Knowledge Transfer within ERP Implementations
A Phenomenological Investigation

Master's thesis within Information Technology and Business Renewal
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Abstract

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Background

The importance of Enterprise Resource Planning (ERP) systems is that they redesign organizational processes and structure. The new knowledge embedded in the ERP systems induces substantial changes in the businesses which adopt ERP systems. Furthermore, ERP implementations are socially complex and knowledge-intensive activities as several companies may be involved in a single ERP project and intensive knowledge transfer among these companies is vital for the success of the implementation projects.

Purpose

To date limited amount of research has been performed in the area of knowledge transfer in ERP implementations. My study answered the following questions:

1. What is the effect of the transfer of knowledge that is associated with ERP implementations?
2. What (if any) knowledge transfer barriers have been identified during the ERP implementation process?
3. What types of activities did the firms initiate to enable the knowledge transfer during the ERP implementation process?

Method

My research consisted of theoretical and empirical parts. Theoretical part entailed a thorough review of current literature on the ERP systems and knowledge management. Adopting a phenomenological approach I next collected the primary data through interviews and surveys with experts in the ERP implementation projects.

Results

I have described the area of knowledge transfer within ERP implementation projects and identified connections between ERP implementations and organizational learning. I have also uncovered and analyzed the origins of a number of factors that potentially inhibit or enable the knowledge transfer within implementation projects. I was able to connect the theoretical part of the thesis with empirical data and gained a comprehensive understanding of the phenomena at hand. Major barriers to the knowledge transfer stem from the tacit nature of the knowledge itself and the lack of social relationships within the various stakeholders. Activities organizations engage in are ‘knowledge conversion’ and relationships facilitation within the project team.
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1 Introduction

In this chapter I introduce the topic of this thesis. The chapter begins by presenting a short historical background of the ERP systems adoption, and continues with the problem discussion. Purpose of this thesis and research questions follow and the chapter is concluded by the discussion of the perspective adopted and the suggested audience of this thesis.

1.1 Background

Starting from the 1990s many firms purchased Enterprise Resource Planning systems as a replacement to older, often house-made information systems. With the purpose of responding rapidly to customer demands, presenting a single face to global client base, achieving economies of scale or simply downsizing themselves, such firms decided to focus on their ‘core’ competencies and outsource other tasks. Often, already downsized firms were simply unable to develop or support large-scale information systems on their own. As a result they often found no reason to continue in-house development of their application software and prioritized replacement of outdated legacy systems with the systems purchased from the third parties (Swanson, 2003; Ross, Vitale & Wilcocks, 2003).

It was in such context that market for the innovative type of Information Systems: ERP (Enterprise Resource Planning) systems started to boom. ERP systems were developed with the purpose of internal integration of technical and business core of the firm and external integration with business partners. From a technological perspective they offered a number of benefits; centralized data source, ease of software configuration/customization, and simple client/server architecture together with reduced implementation and support costs. From a business perspective ERP systems provided management with a holistic view of the organization by integrating business processes and functions, organization’s back and front offices and facilitating enterprise-wide communication (Swanson, 2003). ERP systems replaced several disparate transaction processing systems with a single, integrated system that expressed the strong dependencies amongst functional units of the firm (Ross et al., 2003).

By 1995, ERP adoption boom was in full. Major consultant and software firms found themselves generating most of their revenues from it. In fact, by the end of the 90s, about half of the larger US and European companies migrated to ERP systems, while many companies were still in the process of migration (Swanson, 2003).

1.2 Problem Discussion

The transition from the traditional in-house developed applications to the ERP systems signified a major organizational and inter-organizational innovation. Companies attained vast amounts of knowledge directly and indirectly from each other, with the support of ERP software vendors and consultants. The scope and complexity of organizational learning was extraordinary. As argued by Davenport (2000) who prefers to use the term ES (Enterprise Systems) instead of ERP:

Successful implementation of ES does involve probably the greatest technological change most organizations have ever undergone… Even more difficult and important, however are the major changes in business that come with an ES project. Business processes, the way work gets done in an organization, change dramatically. Organizational structure and culture, the behaviors of workers throughout the company, and even business strategy all have to be restructured. (Davenport, 2000, p.5-6)
Implementing ERP systems is hardly just a matter of hardware or software installation. It involves ‘a transformation that is simultaneously strategic, technological, structural, organizational and social’ (Tchokogue, Bareil & Duguay, 2005, p. 152). Business processes and information are made common across the enterprise and information links between business functions and units are tightened. Unique ways of doing business are to be abandoned. Employees need to be educated about the impact of their work with the new system. Corporate management has to be persuaded to perform fundamental modifications to the firm’s established ways of working. In short, for a successful ERP adoption a company must undergo vast organizational change, and diffusion of new organizational and inter-organizational knowledge represents a huge part in that change process (Davenport, 2000; Swanson, 2003).

As software and systems architecture of the ERP is new to the company, so are the business processes (practices) embedded in the software. ERP systems are ‘...often externally imposed disruptive mechanisms capable of changing a firm’s structure and routines, thereby influencing the actions and interpretations of the organization’s actors’ (Butler & Pyke, 2004, p.171).

Moreover, ERP implementations are different from ‘traditional’ system analysis and design projects. Among such differences are the scale, complexity, organizational impact, costs of the ERP project and subsequent business impact should the project not succeed. In contrast to traditional IS projects that often affect only limited areas of the organization, ERP projects affect the entire organization. Furthermore, implementing ERP systems is intrinsically connected to the Business Process Reengineering (BPR) (Lee & Lee, 2003). BPR is simply an effort to identify the best ways to perform business processes supported by the information system (Olson, 2004). Initializing BPR in the firm is a result of the desire to adopt ‘Best Business Practices’ (BBP) embedded in the chosen ERP package, rather than modifying the software to match the current business processes (Lee & Lee, 2003). When a transfer of a best practice occurs, a firm replicates a practice that is performed in a different way by another organization and thought to be superior compared to the existing internal practice and other alternatives known to the company (Szulanski, 1996).

While modification of ERP systems to fit organization’s current business processes is not impossible, the high costs and long time required for modification result in most organizations choosing to align their business processes with the functionality provided by ERP system. According to Forrester Research only 5 % of organizations among Fortune 1000 companies that purchased an ERP system, chose to customize it to match current business processes. Consequently, implementation of an ERP system results in using the business models embedded in the software package and transfer of knowledge incorporated in the software to the adopting organization (Lee & Lee, 2003).

Contrariwise, traditional IS projects presumed minimal or no BPR at all, and software was custom written to fit the organizational processes (Grabski, Leech & Lu, 2003). Additional distinctions between ERP and traditional systems are greater vendor participation in implementation and support, higher required level of user and IS staff competence for successful ERP implementations (Sumner, 2003), and need for extensive configuration of the ERP packages to support the desired processes of a specific company (Holland & Light, 2003). In fact, ERP system configuration is different from building a customized system, because the focus of implementation shifts from traditional system analysis and design to software configuration. Substantial part of the ERP system analysis and design has already been completed by the software vendor, thus the implementation effort concentrates on enabling the required functionality embedded within ERP model (Holland & Light, 2003).
In addition to this, implementation of comprehensive IT solution such as an ERP system is a knowledge-intensive task as it requires a great amount of experience from a broad range of experts such as representatives from company’s business units, technical specialists from the IT department, project managers and external business and implementation consultants. Choosing the right consultants, using their knowledge and skills as well as transferring and retaining essential knowledge within the firm is essential to the success of ERP implementation. The problem is accentuated by the fact that on the one hand organizations want to reduce the involvement of expensive consultants, but on the other hand majority of the organizations do not have the internal knowledge and skills to implement an ERP system (Chan & Rosemann, 2002).

Therefore substantial knowledge creation and transfer occur when ERP system is implemented and as firm’s knowledge is embedded in its organizational and managerial processes and business routines and practices (Butler & Pyke, 2004) company knowledge base undergoes substantial transformation.

1.3 Purpose of the Thesis

Although adoption of an ERP is a process of information system implementation it is additionally a process of related knowledge creation, storage/retrieval, transfer and application from the knowledge management perspective. From such a perspective ERP implementation can be viewed as a process of bringing new business processes and knowledge into the organization with already existent business rules and knowledge (Lee & Lee, 2003).

As argued by Chan and Rosemann (2002) the knowledge required for ERP project implementation can be structured along three dimensions:

- The phases of ERP system’s lifecycle: selection, implementation, and use of the ERP
- The stages of knowledge lifecycle: identification, creation, transfer, storage, use, and unlearning of knowledge
- The content of knowledge transferred: business, IT, company-specific, project management, communication/coordination/cooperation knowledge.

I have illustrated this conceptual division in the Figure 1 below. As the reader will notice the focus of my research along the first dimension is implementation. The implementation phase consists of the ERP configuration and installation at the adopter organization and introduces associated organizational and technical changes. This phase is comparably short in relation to the entire lifespan of ERP systems, however consumes most of the budget and is knowledge-intensive due to the multitude of external consultants participating and amount of organizational change involved. It is also a most critical phase in the ERP system lifecycle as the ERP implementation is frequently a new and unique experience for many organizations, the project team members might have never worked together before, and because success of the ERP system in the future extensively depends on the implementation stage (Chan & Rosemann, 2002; Davenport, 2000; Timbrell, Andrews & Gable, 2001).

Focus of research along the second dimension is the transfer of knowledge. As argued by Davenport and Prusak (2000) organizations engage in the knowledge transfer to improve own ability to do things, and therefore increase own value. The knowledge sourced from
the ERP vendors or consultants needs to be translated, adapted and combined with knowledge of the organization’s business processes (Timbrell et al., 2001). Within the process of knowledge transfer a number of inhibitors that slow down or prevent transfer and enablers that facilitate the transfer may arise (Davenport & Prusak, 2000). My research will try to identify of these inhibitors and enablers within the context of ERP implementations.

![Figure 1: Structure of ERP related Knowledge. Adopted from Chan & Rosemann (2002).](image)

Foci of research along the third dimension are business and IT knowledge domains. Business domain involves the business issues in the management of ERP systems such as functional knowledge in business areas of procurement, sales, human resource management or accounting and organizational knowledge such as business process management, and documentation management, knowledge of the enterprise culture and educational knowledge. This business knowledge is embedded within ERP software or comes in the form of training from external consultants. IT knowledge represents knowledge that is necessary to implement and use ERP software, such as: knowledge of database management software, network management, programming, client-server architectures and knowledge unique to a specific ERP solution implemented, such as understanding of the architecture of the product, its functionality, existing constraints, implementation methodology and strategies (Chan & Rosemann, 2002).

Two research methods have been used within the study. To provide an account of actual events within ERP implementations I have used a phenomenological approach and collected the data through interviews. To identify and test a number of potential knowledge transfer inhibitors and enablers I have employed a hermeneutic model of Gummesson (2000) and used the literature study as a building block for pre-understanding.
1.4 Research Questions

Various ERP related studies have researched potential benefits and critical success factors of ERP implementation. Yet very few IS researchers have analyzed ERP implementation from a knowledge transfer perspective. To understand the mechanics behind the knowledge transfer in ERP implementation projects my study tries to answer the following questions:

1. What is the effect of the transfer of knowledge that is associated with ERP implementations?
2. What (if any) knowledge transfer barriers have been identified during the ERP implementation process?
3. What types of activities did the firms initiate to enable the knowledge transfer during the ERP implementation process?

1.5 Perspective

ERP implementations are socially complex undertakings. Several companies – including the ERP vendor, vendors of ERP add-on products, vendors of supporting hardware, software, communications, capabilities, and implementation consultants can be involved in a single ERP project. The important business and technical know-how for ERP implementation thus draws from numerous contributors.

The problem will be studied from perspectives of the ERP project managers from the customer organizations, ERP academician, and ERP configuration expert. Taking on such multiple perspectives, can be metaphorically thought of as poking holes in a window curtain; knowledge-transfer within ERP implementations is the view hidden behind that curtain, and each perspective makes a hole revealing a unique angle of vision for comprehending the whole vista. Incorporating multiple views in the research, rather than adopting a view of one actor will provide me with better understanding of the phenomenon at hand. Furthermore, as argued by Berger and Luckmann (1991) knowledge is a social construction. Worded differently; any knowledge, including the most basic, taken for granted common sense knowledge of everyday reality, originates from social interactions. When people interact, they do so with the understanding that their respective perceptions of reality are related, and as they act upon this comprehension their common knowledge of reality becomes bolstered and closer to the objective reality (Berger & Luckmann, 1991). Accordingly, taking a multi-view perspective will provide me with better ways of making sense of the reality.

1.6 Audience of the Thesis

This thesis is intended to benefit academics, practitioners and students in the business or IT related fields. This does not however mean that it can not be comprehended by an individual with a different background, academic or professional level. Some prior knowledge of basic concepts in business and IT is sufficient, while an intellectual capacity of the reader to logically reason, deduce from, interpret and evaluate the text at hand is necessary.

Every effort has been made to improve readability and deliver the meaning of the text as clearly as possible. I did not adopt a complicated style of writing by trying to keep my sentences short whenever possible and expressing my thoughts as coherently as I could.
2 Theory of Science and Research Methodology

In this chapter I present my scientific approach and describe my method of working on the thesis. The first part of this chapter includes the scientific positioning, while the second part describes the course of action for theoretical and empirical parts of the research. Chapter ends with a discussion concerning possible critique of the study.

2.1 Scientific Approach

Before undertaking any scientific research it is important to decide what scientific principles the work will be based on. Scientific positioning influences the choice of an investigation, the aim of the thesis, choice of the method and data collection procedure, analysis and presentation of results (Hussey & Hussey, 1997). It is also important to comprehend that any work is influenced by the perspectives and values of the person who has created it, as how information is framed affects its interpretation (Huber, 1991). As a reader may interpret the work using own frame of reference the researcher needs to clarify own scientific positioning to the audience.

2.1.1 Ontological Assumption

Ontology is a major element of metaphysics and is concerned with what exists. Ontological claims try to specify the sorts of entities which exist and which can be known. Some ontologists have claimed that an ultimate reality exists, however we can never have complete knowledge of it due to the limits of our perception (Hussey & Hussey, 1997; Cornfod & Smithson, 2005).

A researcher therefore has to convey to the reader whether he or she views the world as objective and external to oneself, or socially constructed and understood by examining the perceptions of human actors (Hussey & Hussey, 1997; Cornfod & Smithson, 2005).

The ontological assumption in this thesis is that we all view reality in our own ways and that we construct our own subjective realities in our minds. Humans, as self-aware entities endow the world with own meanings and create meaning and social reality (Berger & Luckmann, 1991). And while one person shares the reality with other persons, each interprets reality in own ways. Such interpretations will be dependent on knowledge, values, and prior experiences of each individual. Each individual’s prior cognitive map (belief structure or mental representation or frame of reference) will shape his or her interpretation of information (Huber, 1991). Human behavior therefore can only be understood if the observer understands meanings that subjects give to some particular phenomena.

2.1.2 Epistemological and Axiological Assumptions

Epistemology is concerned with study of knowledge, and with what humans accept as valid knowledge (Hussey & Hussey, 1997; Thomas, 2004; Cornfod & Smithson, 2005). This in turn involves examination of the relationship between the researcher and the subject of the research. I minimized the distance between myself and the subjects of the research and engaged them in cooperative enquiry (Hussey & Hussey, 1997) – wherein all the persons involved in the research were simultaneously viewed also as contributors to the research and co-subjects of the research. Their thinking and decision-making contributed to generating ideas, seeking the relevant literature, designing and managing this research project.
Axiological assumption is concerned with the values. Researchers have values, even if they have not been made explicit in the course of the research. These values help to determine what is recognized as facts and the interpretations of these facts. The observer does not simply record and describe the observed information but interprets the world while observing it. The researcher is factually involved with what is being researched and engaged in the process of social reality construction. Consequently the research outcome will be influenced by the values, knowledge and experiences of the researcher, making description of the so called ‘objective’ reality impossible (Hussey & Hussey, 1997; Gummesson, 2000). Reiterating a widely accepted (in Western philosophy) definition of knowledge as a justified true belief (Takeuchi & Nonaka, 1995) I posit that my beliefs, values and norms will determine what counts as facts.

2.1.3 The Rhetorical Assumption

The rhetorical assumption is concerned with the language of the research. In many disciplines preferred style of writing should reflect the immediacy of the research and demonstrate the researcher’s involvement. The rhetorical assumption is not however concerned with the use of scientific jargon or terms in the text, but only relates to the choices such as: writing in the first or second person, using passive or active voice, future or past tense (Hussey & Hussey, 1997). I chose to write in the first person, using future tense in the project proposal, and the present and past tense in the final report.

2.1.4 Phenomenological Paradigm of Reality

From the prior discussion I infer my association with the phenomenological paradigm of reality. A phenomenon is defined as a fact or occurrence that appears or is perceived. The phenomenological paradigm deals with understanding the human behavior from the participant’s own frame of reference. It assumes that social reality is within us; therefore even the act of investigating the reality affects the reality. Considerable regard has to be paid to the subjective state of the individual. Phenomenology in general infers using the qualitative research approach, and trying to understand the meaning, rather than the measurement of social events (Hussey & Hussey, 1997; Thomas, 2004). If reality is socially constructed (Berger & Luckmann, 1991) it is important to understand how the reality is experienced by individuals, and how knowledge is acquired. While management research has been strongly influenced by positivist assumptions due to historical reasons (Thomas, 2004; Gummesson, 2000) my argument is that phenomenological approach is more appropriate for the purposes of interpretation and understanding of characteristics of social events. Positivists argue for the unity of science and claim that people and things are similar enough to be studied in the same way (Thomas, 2004; Hussey & Hussey, 1997; Cornfod & Smithson, 2005). I however do not believe that there is just one path for the scientific understanding of the world. Positivism can be appropriate for study of the natural world as positivist research aims to produce ‘objective’, undisputable facts that have no social values embedded in them and are everlasting (Cornfod & Smithson, 2005). Yet, ‘…information systems are social systems whose behavior is heavily influenced by the goals, values and beliefs of individuals and groups, as well as performance of technology’ (Cornfod & Smithson, 2005, p. 22-23). To understand an information system we therefore must look beyond technology, analyze behaviors of people, structures, and processes involved as the information systems influence and are influenced by the context (Cornfod & Smithson, 2005; Newell, Huang, Galliers & Pan 2003). Since my research deals with actions and behaviors generated within the human minds using phenomenological approach is more appropriate.
To finalize I assume that scientific knowledge is enriched by the personality and experience of the researcher and that all interpretations will be based on that personality. Consequently, as a researcher I had to try and understand the reality from somebody else’s point of view (Thomas, 2004) and the dialogue between me and the subjects of the research was given considerable attention as a vital part of seeking understanding. In the phenomenological research the investigator and the object are linked, and for the understanding of human behavior cultural analysis and investigation of human meanings are required. Simple observation of human behavior is insufficient for understanding, participation in social life in different settings, close interaction with social actors, and interpretation of documents written by them is necessary (Thomas, 2004).

2.2 Methodological Assumption

Having established a scientific paradigm I proceed to present my methodological assumption. The term methodology in this case refers to the overall approach to the research process.

The aim of my investigation was to identify the relevant views and opinions from the experts in the ERP implementations. My interest was directed towards comprehension therefore I tried to examine multiple instances of a phenomena in a variety of different cases.

The table below lists major features of research approach used, while the sub-paragraphs following next, explain rationale behind my methodological choices.

<table>
<thead>
<tr>
<th>Type of Research</th>
<th>Phenomenological (Qualitative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigation Design</td>
<td>A mix of Phenomenological and Abductive methods. Adopting beliefs in view of new information</td>
</tr>
<tr>
<td>Theories and hypotheses</td>
<td>Findings serve as a starting point for further research</td>
</tr>
<tr>
<td>Sample Size and Selection</td>
<td>Five respondents. ‘Snowball’ sampling</td>
</tr>
<tr>
<td>Research Settings</td>
<td>Natural</td>
</tr>
<tr>
<td>Data Collection</td>
<td>Qualitative and some Quantitative</td>
</tr>
<tr>
<td>Reliability</td>
<td>Open for questioning</td>
</tr>
<tr>
<td>Validity</td>
<td>Enhanced</td>
</tr>
<tr>
<td>Generalisability</td>
<td>Concerns only specific subjects of the research</td>
</tr>
</tbody>
</table>

Table 1: Features of my research methodology

2.2.1 Phenomenological Research

I was interested not in frequency but in meaning; that is how people make sense of their experiences and the world around them. Furthermore, as certain types of behavioral phenomena escape quantification and statistical inference (Sanders, 1982); using the qualitative method is a natural choice. Qualitative method can be defined as a method that avoids metrification and seeks other means of capturing and analyzing the data. Qualitative
method is usually based on words rather than numbers and as put forth by Miles and Huberman (as cited in Cornfod & Smithson, 2005, p.63):

‘Words, especially organized into incidents or stories, have a concrete, vivid, meaningful flavor that often proves far more convincing to a reader – another researcher, a policymaker, a practitioner – than pages of summarized numbers.’

Qualitative research usually implies that the researcher spends substantial time collecting unstructured observations and then works hard to make sense of them. Observations may be in the form of interviews, conversations, field notes. After the collection stage they must be reviewed, analyzed and structured in some way. In such a research the researcher’s role is more central and intrusive than in a classical survey approach based on a statistical analysis (Cornfod & Smithson, 2005). Qualitative research follows researcher’s intuition in a much more subjective fashion and is strongly associated with phenomenological paradigm (Hussey & Hussey, 1997). However, as knowledge transfer within ERP implementations is an under-researched area, qualitative research is needed and appropriate.

Phenomenological research method which is one of the qualitative research methods used in organizational studies is generally described as a research technique that ‘seeks to make explicit the implicit structure and meaning of human experience.’ (Atkinson as cited in Sanders, 1982, p.353) In other words; phenomenology is an investigation of conscious phenomena: an analysis of the way in which things or experiences are perceived by the humans. The aim of the phenomenology is to seek essences of the events that can not be revealed by simple observations (Sanders, 1982). ‘The task of the phenomenological researcher is the descriptive investigation of the contents of conscious phenomena, both objective and subjective.’ (Atkinson as cited in Sanders, 1982, p.353)

Phenomenology in organizational research is structured into the three categories: intentional analysis, epoche, and eidetic reduction. Intentional analysis tries to derive correlation between the object as perceived (noema) and the subjective apprehension (noesis) of that object or experience. Researcher’s objective is to extract essences from phenomena. Epoche is a basic belief of phenomenology requiring that a researcher while interacting with subjects of the research has to temporarily drop the mental baggage of assumptions and pre-conceptions that he or she has about the events to reveal the true nature of the phenomena. Finally, eidetic reduction is the process of abstracting essences from the consciousness or experience. Eidetic reduction is used to obtain a concrete expression of a particular phenomenon in a universal, ‘pure’ essence (Sanders, 1982).

2.2.2 Design of Investigation

My research method can be conceptualized by using the hermeneutic spiral described by Gummesson (2000). All researchers approach their research with a certain level of pre-understanding which includes their knowledge, insights and experience before the research has started. By working through different secondary or primary data sources (dialogue) they are gaining new insights of the phenomena and interpret them. These interpretations provide them with better understanding, i.e. improved insights. The developed understanding in turn serves as a new level of pre-understanding and helps to formulate deeper and better research questions. Such an iterative process is referred as a hermeneutic spiral, with each stage providing the researcher with some knowledge of the phenomena (Gummesson, 2000). The figure below illustrates the development of my research.
Pre-understanding has been argued to assist in having a fruitful dialogue with the respondents, contribute to the development of the research by revealing a list of great number of factors and relationships in the problem area, and give a concrete form to the purpose of the thesis. However, a pre-understanding also constitutes a risk to the researcher, so that one can unconsciously expect certain answers and interpret the data so it matches up to one’s expectations (Gummesson, 2000). I however felt that pre-understanding was essential to gain a theoretical comprehension of the research topic, so in this case the positive factors weighed over the negative ones.

To build an initial pre-understanding I saw a need to create a general overview of theories in the field of my research. These included Knowledge Management, theories of best practice and knowledge transfer, and Enterprise Resource Planning systems concepts. An extensive study of available literature was performed. The subsequent process of reflection on the literature allowed me to identify any knowledge gaps on the subject of the research.

Next, I generated a list of potential questions for the research and did another literature search, looking for and eliminating the questions that had already been answered. Having chosen a concrete research problem I decided on the objectives of the research, and chose
ERP implementation projects as unit of analysis. Aimed with this combination I developed concrete ideas what to focus on and how to collect the data for the research.

It is argued that a research process is usually meant to follow either inductive or deductive patterns. Within inductive research theory is developed from the observation of empirical reality and general inferences are induced from particular instances. Inductive method involves moving from individual observation to statements by claiming general applicability. In contrast, a deductive research initially develops a conceptual and theoretical structure and then tests it by empirical observation. This means that particular, specific instances are deduced from general theories. Deductive method is thus moving from general to particular (Hussey & Hussey, 1997; Gummesson, 2000).

For my research I decided to use amalgamation of both these methods, resulting in abductive approach. Abductive approach builds up theoretical ground by using empirical facts – similarly to induction, but does not cast off theoretical pre-understanding of the concepts and is thus also close to deduction. Abductive method is based on the ‘belief revision’ – adapting beliefs in the view of new information. An alternation between earlier theory and the empirical findings might come up during process of such research, and theory and practice will be gradually re-interpreted in the view of each other (Gummesson, 2000). During the research process my interpretations contributed to the increased understanding, in turn influencing new interpretations.

2.2.3 Theories and hypotheses

Phenomenological approach gives sufficient degree of freedom concerning theory or hypotheses generation. There may be no relevant existing theory, or the researcher may not wish to be restricted by existing theories. Therefore researcher can carry out the investigation in order to construct a new theory or describe different patterns emerging in data. Alternatively researcher can develop hypotheses earlier in the research and test them later (Hussey & Hussey, 1997).

