM	Pearson chi-square	7.936	6	.243	9 cells (75.0%) have expected count less than 5. The minimum expected count is .59.

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Table 2 Correlations (continued)

Statements		Correlations			Observations
		Value	df	Asymp. Sig (two-sided)	
You can feel organisational culture in the shape of tangible objects (dress, sitting arrangement, equipment used) * Human (employees) are essence of KM	Pearson chi-square	4.973	3	.174	4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.95.
Daily work routine has some reflection of organisational culture * KM is considered important in your organisation	Pearson chi-square	30.339	9	.000	14 cells (87.5%) have expected count less than 5. The minimum expected count is .05.
Daily work routine has some reflection of organisational culture * Human factor plays important role in KM	Pearson chi-square	6.081	6	.414	10 cells (83.3%) have expected count less than 5. The minimum expected count is .07.
Daily work routine has some reflection of organisational culture * Information technology plays important role in KM	Pearson chi-square	8.800	9	.456	13 cells (81.3%) have expected count less than 5. The minimum expected count is .10.
Daily work routine has some reflection of organisational culture * Human factors should be devoted more attention because these are compulsory for KM	Pearson chi-square	3.154	6	.789	10 cells (83.3%) have expected count less than 5. The minimum expected count is .15.
Daily work routine has some reflection of organisational culture * Human (employees) is essence of KM	Pearson chi-square	1.643	3	.650	6 cells (75.0%) have expected count less than 5. The minimum expected count is .49.
Organisational culture provides a sense of protection to you in some issues * KM is considered important in your organisation	Pearson chi-square	42.347	9	.000	14 cells (87.5%) have expected count less than 5. The minimum expected count is .10.
Organisational culture provides a sense of protection to you in some issues * Human factor plays important role in KM	Pearson chi-square	4.169	6	.654	10 cells (83.3%) have expected count less than 5. The minimum expected count is .15.
Organisational culture provides a sense of protection to you in some issues * Information technology plays important role in KM	Pearson chi-square	6.379	9	.701	13 cells (81.3%) have expected count less than 5. The minimum expected count is .20.
Organisational culture provides a sense of protection to you in some issues * Human factors should be devoted more attention because these are compulsory for KM	Pearson chi-square	3.769	6	.708	10 cells (83.3%) have expected count less than 5. The minimum expected count is .29.
Organisational culture provides a sense of protection to you in some issues * Human (employees) is essence of KM	Pearson chi-square	.487	3	.922	6 cells (75.0%) have expected count less than 5. The minimum expected count is .98.

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Table 2   Correlations (continued)

Statements		Correlations			Observations
		Value	df	Asymp. Sig (two-sided)	
Organisational culture helps to achieve your aims * KM is considered important in your organisation	Pearson chi-square	32.022	12	.001	18 cells (90.0%) have expected count less than 5. The minimum expected count is .05.
Organisational culture helps to achieve your aims * Human factor plays important role in KM	Pearson chi-square	8.250	8	.409	11 cells (73.3%) have expected count less than 5. The minimum expected count is .07.
Organisational culture helps to achieve your aims * Information technology plays important role in KM	Pearson chi-square	14.555	12	.267	8 cells (90.0%) have expected count less than 5. The minimum expected count is .10.
Organisational culture helps to achieve your aims * Human factors should be devoted more attention because these are compulsory for KM	Pearson chi-square	6.941	8	.543	11 cells (73.3%) have expected count less than 5. The minimum expected count is .15.
Organisational culture helps to achieve your aims * Human (employees) is essence of KM	Pearson chi-square	2.827	4	.587	6 cells (60.0%) have expected count less than 5. The minimum expected count is .49.