Rather than constructing theories I chose to carry out my research to describe and interpret the patterns emerging in data. Phenomenological studies imply ‘local’ generalizations, and the findings concern the specific subjects under investigation (Sanders, 1982). Therefore the analysis performed serves as a building block for further in-depth research rather than a theory.

2.2.4 Sample Size and Selection

A sample is a subset of population that represents the main interest of the study. A population is any precisely defined set of people or objects under considerations. The aim of phenomenological paradigm is to get depth of the phenomena and not statistical results (Hussey & Hussey, 1997) and critical rule of the phenomenological research is that more subjects do not yield more information (Sanders, 1982). The researcher therefore has to engage in in-depth probing of a limited number of individuals. Too many subjects can become overwhelming, and sufficient information can be collected from approximately three to six individuals (Sanders, 1982). I was therefore able to conduct my research with a smaller sample.

In the first stage I made an estimated selection of the interviewees. A criterion for this selection was perceived competence of the interviewees in the subject of the research. As put forth by Gummesson (2000) ‘…those who are closest to a problem are also those who are best suited to iden-
Given that I was interested in knowledge transfer within ERP implementations it was natural to seek persons experienced within ERP implementation projects to take part in my research. These persons, herein referred as experts were identified from the guest lectures at the Jönköping University. Afterwards, snowball sampling (also referred as networking) was used as it is associated with phenomenological studies where it is essential to include people with experience of the phenomena being studied (Hussey & Hussey, 1997). One of the questions I asked already identified experts was if they know of someone else experienced in the ERP implementation projects and if they could be put me in touch with such a person. This way I extended my sample of participants.

Nevertheless, I was constrained by the limited sample of respondents that I gained access to. It turned out impossible to obtain "cold access" (without references) to the software vendors or consultant companies. I have made several telephone calls to vendor and consultant companies in Sweden but in most cases was either not connected to the right person or simply refused access due to the time limitations or confidentiality of the data. I felt that having no references from persons associated with these companies was the major reason for that. This can also be attributed to the inherent quality of ‘networking’ as a sampling method; to use ‘networking’ effectively one needs to be present in a familiar situation or culture as humans are more open towards transferring their knowledge or helping those individuals they know, especially if such acquaintance has lasted for a longer periods of time (Granovetter, 1983). Size of my social network was however limited due to the fact that I am foreign student and a short time resident in Sweden.

2.2.5 Research Settings

Research setting is the location in which the research is conducted. Under phenomenological paradigm, research is usually conducted in the natural location; most likely the workplace and the researcher should not attempt to control any aspects of the phenomena (Hussey & Hussey, 1997).

Firstly, I conducted the interviews in the cordial and familiar environment to the interviewees - their workplaces. Secondly, I was not able to control any aspects of the phenomena as I was studying already completed projects. Studying projects in process would provide me with knowledge about how the ERP experience unfolded over time. This could be particularly useful for identifying why companies acted the way they did. After the project was over, interviewees may have forgotten some details and reconstructed the past consistent with their outcomes. On the other hand, studying completed projects allowed me to identify key causal factors in success or failure.

2.2.6 Data Collection

While conducting a phenomenological research, the emphasis is on quality, depth and richness of the data (Hussey & Hussey, 1997). As a result the data that I collected was mainly qualitative and in the course of data collection I was trying to capture every subtle detail of the phenomena studied. When carrying out qualitative research, interviews and observations as well as documents (books, newspapers, and articles) can be used as the sources of data (Hussey & Hussey, 1997).
2.2.6.1 Literature Study

An extensive literature study was performed to build a thorough comprehension for formulating research questions and create a potential for a meaningful dialogue with my respondents. I collected data mostly through search engines and electronic databases. Large part of the literature was accessed using facilities provided by Jönköping University Library. The secondary data mostly consisted of academic, scientific and professional literature within the area of my interest. This pre-study increased my comprehension of the topic and identified important nuances in the research. Furthermore, literature study provided me with a frame of reference which constituted a base for formulation and design of the interview questions and surveys used at the empirical stage.

2.2.6.2 Interviews

In order to gain an understanding of the views of the experts I decided to use interview method since it posited me with several advantages such as:

- Interviews permit the researcher to ask more complex questions and ask follow up questions (Hussey & Hussey, 1997).
- Interviews may permit higher degree of confidence in the replies compared to questionnaire responses as non-verbal communication patterns such as attitude and behavior of interviewee can be taken into the account (Hussey & Hussey, 1997).
- Qualitative (informal) interviews provide the best opportunities for studies of processes (Gummesson, 2000).
- Interviews are comparably faster to carry through, in contrast to the observational studies that need formation of long-term relationship between the observer and the subject of the research (Denzin, 1994).

Furthermore, I felt that explicitly written documentation would not be able to capture the diversity of the expert views, because knowledge as argued by Takeuchi and Nonaka (2000) is composed of explicit and tacit components, and tacit component is better understood through social interactions.

Yet interviews have own critical drawbacks such as: ‘Getting to see people; Getting to see the right people; Time to prepare, travel and most importantly write up; Keeping interview on the topic’ (Cornfod & Smithson, 2005, p. 120). How I managed to address first two of these drawbacks is described in the paragraph 2.2.4 ‘Sample Size and Selection’. Final two drawbacks have been addressed by continuous care and attention to the research process.

2.2.6.3 Interview Questions Design

To construct the questions for the interviews (view appendix A) I extracted the specific themes from the literature study that were related to my research questions. Interview questions focused on each respondent’s background and experience (e.g. their roles and involvement in ERP implementations), the effect of the ERP implementations on their firms, the problems encountered and the activities performed to resolve these problems, especially in relation to knowledge transfer.

To gain a deeper understanding of the phenomena at hand I used open-ended questions where each respondent could give a personal opinion in own words. The drawback of open-ended questions is that they can be difficult to analyze (Hussey & Hussey, 1997).
I used informal, semi-structured interview format, and the interview-guide served as a base for discussion rather than a strictly ordered list of questions to be asked. An idea behind informal semi-structured interviews is that questions may have to be worded differently for different respondents, if they are to have the same meaning for all of the respondents (Thomas, 2004). The interviewer is also free to limit the number of questions he or she feels appropriate to ask or even add more areas of enquiry within the interview (Gummesson, 2000). I have adapted framing of the questions for specific contexts and respondents’ experiences and duties in their firms and the order in which questions were asked depended on each interviewer-respondent interaction.

Semi-structured interview gave me considerable power of decision during the interview conduct. A disadvantage of semi-structured interviews is that interviewer bias is likely to arise (Thomas, 2004). Yet such choice posited me with a major advantage by raising the potential for meaningful communication. Additionally semi-structured interviews are suited whenever the sample is heterogeneous (Thomas, 2004) which was clearly a case in my research.

It is also essential to bear the potential respondents in mind (Hussey & Hussey, 1997). Since my sample was composed of intelligent subjects who were knowledgeable and interested in the research topic I could aim for a fairly high level of complexity. As recommended by Cornfod and Smithson (2005) I have designed the questions to be:

- Clear, unambiguous, and easy to understand
- Free of unwanted, superfluous assumptions
- Free of specialist jargon
- Comprehensive (cover any possible case)
- Answerable directly without respondents having to search for additional information

### 2.2.6.4 Interview Design and Situation

Interviews can be face-to-face, voice-to-voice or screen-to-screen, conducted with individuals or with a group of individuals (Hussey & Hussey, 1997). I conducted four face-to-face interviews and one voice-to-voice (telephone) interview with my respondents as I felt this would provide me with more insights from their experience. Furthermore, as argued by Hussey & Hussey (1997) with two interviewees the dynamics of the interviewing process will change. Presence of another person (possibly colleague of the interviewee) could introduce bias in the data. Therefore I chose to conduct individual interviews.

Sanders (1982) posits that for the phenomenological analysis it is essential to tape record and consequently transcribe the interviews. Tape recording allows the interviewer to probe in-depth questions without the distraction of note taking. Furthermore, note taking always involves some reinterpretation of data; meanwhile the tapes and transcriptions record the exact words of the interviewees. These exact records are later studied and analyzed. A phenomenological researcher is also advised to ask fewer in-depth questions than to ask many short questions (Sanders, 1982).

All interviews were recorded with a digital voice recorder. This allowed me to carry out interviews instead of concentrating on taking the notes. It also allowed me to analyze the recorded interviews better. Respondents were explicitly asked for permission to record and
answers were positive in all cases. All interviews were carried out in English, yet neither the respondents, nor the interviewer were natural English speakers. This may have imposed a limitation due to the restrictions of using the foreign language. Care was taken so that all questions were designed in a manner understandable and respondents were asked to inform the interviewer if the question has not been clear to them. The recordings were later transcribed and answers are preserved in verbatim form.

A limitation of tape recording the interviews is that audio communication can not capture presence of non-verbal communication such as symbolic or body language between the interviewer and the interviewee (Gummesson, 2000). This limitation could have been resolved by using a video camera; however I did not have one at my disposal.

Five interviews varied from 50 to 100 minutes each and were conducted either at the respondents’ place of work or Jönköping University. Three ERP implementation project managers and two ERP researchers with practical hand-on experience were interviewed. The complete profiles of the interviewees are presented in the Results section.

2.2.6.5 Surveys

Based on a literature study I have constructed two surveys (view appendices B and C). The first survey listed knowledge transfer barriers and a second survey listed knowledge transfer enablers. Respondents were asked to fill out both surveys after the interviews, and return them to me either by mail or in person.

Surveys were composed with closed questions. In closed questions respondents’ answers are elected from a number of predetermined alternatives. Closed questions are convenient for collecting factual data, and are easy to analyze as the choice of potential answers is limited (Hussey & Hussey, 1997).

I have used a Likert scale to construct the surveys. Likert scale turns the questions into statements and then asks the respondent to indicate their level of agreement, or assign a numerical value to their opinions. Advantages of this method according to Hussey and Hussey (1997) are as follows:

- a number of different statements can be put in a list which does not take up much space
- simple for the respondent to complete
- simple for the researcher to code and analyze.

For the first survey I have requested my interviewees to rate the strength of the knowledge transfer barriers on a scale of 1 to 5, with 1 being weakest and 5 strongest. I have additionally asked interviewees to identify the frequency of occurrence of each barrier as low, medium or frequent in their experience of ERP implementation. For the second survey I have requested interviewees to simply rate the strength of the knowledge transfer enablers on the scale of 1 to 5, with 1 being weakest and 5 strongest. For both surveys respondents had an option to indicate that they had no opinion of some particular statement. As the number of surveys completed was relatively small (only 6 surveys have been returned at the time of the submission of this thesis), I was able to use a non-sophisticated software package such as Microsoft Excel for the analysis of quantitative data.
2.2.7 Phenomenological Analysis of the Data

The aim of using phenomenological analysis is to determine what an experience meant for the persons who had that experience and are able to provide a comprehensive description of it. ‘From the individual descriptions general or universal meanings are derived, in other words the essences or structures of experience’ (Moustakas, 1994, p. 13).

Moustakas (1994) outlines two descriptive levels of the empirical phenomenological approach: Level I – original data is comprised through actual, word-for-word descriptions obtained through open-ended questions and dialogue. On Level II the researcher describes the structures of experience based on reflective analysis and interpretation of the research participant’s story.

I have used a modified Stevick-Collaizi-Keen method of phenomenological data analysis as recommended by Moustakas (1994). Below I have shortly described the steps of my analysis:

1. Obtained a full description of subjects’ experience of phenomenon.

2. From the verbatim transcript of the experience completed the following steps:
   a. Considered each statement with respect to significance for description of experience.
   b. Recorded all relevant statements.
   c. Listed each non-repetitive, non-overlapping statement. These were identified as the meaning units of experience.
   d. Related and clustered each meaning into themes.
   e. Synthesized the meanings and themes into a description of the experience. Included verbatim examples.
   f. Reflected on textual description. Constructed a textural description of structures of experience.

3. From the individual textural descriptions of all co-researchers’ experiences, constructed a composite description of the meanings and essences of the experience, integrating all individual descriptions into a universal description of the experience representing the group as a whole.

2.3 Criticism and Trustworthiness of this Thesis

The phenomenological paradigm usually applies three criteria to measure trustworthiness of the research; Reliability, Validity and Generalisability. Yet it is often argued that Reliability is not of significant concern for the qualitative study (Hussey & Hussey, 1997). Below I critically discuss my research benchmarking it according to all three criteria.

2.3.1 Reliability

Reliability is concerned with the findings of the research. If a research's findings can be repeated they are deemed to be reliable. However, under a phenomenological paradigm reliability criterion is not given much significance. It is not important whether the qualitative
measures can be reliable in a statistical sense, but whether similar observations can be made on different occasions or by different researchers (Hussey & Hussey, 1997). It is important to understand that social phenomena are grounded in specific context, and are too likely to change to allow for identical re-tests (Gummesson, 2000). Therefore reliability of my research is open for questioning until it is repeated in a similar manner by the other researchers.

### 2.3.2 Validity

Validity means that the research findings accurately represent what is really happening in the situation (Gummesson, 2000). Research errors such as faulty research procedures, poor samples and inaccurate measurement weaken validity. However, phenomenological paradigm aims to capture the essence of the events and extract data which is rich in explanations and analysis (Hussey & Hussey, 1997). Further, theories in management are validated in action (Gummesson, 2000) and my aim was to gain full access to knowledge of subjects of the research, not to ‘measure’ the phenomena in the statistical sense.

Validity of my results may be limited by the following:

- interviews were conducted in English which was not a natural language either for respondents or the interviewer
- interview and survey questions structured around literature study could limit the perception
- possible interviewer bias could arise due to semi-structured interview format and my limited experience in interviewing

To obtain high validity I made sure that:

- only the persons with documented competence were selected
- interviews were conducted in the cordial and familiar environment to the interviewees
- care was taken to compose interview questions in a manner understandable to the respondent
- every respondent was asked to examine, complete and approve the empirical material
- interviewees were provided with a short explanation of my research idea prior to the interviews
- as a 3rd person investigating aspects of ERP implementations, and completely uninvolved with the respondents employers I tried to make the report as neutral as possible, without beautifying or blackening the results
- I gave a detailed description of my scientific positioning
- I fully reproduced my course of actions to facilitate understanding of decisions and attitudes
While the sample size for my research was small, the quality of participants’ results from the open-ended questions demonstrated that the interviewees had adequate knowledge of the research area to answer my inquiries.

2.3.3 Generalisability

Generalisability is concerned with the issue whether one can come with conclusions about one thing based on information from another thing (Hussey & Hussey, 1997). In a phenomenological study generalizations are however "local" and concern only the specific subjects under investigation. No generalizations can be made beyond this group; the findings only serve as a starting point for further investigation (Sanders, 1982).

I have tried to enhance the generalisability by trying to achieve comprehensive understanding of the activities and behaviors of the co-subjects of the research. Indeed the ability to generalize from single or limited number of cases is grounded in the 'comprehensiveness of the measurements which makes it possible to reach a fundamental understanding of the structure, process and driving forces' (Norman as cited in Gummesson, 2000, p.89)

Extending the question of generalisability even further and basing my argument on Glasser and Strauss (as cited in Gummesson, 2000) I argue that the number of cases is not crucial for the generation of theory and that comprehensive study of one or a very few cases is quite sufficient to establish aspects of the phenomena.
3 Literature Review and Theoretical Framework

Within this chapter I introduce to the reader the concept of the ERP systems, the reasons of their adoption and knowledge based issues associated with their adoption. Next, to gain better understanding some Knowledge Management background is provided. Final part of this chapter discusses knowledge transfer within ERP implementations and describes the theoretical framework used in constructing interview and survey questions.

3.1 Enterprise Resource Planning (ERP) Systems

3.1.1 What is ERP?

Shanks, Seddon and Wilcocks (2003) provide us with the following definition of Enterprise Resource Planning (ERP) systems

1 ‘is a set of packaged application software modules with an integrated architecture that can be used by organizations as their primary engine for integrating data, processes and information technology, in real time, across internal and external value chains’ (p.1).

2 ‘impress deep knowledge of business practices that vendors have accumulated from implementations in a wide range of client organizations that can exert considerable influence on the design of processes within new client organizations’ (p.1).

ERP systems essentially integrates different departments and functions into a single computer system that tries to serve needs of an entire enterprise. ERP systems nowadays run on client-server networks and are divided into modules that perform specific data processing functions such as: human resource management, financial management, supply chain management, procurement, logistics and materials management, sales and distribution and more. At the kernel of modern ERP systems lies a single relational database management system that provides data integrity and security. An additional feature is a workflow manager supporting management of a dynamic work process (Pang, 2001).

![Figure 3: ERP systems concept. Source: Rashid, Hossain & Patrick (2002).](image-url)
3.1.2 History of ERP

If we trace back, the history of ERP goes all the way to the 1960-70s when the first inventory control (IC) and materials requirement planning (MRP) systems appeared. MRP systems supported inventory requirements for manufacturing systems and the master schedules that controlled the sequence of product assembly components. After that, manufacturing resource planning (MRP II) systems were introduced in the 80s, with the aim of optimizing manufacturing processes by synchronization of materials and production requirements. MRP II covered areas as shop floor and distribution management, project management, human resource, finance and engineering (Pang, 2001).

In 1973, former employees of IBM created the first ERP system with the aim of supporting all enterprise needs, and ERP systems grew in popularity since then, with estimated revenue from ERP systems of US $23 billion by 2000 (Pang, 2001). Based on technological base of MRP and MRP II, ERP systems integrated all the enterprise processes enabling accessibility, visibility and consistency across the enterprise (Rashid, Hossain & Patrick, 2002). Another major benefit of ERP systems was that companies now could use standard software to run their processes. They did not have to develop own ‘in-house’ applications in different business areas which made their day-to-day life simpler. ERP systems also offered new easy to use graphical user interface which supported company employees in their jobs better (SAP, 2007).

A major approach taken up by the ERP vendors was to work with customer partners to build Best Business Practices (BBP) into applications. BBPs can be viewed as guidelines or templates of how certain processes, such as payroll could be performed best. This meant that companies did not have to create own standards or programs for these processes, standards were already available based on the successful experience of other companies (SAP, 2007).

In summary, what early ERP systems did right was making businesses more productive by automating core business processes in all directions. As companies developed needs for common business practices new ERP modules appeared on the market. Consequently, over the past decade ERP systems have become a de facto standard for the replacement of legacy systems in large and multinational companies (Pan, Newell, Huang & Cheung, 2001).

In the 1990s advanced and industry-specific features were added which gave birth to the ‘Extended ERP’ or ERP II. Enhancements included advanced planning and scheduling (APS), E-business support, supply chain management (SCM), Business Intelligence (BI), Sales Force Automation (SFA), Customer Relationship Management (CRM) and more. In fact ERP is now becoming a backbone of doing business online for the companies. Internet-based solutions improved customer satisfactions, increased marketing and sales opportunities, expanded distribution channels and offered cost-effective billing and payment methods (Rashid et al., 2002). Integration of SCM and CRM modules enabled efficient multi-unit business relationships between supply chain partners and customers. Large savings have been achieved in inventory reduction, transportation costs and reduced spoilage by matching the supply with current demand. With CRM modules companies gathered information about customers more effectively and could access customer needs better (Rashid et al., 2002). For a more detailed description of ERP systems, their history and in-
3.1.3 **Why organizations adopt ERP Systems?**

As argued by Adam and O'Doherty (2003) ERP systems represent the implementation of old managerial dream – unification and centralization in one single information system of all information systems required by the firm. ERP systems support recording of all business transactions from purchase orders to sales order, scheduling and monitoring of manufacturing activities. As most ERP systems are based on inventory control modules that record movement of products in and out of company, they are extremely suitable for organizations that want to rationalize their internal processes and obtain better operational performance (Adam & O'Doherty, 2003).

Davenport (2000) suggests that key business processes can be dramatically improved by ERP systems. Whether these processes are financial, managerial, operational, involve internal or external activities, ERP systems are the major tools for making business processes better, leaner and faster through associated business process reengineering. ERPs with their large-scale business involvement and internal/external integration capabilities assist in achieving strategic business benefits such as growth, forming alliances, innovation, and differentiation (Shang & Seddon, 2003). For a comprehensive list of the benefits of ERP systems identified from the literature the reader is referred to the Appendix E.

3.1.4 **Key ERP Issues**

However beneficial ERP concept may sound from the previous discussion, as everything in our life ERP systems come at a cost. Below I have identified issues that have plagued and hindered ERP implementation, adoption and use.

3.1.4.1 **Process Related Issues**

Process issues concern whether organization follows practices embedded by the ERP system or customizes the system to match own processes. In the first case, a considerable business process change will happen, generating much mayhem and resistance from the people in the organization. Most organizations that adopted themselves to the ERP system...
found out that immediate post-implementation phase was highly-disruptive as the new system was associated with new processes. Quite often managers tried to maintain old procedures instead of learning the new business processes supported by new system thus causing problems (Sumner, 2003).

On the other hand whenever organizations customized the ERP systems to own needs they received higher costs due to additional maintenance and upgrade requirements and compatibility issues (Pang, 2001).

3.1.4.2 Technology and Financial Issues

Technology issues involve difficulties in data migration from legacy systems to the ERP database, lack of interoperability between different software, and complicated maintenance of ERP systems.

Another critical issue is the high cost of ERP. Typical range is between $400,000 to $300 million and per user cost is estimated to be US $53,320. Additional hidden costs include user training, integration, customization and testing, data conversion and analysis, consulting fees and personnel turnover (Pang, 2001). Post-ERP depression, is another important issue; a survey by Deloitte Consulting of 64 Fortune 500 companies found that one in four companies experienced a drop in performance when ERP systems went live (Koch, 2007).

3.1.4.3 People and Knowledge Related Issues

It is misleading to think that implementing the ERP system will automatically improve organizational capabilities. The outcome of ERP implementations is factually dependent on various factors such as how well the chosen ERP system fits the business environment, how effectively was the ERP configuration process, how much it matched the company’s culture, strategy and structure, and how well did company adopt to the ERP induced technological determinism. Of paramount importance is however the matter how the ERP adopter company dealt with the following people and knowledge related issues during the implementation:

- **Lack of internal skills and knowledge.** ERP packages are developed outside the user organization. Their depth and breadth, as well as their flexibility make them extremely complex. As a result, the skills and knowledge required to configure and modify the packages are specialized and externally sourced. User companies lack in-house skills for ERP implementation and require help of external consultants who are able to contribute to the project with their previous ERP implementation experience (Timbrell et al., 2001). Software vendors and consultants thus act as knowledge providers who lower knowledge deficiencies within organization and training provided by the consultants and vendors is needed to develop valuable knowledge within the firm. Using a mix of consultants and internal staff to work on a project enables internal staff members to ‘grow’ necessary technical skills. However the firm can not fully rely on consultants as they have limited knowledge of the organization’s inner workings. Unsuccessful collaboration between external consultants and members of the organization has led to deficiencies in the knowledge transfer in the both directions (Grabski et al., 2003).

- **Lack of external competence.** Finding and retaining competent consultants is a major challenge for ERP projects because such projects require multiple skill sets, inclusive of functional, technical, business and interpersonal skills (Sumner, 2003; Swanson, 2003; Chan & Rosemann, 2002; Timbrell et al., 2001) and often the hired con-
sultants are not as knowledgeable as expected (Swanson, 2003). Additionally, because IT product and service firms are growing rapidly, they find it difficult to provide continuity in personnel assigned to implementation projects (Markus, Axline, Petrie & Tanis, 2003).

- Knowledge gaps. In ERP implementation projects a lot of knowledge gaps and deficiencies will come to light. These may be gaps between external vendor, consultants and internal experts or gaps between internal experts and users, or gaps between users from different business units (Li, Liao & Lei, 2006).

- Employee retention. Employee retention and associated loss of knowledge are consistently identified as key problems throughout the literature. The demand for ERP-related knowledge and market rates for ERP specialists is high (Chan & Rosemann, 2002). Individuals directly involved with ERP implementation may leave the organization during the project or after completion, taking their valuable knowledge with them. Key IT specialist and user representatives working in the projects often leave despite high retention bonuses (Sumner, 2003; Chan & Rosemann, 2002). As a result many companies find themselves in a weak position, and experience difficulties in replacing ERP knowledgeable IT specialists and end-users (Markus et al., 2003). Gable, Chan and Tan (2003) tell of an organization that made the implementation partner and the vendor commit to ‘not transferring knowledge into their organization. In a market situation with a serious skill deficit they were concerned that staff could leave once they gained ERP-related knowledge.

- Problems with collaboration. ERP implementations are socially complex undertakings. Several companies – including the ERP vendor, vendors of ERP add-on products, vendors of supporting hardware, software, communications, capabilities, and implementation consultants can be involved in a single ERP project (Markus et al., 2003). Extensive coordination, collaboration and communication between different companies are thus required. Yet in several cases conflicts (sometimes severe) with software vendors or consultants have been reported. Often participating IT firms resent taking subordinate positions to other firms and do not cooperate well. Neither does a single IT product service firm like to take end-to-end responsibility to coordinate all parties, while adopter companies do not wish to cede authority for project management to outside party (Markus et al., 2003).

- Inefficient knowledge transfer and storage. The important business and technical know-how for successful ERP implementation draws from numerous contributors. Top management, IT staff, process owners, system users, vendor and consultant firms are all involved in making the ERP adoption successful. And this important know-how may vanish soon after the implementation is completed (Li et al., 2006). Companies therefore need to transfer and retain the valuable knowledge possessed by the external consultants. Furthermore as a lot of new tacit knowledge will be created through discussion, communication, imitation and practice within the implementation phase – companies will need to convert this tacit knowledge into available organizational knowledge (Li et al., 2006; Timbrell et al., 2001).

- Lack of comprehensive approach. It has been estimated that half of the ERP disasters were not technical but people and culture-related. Failures have been caused by poor change management and inadequate training, underestimation of project complexity, lack of understanding the legacy systems processes, and lack of their proper ‘translation’ into the new processes (Pang, 2001). Users’ unfamiliarity with
the new system is a most common reason for performance problems. As implementing and maintaining ERP package usually requires IT staff to learn a whole new set of skills (Swanson, 2003) firms learn that investment in training or reskilling the IT workforce is higher than expected (Sumner, 2003). Often the task of maintaining the ERP falls to the users (Swanson, 2003) but this causes problems since in several firms there is widespread lack of understanding of the details of ERP products, or cross-functionality of the business processes. Success with ERP requires that employees comprehend the general business processes beyond their immediate responsibilities (Ross et al., 2003; Li et al., 2006) but ‘In many organizations people understand what they do, but not how their work affects others’ (Markus et al., 2003, p.49). Employees that have difficulty understanding outcomes of their actions affected several other processes introducing contaminated data into the system (Ross et al., 2003).

- Resistance to change. Another mistake that companies often make is to assume that changing people’s habits is easy. In fact, changing from things they know and are good at is very hard for individuals. In most cases managers underestimate the extent to which people are affected by ERP implementations (Ross et al., 2003). As everything looks and works differently from the way it did before, people can not do their jobs the old familiar ways and start to panic leading business into spasms (Koch, 2007). A study by Shang and Seddon (2003) found out that it actually took 1 to 2 years for business changes and organizational learning and 2 to 3 years for users to forget the initial process problems and build new system knowledge.

No wonder then that due to so many complications posed by ERP adopter companies, many ‘ERP horror stories’ are abound in the literature and newspapers. It is estimated that failure rates of ERP implementations ranges from 40 to 60 per cent or higher (Li et al., 2006). Additionally ninety percent of ERP projects end up late or over budget (Gable et al., 2003). In some cases implementation time is indefinitely extended which has negative consequences for the companies and even significant investments in time and resources do not guarantee a successful outcome (Tchokogue et al., 2005). To mention a few notable failures: FoxMeyer Drugs, a large pharmaceutical company filed for bankruptcy after an unsuccessful ERP implementation and sued the ERP vendor and consultant companies. Hershey Foods had a 19 per cent drop in earnings due to an incompetent ERP implementation. Whirlpool Corporation’s ERP system crippled their shipping system and Volkswagen experienced significant delays in parts shipments (Pang, 2001).

Aforementioned catastrophic failures point out that careful planning and execution is necessary as ERP implementations affect nearly every aspect of organizational performance and functioning. The organizational change, reengineering of processes, the company-wide implications, high resource commitment, and high risks associated with ERP projects make their implementation an extremely complex endeavor for organizations (Tchokogue et al., 2005).

Before delving deeper into the issues associated with ERP knowledge transfer, I have to clarify what is meant by knowledge in the context of this research. Next section tries to establish a working definition of knowledge.
3.2 Knowledge Management

3.2.1 Taxonomy of Knowledge

Defining knowledge per se is a question of philosophical nature. Since classical Greek period intellectuals and philosophers who have tried to address the question ‘What is knowledge?’ were not able to find a single, unified answer. While the aim of this thesis is not to find the absolute definition, it is important to understand what knowledge means in the organizational context. It is therefore worthwhile no note that most of the contemporary theory on knowledge management in the organizations stems from the works of Michael Polanyi (Newell, Robertson, Scarbrough & Swan, 2002).

Polanyi (1983) starts to define the human knowledge by claiming that ‘we know more than we can tell’ (Polanyi, 1983, p.4) and that most of our knowledge can not be put in words. Such an assertion led him to distinguish between two types of human knowledge: ‘tacit’ and ‘explicit’. Tacit knowledge is what resides within the individual’s mind and is known but tremendously hard to communicate to another individual. An example of tacit knowledge could be riding a bicycle – we know how to ride it, we have done it many times, but it is almost impossible to exactly express the process in words. Tacit knowledge as such can be viewed as experiential in nature, rooted in action, subconsciously acquired, non-verbalized, often even non-verbalizable and as a result hardly to transfer to other persons. Explicit knowledge on the other hand is easy to articulate and communicate and is only top of the iceberg of the knowledge residing within the individual (Butler & Pyke, 2004; Lam, 1997; Werr, 2005).

Revising Plato’s original definition of knowledge as a ‘justified true belief’ Takeuchi and Nonaka (2000) define knowledge as a ‘dynamic human process of justifying personal belief toward the truth’ (Takeuchi & Nonaka, 2000, p. 141), and argue that knowledge is a function of a particular stance, perspective, and intention, it involves beliefs and commitments, is context-specific and relational and closely connected to action. Such definition is close to the thought of Polanyi (1983) that all knowledge is personal, and humans acquire knowledge by creating and organizing experiences, and by self-involving with environment. Davenport & Prusak (2000) provide yet another definition:

‘Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents and repositories but also in organizational routines, processes, practices and norms.’

Davenport & Prusak, 2000, p. 5

3.2.2 Organizational Knowledge

As knowledge is generally considered personal possession of individuals (Takeuchi & Nonaka, 2000) then what is organizational knowledge? To answer this question I adopt knowledge based view of the firm which argues that ‘all firms are in essence knowledge organizations’ (Brown & Duguid, 1998, p. 2), and that firms are in fact bundles of embodied knowledge which includes technology, procedures, organizational structures, and hierarchical relationships (Lam, 1997). Organizations exist to integrate the knowledge (Grant, 1996) and because it is ‘difficult to generate, transfer and apply all the required knowledge via markets’ (Alavi, 2000, p. 19). Organizations operate by using capabilities and knowledge generated through the
process of absorbing information from internal and external sources by using cognitive capabilities of own employees and converting this information into knowledge and actions (Alavi, 2000; Grant, 1996).

Below I have identified two (in my humble opinion) of the most comprehensive definitions of the organizational knowledge:

... The capability members of an organization have developed to draw distinctions in the process of carrying out their work, in particular concrete contexts, by enacting sets of generalizations whose application depends on historically evolved collective understandings.

Tsoukas & Vladimirou, 2001, p. 973

... Incorporated in the minds of its members, in a set of learner rules and routines, in the corporate culture and in a set of material artifacts such as machines, software, instruction, books, products, etc.

Doci, Faillo and Marengo as cited in Moroni, 2006, p.132

Organizational knowledge is therefore a set of collective understandings embedded in a firm, a distinctive way of acting in the world (Tsoukas & Vladimirou, 2001). It is more than the explicit 'know-what' knowledge possessed by the organizations employees. It involves a complex element of tacit organizational 'know-how' to put the 'know-what' into practice. 'Know-how' acts on 'know-what' but they circulate separately, and the latter one is easier to transfer due to its explicit nature. Tacit 'know-how' in turn is embedded and institutionalized in collective work practices of the firm (Brown & Duguid, 1998; Alavi, 2000). Tacit organizational knowledge is also idiosyncratic, scarce and not easily transferable or replicable (Grant, 1996; Alavi, 2000).

3.2.3 Knowledge Conversion (SECI Model)

The distinction between tacit and explicit knowledge does not however mean that they are entities isolated from each other. Rather they are mutually constituted (Takeuchi & Nonaka, 2000) and while tacit knowledge is the necessary component of any knowledge it can be converted into explicit knowledge by linguistic representation (Alavi, 2000). It is by this interaction and transformation of tacit to explicit and explicit to tacit knowledge that organizational knowledge is created and expanded (Takeuchi & Nonaka, 2000). Takeuchi and Nonaka (2000) and Nonaka and Konno (1998) propose a SECI (Socialization, Externalization, Combination, Internalization) model illustrating that knowledge conversion is a social process happening in the collective settings, not within a single individual.

According to the model the knowledge in organization is retained at three levels: individual, group and organization. Knowledge is tacit when only an individual can capture it. It becomes explicit once assimilated into groups and organizations. Quadrants in the SECI model describe how knowledge reconciles in its two different forms. The process is started in socialization quadrant, where only tacit knowledge exists. In this stage experiences, ideas and thoughts are shared among individuals leading to improved understanding of the system. This serves as an initial trigger for the next stage - Externalization. Within this stage the tacit knowledge is articulated into explicit concepts in different forms, be it metaphors, analogies, documentation and more. The outcome of this stage is that such knowledge is
better communicated in groups. Once explicit knowledge is created it is merged and reconciled with other chunks of explicit knowledge when individuals exchange the knowledge in forms of documents, meetings or computer network (Combination). Reconfiguration of existing explicit knowledge and sorting it into different categories may at this stage lead us to creation of new knowledge. The final stage – Internalization involves conversion of explicit knowledge back into tacit knowledge through application of explicit knowledge in practice. ‘Learning by doing’ sets off internalization and produces ‘operational knowledge’. This experience based operational knowledge then sets off another cycle of knowledge generation (Takeuchi & Nonaka, 2000). Below the reader can find an image of the SECI knowledge spiral.

![SECI Knowledge Spiral](image)

Figure 5: SECI Knowledge Spiral. Source: Nonaka and Konno (1998), p.43.

### 3.2.4 Organizational Learning and Unlearning

Organizational learning is a process that entails creation, acquisition, interpretation, distribution, storage and retrieval of information and knowledge. Inputs to this process are data, information, knowledge and organizational commitment (Scott & Vessey, 2003).

Major types of organizational learning usually identified through research literature are experiential learning - when organizations learn from own experiences, and vicarious learning - acquiring experiences of other organizations. With vicarious learning firms learn what other firms are doing and can imitate their processes. Firms commonly attempt to learn about the strategies, practices and technologies used by other firms. They do so to minimize sanctions from a variety of stakeholders or to simply imitate actions of successful organizations (Huber, 1991). Meanwhile consulting firms use knowledge management to actually sell ‘second-hand’ experience (Scott & Vessey, 2003).
Researchers also differentiate between ‘single-loop’ and ‘double-loop’ organizational learning. The distinction is based on the extent of learning and change that occurs during the process. As a result of ‘single-loop’ learning organizations change the range of their potential behaviors by using improved actions and understanding acquired through their experience. Single-loop learning results in ‘adjustment of behavior relative to fixed goals, norms and assumptions and reinforcement of routines, practices and policies’ (Scott & Vessey, 2003, p. 244). Single-loop learning achieves incremental changes in the actions of the organization. On the other hand, double loop learning involves paradigm shifts in the way organizations perceive and relate to their environment (Butler & Pyke, 2004). Double loop learning occurs when a change in established routines, practices and policies challenges organizational goals, norms, assumptions and behavior. Double loop learning is also strategic; it requires new insights and seeks to eliminate underlying causes of organizational problems. In addition double loop learning entails unlearning (Scott & Vessey, 2003).

Unlearning is defined as a process through which learners discard obsolete and misleading knowledge. Unlearning is often intentional, as organizations need to forget, lose remembrance of and intentionally disregard certain knowledge (Huber, 1991).

Several effects are associated with organizational unlearning. Firstly, having unlearned certain knowledge organization can experience a drop in efficiency or temporal inactivity in the context where this unlearned knowledge has been used. Secondly, organization will engage in the search of substitute knowledge. Lastly, unlearning opens up possibilities for new learning and organizational change can be best implemented if a felt need for a change is created and ‘unfreezing’ occurs (Huber, 1991).

The outcome of unlearning is that an organization can unlearn behaviors, and it can unlearn constraints on behaviors. Therefore unlearning can lead to increase or decrease in the range of potential behaviors, and conceptually is a sub-category of learning (Huber, 1991).

3.3 Knowledge Transfer within ERP Implementations

As suggested by Alavi (2000) organizations do not have an all-encompassing mind and memory. Organizational knowledge is distributed across different units, employees, documentation, software, systems, processes, and routines. Knowledge generated inside or outside of the organization therefore has to be transferred from the source to the recipient to be effectively applied where it is needed.

When dealing with ERP implementations knowledge management methodologies will face a number of issues. First, knowledge that has been captured can vanish soon after the ERP implementation is complete (McGinnis & Huang, 2004). Second, knowledge transfer will be challenging due to variety of factors such as type of knowledge (tacit-explicit), incentive system of the organization, absorptive capacity of the recipient organization, motivation and more. Before elaborating on factors affecting the transfer, I have to clarify what types of knowledge is transferred within ERP implementations and which are sources and recipients in the knowledge transfer.

3.3.1 Types of Knowledge Transferred within ERP

Knowledge transfer within ERP implementations has few characteristics. First, it is a computer-package-based knowledge transfer, in which explicitly codified business process
models (best business practices) are transferred. Best practices can be transferred by relocation of human resources, training, and documentation or by combination of these mediums. Yet, the transfer of intra and inter-organizational knowledge is more than mere imitation of visible processes. Second, the scope of knowledge transfer is enterprise-wide since ERP systems tightly connect all organizational business functions and knowledge transfer is not confined within one area. Adopting new business practice in one area will strongly affect other areas (Lee & Lee, 2003). Third, implementation of an ERP system involves considerable amounts of tacit knowledge transfer (Werr, 2005).

Reiterating previous distinction between tacit and explicit knowledge I contend that explicit knowledge is transmittable in a formal, systematic way while tacit knowledge is associated with individual experiences and can not be fully codified and systematically and logically transferred because of its subjective and intuitive manner (Lee & Lee, 2003).

To continue further I need to go into detail on how the business processes differ. Brown and Duguid (as cited in Lee & Lee, 2003) distinguish between two types of business processes: canonical and non-canonical. Canonical processes are based on abstract representation of organization. Canonical processes originated in Taylor’s scientific management wherein complex tasks are mapped to a set of simpler canonical steps. Non-canonical processes are what actually happen during work. They are informal processes that are defined by the relationship, communication, and coordination of on-the-job practices (Lee & Lee, 2003). Comparable taxonomy of processes was introduced by Sachs (as cited in Lee & Lee, 2003) who divided processes into ‘organizational, explicit’ and ‘activity-oriented, tacit’ processes. The former are represented by sets of pre-defined tasks and operations, while the latter actually represent how employees perform their business functions effectively. It is within social interactions at the workplaces that the problems are discovered and resolved (Sachs as cited in Lee & Lee, 2003).

Hence, on the one hand we have an explicit knowledge transfer based on canonical processes represented through the reference models in ERP systems. The reference models are formal chains of activities, explicitly codified in the software by using process modeling tools. High degree of codification can increase speed of such processes (Lee & Lee, 2003). On the other hand, we have a transfer of tacit knowledge associated with non-canonical processes. However, ERP is not simply a software package tailored to an organization but an organizational infrastructure that affects how people work. ERP embodies established ways of doing business which impose a new logic on company’s strategy, organization and culture. Non-canonical processes are intrinsically connected with organizations’ tacit knowledge which is hard to transfer and unlearn (Lee & Lee, 2003).

ERP implementation will therefore transfer business knowledge related to business processes, and the tacit component of this knowledge will not be easily transferred to the recipient firm. As put forth by Lee and Lee (2003) knowledge transfer is facilitated by close communication, research alliance, or strategy alliance between a knowledge source and recipient. As there is no collaborative social arrangement such as narration, communication or collaboration within ERP knowledge transfer, an ability of the knowledge recipient to adjust their organizational culture, values and norms to the new principles embedded in the transferred business models will play a vital role in knowledge transfer success (Lee & Lee, 2003). In addition the success of knowledge transfer may lead to organizational changes such as redistribution of roles and responsibilities between individuals, new knowledge structure in the organization, and new knowledge requirements for people involved in the process (Lee & Lee, 2003).
Lee & Lee (2003) identify two distinct phases of knowledge transfer within ERP implementations: implementation and internalization. Implementation is ‘*degree to which the recipient unit follows the formal rules implied by the practice*,’ while Internalization is ‘*the state in which the employees at the recipient unit attach symbolic meaning to the practice*’ (Kostova as cited in Lee & Lee, 2003).

When ERP package is implemented by the organization, canonical processes are easily mapped and transferred within the process of implementation. Canonical processes may be accepted by the organization but the non-canonical processes have to be merged with the existing values and knowledge of the organization to complete the process through internalization. In this internalization phase, new and old values and knowledge may conflict, creating organizational resistance and gaps between the designed model and actual practice. Only after the non-canonical processes are accepted by the organizations members, and internalized with existing organizational practices, will the knowledge transfer be successful and complete (Lee & Lee, 2003).

### 3.3.2 Sources, Recipients and Means of Knowledge Transfer within ERP Implementations

At the very least there are usually three parties participating in ERP implementations (see Figure 5): the organization implementing the system (the implementer), the organization that developed and sells the system (the vendor), the organization aiding in the implementation (the consultant) (Haines & Goodhue, 2003; Li et al., 2006).
Each of these parties contributes to the project in different ways. The vendor provides the implementer with software and documentation and offers training in own product including the function of software, modules, business processes, operating rules, etc., to the implementer's employees (Haines & Goodhue, 2003; Li et al., 2006). Capturing and storing knowledge provided by the vendor benefits the implementer by reducing training costs and lowering the learning curve of the software (Li et al., 2006).

The consultants are added into ERP projects to provide additional skills and specialized knowledge or sometimes the expert personnel that neither vendor nor the implementer may have (Haines & Goodhue, 2003; Li et al., 2006). Consulting company might possess knowledge that includes in-depth understanding of the ERP management ideas, architecture of the ERP software, the expertise in BPR or project implementation and the accumulative experience from providing services to other organizations (Li et al., 2006).

The implementer possesses detailed knowledge about own business processes, organizational context, culture and competitive situation - elements vital for implementation success (Haines & Goodhue, 2003; Li et al., 2006).

Within the implementation process I am concerned with two types of knowledge transferred amongst these actors: knowledge about hardware and software or 'IT knowledge', and knowledge about business practices embedded in ERP; how to configure the software
to meet the customer needs as well as organizational change expertise or ‘Business knowledge’.

These two types of knowledge will be transferred by various means within ERP projects. Explicit documentation will be developed such as operating manuals, education/training documents from the vendors and consultants, detailed documentation about the implementation process, records of business processes before and after the implementation, etc. Formal education may be offered in the form of seminars and trainings. Knowledge may also be transferred informally via conversations, joint problem-solving, face-to-face meetings or electronic means.

3.3.3 Knowledge transfer through Business Process Reengineering

In traditional IS development projects requirement analysis involves much effort to identify customer needs. In contrast, ERP projects vary highly in the amount of effort needed to identify user needs. In so called ‘vanilla’ implementations, functionality is given based on vendor’s specifications. Yet most of the organizations choose to configure their ERP packages by using extensive Business Process Reengineering (BPR) (Olson, 2004).

BPR is simply an effort to identify the best ways to perform business processes supported by the information system. ‘A process is a logical set of related activities taking inputs, adding value through doing things and creating an output’ (Olson, 2004, p. 47). Less formally, a process is the way that work is supposed to be done in an organization. This second definition makes it clear that processes are not abstractions; work is not performed all the time exactly as the process design specifies. In business there are many different ways to get the same task done. This is why some researchers refer to the way the work is actually done as a ‘practice’ and as DavVenport (2000) points out ERP implementations can be viewed as the attempt to turn process designs into practice.

BPR identifies the best way to design the flow and processing of information to obtain forecasts that will generate the greatest profit to the organization. Using BPR, companies analyze the way organization completes each business task and try to identify the best way of doing things, either through more automation or by adding people to do specific tasks. BPR is intrinsically connected to ERP, because for the firm to benefit from ERP implementation it has to change at least some ways of doing business (Olson, 2004).

BPR does not however come without risks. Failure rates for BPR have been cited of 50 to 70 percent (Olson, 2004). Difficulties in implementing BPR are generally associated with employee resistance to change, inadequate attention to employee concerns, inadequacy in staffing, mismatch between strategies used and goals. Such problems often cause highly turbulent transition periods for the organizations resulting in declined productivity and financial losses. As argued by Olson (2004) blanket adoption of ERP can destroy the processes in which the company developed competitive advantage.

3.3.4 Knowledge transfer through Best Business Practices

A primary feature of ERPs associated with BPR is built in business process reference models also called ‘best business practices’ (BBP) because they have been implemented and proved in many world-class companies (Lee, 2001). ERP Software vendors devote considerable time and research to identifying the best ways of performing industry-specific tasks. Between 800 and 1000 best practices are included in SAP’s R/3 software and additional
expertise is usually developed by consultant firms (Olson, 2004). Best practices change the organizational climate by attempting to produce dramatic improvements in performance.

During ERP implementations a transfer of a best practice occurs, meaning that a firm replicates a practice that is performed in different way by another organization and thought to be superior compared to the existing internal practice and other alternatives known to the company (Szulanski, 1996). In terms of knowledge management we can think of the practices as bits of knowledge. Indeed, ‘Practice refers to the organization’s routine use of knowledge and often has a tacit component, embedded partly in individual skills and partly in collaborative social arrangements.’ (Szulanski, 1996, p. 2)

Practices existing in the organization evolve over time under the influence of organization’s history, people, interests, and actions and have become institutionalized in the organizations. They reflect the shared knowledge and competence of the organization’s employees and are viewed by organization’s employees as the taken-for-granted way of performing their tasks. Practices consist of sets of written or unwritten rules describing how particular function has to be performed and associated set of cognitive elements. Practices also reflect a set of underlying norms and beliefs of the employees (Kostova, 1999).

Practices developed in the organizations are varied. Some are narrowly focused on specific functional tasks (e.g. how the containers have to be unloaded in a warehouse). Others can deal with broader concepts, for example total quality management. Practices also differ in terms of their formalization – from completely informal to the highly documented and formalized. Additional distinction is content and focus of the practices, some of them can be primarily 'hard' (encoded in technologies or products), while some can be primarily 'soft' or encoded in people’s activities (Kostova, 1999).

Strategic practices are organizational practices that are believed to be of strategic importance to the company. They reflect the core competencies of the firm and provide it with competitive advantage. Such practices are harder to imitate as they are more complex, broader in scope and 'people' focused. Because of their importance strategic practices become 'infused with value' – they acquire symbolic and normative meaning for organization. Such meaning goes beyond technical efficiency as some practices can actually serve as a source of employees’ personal satisfaction or organizational identification (Kostova, 1999).

Szulanski (1996) reasons that transfer of BBPs is a complementary exchange of organizational knowledge between source and recipient. Transferred practice is often adjusted to conform to the needs of the recipient, to prevent problems experienced in previous transfers of the same practice, or to help make the introduction of new knowledge less intimidating to the recipient.

The key decision that determines the success or failure of ERP project is whether company follows these best business practices or modifies the system to suit own, unique needs. As argued by (Markus et al., 2003) almost every software analyst advises against modifying the ERP software. Companies are recommended to live with functionality offered and to change own procedures to adapt to it (Markus et al., 2003). In fact adapting business processes to the ERP is the success road for the adopter companies (Swanson, 2003). Researchers in general agree that if the company decides to modify ERP to fit idiosyncratic business processes, it will incur high costs of customization and software maintenance over the time (Pang, 2001). The failure to fully consider and engage business change is the major reason for many ERP implementation fiascos (Swanson, 2003; Davenport, 2000).
Once the company gives in to so called 'technological determinism' of ERP systems it will receive the best practices within own sector, and have a chance to improve and standardize own processes. However, this approach will create significant turmoil by requiring employees to change their ways of doing business, 'unlearn' previous knowledge, and learn new knowledge (Pang, 2001). People do not like to change, and ERP requires them to change how they do their jobs, and as put forth by Koch (2007) software is actually less important than the changes that companies make in the ways they do business. If company uses ERP to improve the ways it orders and manufactures, ships and bills for goods it will see value from the ERP. If it simply installs the software without trying to improve the ways people do their jobs, company will not see any value at all – all the ERP system will do is slow the organizational processes down by replacing the old software that everybody knew with the software that nobody knows (Koch, 2007).

3.3.5 Factors Affecting Knowledge Transfer

Although the strategic importance of knowledge transfer has been recognized by scholars, prior research has shown that there exist various barriers to transfer success, some of them related to the characteristics of the knowledge transferred, and others of cultural, organizational, behavioral, cognitive, and psychological nature. As argued by Timbrell et al. (2001) successful transfer of knowledge should begin by assessing the origins of transfer difficulty and then trying to overcome the most significant barriers. Based on the literature study I have identified a number of potential factors affecting knowledge transfer in ERP implementations. These factors are as follows:

1. Characteristics of the Knowledge Transferred
2. Characteristics of the Knowledge Source
3. Characteristics of the Knowledge Recipient
4. Characteristics of the Organizational Context
5. Characteristics of the Social Environment
6. Knowledge Embedded in Organizational Processes
7. Knowledge Embedded in the Legacy Systems
8. Documentation and Accessibility of Knowledge
9. Communication Patterns within the Implementation Project
10. Experience and Frequency/Variability of Task Performance
11. Structure

Having identified these factors I categorized them into two parts: inhibitors and enablers. Next I decided to test their strength. Each of these factors was sub-categorized and represented in one (or sometimes more) variable in the two surveys that were presented to each expert after the interview. Survey 1 was constructed with variables inhibiting knowledge transfer, and Survey 2 with variables enabling knowledge transfer. Sub-paragraphs below elaborate on each of the aforementioned factors and provide a rationale for representation of these factors as different variables in the surveys.
3.3.5.1 Characteristics of the Knowledge Transferred

The type of new knowledge offered by the knowledge source will influence the transfer (Lane & Lubatkin, 1998; Szulanski, 1996). A vital characteristic of the knowledge which will negatively influence easiness of the transfer is causal ambiguity (Szulanski, 1996; Timbrell et al., 2001).