Figure 2   Graphical representations of correlations values (see online version for colours)
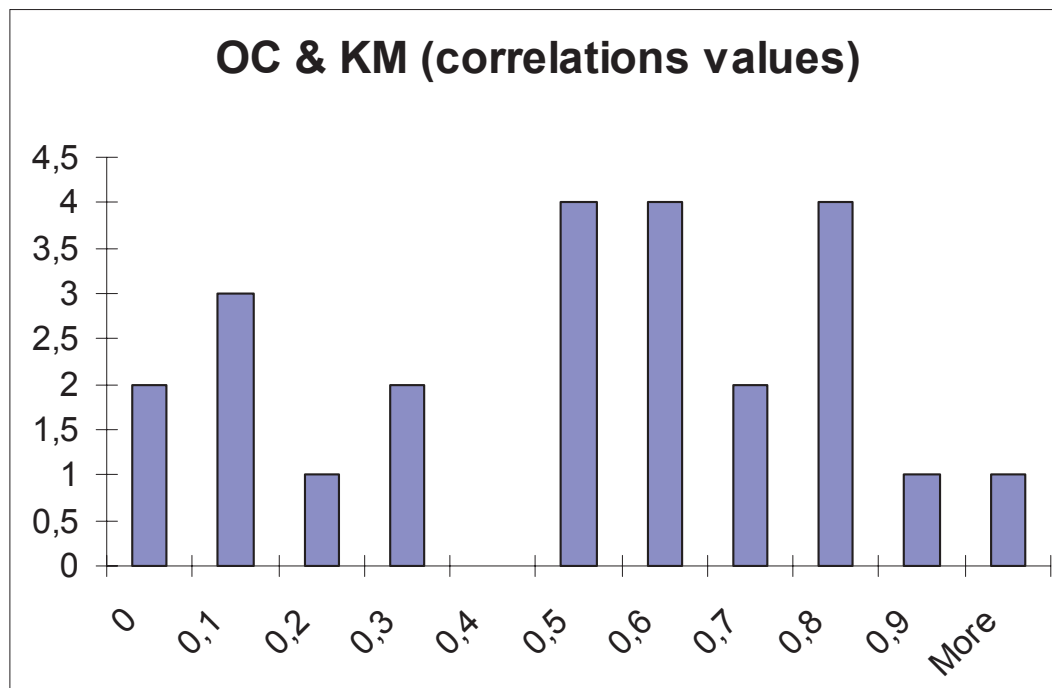
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The results demonstrate that KM is not considered important in such organisations where the members feel that organisational culture does not provide a sense of protection. Anyhow, humans are considered important for KM, in such organisations where the members feel that organisational culture provides a sense of protection. It is also obvious from the results that KM is not considered important in such organisations where organisational culture does not help to achieve the aims of the employees.

Figure 2 provides an overall depiction of correlation values. It visualises the relationship in organisational culture and KM. In order to manipulate the ability to manage knowledge, the organisational culture can be focused so that employees are able to share their knowledge because such culture promotes openness and acceptance of new ideas.

5   Conclusions

This study concentrated on the concerns of organisational culture during the practice of KM in projects by examining the relationships between organisational culture and KM. Organisational culture comprises the assumptions, values, norms and tangible signs (artefacts) of an organisation. Knowledge that is considered an organisational asset is described as the fluid mix of framed experiences, values, contextual information, and expert insights that provide a framework for evaluating and incorporating new experiences and information in organisations. A framework was employed in this study to assess the relationships between organisational culture and KM and the empirical evidence shows that a positive relationship exists between these variables.

Results enlighten that there is relationship in the tangibility of cultural artefacts and KM importance in organisations. In organisations where the members feel the organisational culture in the shape of tangible objects, they feel that IT plays an important role in KM. On the other hand, in organisations where the members feel the organisational culture in the shape of tangible objects, they think that there is no need to devote more attention to human factors because it is not compulsory for KM inasmuch as human beings are not the essence of KM. Furthermore, in organisations where the members feel the reflection of organisational culture in their daily work routine, they considered IT as important in KM, and humans should be given more attention because they are compulsory for KM since they are the essence of KM.

KM, whether explicit or tacit, is a crucial precondition to project success in today's dynamic and vibrant global environment. The management of knowledge in projects is thus becoming an important issue in establishing and sustaining a company's competitive advantage. Without an appropriate organisational culture, however, valuable knowledge assets can be irretrievably lost once a project is completed. This results in a fragmentation of organisational knowledge. There is constant need for supportive organisational culture if companies want to be knowledge-intensive to bring innovations in their products to compete in the current globalised era.

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