Causal ambiguity refers to the situation where it is hard or even impossible to relate the consequences or effects of a phenomenon to its initial state or cause. As argued by Szulanski (1996) when the reasons for success or failure in reproducing capability in a new setting can not be determined even post factum, causal ambiguity is present. Causal ambiguity is related to the tacitness of knowledge transferred, as the undefinable portion of knowledge is embedded in tacit human skills (Polanyi, 1983). Causal ambiguity may therefore result from misunderstandings of the environmental context into which the new knowledge is transferred (Szulanski, 1996). As knowledge is highly experiential in nature it has the quality of being incrementally accumulated over time and embedded into firm’s history. Such ‘knowledge of experience’ will be less codified, more complex, less teachable, context-bound, dependent of other organizationally embedded knowledge elements and as a result hard to transfer (Kogut & Zander, 2003; Zander & Kogut; 1995, Lam, 1997; Werr, 2005). To effectively transfer tacit knowledge and resolve problems associated with ambiguous knowledge Japanese firms have often utilized the apprenticeship model – wherein young engineers learn on the job while being supervised and directed in their activities by more experienced professionals. (Takeuchi & Nonaka, 1995). Reflecting on this discussion I added *Ambiguous (unclear to the customer) knowledge* as a variable on Survey 1 and *Apprenticeship model* as a variable on Survey 2.

Werr (2005) in a study of ERP implementation project refers to a case when with the aim of soliciting the input and ideas from business representatives, company set up a number of workshops. However, IT staff participating in these workshops often used a rather technical jargon, which resulted in a low participation from business representatives. The business soon perceived the project distant from the firm’s objectives and thus difficult to understand and get involved in. I therefore added *Technical jargons adopted by implementation team* as a variable on Survey 1.

3.3.5.2 Characteristics of the Knowledge Source

Characteristics of knowledge source will affect the transfer and lack of motivation is first of such inhibiting characteristics. The knowledge source can be reluctant to share the knowledge for the fear of losing own privileged status or superiority, be resentful towards non-compensation of his efforts, unwilling to allocate time and resources necessary for the transfer, or simply feel antagonistic to the knowledge recipient (Szulanski, 1996; Timbrell et al., 2001). This may result in insufficient resource allocation to the project, rushed and un-planned introduction of the new system and low level of customer support afterwards (Timbrell et al., 2001). *Lack of motivation from the knowledge source (vendor, consultant)* was therefore added as a variable to the Survey 1.

Knowledge that does not have a proven record of past usefulness will also be difficult to transfer as knowledge recipients will be less receptive to such knowledge (Szulanski, 1996; Timbrell et al., 2001; Davenport & Prusak, 2000). Indeed a source that is trusted is more likely to succeed in transferring own knowledge. If the knowledge source is not perceived as reliable or knowledgeable it will be harder to set off the transfer and its expertise can be challenged and resisted (Szulanski, 1996; Timbrell et al., 2001). Individuals judge knowledge
according to status and reputation of the source. ‘Reputation is a proxy for value that we use to evaluate the flood of information coming at us. We don’t have time to look carefully at everything, so we select what we think will be worthwhile based on the reputation of the sender.’ (Davenport & Prusak, 2000, p.101) To represent this Users do not feel that knowledge source is reliable — was added as a variable to Survey 1.

3.3.5.3 Characteristics of the Knowledge Recipient

Lack of motivation to accept and internalize the knowledge from outside is another factor identified in the research literature. It can result in passivity, insincere acceptance, active rejection, or even hidden sabotage during the implementation (Szulanski, 1996; Timbrell et al., 2001). Lack of motivation of the knowledge recipient (customer) was therefore added as a variable to the Survey 1.

Resistance is associated with almost any type of system change, and even more with ERP projects that are combined with BPR. Users are concerned that their jobs may be eliminated or altered from their ‘usual’ ways of performing tasks. Persons that are reengineered out of their position and repositioned within the company may resist the change (Grabski et al., 2003). Further as Werr (2005) argues employees may resist introduction of ERP because they feel that they perceive it coming from the top, giving them more problems than relief. User resistance to system change, Users perceive new system as a threat to their job security and User resistance (users might feel project comes from the top and think it will complicate their lives further were added as variables to the Survey 1.

Support from the corporate management has been repeatedly cited as a critical success factor for ERP systems implementation (Parr & Shanks, 2003; Sumner, 2003; Holland & Light, 2003). Top management can provide adequate financial or human resources and instill commitment to the project within the business, thus overcoming the problems with motivation. Support from the top management was therefore added as a variable on Survey 2.

Lack of absorptive capacity of the source has been found to be a strong inhibitor to the transfer by (Szulanski, 1996; Kostova, 1999; Timbrell et al., 2001; Davenport & Prusak, 2000). Absorptive capacity is defined as the firm’s general ability to value, assimilate, and commercialize new, external knowledge (Lane & Lubatkin, 1998). Absorptive capacity also tends to develop gradually, is path dependent and builds on absorptive capacity of each employee in the firm (Lane & Lubatkin, 1998; Szulanski, 1996). Furthermore, absorptive capacity depends on prior stock of knowledge the firm possesses (Timbrell et al., 2001). The recipient in the knowledge transfer must possess some basic knowledge of the traditions and techniques upon which the new knowledge builds to understand the assumptions that shape the new knowledge (Lane & Lubatkin, 1998). Indeed new skills are learned more quickly if they share elements with already acquired knowledge (Zander & Kogut, 1995).

As argued by Lane and Lubatkin (1998) knowledge recipients have the greatest potential to learn from sources with similar basic knowledge. Therefore common knowledge is an important prerequisite for communication between different specialists. If specialized knowledge has to be reduced to common knowledge in order to communicate it, there is inevitable information loss. The size of this loss will depend upon the level and sophistication of common knowledge (Grant, 1996).

As absorptive capacity develops over time and is path-dependent, the pre-transfer differences between technological portfolios of the knowledge source and recipient should inhibit recipient’s capacity to absorb new knowledge (Mowery, Oxley & Silverman, 1996).
To reflect on this discussion *Gaps in skills between organizations participating in the project and Differences in technology (IT)* were added as variables to the Survey 1. In contrast the variable ‘*Level of common knowledge (business knowledge, process knowledge, IT-knowledge, etc*)’ was added to the Survey 2.

Kostova (1999) suggested that organizational culture will impact the practice transfer in two ways. First as transfer of practice is associated with organizational learning and change of the recipient unit, then the cultural orientation of that unit will influence the transfer. The more open and supportive the recipient organization’s culture is of learning and change the more successful the transfer. *Not invented here syndrome (low acceptance of copying adapting best practices)* was added as a variable to the Survey 1.

Internalization which is defined as organization’s ability to exploit the knowledge acquired within the transfer is another important factor. Internalization involves organization’s ability to identify relevant knowledge and to disseminate this knowledge across the firm. This ability is argued by Werr (2005) to be dependent on earlier experiences of involved individuals and the existence of areas for knowledge exchange. A variable ‘*Organizations ability to use the knowledge obtained*** was added to Survey 2.

### 3.3.5.4 Characteristics of the Organizational Context

Organizational context will influence the existing knowledge flows. A transfer of knowledge that worked well in one context may not be appropriate in another one. It is argued that to successfully transfer practices source and recipient must possess some level of homogeneity. Such resemblance can be either external – organizations relationship to the environment, or internal – organization’s composition and portfolio of resources (Wareham & Gerrits, 1998).

As indicated by prior research formal structure and systems, sources of coordination and expertise and behavioral norms in the organizations all affect the knowledge transfer (Szlanski, 1996). As argued by Kostova (1999) and Wareham and Gerrits (1998) the success of transfer will be affected by the compatibility of organizing principles of the knowledge recipient and knowledge source, and differences in organizational culture, wherein organizational culture is be defined as a set of values, behavioral norms and expectations shared between members of the firm. Davenport and Prusak (2000) support this argument by saying that ‘*People who share the same work culture can communicate better and transfer knowledge more effectively than people who do not’* (Davenport & Prusak, 2000, p.100).

Shared behavioral norms are a central element of the common knowledge that facilitates communication and understanding. It is argued that the wider the scope of knowledge integrated and the greater the number of individuals involved, the lower the level of common knowledge and the more inefficient the communication (Grant, 1996). A variable *Shared Behavioral Norms* was therefore added to the Survey 2.

Compensation practices in the firms can vary highly from highly algorithmic and mechanistic to experiential and situation-specific. Similarity between the recipient and the source firm’s compensation practices will influence the easiness of transfer. This is due to the fact that persons from one company working in the project team may feel resentful towards being rewarded and appreciated less for sharing their knowledge in comparison to persons from another company (Lane & Lubatkin, 1998). Two variables: *Differences in incentives and compensation schemes* and *Differences in status of Knowledge Owners (some might be top managers, some just regular workers)* were therefore added to the Survey 1.
Organizational structure i.e. degree of formalization and centralization used by the different firms in the implementation process will also influence the transfer. Structure is important as organizations members interact not only as individuals, but also as actors performing certain roles in the firm. Recalling a previous postulate that ‘all firms are in essence knowledge organizations’ (Brown & Duguid, 1998, p. 2) we can view the structure as codification of the organization’s historic pattern of roles. Structure reflects and stores organization’s knowledge and perception about the environment, influences communication processes, work system and problem-solving behaviors. Since firm’s structure is interlinked with its knowledge-processing systems then a firm’s knowledge is embedded in both and if firms engaged in knowledge transfer have different structure assimilating the new knowledge will become a difficult task (Lane & Lubatkin, 1998; Lam, 1997). Research by Lam (1997) has demonstrated that incompatibility in the knowledge structures and work systems between partner firms generates difficulties and conflicts within work. A variable: Differences in levels of organizational culture of formality between organizations participating in the project was added to the Survey 1, while Resemblance of vendor/consultant/user organization in certain ways (with explanation) was added to the Survey 2.

Davenport and Prusak (2000) further posit that several cultural factors will hinder knowledge transfer, such as lack of trust, narrow idea of productive work, status and rewards go to knowledge owners, ‘not-invented here’ syndrome, intolerance for mistakes or need of help in the company. Werr (2005) and O’Dell and Grayson (1998) identify lack of time as another impeding factor. Further, people have to be rewarded for taking time to share their knowledge which is something that the culture that values personal expertise and knowledge creation over knowledge sharing does not often permit (O’Dell & Grayson, 1998).

Above all Davenport and Prusak (2000) accentuate the need to have common ground and high level of trust between the parties wherein common ground can be conceptualized as similar language, culture and shared knowledge. To reflect on this discussion Lack of trust amongst the project team members; Lack of time and meeting places; Narrow idea of productive work; Intolerance of mistakes in the project team; Intolerance of need for help in the project team were all added as variables to the Survey 1.

Motive concerns the background of the cooperative relationship. For knowledge exchange to occur it has to be explicitly targeted and aimed at by knowledge source and recipient organizations. If organizations do not have such a motive for cooperation, knowledge transfer is unlikely. Clear deliverables with clear deadlines that are continuously followed up are also argued to facilitate creation of such unifying goal (Werr, 2005). Motive (background of cooperative relationship) and Clear deliverables/deadlines/goals were added to the Survey 2, meanwhile Unclear project definition (client does not know what he wants) was added to the Survey 1.

### 3.3.5.5 Characteristics of the Social Environment

Several studies indicated that national background accounts for vast differences in managerial perspectives (Gupta & Govindarajan, 1991) and organizational practices are shaped by different socio-cultural environments in which they have evolved (Butler & Pyke, 2004; Lam, 1997) and therefore vary across countries. Kostova (1999) posits that success of transfer will be affected by the compatibility between the values implied by the particular practice transferred and the underlying norms and values of the recipient unit. Davenport and Prusak (2000) argue that the closer the people are to the culture of the knowledge being transferred – the easier the transfer. Kostova (1999) supports this argument saying that different cultures, vocabularies and frames of reference will impose country-level effects on the transfer, and as practices (knowledge) get transferred they may not fit with the institu-
Organizations tend to absorb practices which are socially legitimate, i.e. consistent with the regulatory, cognitive and normative institutions in their countries. Regulatory component reflects the existing laws and rules in a country. Should the employees of the recipient organization perceive a practice transferred to be in conflict with laws in own country they will likely reject the transfer. A cognitive component constitutes the shared nature of reality and frames of reference that affect the ways how individuals notice categorize and interpret the phenomena. If a practice is inconsistent with cognitive institutions in their environment employees will have trouble understanding, interpreting and acting out the practice appropriately. Cognitive element will also affect learning processes. It is easier to learn new knowledge when it is harmonious with the prevalent knowledge. Finally, normative component refers to the values and norms held by particular social groups. If the practices are not consistent with different value systems of the recipients’ national cultures their transfer will not be successful (Kostova, 1999).

To reflect the abovementioned discussion the following variables have been added to the Survey 1: Different national cultures of vendor, consultant and customer; Different languages; Different frames of reference.

3.3.5.6 Knowledge Embedded in Organizational Processes

As argued by Pan et al. (2001) the knowledge embedded in existing organizational processes will impede the transfer. ERP implementations in essence integrate different departments by establishing common processes. Yet, within each organization, due to their decentralized nature, there exist a diverse and often conflicting base of interests and competencies in specific knowledge areas (Pan et al., 2001) and cognitive maps (also referred as belief structures, mental representations, frames of reference) of the individuals vary across organizational units having different responsibilities.

This is troublesome in ERP implementation context because how information is framed and labeled affects its interpretation. If information is not uniformly framed during distribution, same interpretations will be harder to achieve and different knowledge about the system will be created. Furthermore, information overload – a situation when organizational units can not process or adequately interpret received information due to its variety and possibly contradicting nature may occur (Huber, 1991). ERP adopter companies have to take into account how the diversity of knowledge about cross-functional processes can be effectively integrated. Standardization and knowledge transparency throughout the organization is therefore vital for the success of the implementation. Common, or sometimes referred as ‘redundant’ knowledge has to be developed across the different units (Pan, et al., 2001). To effectively integrate the different knowledge bases existing in the companies Japanese firms have adapted the practice of rotating the engineers and managers among different departments (Takeuchi & Nonaka, 1995).

To reflect this discussion Standardization and Documentation of knowledge; Localization of knowledge in more decentralized organizations; Cross functional teams; Rotation of team members between different departments to transfer knowledge were all added as variables on the Survey 2.
3.3.5.7 Knowledge Embedded in the Legacy Systems

‘Legacy systems encapsulate the existing business processes, organizational structure, culture and information technology’ (Holland & Light, 2003, p.185). Unsurprisingly they determine the amount of organizational change required for successful transition to the new system. If legacy IS are complex entities with multiple technological platforms and different routines are used to manage common business processes, then the amount of technical and organizational change required will be high. If, on the other hand Information System is architecturally simple and organization already has common business processes, amount of change may be lower (Holland & Light, 2003).

Pan et al. (2001) write about how the knowledge embedded in legacy information systems posed severe problems in ERP implementation. Users were often concerned how the new ERP system was consistent or similar to their legacy IS. They inertially tended to prefer the old procedures instead of adopting the new ones. Holland and Light (2003) also identify a precedent when staff initially tried to use the new system in the way they had used the old one. To reflect on this discussion Legacy systems inertia and Differences between previous business practices and new ERP practices were added as variables to the Survey 1. Furthermore, as it is vitally important for the knowledge recipient to understand the principles behind the new system I added Trainings, seminars, formal education as a variable to the Survey 2.

3.3.5.8 Documentation and Accessibility of Knowledge within the Implementation Project

Personnel turnover creates substantial knowledge losses in the process of implementation. Additionally research identified that information is often not adequately stored for the future purposes (blackboards get erased, task completion times not recorded), or stored in a way that it is hardly accessible. Furthermore, employees with information needs often do not have a clear idea of the knowledge possessed by other employees in the firm or where to seek such knowledge (Huber, 1991). Consequently documentation and accessibility of knowledge are important for success and were represented as variables Documentation of activities at each step and E-collaboration tools (e-mail, groupware) in the Survey 2.

3.3.5.9 Experience and Frequency/Variability of Task Performance

As argued by Lane and Lubatkin (1998) the more experience the knowledge source and recipient firms have of solving similar types of problems the easier the knowledge transfer must be. This proposition is expanded with an argument by Kogut and Zander (2003) that difficulty of transfer should decline with each subsequent transfer and the experience of the parties involved. Consequently the variables: Lack of prior experience or related knowledge of the vendor or consultant, and Lack of prior experience or related knowledge of the customer were added to the Survey 1.

In the same line of reasoning it is argued that the efficiency of knowledge integration depends upon sophistication of the system of signaling and responsiveness that develops between individuals as a result of repetition and improvement. The more frequently team members perform some activities and the more varied these activities are – the easier subsequent knowledge integration becomes (Grant, 1996). Furthermore, people develop better understanding of each other in the long-term collaborative context (Werr, 2005). I therefore added Frequency and variability of task performance and Prior experience of collaboration with specific partners as variables to the Survey 2.
3.3.5.10 Communication Patterns within the Implementation Project

Communication patterns have been identified by previous researchers as an important determinant to innovation diffusion in the organization (Gupta & Govindarajan, 1991, Lam, 1997). Line of reasoning is that success at innovation requires adequate information-processing capacity in the firm and such capacity is a function of the intensity of communication. As put forth by Lam (1997) ‘Knowledge is utilized and transmitted through intensive and extensive interaction between group members.’ (Lam, 1997, p. 978)

Intensity of communication in the organization can be conceptualized in four dimensions: frequency, informality, openness, and density of communication, wherein density is defined as number of people who interact with each other within the project and across different organizational boundaries (Gupta & Govindarajan, 1991).

As the more uncertain and complex the project is the more desirable it is to have higher frequency and informality in communication. High frequency of communication also facilitates the adoption and diffusion of innovative knowledge across different units of the corporation (Gupta & Govindarajan, 1991) and facilitates the transfer of tacit and socially embedded knowledge (Werr, 2005). I have added the following variables to the Survey 2: Frequency of communication, Informality of communication, and Number of people in communication.

Openness concerns the will of the individuals involved in the implementation project to share their knowledge with each other and interact freely (Werr, 2005). Effectiveness at adapting to environmental uncertainty necessitates use of decision-making processes that are based on open communication patterns (Gupta & Govindarajan, 1991). Free interaction is indispensable to the transfer of mostly tacit knowledge embedded in social relations and work routines and creation of new knowledge. Openness is important for both the recipient unit – to share information about their organization, and the source – to contribute their expertise (Werr, 2005).

Trust is another necessary condition for open interaction and cooperative behavior among individuals (Werr, 2005; Davenport & Prusak, 2000; Newell et al., 2002). High levels of trust are considered essential to facilitate the communication needed to share tacit knowledge and generate more knowledge (Newell et al., 2002). Werr (2005) has described a case of business and project team perceiving each other as adversaries creating distrust and conflict in the relationship. This in turn impeded the knowledge flows, especially in the context of business processes design.

To reflect on this discussion Openness and Trust were added to the Survey 2 list, meanwhile the, Lack of trust between the project team and the business itself, Inter-group competition and Tense relations in the project team were added to the Survey 1.

A transfer of knowledge may require numerous individual exchanges. Success of these exchanges will highly depend on the ease of communication and distance in the relationship between the knowledge source and recipient. An arduous (laborious and distant) relationship will create difficulties in the transfer as found by Szulanski (1996) and Timbrell et al. (2001).

Media richness, defined as the ‘communication medium’s capacity to change mental representations within a specific time interval’ (Huber, 1991, p.103) is considered as an important antecedent of transfer success. Media richness has two characteristics – the variety of symbols that media can convey and the rapidity of feedback the medium can provide. Media can convey different range of symbols affecting aspects of information interpretation and thus leading to crea-
tion of different knowledge. Different researchers studied various degrees of how audio-
media, conference-groups or face-to-face communications changed the patterns of indi-
viduals’ behaviors (Huber, 1991). As argued by Takeuchi and Nonaka (2000), Davenport
and Prusak (2000) and Lam (1997), face-to-face communication is preferable as it creates
more possibilities for intense interactions, creation of shared understanding and transfer of
tacit knowledge.

Knowledge networks are defined by Davenport and Prusak (2000) as self organizing enti-
ties of individuals who have similar interests and may communicate face-to-face or using
communication technologies like telephone, groupware, e-mail etc., to share expertise and
solve problems. Furthermore, co-workers who have complementary knowledge may form
different groups – often called ‘communities of practice’. These self-organized groups are
generally initiated by employees who communicate with each other because they share
common interests or aims. If such communication proves useful over time, the groups can
become more formal over time. Davenport and Prusak (2000) advocate for creation of
such informal groups for the purposes of sharing expertise and joint problem-solving.

To reflect this discussion I have added Frequency of actual face-to-face communication, and Infor-
mal knowledge networks/Communities of practice as variables to the Survey 2.

Within implementation of an ERP system a lot of learning occurs. The main vehicle for
learning is the interaction between project members with different skills and backgrounds
(Werr, 2005). Parr and Shanks (2003) and Sumner (2003) also provide support for getting a
right mix of business analysts, technical experts and users from implementer firm and con-
sultants from external companies in the project team. Implementation of ERP system is a
knowledge-intensive task as it requires a great amount of experience from a broad range of
experts such as representatives from company’s business units, technical specialists from
the IT department, project managers and external business and implementation consultants
(Chan & Rosemann, 2002). Consequently a variable: Various backgrounds of people in communi-
cation was added to the Survey 2.

3.3.5.11 Structure

Efficient knowledge transfer means that amount of communication necessary for transfer
can be optimized. Organization structure has to be designed to reduce the intensity of
communication necessary to achieve efficient knowledge integration. As argued by Grant
(1996) bureaucracy is a structure which (under certain conditions) maximizes the efficiency
of knowledge integration as it entails higher levels of coordination with lower levels of
communication. A similar view on the importance of structure is taken by Gupta & Go-
vindarajan (1991) who argue for use of liaison positions, cross-unit committees, and matrix
structure as the major formal structural mechanisms for coordination between different
units in the organization. Gupta and Govindarajan (1991) posit that the more complex
such integrative mechanism is – the greater information-processing capacity it will have and
the better coordination between different units will be.

A contrary opinion is provided by Newell et al. (2002) who argue that general trend
amongst the knowledge-intensive organizations has been to organize themselves in a flatter,
less bureaucratized ways. When creativity and innovation are a major strategy Newell at
al. (2002) suggest adhocracy as the most appropriate organizational configuration. Adho-
cracy devolves a hierarchical structure of bureaucracy and prefers organizational structure
which is organic and flexible. Within adhocracy control is based on professionalism and
shared, organizational values – referred as cultural or normative control, instead of forms
of direct control such as supervision (Newell et al., 2002). Thus: ‘the informal … adhocracy is considered to provide the necessary autonomous working conditions in which individuals will feel free to spend time experimenting with ideas and … engage in creative and innovative behavior.’ (Newell et al., 2002, p.29)

As I personally see the implementation project team is a knowledge-intensive entity, Less bureaucracy/More adhocracy and Providing opportunities to interact and learn about best practices rather than just ordering the organization to adhere to them were added to the Survey 2. Further, as argued by Newell et al. (2002) adhocracy is characterized by few or no formal rules, policies and procedures. Such an argument gives additional support for locating Informality of communication as a variable in the Survey 2.

Further, as Gupta and Govindarajan (1991) suggest that the greater the magnitude and scope of knowledge creation in the organizational unit, the greater autonomy such unit should be given. Since ERP implementation is a knowledge-intensive activity, project team members can be viewed as knowledge workers whose work is characterized by creativity and problem solving. As put forth by Newell et al. (2002) it is knowledge workers themselves who tend to be the most appropriate persons to decide how to initiate, plan, organize and coordinate their work. In some cases management does not share the same level of skills and experience as project team members do. Knowledge workers therefore demand autonomy in decision-making and to facilitate knowledge-creation management should not deny such request (Newell et al., 2002). In this line of reasoning ‘Autonomy of the project team’ was added to Survey 2.

Modularity is another facilitating factor for efficient communication. It is argued to be especially efficient in organizing highly complex activities which involve broad-scope knowledge integration (Grant, 1996). Modularity is translated into division of labor in ERP implementation meaning that the total implementation can be divided into relatively independent subsystems – and teams implementing each subsystem can have minimal concern for its interaction with others. This may posit the teams with an advantage of faster implementation and better knowledge sharing in smaller sub-teams, but may possibly inhibit cross-team knowledge transfers. Since modules implemented in ERP systems are mostly distinct in their functionalities I have added Division of labor as a variable to Survey 2.
Expert views on the Knowledge Transfer within ERP Implementations

In this section I present the results from the empirical study. The study was carried out by making five in-depth interviews with four Swedish experts and one international expert in the area of ERP Systems. The interviews focused on experts’ views concerning the research area. The surveys focused on the strength and frequencies of knowledge transfer barriers and enablers. I begin this section with presenting the covered areas and interviewee profiles and then present the results as derived from the interviews and surveys.

4.1 The Covered Areas

Questions asked during the interviews could be broadly categorized into three areas:

1. **Effect of transfer of knowledge associated with ERP implementations.** Are companies aware of changes introduced by ERP? How do ERP systems change companies?

2. **Problems and inhibitors.** Regular problems encountered during the transfer of business or IT knowledge about the new system. What were inhibiting factors in knowledge transfer?

3. **Activities and Enablers.** How these problems were addressed? What kind of guiding principles were established in the context of the knowledge-transfer? What did you feel were knowledge integrating mechanisms?

These areas should not be seen as absolute, and often interrelations among them may be observed. I have used all parts from the theoretical framework to construct the interview questionnaire (included in Appendix A). Views and opinions were revealed by using open-ended, probing questions.

4.2 Interviewee Profiles

Ines Casanovas – Assistant Professor at National Technical University, Buenos-Aires, Argentina. Guest lecturer at Jönköping International Business School. Ines has an extensive experience of work within ERP systems from vendors SAP and Baan. Experience of being a project manager and coordinator of the team of several ERP project managers.


Mats Apelkrans - Ph.D., Assistant Professor at Jönköping International Business School. Research specialized in Systems Development, Information Logistics and ERP Configuration.

Jonas Rydh - B.Sc. Lecturer, at Jönköping International Business School. Jonas Rydh was a teacher at the Enterprise Resource Planning class of 2007. For the teaching purposes of this class he implemented Jeeves ERP system on campus. The implementation was performed in collaboration with consultants from a local company SysTeam.
4.3 Effect of ERP systems on the knowledge-base of the firm

Companies are generally aware of the changes associated with ERP systems’ introduction. Experts’ views differed however as to the different level of awareness amongst large, medium and small enterprises. It was opined that organizational changes associated with the ERP systems are better understood in large firms. Such firms also approach ERP implementations with more caution and put significant effort into selecting and configuring the ERP while smaller firms are simply looking forward to have vanilla ERP system implemented and work on the changes later. ‘That’s why I insist in changing the software or changing the company.’ (Ines Casanovas)

It was also observed that sometimes companies follow trends in technological adoption, without actually thinking whether the new system is necessary for their activities. ‘They actually want something they heard of from other company but don’t analyze if it’s something they actually need. For example we can send an SMS as a confirmation of something, but we don’t have customers that have mobile phones.’ (Jonas Rydh)

A disparity in the different levels of learning induced by ERP systems amongst larger or smaller enterprises has also been noticed: ‘Big companies learn more reluctantly, they are harder to adapt to the change because they have a bigger stock of knowledge and feel very competent compared to the small firms that want to learn more.’ (Mats Akelprans)

One of the reasons for ‘blind’ adoption of ERP systems is that they are often viewed as a roadmap for change. Best business practices and new quality standards embedded are often self-imposed by adopter companies to change themselves. ‘So if you are trying to improve, that is the way to do it.’ (Ines Casanovas)

This observation contrasted with the actual cases of implementation at Kjell Bengtsson’s company and at Kongsberg Automotive. In the former case the major reasons for ERP adoption were resolving problems with delivery precision, Y2K bug, and shortening the lead time. Additionally, significant benefits were achieved by ERP in the area of procurement – where previous processes were unsupported by IT. Sales and distribution, materials management, preventative maintenance, financial reporting, and tracking and production – all these areas were positively affected by ERP system. So software was not seen as a determinant of change, but rather as a tool to optimize the company’s performance and to change administrative processes. The firm was however aware that it had to adapt to the system.

The same type of functional approach was noticed in the case of Kongsberg Automotive; herein the change to ERP was performed with the aim of replacing already existing MRP (Materials Requirement Planning) system with an ERP system that could support multiple areas such as finance and logistics. Another reason for ERP adoption was growing international presence of the Kongsberg Automotive.

Most of the experts agreed that context is often not taken into account when adopting ERP systems. This was especially true with subsidiary units in different countries. When
head offices are aiming to have a common structure globally, subsidiary units have to manage as they can and adapt to the standards imposed by head offices.

‘Most of our companies have been bought by international companies so decisions are made from Europe; you receive a guideline you have to implement this ERP, not even an ERP... Even in the high level of country managers they don’t have a possibility to discuss much, because ERP is already implemented in most of the countries, so when they include another country you can not resist.’ (Ines Casanovas)

Kjell Bengtsson also felt that standard software had drawbacks that it often does not take context of the company into account: ‘They are coming in with the solution that has worked fine in other problems but it’s not good, because you may be losing your selling edge, your nerve in business. I think they should be more flexible in changing the system as it’s too rigid.’

Per Högberg hinted to the same pattern: ‘You don’t want to adapt to the system normally. You would like to be special and you say normally: oh we just can’t adapt to the system, the system must adapt to our processes’.

Ines Casanovas felt that ERP compels you to adapt to the standard practices. This does not however mean that companies adopt all best business practices from the ERP. There is a certain amount of procedures that companies can choose to configure within the implementation. Going over that minimum will however posit significant disadvantages in the future functionality.

Kjell’s Bengtsson found this out the hard way. During the implementation project the customer firm pushed through certain crash-criteria in their implementation. Few key processes were not allowed to be changed in the firm and because of that ERP package was customized. As they found out the implementation could have been much easier if these crash-criteria were dropped, because firm ran into significant problems later. This is consistent with what another interviewee predicted: ‘By using the new system but keeping the same practices you get an expensive system and adding up another problem – not solving ones you have.’ (Ines Casanovas)

According to Per Högberg, Kongsberg Automotive went the same way and initially customized their ERP system according to how they thought it could perform best: ‘Because it’s not so easy to say: just enable this process from SAP and run it. You always need to do some adjustments with the system. It’s not a self-playing piano.’ (Per Högberg)

As a result some process changes were made to meet the Kongsberg Automotive’s requirements. Per Högberg however revealed the new trend within the Kongsberg Automotive: ‘Nowadays we are looking much more after the best practice of SAP perspective, when we’re looking into new areas’. This is done to be closer to the world standards instead of using self-invented Kongsberg Automotive standards.

Experts thought that customizing ERP is often not the best choice. But a possibility of customized ERP system becoming better in time due to good maintenance was hinted to. Yet, with customized versions there is a hidden danger: when a new version of ERP is published by the vendor and: ‘...the company is told to upgrade ... but is it good for us to have this new version? Do we really need this new functionality perhaps we need other functions? It costs a lot and it costs to relearn the process in another way.’ (Mats Apelkrans)

### 4.4 Problems and Inhibitors

One of the major problems encountered during implementation was resistance to changes. It was felt, both, from the management and the users. As put forward by Kjell Bengtsson:
Expert views on the Knowledge Transfer within ERP Implementations

‘Different departments’ managers - they were not allowing to get the process owner philosophy through the company. There was a guy like a silo in charge of particular part, and we did not get acceptance of process owner concept in the company and that was very hard later on. But we hoped actually that when they saw the system they’d reflect and come back later and say that perhaps we should do it in the different way, but they did not.’ (Kjell Bengtsson)

It was noticed that often management does not try to understand the ERP system because they just want that system to give them results and financial reports. So the task of learning the system is left to the users. Experts agreed that the personality of the employees substantially affected their level of resistance. Younger, professional managers have been noted for openness to learn and incorporate new business knowledge. Newly hired people also tend to resist less and learn eagerly. People with a lot of experience who have been working within the firms for long time and are therefore trusted by the management put the most resistance to the changes: ‘They have the expertise but they have the old way of doing things.’ (Ines Casanovas)

Apart from the natural resistance against change, un-preparedness to the change was also noted as an inhibiting factor. In Kjell Bengtsson’s firm employees were initially un-prepared for the changes. Later the firm introduced a method of Accelerated Change – which involved continuous training of the employees, explaining them the vision and goals of the company, and adopting continuous improvement mind-set. At least 24 000 hours for 800 employees were spent and 5 classrooms were used for nearly half a year. Yet it was felt that this should have been started right from the beginning: ‘You should start this kind of information to the end-users even if you don’t know what they will be trained in; there are other things that you should start training them with – in terms of change management philosophy.’ (Kjell Bengtsson)

Another major issue is that due to the complexity of ERP systems, in a big SAP system there are hundreds of modules and 10 thousand parameters. So even if the customer firm knows what they need, consultants often do not have enough knowledge to address these needs. Lack of skills in consultants is especially severe in the areas of customer relations and materials handling: ‘There are few consultants that know all these 10 thousand parameters and how to use them the best way.’ (Mats Akelprans)

Per Högberg explicitly complained that a lot of rookie consultants participated in the implementation project and this posed significant difficulties to Kongsberg Automotive. Kjell Bengtsson also noticed dissatisfactory performance of the consultant group’s in his project. The group was very heterogeneous; there were a lot of newbie consultants, and some very experienced consultants. The major reason for dissatisfaction was the lack of experience: ‘They came directly from the 6 weeks academy of SAP, really inexperienced people, and problem for us was that there was not so many alternatives – the problem was the millennium bug and there were not so many people around at that time so the timing was not so good.’ (Kjell Bengtsson)

Jonas Rydh had mixed experiences in regards to the consultants. He felt that some consultants only talk about system and how much it costs, while others actually impose own standards on the implementer companies. They ask them to have a project leader, clear goals and specifications of the system, define process owners and all responsibilities within the implementation. Vendors often behave like this because their software is often offered on a per-service basis and on each transaction they receive a booking fee, e.g. 2%. So if the system is not implemented, run and maintained well, vendors do not get anything.

‘So as a person between the vendor and customers I feel that it is good when a vendor says that they have requirements on the project process and on the customer’s organization. For me it’s quality. So this is one kind of knowledge transfer – they know how we should run the project, not only how to run the system.’ (Jonas Rydh)
Most of the problems encountered were attributed to the new knowledge; people having to unlearn previous systems:

‘They have a lot of things they like, and when you try to explain to them that the new system will not allow them to do those things — they resist a lot. For example in Access you can enter the database and change the register, in an ERP you can’t do that. You need to exit the application, application will ask what you want to change and you have to enter certain data and IDs-s of the user. It’s very common to hear that it was easier with the old system and harder with the new one.’ (Ines Casanovas)

According to Per Högberg the major problem is the lack of understanding of the philosophy of business system processes. He opined that quite often the employees perform correct operations according to system requirements, yet only from a transaction perspective. So one may really think that they understand the system, yet in the reality they are just ‘keyboard drivers’. They do not comprehend the complexity of the process-based perspective: ‘I still have people in my group that have worked very hard with SAP for more or less ten years now, but still have big problems to understand the entire process. But they are phenomenal specialists at handling the transactions and handling the keyboard.’ (Per Högberg)

He felt this as the major inhibitor, which was also extremely hard to pinpoint and handle. He did not feel that lack of technical training can be much of a barrier as it can be overcome with extra education. ‘But to understand the process, understand the behavior, understand what the system does and why it does it; that is hard.’ (Per Högberg) Lack of understanding posits a major problem for ERP implementations because ‘in the old systems if you made a fault you probably you just hurt yourself, but in ERP it’s shit in and then you get shit out multiplied ten times.’ (Per Högberg)

Further, the local characteristics of knowledge inhibited the transfer. Per Högberg’s experience of implementation in Brazil was according to him a real nightmare because Brazil had extremely complicated financial and tax regulations. Kongsberg Automotive found it hard to understand the local legislation and it was also changed very often:

‘They send out a newspaper more or less every quarter — the same size of Jönköping Posten with information on financial legislation. They have transaction taxes, even if you just move products between one to another side of the street you have to pay a transaction fee. You have a tax on the tax. So you get a tax and tax and tax. And they had a lot of differentiation in reporting and tax codes, I think we have 5 or 6 different tax indexes in Sweden and they have 56! So it is complicated and hard for us to understand their tax system… from a technical side.’ (Per Högberg)

A reluctance to share knowledge was noted some persons were actually hoarding their knowledge because of their caution of loosing their status and ‘Perhaps you loose your power – in terms of being one and only that knows this specific area, while nowadays 3-4 people can do the same thing.’ (Kjell Bengtsson) In fact few people in the project had to be replaced as they were not interested in knowledge sharing.

An interesting context-based aspect was revealed by Ines Casanovas. She felt that employees in Latin America have to often accept the new ERP system nevertheless of all their resistance. And the reason for such behavior she said was harsh economic situation and high unemployment rates. Regardless of the size of company, users are pushed to cope their best. What management tells them is ‘Try to climb up the new one or get out!’ (Ines Casanovas) She contrasted this with a situation of ten years ago when there were no employment problems. However as Argentina is technologically dependent on countries of the 1st world it tries to learn a lot from them. Business culture is open and receptive to new knowledge and adaptation: ‘We don’t have a culture of building up a wall. It’s usual for us we are always learning.’ (Ines Casanovas)
Per Högberg noted that different languages did not pose much of a problem to him: 'I thought I had a biggest challenge when I made implementation in Korea. Because I had a translator all time. There were just two guys able to understand English so everything had to be translated. But they understood very well what to do, they adapted the process.' (Per Högberg)

It was organizational characteristics and presence of legacy systems that tended to change attitude of the implementer firms. For example, Kjell Bengtsson’s firm’s subsidiary unit in Denmark wanted to keep own specific system because it was in Danish, while a new ERP system was only in English. On the other hand a unit in Estonia was interested in getting the ERP system up and running as soon as possible because it felt isolated from other offices.

Per Högberg had the same experience in Norway two years ago: Kongsberg Automotive’s subsidiary unit did not want to implement the SAP ERP at their site because they had another ERP system from a different vendor which supported their processes very well and was a state-of-the-art installation. Subsidiary unit has actually requested the entire firm to move to their ERP system and…

'They gave us extremely much headache and huge problems with the steering committee because they did not want to listen to the project management, they did not want to understand the challenges we had. And of course in the project we underestimated the efforts needed to convince them of the entire process and the benefits of using the same ERP system in the whole group.' (Per Högberg)

Similar problem was encountered while implementing at another unit in England. Yet there it was overcome as put forth by Per Högberg by ‘explaining them who was the boss’. Therefore the biggest problems were not posed by different language or lack of technical skills but by the ‘…mentality of the receiver to really understand why and really accept that they will be provided with the new system which is beneficial for the group. And when it’s beneficial for the entire group, probably you need to suffer a little bit.’ (Per Högberg)

As for the major factors that inhibited knowledge transfer different backgrounds of project members together with uneven levels of experience were noted. So did the different attitudes; it was suggested that eagerly enthusiastic professionals often perceive more cautious and experienced project members as less authoritative and vice-versa.

'If there is a project manager with a lot of experience and then there is a new member who wants to solve everything and is encouraging, but the older one is rather thinking and trying to be more sure what you’re doing – that is a barrier. So when you are trying to transfer knowledge to some person who’s very young and very new, he may think: Oh this is an old person, while the old one says: he’s a crazy one, but he’ll learn in time.' (Ines Casanovas)

The differences in attitude, experience and length of employment thus mattered. Previous experience and knowledge of IT of the project’s members were also noticed as important factors. IT groups were noticed to work well in the implementation. A different level of formality between the team members was also noted as a barrier in the medium and small projects. Lack of prior experience in use of ERP, lack of time, and lack of the source’s expertise were mentioned as inhibitors: 'You want to talk to someone who is quite good in technical part and in business part. That’s a problem.' (Jonas Rydh)

Per Högberg emphasized that country characteristics are necessary to be taken into account:

'And it’s so different in different areas in the world, sometimes it’s just a question of person being proud, sometimes legislation, and sometimes different organizational hierarchy. For example in South Korea or Asia age is important.
to have some authority to be a manager to say something, you need to be old enough. It’s very hard to come as a young guy and tell them what to do.’ (Per Högberg)

In the case of Jeeves ERP implementation at JIBS, Jonas Rydh felt that the lack of codified help files was prohibitive and especially troublesome in the beginning. He felt that this problem may have been resolved if the implementation process was continued further. However in this specific case there was a lack of time and lack of financial incentives as the consultant company - SysTeam was not getting any money from the installation. This was consistent with his experience in the service sector; vendors do not usually give too much information in the customers, especially when customers are in the selection phase. Financial or other types of incentives were indeed felt to be important: ‘Give them lots of credit when they are doing their job because it’s tough job, most of the people in the project group were working 100% in their ordinary job and 100% in their project team, so it’s not easy.’ (Kjell Bengtsson)

Another major problem was the lack of understanding of the business by the consultants. Consultants do not try to deeply understand the processes of the customer:

‘We have a business here as well, how we want to use this system in our education. It’s very often they don’t answer the question, just tell what the system can do in general, not what we can do with the system here. And it’s the same thing in the service sector, they say system can do this and that, but all right we want to do in this way, it is possible? And they say: 1) maybe in the future 2) they don’t answer a question at all. They are very tricky persons.’ (Jonas Rydh)

Tension in large projects managed simultaneously by two or three consultant companies has been observed. Competitor consultant firms were observed to be reluctant to share knowledge with each other, as inter-group competition was present. As put forth by Per Högberg:

‘That’s a disaster. We had quite a few times combined different companies and then asked them to work together and they were very reluctant … And then we took the coordination, as it’s very hard to ask them to take coordination. Again they did not want to give out their knowledge, which they think is their property. We tried to explain to them they don’t own that knowledge anymore, it’s customer’s knowledge but it’s hard … They even have problems to ask questions from SAP, they’d like to have all information on their own.’ (Per Högberg)

Sometimes there was also a feeling like project group and business are adversaries, but the project manager or liaison center always worked to resolve such difficulties. Kjell Bengtsson articulated that before the project some managers in the firm rejected the notion of ERP because they felt that ERP was a standardized solution. This threat was however addressed in a 3 day flying seminar. SWAT analysis was performed, company’s current standing and future vision identified. Consultant company proposed the changes necessary, though not all of these changes were accepted.

Legacy systems inertia has been mentioned as one of the problems. The major reason stated for continued use of ‘shadow’ systems was the users’ lack of knowledge about the new system: ‘People are usually unsure if the new system will give them the right information in the way they need it … I think the reason for this could be lack of knowledge, especially lack of training.’ (Jonas Rydh).

Yet all experts agreed that company and its employees have to be constantly reminded that legacy systems will have to be forgotten during the adoption. In some cases companies gradually phased out the old system after the implementation of new ERP. However in certain cases disparate systems were allowed to continue their existence for local tax-processing and HR departments.
4.5 Activities and Enablers

Experts opined that working with project team members through consensus was the best way. Using persuasion, not force, and careful explanation why the processes need to be changed were considered essential. It was suggested that project team members from the business side need to be explained the rationale behind the consultants' decisions. To overcome user resistance certain methods were suggested such as making minor changes in non-critical areas whenever asked so by the company employees: 'Let them make a decision in that sort of thing that is not critical for the process ... let them feel they are involved that key thing - change management.' (Kjell Bengtsson) and 'I think it's not so much of technique to make that type of installation, it's much more methodology of thinking about processes and people. People management in this area is extremely important.' (Per Högberg)

Explicitly documenting things into knowledge repository was felt to be essential by all experts. If everything is formalized there is less threat of valuable knowledge drains due to employee retention. It also makes life easier when you have new people added. Kjell Bengtsson's firm specifically requested that outside consultants wrote down every step performed within the implementation. The project handbook was produced after a while but it was felt that such project handbook should have been handy right from the beginning, and should have covered all areas such as compensation, delivery of modules, and documentation. Kongsberg Automotive also extensively worked on developing a printed knowledge-library of all documentation in Swedish. This printed material included all experiences and insights from previous implementations.

An interesting point was presented by Ines Casanovas. She felt that while working in an unstable scenario (Latin America) certain things have to be managed quickly by using intuition generated from experience. Thus explicit documentation is more effective for the stable environments: 'In Europe it's easier to formalize, have knowledge repositories, because everything is almost fixed and planned even in the books, but for us it doesn't work because we don't use books we use expertise.' (Ines Casanovas)

Jonas Rydh also felt that one of the hardest parts of the project is documenting everything that is being done. Even though the team knows it is important, they often do not have time.

In the experience of Ines Casanovas knowledge repositories created during the implementation are contractually left with the consultant company. This way consultant company ensures that it will not make same mistakes again. The implementer firm only keeps the knowledge about improving processes or ERP software itself. Quite often there occurs a personnel transfer from implementer to consultant company and vice-versa.

Formal education was suggested as the best activity for business knowledge transfer. Environment however does not always allow for such mode of transfer, because there's often not enough time to document everything. So, as Ines Casanovas put forth: 'When pressured by time – learn as you can.' When rushing in the project formalities are often kept aside, project managers are often involved in 'firefighting', solving the actual problems. However, consultant companies, such as Accenture have to meet international standards (CNM) so they tend to put significant emphasis on documentation (Ines Casanovas).

The importance of formal training was understood in Kjell Bengtsson's company. Formal training and testing of the users were established as mandatory. There were around 120 roles in the system, each user had to pass the test for own role to be allowed to use the system.
IT tools that Mats Apelkrans felt necessary to be used in the implementation are: “Application Performance Measurement” and ARIS. Before starting writing the code and tweaking the software companies should use these tools to measure the actual process improvements that can be achieved by re-configuring ERP standard processes.

‘ARIS is a tool describing graphical processes .... where you can put responsibilities in different tasks in the process chart. And when you start the process you can measure the performance, you can put times on every subtask and so on, and you can measure change in the process – is it better or slower. So I think good installations and customized solutions should be prepared with those things.’ (Mats Apelkrans)

Jointly drawing process maps, finding out current situation in the company and then having discussion on what can be done for improvement was perceived as vital by Jonas Rydh. He felt that businesses should not blindly adopt ‘best practices’ but to actually make best choices. Per Högberg also felt that understanding the prior process and translating it into the new process was imperative.

One of the initial activities necessary to facilitate the transfer was developing a common language between the team members, so when one person (e.g. IT) says something, another one (business person) understands him correctly: ‘You have to agree what you are talking about so you don’t talk about different things’ (Jonas Rydh). Per Högberg used this technique extensively in his experience: We made sure that people understood what everyone meant, and with this understanding it makes it extremely easy to do it these days, especially in IT.

Informal transfer types were seen as best for transfer of IT knowledge by Ines Casanovas. This was agreed by Jonas Rydh leaning towards informal face-to-face communication in the beginning, with some formal training and documents later in the implementation process. He complained that there’s often not enough time or motivation in the beginning for reading all the documentation.

An interesting insight was provided by Kjell Bengtsson. As the system introduced in the implementer company was new, and unlike simple office applications as Word or Excel – more complicated, knowledgeable users were hard to find, so everyone was starting from the scratch. What the firm did to solve this problem was an early initial training of key users (persons with more knowledge of the business). These users were geographically dispersed, both inside and outside of Sweden and they would be the first persons to help in own departments when the problems arose. They were also informing other employees about changes, and brought user feedback to the project team.

It was felt that level of formal education depended on company size and experience, small companies do not usually have a system tutorial, but bigger companies make presentations, ‘and they have meetings with users where they discuss all those things like do you like the layout on this screen or how this works. I think they are more prepared to handle the resistance from the users.’ (Mats Apelkrans)

Yet in small companies an average user is often in the development process, but in bigger companies users are not involved in the development so there is much teaching to be done when the system goes live. Importance of addressing users’ feedback was stressed by Mats Apelkrans: ‘Listen very much to the users. Users have positive and negative aspects of things; there are things which are not used at all, things that don’t work as planned.’

In regards to the country differences Per Högberg advised to use regional differentiation in behavior types. He felt that one week of such education is necessary. Furthermore he opined that personalities of the employees matter and: ‘Even if you are working in our country, you have to be aware of things like Myers Briggs type indicator or how to understand different behaviors of different peo-
Expert views on the Knowledge Transfer within ERP Implementations

It has been felt that the harder the project the more interaction was necessary for success. Trust, attitude, openness of the communication and devotion to the project were mentioned as critically important factors by all experts. It was also noted that collaboration, faster decision making and understanding between project members develop and intensify over time:

‘First phase is - you like each other very well, next phase you get very upset because then you have to start working your position will be different, third phase will be even more irritation, and the fourth phase understanding occurs because they are veterans now … and you have to build up like a soccer team, with a very strong team spirit.’ (Kjell Bengtsson)

Different ‘mind maps’ of the persons in the implementation projects also mattered. It was felt that similarity in the ways of working should be present. Some persons have no problems reading large text documents, while others prefer drawings and figures on the board, and informal brainstorming as a solution. According to Jonas Rydh it is hard to compile every requirement in the project in a way understandable to everyone. If the level of documentation is too high some members will simply drop out. At the same time project team can not spend all its time drawing pictures on the board while work needs to be done. A good mix of formality and informality was felt to be necessary.

E-collaboration is often used as one of the tools. Ines Casanovas revealed another context-based characteristic: in Latin America e-collaboration and knowledge sharing using IT is not very beneficial. People do not want to share their knowledge with everyone; they try to be necessary persons because of the worsened job market situation.

Jonas Rydh used e-mail for collaborative purposes, and felt it was helpful, but not the most appropriate way to communicate. In turn, Per Högberg pointed to extensive use of remote conference sessions such as desktop sharing. He did not however feel that remote communication is very beneficial for the implementation projects. ‘We don’t avoid it because we have so much job to do there’s so many projects but we try to be as much as possible on site. Otherwise you don’t capture the meanings.’ (Per Högberg) Efficiency of video conferences for knowledge-sharing in implementation projects he felt was dismal.

Mixing people with different background in the project was perceived as absolute requirement for success by all experts. Even though it might impose initial delays, especially when one wants to run the project in some kind of democratic way. Yet, none of the professionals have a broad knowledge in all domains of knowledge necessary for ERP implementation. As put forth by Per Högberg: ‘You need to combine IT, business, and users. With that combination you can create lot of enhancements.’ Forming teams with very specialized professionals is more typical, and in the big project team specialists with many different backgrounds and few project managers responsible for different areas are required. Yet even though having the ‘dream team’ members together was felt as paramount it is not the only critical factor: ‘If I should do this again I should have selected the consultants and the consultant company much more careful, and also when hiring the people I should interview them understanding their ways of working, how good are they for working in the project team.’ (Kjell Bengtsson)

An interesting insight was provided by Per Högberg. Kongsberg Automotive nowadays hires a main share of the experienced consultants, and some young consultants are taken at different terms. Moreover, if Kongsberg Automotive feels that working with particular
consultant is extremely beneficial, they change the consultant company to follow that individual.

A clear division of labor was also noticed as beneficial. As IT projects are very hard to handle and are most usually delayed and go over cost, the latest approach has been to divide the large ERP projects into smaller, 5-6 or 7 sub-projects which have shorter time horizons in order to reach their goals quicker. This division is usually based on per module basis, which means that the sub-projects are not divided between analysts of one company and programmers of the other. Instead teams are composed to implement different modules, and together they participate in setting the global design. After that…‘…everyone goes to their box and works their, so they don’t share their knowledge, except in the main design... and ... well I have financial, and you have manufacturing, and we have nothing to talk about except the global design.’ (Ines Casanovas)

A lot of interaction between the business and the project team and necessity of support from the top management were mentioned as vital for success which logically implied the next question about subordination levels. Experiences and opinions were more or less the same on the level of autonomy necessary to be given to the project team: ‘I think the bigger the project you need more interaction with the business company, because you are getting isolated. In fact the project team is like a service to the company, it’s not defining the business.’ (Ines Casanovas)

Compare this to:

‘It was extremely strict in terms of decision making, every decision had to be made in 24 hours, and project module was also extremely precise in that case, every day my friend and I were sitting down and went through open issues and problems and every week we took the whole project team together … and explained what has been planned, and what has been achieved during the week and what was discrepancy so we could focus on fixing that and start up again. So no, not working autonomously, you are extremely hard-driven in every aspect and managed from the top.’ (Kjell Bengtsson)

In general, a good mix of bureaucracy and ad Hocracy was recommended. However, in each case less autonomy was to be given to the team in terms of making decisions on critical factors. Yet a danger of restricting creativity was also noticed. Sometimes it is better when ‘you have a mission to solve but how you solve it doesn’t matter you just have to solve it.’ (Jonas Rydh)

Furthermore, openness of communication and ad-hocracy were felt as imperative by Per Högb erg:

‘You need bureaucracy because it’s a complex project you need to ensure that you think about everything, that all parameters are done because if you just make one single fault it could be a disaster… But how do you know that when you are walking into the company and you change their entire processes and their entire lives that you really capture everything that you need to take into consideration? Therefore you need a combination of ad-hoc work, you need to be creative and listening to the people around, trying to understand and influence to ensure that you really give them what they need.’ (Per Högb erg)

Importance of being flexible was noticed; Per Högb erg advised to listen everywhere, and compare the new information what has been said earlier. In his opinion even if something has been formally decided at the top, there could be extra information gathered at the shop-floor which may contradict the previous knowledge; so certain parameters may need to be changed. Such behavior as he argued efficiently overcomes user resistance to the changes.
4.6 Results of the Surveys

Below I have presented results of the surveys for knowledge transfer barriers and enablers. Three out of five surveys have been returned at the moment of the submission of this thesis. Only the mean, median, and mode were measured due to the limited importance of the surveys for the nature of my qualitative. Microsoft Excel was used for entering and analyzing the quantitative data. Next I have classified each barrier and enabler according to their strength. If the strength was higher than the mean measured, then the barrier/enabler was considered strong. If strength was lower than the mean, then the barrier/enabler was considered to be weak. The reader is however advised to view this classification and ratings with caution due to the limited sample. I stress again that the purpose of this study was to understand the meanings, not to generate statistics. The reader is referred to the Appendices E, F and G for the full presentation of the results.

4.6.1 Transfer Barriers

The mean rating for the strength of the knowledge transfer barrier was 3.03. Thus I classified the barriers with the rating higher than 3.03 as a strong barrier. Only these strong barriers are listed (in descending order) in the table below. Full results are listed in Appendix F.

<table>
<thead>
<tr>
<th>Transfer Barrier</th>
<th>Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>User resistance (users might feel project comes from the top and think it will complicate their lives further)</td>
<td>4.00</td>
</tr>
<tr>
<td>User resistance to system change</td>
<td>4.00</td>
</tr>
<tr>
<td>Gaps in skills between organizations participating in the project</td>
<td>4.00</td>
</tr>
<tr>
<td>Lack of time and meeting places</td>
<td>3.67</td>
</tr>
<tr>
<td>Users perceive new system as a threat to their job security</td>
<td>3.67</td>
</tr>
<tr>
<td>Unclear project definition (client does not know what he wants)</td>
<td>3.67</td>
</tr>
<tr>
<td>Differences between previous business practices and new ‘ERP’ practices</td>
<td>3.67</td>
</tr>
<tr>
<td>Tense relations in the project team</td>
<td>3.50</td>
</tr>
<tr>
<td>Inter-group competition (E.g. if customer is implementing two ERP projects at the same time)</td>
<td>3.50</td>
</tr>
<tr>
<td>Lack of trust between the project team and the business itself</td>
<td>3.33</td>
</tr>
<tr>
<td>Differences in status of Knowledge Owners (some might be top managers, some just regular workers)</td>
<td>3.33</td>
</tr>
<tr>
<td>Lack of prior experience or related knowledge of the customer</td>
<td>3.33</td>
</tr>
<tr>
<td>Lack of prior experience or related knowledge of the vendor or consultant</td>
<td>3.33</td>
</tr>
<tr>
<td>Legacy systems inertia</td>
<td>3.33</td>
</tr>
</tbody>
</table>

Table 2: Strong transfer barriers.
Next I have merged the strength and the frequency of the barriers. The frequencies of the barrier’s occurrence listed as Low, Medium and Frequent in the Survey 1 were assigned numerical meanings of 1, 2 and 3 accordingly. A combined rating was generated as the product of the barrier's strength and frequency of its occurrence. The mean of this combined rating was 6.83. Any barrier with rating higher than that was considered to be simultaneously strong and frequent. The table below lists the strong and frequent barriers. Full results are listed in appendix G.

<table>
<thead>
<tr>
<th>Transfer Barrier</th>
<th>Strength * Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>User resistance to system change</td>
<td>12.00</td>
</tr>
<tr>
<td>User resistance (users might feel project comes from the top and think it will</td>
<td>10.67</td>
</tr>
<tr>
<td>complicate their lives further)</td>
<td></td>
</tr>
<tr>
<td>Users perceive new system as a threat to their job security</td>
<td>10.00</td>
</tr>
<tr>
<td>Differences between previous business practices and new ‘ERP’ practices</td>
<td>10.00</td>
</tr>
<tr>
<td>Lack of time and meeting places</td>
<td>9.67</td>
</tr>
<tr>
<td>Unclear project definition (client does not know what he wants)</td>
<td>9.67</td>
</tr>
<tr>
<td>Lack of trust between the project team and the business itself</td>
<td>9.00</td>
</tr>
<tr>
<td>Tense relations in the project team</td>
<td>9.00</td>
</tr>
<tr>
<td>Lack of prior experience or related knowledge of the customer</td>
<td>8.33</td>
</tr>
<tr>
<td>Differences in status of Knowledge Owners (some might be top managers, some</td>
<td>8.00</td>
</tr>
<tr>
<td>just regular workers)</td>
<td></td>
</tr>
<tr>
<td>Legacy systems inertia</td>
<td>8.00</td>
</tr>
<tr>
<td>Lack of prior experience or related knowledge of the vendor or consultant</td>
<td>7.50</td>
</tr>
<tr>
<td>Lack of motivation of the knowledge recipient (customer)</td>
<td>7.00</td>
</tr>
</tbody>
</table>

Table 3: Simultaneously strong and frequent transfer barriers.
4.6.2 Transfer Enablers

The mean rating for the strength of the knowledge transfer enablers was 3.39. Thus I classified the enablers with rating higher than 3.39 as strong (necessary) enablers, and enablers with rating lower than 3.39 as optional enablers. Only the strong (necessary) enablers are listed (in descending order) in the table below. Full results are listed in Appendix H.

<table>
<thead>
<tr>
<th>Transfer Enabler</th>
<th>Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of actual face-to-face communication</td>
<td>4.33</td>
</tr>
<tr>
<td>Support from the top management</td>
<td>4.33</td>
</tr>
<tr>
<td>Trainings, seminars, formal education</td>
<td>4.33</td>
</tr>
<tr>
<td>Providing opportunities to interact and learn about best practices rather than just them ordering the organization to adhere to them</td>
<td>4.33</td>
</tr>
<tr>
<td>Openness and Trust (willingness of the individuals involved in the consulting process to share their knowledge with each other and interact freely)</td>
<td>4.33</td>
</tr>
<tr>
<td>Level of common knowledge (business knowledge, process knowledge, IT-knowledge, etc)</td>
<td>4.00</td>
</tr>
<tr>
<td>Frequency of communication</td>
<td>4.00</td>
</tr>
<tr>
<td>Standardization and Documentation of Knowledge</td>
<td>4.00</td>
</tr>
<tr>
<td>Clear deliverables/deadlines/goals</td>
<td>4.00</td>
</tr>
<tr>
<td>Motive (background of cooperative relationship)</td>
<td>4.00</td>
</tr>
<tr>
<td>Documentation of activities at each step</td>
<td>3.67</td>
</tr>
<tr>
<td>Informal knowledge networks*, Communities of Practice**</td>
<td>3.67</td>
</tr>
<tr>
<td>E-collaboration tools (e-mail, groupware)</td>
<td>3.67</td>
</tr>
<tr>
<td>Prior experience of working with specific partners</td>
<td>3.67</td>
</tr>
<tr>
<td>Organizations ability to use the knowledge obtained</td>
<td>3.67</td>
</tr>
</tbody>
</table>

Table 4: Strong (necessary) enablers
5 Analysis

In this section I present a phenomenological analysis of the expert views on knowledge transfer within ERP implementation projects, and provide the reader with a comprehensive interpretation of the results.

5.1 Introduction

I have started this study with a purpose to investigate how the knowledge embedded in the ERP systems (business and IT knowledge) is transferred within ERP implementation projects to the adopter company and what are the barriers and the antecedents to the knowledge transfer. Three, specific research questions have been examined:

1. What is the effect of the transfer of knowledge that is associated with ERP implementations?
2. What (if any) unique knowledge transfer barriers have been identified within the ERP implementation projects?
3. What types of activities did the firms initiate to enable the knowledge transfer within ERP implementation projects?

The structure of my analysis will therefore follow the prior order of results presentation. Each area will be analyzed and my opinion will be stressed.

I have followed Stevick-Collaizi-Keen method of phenomenological data analysis as outlined by (Moustakas, 1994). Having obtained a full description of subjects’ experience of phenomenon, I next completed the following steps:

a. Considered each statement with respect to significance for description of experience.
b. Recorded all relevant statements.
c. Listed each non-repetitive, non-overlapping statement. These were identified as the meaning units of experience.
d. Related and clustered each meaning into themes.
e. Synthesized the meanings and themes into a description of the experience. Included verbatim examples.
f. Reflected on textual description. Constructed a textural description of structures of experience

Finally, from the individual textural descriptions of all co-researchers’ experiences, I constructed a composite description of the meanings and essences of the experience, integrating all individual descriptions into a universal description of the experience representing the group as a whole.
5.2 Effect of transfer of knowledge associated with ERP implementations

5.2.1 Organizational Learning induced by ERP Systems

Organizational learning was the major effect of ERP adoption. For the businesses the ERP implementation projects meant a reassessment of their organizational practices and routines. The ERP systems with their built-in best practices required the organizations to reflect on their own processes in order to create an alignment between the processes and the new system. Although standard processes of the ERP systems were prescribed to a certain level, there was still some freedom exercised in the system configuration. ERP configuration is an intensive activity, SAP R/3 v.4 for example has almost 15 000 tables which result in myriads of configuration options (Scott & Vessey, 2003). Prototyping and extensive testing, and trial-and-error method were therefore necessary to find configuration errors. This means that important decision choices were made, and within these choices there occurred learning and alteration of the knowledge base of the firms.

Organizational learning took two different forms, involving different types of personnel and time periods. Initially, organizational learning occurred during the implementation itself. During this stage, project team and the business interacted and determined the extent to which the new ERP systems would differ from the systems to replace and how the system was supposed to be implemented. In the second stage organizational learning occurred when users tried to unlearn the old system, and learn the new system and new ways of working. Changes users had to experience should have depended on whether single or double-loop learning has occurred (Scott & Vessey, 2003).

The results indicate that not only the explicit business processes of ERP systems were imposed on the organization, but also the non-canonical processes were transmitted. This implied certain changes in organizational structure, redistribution of roles and responsibilities and new knowledge requirements for the people involved in the process. Furthermore, it brought a new knowledge structure to the organizations.

Learning by doing or experiential learning took place on the managerial and employee levels. As put forth by Lee and Lee (2003) users accept explicit business processes embedded in the package due to three reasons: the process is being automated, the package is functionally limited, and package is cross-functional. As ERP systems are based on integration, these factors play a major role in implementation. Initially users will be restricted by the nature of the new system, and system will emerge as an infrastructure which will govern what the users are doing. In the internalization stage organizational members start to comprehend the requirements of a broader scope of knowledge, and people begin to seek knowledge to resolve own inquiries. Such seeking process generates an atmosphere that values organizational meta-knowledge, or knowledge about who knows what knowledge (Lee & Lee, 2003).

As empirical data revealed project team members and employees became more knowledgeable in other areas and the organizational knowledge structure of the implementer firms became more convergent (Lee & Lee, 2003) as individuals started to share more knowledge. At the same time each individual’s knowledge became more divergent (Lee & Lee, 2003) as each person had to learn and understand other subject areas; the IT expert needed more knowledge about business processes, while an expert in product lifecycle manage-
ment needed more understanding of related functional areas and IT knowledge about the system.

My conjecture that organizational learning was the major effect of ERP implementation is supported with the propositions by Butler and Pyke (2004) that: ‘The implementation of any technology in organizational environments characterized by functional differentiation specialization requires collective learning, coordination and significant organization’ (Butler & Pyke, 2004, p.171).

Implementation of an ERP system therefore should not be viewed as a mere imitation of organizational processes. As organizational knowledge is embodied in routines and operating procedures (Pisano, 1994; Grant, 1996; Butler & Pyke, 2004; Lam, 1997) when organization reengineers own processes to ERP best practices, organizational routines change, resulting in ‘double-loop’ learning.

5.2.2 Disparity in the level of learning amongst Small, Medium and Larger Enterprises

The empirical investigation indicated one interesting aspect: In the experience of the interviewees the disparity between levels of learning and adaptation was dependent on the size of the firm. It was noticed that big firms learn and adapt their practices more reluctantly than the small ones. This is consistent to the thought of Szulanski (1996) that within the transfer of best practice the identity of the recipient matters and with the findings of the study by Mowery et al. (1996) that larger firms appear to absorb fewer capabilities from their alliances. My empirical evidence attributed this disparity to the bigger stock of knowledge and feeling of high competence possessed by the bigger firms. This could indeed be the result of some firms having a high level of competence in a certain process(es). As a result, when comparing such process to the processes embedded in an ERP system, an organization may perceive own process as superior to other processes in which it has less competence. Yet the latter processes may actually be superior and would have been found to be so if the organization had developed competencies in them equal to its competence in the process that was observed to be more effective (Leavitt and March as cited in Huber, 1991).

Such an assumption may be further extended by arguing that ‘bigger’ firms are also successful firms. It is well established that success tends to lead to the specialization, specialization in turn leads to competence and therefore to more success (Huber, 1991). Specialization also results in conquering niches and regions that are uninhabited by the competitors and so the successful firms may in fact blindly ignore the capabilities and competencies developed by the others. Indeed ‘Organizations tend to learn well what they do and tend to do what they have learned to do well.’ (Huber, 1991, p.108)

Further, the reluctance to adapt to the ‘best practices’ embedded in ERP system by the bigger firms may be attributed to the fact that internalization and ultimate success of practice transfer depends on the support of all employees and the key players at the recipient unit (Kostova, 1998). It is natural to think that implementation project will be posed with more difficulties in achieving such overall support in the larger firms.

5.2.3 Organizational memory development and integration

During the process of ERP implementation the project teams realized that a large amount of knowledge created within the implementation will be inaccessible after the project is over. To overcome this future problem the project teams began to implement various
knowledge repositories. These were paper-based documents and guide-books which recorded experiences of implementation. Such knowledge-enabling structures should have encouraged knowledge sharing and facilitated the structural integration between the knowledge bases of various units and departments. Further they contributed to the development of organizational memory and improved integration – two factors which should support the future growth.

5.2.4 Disruptive nature of ERP embedded knowledge

It is generally argued that every industry has own recipe for success, the conventional wisdom on how the resources, knowledge and processes of the firm should be combined to provide the best outcomes. Yet such a recipe can only provide guidance in activities a firm must accomplish. The differences in histories and resources of the firms, particularly their knowledge may lead the firms to develop a unique set of competitive capabilities (Lane & Lubatkin 1998).

Experts opined that the standard nature of ERP systems may put firms at disadvantage by possibly disrupting their core competitive processes. In such a case ERP systems may have worked as competitive equalizers, by destroying their ‘selling edge’. As demonstrated from the empirical data local context was often not taken into account when implementing ERP systems. Just as expected the firms often saw themselves as recipients of a standardized solution and put forth certain resistance to the introduction of ERP. At least in one case this threat was addressed by the consultant firm early in the implementation.

Care must therefore be taken while transplanting practices. Practices deemed in one environment may not be appropriate in another. A practice should not be considered superior just because some firm had superior results. Many situational and extraneous variables (market, history) may have caused some firms to have better results. Conversely, a firm working under adverse circumstances could have been perceived as an underperformer even if it used outstanding process (O'Dell & Grayson, 1998).

As argued by Porter (1996) the essence of firm’s competitive strategy is performing different activities from own competitors, or performing similar activities in different ways. The popularization and wide-adopt of ERP systems may promote ‘sameness’ amongst companies, leading to margin erosion and bankruptcy. Porter (1996) goes as far to suggest that ‘best business practices’ actually breed homogeneity amongst firms. My empirical evidence revealed that firms are indeed taking caution when adopting ERP systems by leaving some of own core processes unchanged and choosing to instead customize the ERP system. Discarding the firms that implement ERP systems without actually thinking if it is necessary for their activities, we can view ERP implementations on a scale: at one extreme of this scale there are smaller firms that are simply looking forward to have ‘vanilla’ ERP system implemented, replicate the best business practices as they are and try to cope their best with the changes. At the other extreme, there are firms that choose to customize the ERP system so extensively that it poses them with significant difficulties later. Somewhere in the middle ground are firms (such as Kongsberg Automotive) for which best practices embedded in the ERP system serve as catalysts for creative thinking and process development, or re-design of own practices. They do not blindly adopt all practices but engage in ‘selective adaptation’ – by performing certain customizations that they feel are most appropriate. Of course one might question whether this might be called adaptation to the system or the new system merely urges such firm to think about own processes from an innovative perspective.
Practice transfer assumes in varying degrees that a best practice from one organization can be applied in another organization and provide similar results. However, researchers point to the fact that adaptation of a best practice without any shaping of it to the recipient organization is a unique curiosity, some revision is necessary to make the practice fit with the specific characteristics of the recipient (Wareham & Gerrits, 1998). The knowledge of the recipient unit plays a major role in this adaptation.

5.2.5 ERP Systems and growth of the firms

One way to look at the abovementioned ‘selective adaptation’ is from a learning perspective. Organizations have to learn how to best exploit new technologies or ways of working (Wareham & Gerrits, 1998). During the learning process, they may engage in ‘learning-by-doing’ approach, especially when they lack the underlying knowledge needed to stimulate and predict the effects of change. However, if the change lies in an area where there is a well-developed theory and validated empirics or where the organization had experience of making similar changes, organizations may perform more formal planning to accelerate the implementation. If this is not the case, the firm may engage in deliberate experimentation by customizing the ERP system or implementing changes in own processes and observing how it works in practice (Pisano, 1994).

Further, certain aspects of organizational knowledge can be very specific to the firm. Even within the same industry or same technology, different firms may need to utilize different approaches to learning (Pisano, 1994). As firms gain experience in ERP systems through learning by doing, their knowledge base will expand and they may start behaving more opportunistically in the future. Environments are not static, and knowledge base of the firms and their learning styles evolve (Pisano, 1994). Therefore, the patterns of ‘selective adaptation’ to the system may also change over time. Empirical evidence points to such a fact: Kongsberg Automotive initially designed their ERP system according to their own specifications but has lately changed their opinion towards adapting to the best practices imposed by SAP software due to the environmental factors.

Another way to view ‘selective’ or even full adaptation to the system is as a roadmap for change. As put forth by one of the interviewees, best business practices and new quality standards embedded in the ERP are self-imposed by adopter companies to change themselves.

The third way to view ‘selective’ adaptation is the functionality view of the ERP systems. As the data suggested the major reasons for ERP implementation in their firms were achieving certain benefits, such as international expansion or better customer responsiveness.

Regardless of the perspective, ERP implementations seem to be performed with one major thought in their minds: that sustaining competitive advantage under new conditions of dynamic competition requires continuous innovation. Innovation in turn requires extending capabilities to encompass new knowledge (Grant, 1996). ERP adoption, associated learning and the transfer of knowledge thus lie at the heart of the growth of firms; companies grow on their ability to create new knowledge to expand their markets (Kogut & Zander, 2003). As best practices in ERP software are IT based, the goal of adapting to the system is not so much a question of acquiring new technology, but rather learning to incorporate it into the present and emergent organizational knowledge (Wareham & Gerrits, 1998).
5.3 Problems and Inhibitors

5.3.1 Lack of Competence

Consistent with what literature review suggested a significant problem noted by experts was lack of the ERP related knowledge and inexperience of some of the vendor or consultant company’s personnel. Yet even such consultants were put to use in at least one case, due to the lack of better alternatives and internal constraints such as a threat of a Y2K bug disrupting the organizational functions. It may be argued that when faced with competitive market, firms try to acquire knowledge and learn whether or not such knowledge has potential.

The lack of prior experience and related knowledge by the implementer firms was also a significant barrier. Prior experience is indeed critical, if more knowledge and skills are available internally, the less dependent an organization will be on consultants. Prior experience also enables the implementer to evaluate the consultant’s behavior and determine the level of consultants’ expertise. Both, excessive and insufficient involvement of consultants or vendors can be dangerous to the firms. As the interviews revealed, none of organizations had all the necessary knowledge in-house.

Also critical are knowledge and skills needed to fill the strategic roles of the project manager. Evidently an organization is better off if it has such knowledge in house but what should be done if this is not the case? The solution is to increase the implementer’s internal knowledge before the implementation project and thus limit the need for consultants. This can be done by hiring appropriate people, but of course the challenge of finding such ‘appropriate’ people remains.

5.3.2 Causal Ambiguity and Legacy Systems

As predicted in the literature review problems encountered were related to the causal ambiguity of the new knowledge. Adding to this, the knowledge embedded in the legacy systems substantially inhibited the transfer. The exhibited tendency to ‘benchmark’ the new system against the old one illustrated that people are generally reluctant to change, 'unlearn' old and learn new knowledge (Holland & Light, 2003).

The differences between process-based nature of ERP systems which supplanted the transaction-based philosophy of legacy information systems posed a significant problem. An explanation to this can be that transactions performed in legacy systems consisted of similar sequences of actions or a learned repertoire of behaviors which were strongly memorized and routinized by the employees (Zander & Kogut, 1995). Expert views agreed with that of the Szulanski (1996) that knowledge transfers involving the most non-routine problems were perceived as the most difficult by the employees.

The transactional knowledge embedded in the legacy systems is usually referred as ‘procedural knowledge’ (Zander & Kogut, 1995), and as argued it is easier to memorize (and harder to forget) because it can be stored in chunks. Indeed it should be easier to remember smaller parts than to figure out the way to recombine different propositions and processes. However, procedural knowledge can only be used for a limited number of activities, and for the learning of radically new applications such as an ERP system declarative knowledge which consists of facts or propositions is argued to be more effective (Zander & Kogut, 1995).
On the other hand, slow learning curve of the ERP system can be attributed to the fact that while trying to understand the logic and knowledge of the ERP system, the knowledge recipient may rely on prior knowledge of the legacy system. Worded differently – recipient may be not resisting the change but trying to make sense of the change (Cohen & Levinthal as cited in Pan et al., 2001).

Causal ambiguity was also represented through characteristics of the social context; ERP implementations involved dyadic exchanges of knowledge between source and recipient, and the case of ERP implementation in Brazil revealed the difficulty of understanding the local knowledge because of its inherent complications and different regulatory components (laws and regulations of the country).

5.3.3 Resistance

The thought that user resistance is the most important knowledge transfer barriers was omnipresent in interviews and surveys. In fact, the most significant transfer barriers from the surveys are all related to the user resistance. The following discussion elaborates on the nature and inherent impact of such resistance.

It is generally agreed that a process of practice transfer has two aspects: (1) diffusion of a set of rules, (2) creation of an 'infused-with-value' meaning of these rules within the practice recipient organizations employees. What this means is that the knowledge transfer process does not end with the adoption of formal, written rules but goes on until these rules become internalized by the recipient organization. Employees of the knowledge recipient organization should endow the practice with a symbolic meaning and value (Kostova, 1999).

Hence, success of transfer is defined as the degree of institutionalization of the practice at the recipient organization. A practice is institutionalized when it is perceived as a taken-for-granted by the employees, and receives status of 'this is how we do things here' (Kostova, 1999). Institutionalization is conceptualized at two levels; implementation – when the knowledge recipient follows the formal rules implied in business practice and internalization – when the recipient unit endows the practice with value or 'infuses' it with value. Practice becomes internalized when employees see the value of using the practice, accept it, and when the practice becomes associated with employees organizational identity (Kostova, 1999).

Even though definitions of implementation and internalization are distinct they are positively correlated; higher level of implementation will be associated with higher level of internalization. This does not however mean that internalization is an automatic result of implementation. Practice can be formally implemented and followed, but if the employees disapprove of it they will not infuse it with value (Kostova, 1999). As put forth by Kostova (1999): ‘…only when practice is implemented formally and is also internalized by the employees will it become an institutionalized organizational practice. … And only then will the practice be a source of organizational identity and competitive advantage.’ (Kostova, 1999, p.312)

Internalization is related to the concepts of practice commitment, practice satisfaction and psychological practice ownership. Practice commitment is defined as the strength of individual's identification with and involvement in a particular organizational practice. Practice committed individuals can be characterized by a strong belief and acceptance of the practice’s goals and values, devotion to put their effort into the practice implementation, and a strong will to continue using the practice. Practice satisfaction is defined as person’s posi-
tive attitude towards the practice and recognition of the practice’s value to the organization. Psychological practice ownership means that employees feel as if organizational practice is their own and has become part of their “extended selves” (Kostova, 1999). It follows then that during ERP implementation, what must be considered is the employees’ commitment to, satisfaction with, and perception of ownership towards the ERP embedded practices.

5.3.4 Knowledge Hoarding

The evidence revealed that some persons resisted the ERP initiative and were reluctant to get involved in sharing their knowledge with others. Lack of the knowledge recipient’s motivation has been noted as one of the significant barriers. There are two explanations for this. First, organizational culture that values personal technical expertise and knowledge creation is argued to inhibit the transfer (O’Dell & Grayson, 1998). Second, ERP implementations generally imply a shift in information ownership (Newell et al., 2003) and redirection of information flows (Huang, Newell & Galliers, 2003) and individuals may feel threatened by the related loss of power.

Moreover, as evidence revealed organizational structure promoted ‘silo’ behavior, in which organizational divisions and departments focused on maximizing own accomplishments and therefore consciously resisted the implementation, hoarding the information they had and sub-optimizing the transfer.

5.3.5 Characteristics of Organizational context

As foreseen in the literature review organizational characteristics tended to change attitude of the implementer firms, especially at subsidiary units. Lack of financial or other types of incentives and appreciation for performing ERP related work were pointed out as inhibitors.

The critical challenge of integrating knowledge was bringing the key parties together. The lack of contact, trust, relationships, common perspectives, meeting time and spaces, differences in status of knowledge owners, were all mentioned as important transfer barriers within the project team. Knowledge integration in the projects applied not only to various sources of knowledge but also to solving conflicts between the different parties involved. As suggested by the literature tension and intra-group competition in the projects with several consultant companies and resultant knowledge-hoarding were omnipresent. At least in one case consultant firms resented taking responsibility to coordinate the entire project, and the implementer company had to step into that role.

5.3.6 Characteristics of the Social context

Somewhat unexpectedly lack of a shared language posed a problem but not an irresolvable one. My personal speculation is that while a lack of a shared language is a barrier (Davenport & Prusak, 2000), it can be overcome by using good technical or business translation practices. Further, the cultural orientation of the unit, its willingness to learn and openness to change may have positively affected the transfer (Kostova 1999).

The country and national characteristics however need to be taken into account when transferring knowledge as the difficulties in the transfer of knowledge between different cultures and nations stem not simply from the ambiguous and highly tacit nature of some knowledge but from differences in the degree of tacitness of knowledge and the way in
which it is formed, structured and utilized in different countries Lam (1997). Many barriers lie in the nature of the knowledge itself and its social embeddedness (Lam, 1997).

Empirical data suggests that different social environment dictated different behavior and various methods for knowledge transfer. As suggested by Kostova (1999) organizations indeed tended to absorb practices which are socially legitimate, i.e. consistent with the regulatory, cognitive and normative institutions in their countries.

5.4 Activities and Enablers

5.4.1 Rigor and Discipline

Importance of project management for successful implementation was stressed in the interviews. Adoption of a complete and proven methodology to plan and coordinate deployment of the resources needed, along with a rigorous discipline, definition of clear and consistent goals, establishment of metrics and results-based orientation were mentioned as important. Using such methodology allowed the implementer firms to avoid numerous pitfalls associated with unplanned introduction and lack of comprehension of the ERP systems.

Project implementation methodology, technical knowledge and skills were often provided by consultants and the vendors. However the implementer firms had to possess some technical competencies such as system administration, system customization and a good conceptual understanding of the system. Possession of such shared knowledge aided the process of transfer. If not already present, this knowledge also had to be transferred into the organization during the implementation.

5.4.2 Education and Knowledge Codification

The organizations used different methods to train their staff. One approach was to train key users, who then established internal training programs in their units. This is usually referred as the “train the trainer” method (Haines & Goodhue, 2003) in the literature. Such massive training and certification of the employees created a change readiness in the organizational culture and showed the organizations’ commitment to the implementation.

The concentration of knowledge in individual experts puts the project teams in a highly vulnerable situation when such individuals leave. As empirical data pointed out it was felt essential within the implementation projects to develop systems for abstracting knowledge from the individuals and storing it in written procedures and documents to retain it and to make it accessible to a wider circle of individuals. Lam (1997) calls such form of knowledge creation ‘mechanistic’ and argues that the dominant form of coordination and knowledge transfer in such case is document based. Benefits of storing knowledge in codified form are transparency and higher accessibility (Lam, 1997).

As evidence revealed, production of explicit manuals and training documentation was ubiquitous. Further, degree of knowledge codification had a significant influence on the speed and difficulty of knowledge transfer. As argued by Kogut and Zander (2003) the costs of transfer originate from the degree of tacitness of knowledge. These costs arise from the efforts of codifying and teaching complex knowledge to recipients; the less knowledgeable the user, more efforts will be necessary. As a result if the source and recipi-
ent firms had developed procedures by which to codify knowledge, they should more often succeed in transfer of their knowledge.

Empirical data uncovered that both; consultant and implementer firms are looking to record their implementation experiences for the development of better implementation methods. Development of such methods increases organizational knowledge, improves and expedites further implementation, and probably reduces costs. It may also allow for deployment of less experienced (possibly less expensive) consulting staff. Empirical evidence spoke nothing of such practices adopted by the vendors yet such lack of evidence may be attributed to the composition of the sample attained as none of the respondents were employees of the ERP vendor firms.

Evidence pointed to the effect of the environmental context on both: the choice of educational methods and level of knowledge codification. As pointed out unstable environment and time-constraints necessitated less formal methods of knowledge transfer and learning. The explanation to this can be that where the environment is more dynamic and the firm needs to rapidly change its products, services or processes to adapt to the changing demands, more organic structure is required (Newell et al., 2003). Organic structures are characterized by low degrees of standardization, formalization, specialization and hierarchy in their structure (Newell et al., 2003).

### 5.4.3 Getting the right mix of competencies

As a result of specialization, differentiation, and departmentalization, organizations frequently do not know what they know (Huber, 1991). My findings revealed that the composition of the project teams conveyed the will of the organizations to ensure that representatives of various functions were contributing and transferring their knowledge to the implementation. Standardization and localization of knowledge were also perceived important.

As expected all experts opined that mixing persons with different backgrounds in the team was a positive factor. This is consistent with proposition by Demsetz (as cited in Grant, 1996) that efficiency in the acquisition of knowledge requires that individuals specialize in specific areas, however the application of knowledge to requires the bringing together of many areas of specialized knowledge.

Modularity and efficient division of labor to different sub-teams implementing different modules were also observed and perceived as beneficial. Such division should be seen as an efficient decomposition of transferred knowledge into smaller chunks, which speeds up coordination and communication within the project (Zander & Kogut, 1995).

### 5.4.4 Communication Patterns

The knowledge transfer does not occur in a social vacuum but was contextually embedded and is influenced by that context (Kostova, 1999). Communication patterns within the project team were clearly felt to be important by the experts as it was advised to intensely communicate within the project team and with the business itself. This is in line with the thought of Zander and Kogut (1995) that to replicate new knowledge in the absence of a social community is difficult. Further, it was felt that it is easier to transfer knowledge within projects where participants have higher teamwork orientation and have worked together for extended periods of time. Observation of any team as argued by Grant (1996) brings to light closely coordinated working procedures where team members apply own
specialist knowledge, but where the patterns of interaction appear automatic. Such coordination is developed through intense interactions, training and constant repetition supported by a series of explicit and implicit signals (Grant, 1996).

As data revealed within the implementation project the knowledge recipient firms got close to the knowledge source firms to understand not just the objective and explicit components of the source’s capabilities but also the more tacit component: the know-how of knowledge. And while e-collaboration has been used for transfer of explicit knowledge, learning tacit knowledge required extensive face-to-face interactions; as such knowledge is literally absorbed through action or experience (Takeuchi & Nonaka, 1995). Empirical evidence found support for both types of knowledge transfer. Printed material, and IT-tools were used for making individual knowledge explicit and easily accessible for the rest of the organization. However large part of the learning took place through interaction within the project teams and practice of sending the experienced personnel to the implementation sites was often exercised. The preferred medium was face-to-face communication. This indicates that the knowledge perceived as most important by the project members was at least to some extent – tacit. A great share of the important information people needed to implement in the system could not be written down – it required to be shown through dialogue or interactive problem solving. Such an observation is harmonious with a thought by Takeuchi & Nonaka (1995) that the differences between more or less successful industry knowledge transfers lies in the way in which the individuals succeed in capturing the tacit knowledge - the know-how, judgment, and intuition of each party.

Further, more intense communication patterns should have created higher information-processing capacity, and such capacity is especially desirable when the firms are posed with task of extensive knowledge transfer and integration (Gupta & Govindarajan, 1991).

From the empirical data the transfer of knowledge emerged as a major aspect in the relationship between the implementer and consultant firms. This had implications on how organizations selected appropriate consultants. As predicted by the literature, expertise and positive experience of prior collaborative work were the criteria most commonly used for the selection of a consultant. My findings also suggest that organizations need to take into account the willingness and ability of consultants to transfer their knowledge.

### 5.4.5 Personality of Employees

As anticipated from the literature experts opined that the real problems within implementation lie in people, not in technology. Culture and behavior were the key enablers and inhibitors of knowledge sharing. Personality of the employees and their motivation affected their level of resistance and different modes of knowledge transfer chosen. The effect of the different ‘mind maps’ on the knowledge transfer gave support to the proposition that how information is framed and labeled affects its interpretation (Huber, 1991).

### 5.4.6 Capacity to Change

Also important was the firm’s capacity and determination to change. Unpreparedness for change was noticed as an inhibiting factor. On the other hand; the favorable attitude to the change and the openness of the management and project team to the employee involvement in the ERP implementation were undoubtedly facilitating factors for the knowledge transfer. Indeed, as literature review suggested implementation of a practice is not automatically followed by internalization (Kostova, 1999). Even when ERP based practice is
formally implemented employees may still not infuse it with value by developing positive attitudes towards it. They may disapprove of the practice or some of its aspects, perceive it coming from the top, or they simply may not have had the time to develop a positive attitude towards it (Kostova, 1999). Addressing user feedback by making non-principal, minor user interface modifications and user involvement in the change were mentioned as essential to overcome such resistance. Further, the increased interaction with the users was beneficial to understand the knowledge embedded within organizational practices and processes.

As predicted in the literature, support from the top management in both resources and endorsement of the ERP was perceived extremely important by the experts. The steps undertaken were creation of the unified vision for the company that endorsed and sustained ERP implementation and related learning and transfer. As put forth by O’Dell and Grayson (1998) to effectively implement the change, management has to take an active, supportive role.

5.4.7 Structure and Autonomy

Quite unexpectedly (at least to the author) experts opined that devolving control to the project team and making it autonomous is not the good choice. In fact, strict decision making, and a large amount of bureaucracy were recommended. This is consistent with a thought of Motwani (as cited in Tchokogue et al., 2005) that ‘Incremental, bureaucratic, strategy led, cautious implementation process backed with cultural readiness and careful change management are factors that contribute to successful ERP implementations.’ (Tchokogue et al., 2005, p161). However a good balance of bureaucracy with ad-hocracy was still recommended pointing to the knowledge-intensive nature of ERP implementation projects.

5.4.8 Shared Knowledge and Relationship Building

The fact that IT group within the firms generally worked well within implementations is consistent with the proposition by Zander and Kogut (1995) that new skills are more easily learned when they share elements with already acquired knowledge.

As anticipated, development of common vocabulary was pointed out as an important facilitator to the knowledge transfer. As the findings revealed, in the beginning when implementation team was created many people were strangers to each other. The process of relationship building started through increased information sharing and increased interaction between team members. The initial informal communication, joint development of process maps, and formal training within the project team should have successfully established a common ground and trust into which project members rapidly socialized later. As a result more shared knowledge links were found, fostering social relationships and creating something similar to a ‘strong willed a soccer team’. These relationships should be perceived as crucial for transfer success as they also contributed to the development of open communication patterns.

5.4.9 Internalization

Internalization which is defined as organization’s ability to use the knowledge acquired within the transfer was seen as an important enabler. This is consistent with the thoughts of Davenport and Prusak (2000) and Lane and Lubatkin (1998) that effective knowledge transfer requires not only transmission but also knowledge absorption and use. Further-
more, internalization entails organization’s ability to identify relevant knowledge and to disseminate this knowledge across the firm. This ability is argued by Werr (2005) to be dependent on earlier experiences of involved individuals and the existence of areas for knowledge exchange.
Conclusions

This study focused on developing a better understanding of the role of the knowledge transfer within ERP implementation projects. Three specific research questions were probed:

1. What is the effect of the transfer of knowledge that is associated with ERP implementations?
2. What (if any) knowledge transfer barriers have been identified during the ERP implementation process?
3. What types of activities did the firms initiate to enable the knowledge transfer during the ERP implementation process?

The answer to the first question is that organizational learning is the major effect of the ERP implementations. For the businesses the ERP implementation projects mean a reassessment of their organizational practices and routines. The impact of ERP implementations is that not only firms reengineer own processes according to ERP best practices, but often view own processes from an innovative perspective. Therefore ERP implementations are not mere imitations of organizational processes. As organizational knowledge is embodied in routines and operating procedures when these processes are reengineered to conform to the ERP best practices, organizational routines change, resulting in organizational learning. An ability of firms to learn from the ERP implementations is jointly determined by the relative characteristics of the parties participating in the learning process.

To answer the second question my empirical investigation identified a number of barriers that inhibit the knowledge transfer within ERP implementations. These barriers mainly stem from two origins: the nature of transferred knowledge itself and the lack of social relationships between the individuals participating in the transfer. The substantial part of the knowledge necessary for ERP implementation is tacit by nature and socially embedded in various organizational systems, structures, individuals and relations. Such knowledge will need to be literally extracted from the minds of various individuals. Furthermore, this extracted knowledge will need to be transferred. Underdeveloped relationships, both on the personal and project team-business are a significant source of transfer barriers. Lack of social communication, tense relations, absence of shared knowledge and behavioral norms amongst the stakeholders participating in the project result in sub-optimal transfers.

My study has also answered the third question: ERP implementer firms to various degrees engage in different activities to enable the process of knowledge transfer. The process of ‘knowledge conversion’ which involves interaction between different tacit and explicit types of knowledge is used for extraction of tacit knowledge. The project teams perceive that the knowledge most important for successful implementations is at least to some extent – tacit and recognize the fact that the critical success factor for knowledge conversion is bringing the key parties together. Consequently the creation of supportive working relationships for the project teams is perceived as the most important activity. However creation of such relationships is not a straightforward task, as the challenge of the inter-organizational knowledge transfer lies in the complications of the interface between the different firms participating in the project. The management of this interface is demanding as it involves overcoming problems at two levels: those affecting the project team, and those affecting the relationship between the project team and the implementer firm itself.
Conclusions

At the team level problems include configuration of the ERP system, integration of diverse knowledge of the participants, management of possible tense relations and intra-group competition, and daunting task of developing shared knowledge. At the project team-organization interface problems include managing relations with other organizational entities, such as top management, steering and liaison committees, management and users at the units where ERP is to be implemented. Only when the problems at the project team level and between the team and other stakeholders are resolved that the knowledge transfer and ERP implementation will succeed.

The central message of my study is that knowledge transfer is a key issue in ERP implementation. The need for knowledge transfer continues even after implementation. Moreover, the knowledge integration does not happen automatically as the ERP implementation is not purely a technological task, but a process of knowledge transfer enabled by establishment and preservation of knowledge based social relationships.
Reflections

7 Contributions

In my opinion this work can benefit two major groups: ERP practitioners and Information Systems researchers.

For the first group this thesis provides a comprehensive overview of the issues posed in ERP implementations. While not explicitly producing a methodology for solving various knowledge-related issues encountered in the implementation projects my study provides insights into the nature and dynamics of the complexity that underlie ERP implementations by identifying and discussing the nature of barriers and enablers within the knowledge transfer.

Various authors have researched potential benefits (Davenport, 2000; Shang & Seddon, 2003; Adam & O’Doherty, 2003; Ross et al., 2003; Olson, 2004) and critical success factors (Ross et al., 2003; Grabski et al., 2003; Sumner, 2003; Holland & Light, 2003; Parr & Shanks; 2003) of ERP implementation. Yet very few have analyzed ERP implementation from a knowledge management perspective. My thesis benefits Information Systems researchers because it offers a knowledge management based perspective that sees ERP implementations as a processes of collective knowledge construction (Berger & Luckmann, 1991) and transfer which is influenced by various participants such as a project team, different organizational units, users, top management, external consultants and ERP vendors.

7 Limitations

I am aware that my study has several limitations. Due to the limited resources only five interviews have been conducted. Furthermore, four experts interviewed were from Sweden and only one expert was international. This may not give an all-comprehensive understanding of the phenomena at hand. Still I believe that my study is saturated enough to become a building block for more extensive research that could cover a larger sample or entail deeper investigation of the phenomenon.

Furthermore, the qualitative, phenomenological nature of my study may imply that the research was conducted in more subjective fashion (Hussey & Hussey, 1997). However, as my research dealt with actions and behaviors generated within the human minds I felt that using phenomenological approach was appropriate.

Furthermore a disadvantage of semi-structured interviews that were used in the research might be the presence of interviewer bias (Thomas, 2004). Yet such choice posited me with a major advantage by raising the potential for meaningful communication. Additionally semi-structured interviews were suited because my sample was heterogeneous (Thomas, 2004).

7.3 Propositions for Future Research

The major findings of this study leads to the claim that successful knowledge transfer increases the success of ERP implementation projects. Therefore if the organization overcomes the difficulties of radical change associated with implementation of a new information system it will positively affect the effectiveness of such system.
However, success of the knowledge transfer is not determined simply by implementation. In fact, knowledge is successfully transferred only when it reaches the status of internalization – when the recipient unit endows the practice with value or ‘infuses’ it with value (Kostova, 1999). The further research could investigate this second phase of knowledge transfer.

An ERP implementation is also an interactive, ongoing and dynamic process that should not rest on a static body of knowledge. The need for knowledge transfer continues even after implementation. The alternative direction for the research would be to analyze the post-implementation phase, when ERP project team is disbanded and ERP support group is created instead. What would be the dominant strategies for an organization after the implementation stage is over – after all transferred knowledge is internalized by employees in the implementer firm?
Reference List


Appendices

Appendix A - Interview Questions

I. Personal Background (5 minutes)

1. What is your current position and responsibilities?

2. How long is your experience with ERP? In what roles, positions? Please elaborate on the essence of your participation in ERP projects, what is it that you exactly did/do in them?

II. Contextual Questions (50 minutes)

1. In your opinion does ERP systems adoption affect knowledge-base of the company?

2. What are the regular problems encountered when ERP users try to learn a new system?

3. Can some of these problems be partially attributed to new knowledge? Which ones?

4. Could it be that with newly hired people resistance can be lower?

5. How did you (do you) handle such problems in your organization/organization of your choice?

6. Has the customer company ever specifically requested the consultants to write down everything they did? Is such knowledge transfer contractual based?

7. Did personality of employees affect their perceptions of the system and how? E.g. length of employment with the company, or senior (aged) employees.

8. What types of activities in your opinion transfer ‘business knowledge’ best?

9. What types of activities in your opinion transfer ‘IT knowledge’ best?

10. In regards to E-collaboration tools do they actually help or do they cause even more complications in a sense that some people have to learn how to use them too?

11. To what extent can you agree with the concept of the ‘best business practice’ (BBP) itself? Is it not preposterous to claim that some practices are best? Practices deemed efficient in one environment may not be appropriate in another. Are factors like environmental, social, technical environment of the ERP adopter firm taken into account when transferring BBP?

12. BBP’s fundamental assumption is transferability, in a sense that BBP from one organization can be applied in another organization and will provide same results. Can you agree with that?
13. Sub-question: Literature claims that the adaptation of a best practice without any shaping of it to the receiving organization is very rare. In your experience how frequently have you encountered minimal or no-at-all configuration instances of ERP?

14. What do you think are the major barriers of business knowledge transfer?

15. How about level of formality?

16. What do you think are the major barriers/inhibitors of knowledge transfer?

17. Have you observed tensions between project team members? What type of tension? Did it inhibit knowledge transfer and in what ways?

18. As a consultant do you view your knowledge easily transferable (explicit) or hardly transferable (tacit)?

19. What type of interactions do you think can help in knowledge transfer?

20. Do you think mixing people of different backgrounds in project team helps (IT, business, etc) knowledge transfer?

21. Do you think that if project gets a distinct identity and people working in it feel as a team – the k-transfer will be more successful? One article tells of experience of the project team that got so coherent that they fought with the rest of the organization. Have you encountered anything like this?

22. Did members of the business see themselves as the recipients of the standardized solution because of ERP implementation?

23. Project group and business itself can perceive each other as adversaries and not support. Ever encountered this?

24. Ever had experience when nobody fully understood the concept behind the BBP?

25. The greater the magnitude and scope of K creation – the greater should be the need for autonomy of the project team. Can it be argued that bigger the project, more autonomy has to be assigned to the project team then?

26. Do you think attitude and devotion are paramount for successful k-transfer?

27. Do you agree with the idea that if ERP system is not utilized it will become history for the organization? Why do you think people often use shadow systems even after ERP implementations?

28. Can you agree with an idea that best practices are a roadmap for change?

29. Have you seen companies just adopting technology because it is a ‘fad’?

III. Thank You, Follow up (5 minutes)
## Appendix B – Survey 1. Knowledge Transfer Barriers

Following is the list of knowledge transfer barriers that have been identified from the research literature. In a second column, based on your experience rate their strength on the scale of 1 to 5 (1 – corresponding to extremely weak barrier, 5 to the extremely strong barrier) as an inhibitor of knowledge transfer. In the third column please write relative frequency of occurrences – L for low, M for medium, F for frequent. Enter “-“, if you feel that the issue does not refer to your experience.

<table>
<thead>
<tr>
<th>Transfer Barrier</th>
<th>Strength</th>
<th>Frequency of occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of trust amongst the project team members</td>
<td></td>
<td></td>
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<tr>
<td>Lack of trust between the project team and the business itself</td>
<td></td>
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<tr>
<td>Different national cultures of vendor, consultant and customer</td>
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<tr>
<td>Different languages</td>
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<tr>
<td>Different frames of reference</td>
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<tr>
<td>Lack of time and meeting places</td>
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<tr>
<td>Narrow idea of productive work</td>
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<tr>
<td>Differences in status of Knowledge Owners (some might be top managers, some just regular workers)</td>
<td></td>
<td></td>
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<tr>
<td>Differences in incentives and compensation schemes (e.g. some companies reward quantitatively for sales volume, some qualitatively – how valuable the employee’s knowledge is etc.)</td>
<td></td>
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<tr>
<td>“Not invented here” syndrome (low acceptance of copying and adapting best practice)</td>
<td></td>
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<tr>
<td>Intolerance of mistakes in the project team</td>
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<tr>
<td>Intolerance of need for help in the project team</td>
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<tr>
<td>Lack of motivation from the knowledge source (vendor, consultant)</td>
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<tr>
<td>---------------------------------------------------------------</td>
<td></td>
<td></td>
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<tr>
<td>Lack of motivation of the knowledge recipient (customer)</td>
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<td></td>
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<tr>
<td>Lack of prior experience or related knowledge of the customer</td>
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<td></td>
</tr>
<tr>
<td>Lack of prior experience or related knowledge of the vendor or consultant</td>
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<tr>
<td>Tense relations in the project team</td>
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<tr>
<td>User resistance (users might feel project comes from the top and think it will complicate their lives further)</td>
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<tr>
<td>User resistance to system change</td>
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<td></td>
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<tr>
<td>Legacy systems inertia</td>
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<tr>
<td>Users do not feel that knowledge source is reliable (source can be challenged or resisted)</td>
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<td></td>
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<tr>
<td>Users perceive new system as a threat to their job security</td>
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<tr>
<td>Differences in levels of organizational culture of formality between organizations participating in the project</td>
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<tr>
<td>Unclear project definition (client does not know what he wants)</td>
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<tr>
<td>Technical jargons adopted by implementation team</td>
<td></td>
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<tr>
<td>Gaps in skills between organizations participating in the project</td>
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<td></td>
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<tr>
<td>Ambiguous (unclear to the customer) knowledge</td>
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<tr>
<td>Inter-group competition (E.g. if customer is implementing two ERP projects at the same time)</td>
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<tr>
<td>Differences between previous business practices and new ‘ERP’ practices</td>
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<tr>
<td>Differences in technology (IT)</td>
<td></td>
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</tbody>
</table>
### Appendix C – Survey 2. Knowledge Transfer Enablers

In this table based on your experience please rate the strength of knowledge enablers (factors that assist knowledge transfer), on a scale of 1 to 5 (1 – corresponding to extremely weak enabler, 5 to the extremely strong enabler). Enter “-“, if you feel that the issue does not refer to your experience.

<table>
<thead>
<tr>
<th>Knowledge Enabler</th>
<th>Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of common knowledge (business knowledge, process knowledge, IT-knowledge, etc)</td>
<td></td>
</tr>
<tr>
<td>Shared behavioral norms</td>
<td></td>
</tr>
<tr>
<td>Frequency and variability of task performance</td>
<td></td>
</tr>
<tr>
<td>Division of labor</td>
<td></td>
</tr>
<tr>
<td>Less bureaucracy/More adhocracy</td>
<td></td>
</tr>
<tr>
<td>Frequency of communication</td>
<td></td>
</tr>
<tr>
<td>Frequency of actual face-to-face communication</td>
<td></td>
</tr>
<tr>
<td>Informality of communication</td>
<td></td>
</tr>
<tr>
<td>Number of people in communication</td>
<td></td>
</tr>
<tr>
<td>Various backgrounds of people in communication</td>
<td></td>
</tr>
<tr>
<td>Autonomy of the project team</td>
<td></td>
</tr>
<tr>
<td>Support from the top management</td>
<td></td>
</tr>
<tr>
<td>Documentation of activities at each step</td>
<td></td>
</tr>
<tr>
<td>Trainings, seminars, formal education</td>
<td></td>
</tr>
<tr>
<td>Apprentice model</td>
<td></td>
</tr>
</tbody>
</table>
Informal knowledge networks*, Communities of Practice**

<table>
<thead>
<tr>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-collaboration tools (e-mail, groupware)</td>
</tr>
<tr>
<td>Cross functional teams</td>
</tr>
<tr>
<td>Rotation of team members between different departments to transfer knowledge</td>
</tr>
<tr>
<td>Standardization and Documentation of Knowledge</td>
</tr>
<tr>
<td>Localization of Knowledge in more decentralized organizations</td>
</tr>
<tr>
<td>Providing opportunities to interact and learn about best practices rather than just them ordering the organization to adhere to them</td>
</tr>
<tr>
<td>Clear deliverables/deadlines/goals</td>
</tr>
<tr>
<td>Resemblance of vendor/consultant/user organization in certain ways***</td>
</tr>
<tr>
<td>Openness and Trust (willingness of the individuals involved in the consulting process to share their knowledge with each other and interact freely)</td>
</tr>
<tr>
<td>Prior experience of working with specific partners</td>
</tr>
<tr>
<td>Organizations ability to use the knowledge obtained</td>
</tr>
<tr>
<td>Motive (background of cooperative relationship)</td>
</tr>
</tbody>
</table>

*Knowledge networks are defined as self organizing groups of individuals who have similar interests and may communicate face-to-face or using technologies like telephone, groupware, e-mail etc., to share expertise and solve problems

** Communities of Practice refer to the process of learning that happens when people who have a common interest in some subject or problem collaborate over an extended period to share ideas and find solutions to the problem.
*** It is argued that if one company wants to apply knowledge generated by another company, they should resemble each other in certain ways to allow the transfer. Such resemblance can be either external – the organization's relationship to the environment, or internal – organizational processes, technology, organization's portfolio of resources, etc.

Thank You.

Please sign and date.

Signature ___________________________ Date ________________ Place ___________________________
Appendices

Appendix D - ERP Vendors, Selection Criteria, ERP Customers

ERP Vendors

Largest ERP software vendors that accounted for the 72% of the worldwide revenues in 2004 were the following:

- SAP (Systems Applications and Products in Data Processing) – the market leader in ERPs with 40% of market share (Woodie, 2007). Based in Germany, SAP provides multitude of ERP applications, with special emphasis on multi-country, multicurrency environments, scalability and web-based platform independence (Pang, 2001).

- Oracle, having acquired PeopleSoft (formerly well known for HR management software) and JD Edwards (which targeted small to medium enterprises) controlled 22% of ERP market by 2004 (Woodie, 2007) and is widely known for developing ERP products that are easily interfaced with other applications to create so called 'best of breed' ERP packages which integrate most appropriate modules coming from different vendors. Oracle also produces Oracle relational database management system – often a kernel of many ERP products (Pang, 2001).

- Sage Group – based in England, has very strong presence in Europe is fast-growing and accounts for 5% of the market (Woodie, 2007).

- Microsoft’s Business Solutions (MBS) Group – claimed 3% of the market in 2004 (Woodie, 2007).

- SSA Global which acquired another large vendor Baan - has strong background with manufacturing industry and is best known in aerospace, automotive, defense and electronics sectors (Rashid et al., 2002).

Each of these vendors due to historic reasons has a specialty in one particular area, e.g. SAP is known for logistics and Oracle for financials. There is a variety of other ERP vendors aimed at specific market sectors, and Scandinavian market is highly developed at the moment.

Which ERP System?

The resulting strong competition and feature-overlapping products make the choice of the ERP vendor hard. Due to the competition software companies are continuously updating their offerings and adding more features. Long term-vision, commitment to support and service, and vendor experience are looked upon as major qualities for product selection (Ross et al., 2003).

According to Pang (2001) when considering which vendor to select organizations base their decisions by evaluating four factors: functional capabilities, technical attributes, partnership and cost. More detailed these considerations include: functional fit with the organizational business practices, degree of integration among components of the ERP system, flexibility and scalability, user friendliness of the system, quicker implementation time, ability of multi-
site support, technological capabilities (database independence, security), availability of regular updates, amount of customization required, local support infrastructure and costs of implementation (software licenses, implementation, maintenance, hardware base procurement) and availability of requisite knowledge and skills to implement the ERP system (Pang, 2001; Swanson, 2003; Ross et al., 2003).

**Who is using ERPs?**

In the private sector 70% of largest 1000 corporations have implemented ERPs by the year 2000. Corporations such as Microsoft, IBM, General Motors, HP, Mercedes Benz, governmental organizations such as US Department of Defense, NASA, US Army (Pang, 2001), and educational organizations such as University of Nebraska (USA), have all implemented ERPs to aid their work processes. Small to medium size based enterprises are also ERP adopters (Adam & O’Doherty, 2003).
## Appendix E – Business and IT Benefits of ERP Systems Adoption

<table>
<thead>
<tr>
<th><strong>Business Benefits</strong></th>
<th><strong>IT Benefits</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Building more efficient processes (Pang, 2001)</td>
<td>One unified system instead of multiple and often redundant, incompatible IS (Pang, 2001; Ross et al., 2003; Adam &amp; O'Doherty, 2003)</td>
</tr>
<tr>
<td>Meeting Business Process Reengineering requirements (Pang, 2001)</td>
<td>Centralized data source translates into better data visibility (Pang, 2001; Ross et al., 2003).</td>
</tr>
<tr>
<td>Resolving competitive challenges (Pang, 2001)</td>
<td>Facilitates intra and inter-organizational communication and collaboration (Pang, 2001; Ross et al., 2003)</td>
</tr>
<tr>
<td>Dealing with labor shortages (Pang, 2001)</td>
<td>Improved data reporting (Pang, 2001)</td>
</tr>
<tr>
<td>Improvement of back-bone and front-end functions (Rashid et al., 2002)</td>
<td>Improved system scalability with add-ons (Pang, 2001)</td>
</tr>
<tr>
<td>Productivity and quality improvement (Koch, 2007)</td>
<td>Reduce IT costs (Shang &amp; Seddon, 2003)</td>
</tr>
<tr>
<td>Better resource management (Koch, 2007),</td>
<td>Increase IT Infrastructure capability (Shang &amp; Seddon, 2003)</td>
</tr>
<tr>
<td>Improved decision making and planning (Koch, 2007)</td>
<td>Eliminates software interfaces and internal EDI solutions (Adam &amp; O'Doherty, 2003)</td>
</tr>
<tr>
<td>Support for organizational change (Koch, 2007)</td>
<td>Reliable, simple, rapid and automatic circulation of data between modules (Adam &amp; O'Doherty, 2003)</td>
</tr>
<tr>
<td>Integration of financial and customer order information (Koch, 2007)</td>
<td>Better execution of supported business activities (Adam &amp; O'Doherty, 2003)</td>
</tr>
<tr>
<td>Standardization, optimization and speeding up of processes (Koch, 2007; Adam &amp; O'Doherty, 2003)</td>
<td></td>
</tr>
<tr>
<td>Reducing inventory (Koch, 2007)</td>
<td></td>
</tr>
<tr>
<td>Standardization of HR information (Koch, 2007),</td>
<td></td>
</tr>
<tr>
<td>Cycle time reduction (Davenport, 2000),</td>
<td></td>
</tr>
<tr>
<td>Faster information transactions (Davenport, 2000)</td>
<td></td>
</tr>
<tr>
<td>Better financial management (Davenport, 2000)</td>
<td></td>
</tr>
<tr>
<td>Laying the groundwork for E-commerce (Davenport, 2000)</td>
<td></td>
</tr>
<tr>
<td>Making tacit knowledge – explicit (Davenport, 2000),</td>
<td></td>
</tr>
<tr>
<td>Improved strategic decision making (Ross et al., 2003),</td>
<td></td>
</tr>
<tr>
<td>Building a unified vision of the company (Shang &amp; Seddon, 2003).</td>
<td></td>
</tr>
<tr>
<td>Standardize operating procedures and reporting (Adam &amp; O'Doherty, 2003)</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Business and IT Benefits of ERP Systems Adoption
## Appendix F – Quantitative Results: Transfer Barriers’ Strength

<table>
<thead>
<tr>
<th>Transfer Barrier</th>
<th>IC - Rating</th>
<th>IC - Frequency</th>
<th>KB - R</th>
<th>KB - F</th>
<th>M.A. - R</th>
<th>M.A. - F</th>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of trust amongst the project team members</td>
<td>4</td>
<td>M</td>
<td>2</td>
<td>M</td>
<td>3</td>
<td>M</td>
<td>3.00</td>
<td>3</td>
<td>#N/A</td>
</tr>
<tr>
<td>Lack of trust between the project team and the business itself</td>
<td>3</td>
<td>F</td>
<td>4</td>
<td>F</td>
<td>3</td>
<td>M</td>
<td>3.33</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Different national cultures of vendor, consultant and customer</td>
<td>3</td>
<td>F</td>
<td>1</td>
<td>L</td>
<td>4</td>
<td>M</td>
<td>2.67</td>
<td>3</td>
<td>#N/A</td>
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<tr>
<td>Different languages</td>
<td>1</td>
<td>L</td>
<td>1</td>
<td>L</td>
<td>4</td>
<td>M</td>
<td>2.00</td>
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<td>1</td>
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<tr>
<td>Different frames of reference</td>
<td>3</td>
<td>M</td>
<td>2</td>
<td>M</td>
<td>3</td>
<td>L</td>
<td>2.67</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Lack of time and meeting places</td>
<td>2</td>
<td>L</td>
<td>4</td>
<td>F</td>
<td>5</td>
<td>F</td>
<td>3.67</td>
<td>4</td>
<td>#N/A</td>
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<tr>
<td>Narrow idea of productive work</td>
<td>1</td>
<td>F</td>
<td>3</td>
<td>M</td>
<td>4</td>
<td>M</td>
<td>2.67</td>
<td>3</td>
<td>#N/A</td>
</tr>
<tr>
<td>Differences in status of Knowledge Owners (some might be top managers, some just regular workers)</td>
<td>4</td>
<td>F</td>
<td>3</td>
<td>M</td>
<td>3</td>
<td>M</td>
<td>3.33</td>
<td>3</td>
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</tbody>
</table>
## Differences in incentives and compensation schemes (e.g. some companies reward quantitatively for sales volume, some qualitatively – how valuable the employee’s knowledge is etc.)

<table>
<thead>
<tr>
<th>Score</th>
<th>Frequency</th>
<th>Weight</th>
<th>Average</th>
<th>Range</th>
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<tbody>
<tr>
<td>2 L</td>
<td>2</td>
<td>2 L</td>
<td>3 M</td>
<td>2.33</td>
</tr>
</tbody>
</table>

## “Not invented here” syndrome (low acceptance of copying and adapting best practice)

<table>
<thead>
<tr>
<th>Score</th>
<th>Frequency</th>
<th>Weight</th>
<th>Average</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 L</td>
<td>1</td>
<td>4 M</td>
<td>3 F</td>
<td>2.67</td>
</tr>
</tbody>
</table>

## Intolerance of mistakes in the project team

<table>
<thead>
<tr>
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<th>Weight</th>
<th>Average</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 M</td>
<td>2</td>
<td>2 M</td>
<td>4 L</td>
<td>2.67</td>
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</tbody>
</table>

## Intolerance of need for help in the project team

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<th>Frequency</th>
<th>Weight</th>
<th>Average</th>
<th>Range</th>
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</thead>
<tbody>
<tr>
<td>3 F</td>
<td>3</td>
<td>2 M</td>
<td>3 L</td>
<td>2.67</td>
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</tbody>
</table>

## Lack of motivation from the knowledge source (vendor, consultant)

<table>
<thead>
<tr>
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<th>Frequency</th>
<th>Weight</th>
<th>Average</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 L</td>
<td>3</td>
<td>3 M</td>
<td>2 N/A</td>
<td>2.67</td>
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</tbody>
</table>

## Lack of motivation of the knowledge recipient (customer)

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<thead>
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<th>Frequency</th>
<th>Weight</th>
<th>Average</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 L</td>
<td>1</td>
<td>4 F</td>
<td>4 M</td>
<td>3.00</td>
</tr>
</tbody>
</table>

## Lack of prior experience or related knowledge of the customer

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<th>Frequency</th>
<th>Weight</th>
<th>Average</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 M</td>
<td>1</td>
<td>5 F</td>
<td>4 M</td>
<td>3.33</td>
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</tbody>
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#N/A
<table>
<thead>
<tr>
<th>Issue</th>
<th>Impact</th>
<th>Difficulty</th>
<th>Resistance</th>
<th>Threat Level</th>
<th>Average Impact</th>
<th>Average Difficulty</th>
<th>Average Resistance</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>Lack of prior experience or related knowledge of the vendor or consultant</td>
<td>3</td>
<td>L</td>
<td>4</td>
<td>F</td>
<td>3</td>
<td>N/A</td>
<td>3.33</td>
<td>3</td>
</tr>
<tr>
<td>Tense relations in the project team</td>
<td>4</td>
<td>F</td>
<td>3</td>
<td>M</td>
<td>N/A</td>
<td>N/A</td>
<td>3.50</td>
<td>3.5</td>
</tr>
<tr>
<td>User resistance (users might feel project comes from the top and think it will complicate their lives further)</td>
<td>3</td>
<td>F</td>
<td>5</td>
<td>F</td>
<td>4</td>
<td>M</td>
<td>4.00</td>
<td>4</td>
</tr>
<tr>
<td>User resistance to system change</td>
<td>4</td>
<td>F</td>
<td>4</td>
<td>F</td>
<td>4</td>
<td>F</td>
<td>4.00</td>
<td>4</td>
</tr>
<tr>
<td>Legacy systems inertia</td>
<td>3</td>
<td>M</td>
<td>4</td>
<td>F</td>
<td>3</td>
<td>M</td>
<td>3.33</td>
<td>3</td>
</tr>
<tr>
<td>Users do not feel that knowledge source is reliable (source can be challenged or resisted)</td>
<td>1</td>
<td>L</td>
<td>3</td>
<td>M</td>
<td>N/A</td>
<td>N/A</td>
<td>2.00</td>
<td>2</td>
</tr>
<tr>
<td>Users perceive new system as a threat to their job security</td>
<td>3</td>
<td>F</td>
<td>5</td>
<td>F</td>
<td>3</td>
<td>M</td>
<td>3.67</td>
<td>3</td>
</tr>
<tr>
<td>Differences in levels of organizational culture of formality between organizations participating in the project</td>
<td>3</td>
<td>M</td>
<td>3</td>
<td>M</td>
<td>N/A</td>
<td>N/A</td>
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</table>
### Table 6: Transfer Barriers’ Strength

<table>
<thead>
<tr>
<th>Issue</th>
<th>Value1</th>
<th>Value2</th>
<th>Value3</th>
<th>Value4</th>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclear project definition (client does not know what he wants)</td>
<td>3 F</td>
<td>4 M</td>
<td>4 F</td>
<td>3.67</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Technical jargons adopted by implementation team</td>
<td>2 F</td>
<td>3 M</td>
<td>4 M</td>
<td>3.00</td>
<td>3</td>
<td>#N/A</td>
<td></td>
</tr>
<tr>
<td>Gaps in skills between organizations participating in the project</td>
<td>4 L</td>
<td>4 M</td>
<td>4 M</td>
<td>4.00</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Ambiguous (unclear to the customer) knowledge</td>
<td>1 F</td>
<td>3 M</td>
<td>N/A</td>
<td>N/A</td>
<td>2.00</td>
<td>2</td>
<td>#N/A</td>
</tr>
<tr>
<td>Inter-group competition (E.g. if customer is implementing two ERP projects at the same time)</td>
<td>4 M</td>
<td>N/A</td>
<td>N/A</td>
<td>3 L</td>
<td>3.50</td>
<td>3.5</td>
<td>#N/A</td>
</tr>
<tr>
<td>Differences between previous business practices and new ‘ERP’ practices</td>
<td>3 F</td>
<td>5 F</td>
<td>3 M</td>
<td>3.67</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Differences in technology (IT)</td>
<td>3 M</td>
<td>2 L</td>
<td>3 M</td>
<td>2.67</td>
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<tr>
<td>Mean</td>
<td>2.60</td>
<td>3.24</td>
<td>3.46</td>
<td>3.07</td>
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<tr>
<td>Median</td>
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<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
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<td></td>
<td></td>
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<tr>
<td>Mode</td>
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<td>4.00</td>
<td>3.00</td>
<td>2.67</td>
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</table>
### Appendix G – Quantitative Results: Transfer Barriers’ Strength * Frequency

<table>
<thead>
<tr>
<th>Transfer Barrier</th>
<th>IC Rating</th>
<th>IC - Frequency</th>
<th>IC Product</th>
<th>KB - R</th>
<th>KB - F</th>
<th>IC F</th>
<th>M.A. - R</th>
<th>M.A. - F</th>
<th>IC P</th>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
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</thead>
<tbody>
<tr>
<td>Lack of trust amongst the project team members</td>
<td>4</td>
<td>2</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>6.00</td>
<td>6</td>
<td>#N/A</td>
</tr>
<tr>
<td>Lack of trust between the project team and the business itself</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td>4</td>
<td>3</td>
<td>12</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>9.00</td>
<td>9</td>
<td>#N/A</td>
</tr>
<tr>
<td>Different national cultures of vendor, consultant and customer</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>2</td>
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<td>Different languages</td>
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<td>3.33</td>
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<td>Different frames of reference</td>
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<td>4</td>
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<td>3</td>
<td>4.33</td>
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<td>#N/A</td>
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<tr>
<td>Lack of time and meeting places</td>
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<td>1</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>12</td>
<td>5</td>
<td>3</td>
<td>15</td>
<td>9.67</td>
<td>12</td>
<td>#N/A</td>
</tr>
<tr>
<td>Narrow idea of productive work</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>8</td>
<td>5.67</td>
<td>6</td>
<td>#N/A</td>
</tr>
<tr>
<td>Differences in status of Knowledge Owners (some might be top managers, some just regular workers)</td>
<td>4</td>
<td>3</td>
<td>12</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>8.00</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>
### Differences in incentives and compensation schemes (e.g., some companies reward quantitatively for sales volume, some qualitatively – how valuable the employee’s knowledge is etc.)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Not invented here” syndrome (low acceptance of copying and adapting best practice)</td>
<td>2</td>
</tr>
<tr>
<td>Intolerance of mistakes in the project team</td>
<td>2</td>
</tr>
<tr>
<td>Intolerance of need for help in the project team</td>
<td>3</td>
</tr>
<tr>
<td>Lack of motivation from the knowledge source (vendor, consultant)</td>
<td>3</td>
</tr>
<tr>
<td>Lack of motivation of the knowledge recipient (customer)</td>
<td>1</td>
</tr>
<tr>
<td>Lack of prior experience or related knowledge of the customer</td>
<td>1</td>
</tr>
<tr>
<td>Lack of prior experience or related knowledge of the vendor or consultant</td>
<td>3</td>
</tr>
<tr>
<td>Tense relations in the project team</td>
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### Scores

<table>
<thead>
<tr>
<th>Factor</th>
<th>Score</th>
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</thead>
<tbody>
<tr>
<td>“Not invented here” syndrome (low acceptance of copying and adapting best practice)</td>
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</tr>
<tr>
<td>Intolerance of mistakes in the project team</td>
<td>4.00</td>
</tr>
<tr>
<td>Intolerance of need for help in the project team</td>
<td>5.33</td>
</tr>
<tr>
<td>Lack of motivation from the knowledge source (vendor, consultant)</td>
<td>4.50</td>
</tr>
<tr>
<td>Lack of motivation of the knowledge recipient (customer)</td>
<td>7.00</td>
</tr>
<tr>
<td>Lack of prior experience or related knowledge of the customer</td>
<td>8.33</td>
</tr>
<tr>
<td>Lack of prior experience or related knowledge of the vendor or consultant</td>
<td>7.50</td>
</tr>
<tr>
<td>Tense relations in the project team</td>
<td>9.00</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>User resistance (users might feel project comes from the top and think it will complicate their lives further)</td>
<td>3</td>
</tr>
<tr>
<td>User resistance to system change</td>
<td>4</td>
</tr>
<tr>
<td>Legacy systems inertia</td>
<td>3</td>
</tr>
<tr>
<td>Users do not feel that knowledge source is reliable (source can be challenged or resisted)</td>
<td>1</td>
</tr>
<tr>
<td>Users perceive new system as a threat to their job security</td>
<td>3</td>
</tr>
<tr>
<td>Differences in levels of organizational culture of formality between organizations participating in the project</td>
<td>3</td>
</tr>
<tr>
<td>Unclear project definition (client does not know what he wants)</td>
<td>3</td>
</tr>
<tr>
<td>Technical jargons adopted by implementation team</td>
<td>2</td>
</tr>
<tr>
<td>Gaps in skills between organizations participating in the project</td>
<td>4</td>
</tr>
<tr>
<td>Ambiguous (unclear to the customer) knowledge</td>
<td>1</td>
</tr>
</tbody>
</table>
Appendices

| Inter-group competition (E.g. if customer is implementing two ERP projects at the same time) | 4 | 2 | 8 | N/A | N/A | 3 | 1 | 3 | 5.50 | 5.5 | N/A |
| Differences between previous business practices and new ‘ERP’ practices | 3 | 3 | 9 | 5 | 3 | 15 | 3 | 2 | 6 | 10.00 | 9 | #N/A |
| Differences in technology (IT) | 3 | 2 | 6 | 2 | 1 | 2 | 3 | 2 | 6 | 4.67 | 6 | 6 |
| Mean | 5.83 | 7.79 | 7.21 | 6.83 |
| Median | 6 | 6 | 7 | 6.33 |
| Mode | 9 | 6 | 6 | 6.00 |

Table 7: Transfer Barriers’ Strength * Frequency
### Appendix H – Quantitative Results: Transfer Enablers’ Strength

<table>
<thead>
<tr>
<th>Transfer Enabler</th>
<th>IC - Rating</th>
<th>KB - Rating</th>
<th>MA - Rating</th>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of common knowledge (business knowledge, process knowledge, IT-knowledge, etc)</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>4.00</td>
<td>4</td>
<td>#N/A</td>
</tr>
<tr>
<td>Shared behavioral norms</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>3.00</td>
<td>3</td>
<td>#N/A</td>
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<tr>
<td>Frequency and variability of task performance</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>2.33</td>
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<td>3</td>
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<td>Division of labor</td>
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<td>2.00</td>
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<td>#N/A</td>
</tr>
<tr>
<td>Less bureaucracy/More adhocracy</td>
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<td>4</td>
<td>3</td>
<td>3.33</td>
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<td>3</td>
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<tr>
<td>Frequency of communication</td>
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<td>5</td>
<td>4</td>
<td>4.00</td>
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<td>#N/A</td>
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<tr>
<td>Frequency of actual face-to-face communication</td>
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<td>5</td>
<td>4</td>
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<td>4</td>
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<tr>
<td>Informality of communication</td>
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<td>3</td>
<td>4</td>
<td>2.67</td>
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<td>#N/A</td>
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<tr>
<td>Number of people in communication</td>
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<td>4</td>
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<td>2.67</td>
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<td>2</td>
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<td>Various backgrounds of people in communication</td>
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<td>2.67</td>
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<td>3</td>
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<tr>
<td>Autonomy of the project team</td>
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<td>2</td>
<td>2</td>
<td>1.67</td>
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<td>2</td>
</tr>
<tr>
<td>Support from the top management</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>4.33</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Documentation of activities at each step</td>
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<td>4</td>
<td>3</td>
<td>3.67</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Trainings, seminars, formal education</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>4.33</td>
<td>4</td>
<td>4</td>
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<tr>
<td>Apprentice model</td>
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<td>N/A</td>
<td>2.00</td>
<td>2</td>
<td>#N/A</td>
</tr>
<tr>
<td>Informal knowledge networks*, Communities of Practice**</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>3.67</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>E-collaboration tools (e-mail, groupware)</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>3.67</td>
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<td>Cross functional teams</td>
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<td>4</td>
<td>5</td>
<td>3.33</td>
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<td>#N/A</td>
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<tr>
<td>Rotation of team members between different departments to transfer knowledge</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>3.00</td>
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</tr>
<tr>
<td>Standardization and Documentation of Knowledge</td>
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<td>2</td>
<td>5</td>
<td>4.00</td>
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<td>5</td>
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<tr>
<td>Localization of Knowledge in more decentralized organizations</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3.33</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Providing opportunities to interact and learn about best practices rather than just them ordering the organization to adhere to them</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>4.33</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Clear deliverables/deadlines/goals</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>4.00</td>
<td>4</td>
<td>#N/A</td>
</tr>
<tr>
<td>Resemblance of vendor/consultant/user organization in certain ways? ***</td>
<td>3</td>
<td>3</td>
<td>N/A</td>
<td>3.00</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Openness and Trust (willingness of the individuals involved in the consulting process to share their knowledge with each other</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>4.33</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
and interact freely)

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>4</th>
<th>5</th>
<th>3.67</th>
<th>4</th>
<th>#N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior experience of working with specific partners</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3.67</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Organizations ability to use the knowledge obtained</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4.00</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

| Motive (background of cooperative relationship) | 4 | 4 | 4 | 4.00 | 4 | 4 |
| mean | 2.93 | 3.85 | 3.62 | 3.39 |
| median | 3.00 | 4.00 | 4.00 | 3.67 |
| mode | 3.00 | 4.00 | 4.00 | 4.00 |

Table 8: Transfer Enablers' Strength