Irja Kankaanpää

IMPLEMENTATION OF IT APPLICATIONS IN SMALL AND MIDDLE SIZE ENTERPRISES – Controlling the critical success factors

Master's thesis of
Information Systems
2.11.2002

University of Jyväskylä
The Department of Computer Science and Information Systems
Jyväskylä

ABSTRACT

Kankaanpää, Irja Kaarina
Implementation of IT applications in small and middle size enterprises – Controlling the critical success factors / Irja Kankaanpää
Jyväskylä: The University of Jyväskylä, 2002
165 p.
M.Sc. Thesis

In this thesis, the implementation of information technology (IT) applications in small and middle size enterprises (SME) is being investigated from the perspective of an IT consultant. The goal of this study is to define methods with which an external consultant is able to control success factors influencing the outcome of IT application implementation process in small businesses in order to increase the probability of IT success.

IT implementation process and success factors were studied with a literature review. Control methods were studied with a case study. Data for the case study was acquired from IT consultants of the Information Technology Research Center, the University of Jyväskylä. Sixty-seven success factors and related control methods were studied with a questionnaire and interviews.

The results of this thesis emphasize that human factors have a crucial role in the IT implementation process in SMEs. A precondition of effective consultancy is a mutual trust between small business and a consultant. When trust exists, a consultant is able to control the success factors with the following methods: Acting as a middleman between SME and IT application vendor, promoting realistic thinking, formalising communication practices, and providing professional help with project planning and change management.

KEY WORDS: small and middle size enterprises, IT implementation process, success factors, control methods

TABLE OF CONTENT

1 INTRODUCTION

Information technology (IT) is of increasing importance to small and middle-size enterprises (SME) due to the enhanced and competitive advantage it brings to the workplace (Lees and Lees, 1987). According to Bridge and Peel (1999) a company has to keep up with technological changes to maintain this advantage. However, introduction and implementation of new IT is not as straightforward as one might think and often requires external expertise to be successful. Implementation is a rather multi-dimensional and complex process and concerns both technical and social aspects within an organisation (Levine and Rossmoore, 1993). According to Lai and Mahaptra (1997) the importance of successful implementation of IT is reflected in the increase of research publications in this field in resent decades. The amount of publications on IT implementation has more than doubled between the years 1976 and 1995.

1.1 Research scope

Besides their size, SMEs are characterised by a set of commonly recognised features, which distinguish them from larger companies (Boedeker et al. 1995). According to Telem (1989), small businesses differ from large businesses, due to their rather simple structure, relative flatness of hierarchy, and more intensive multifunctional internal framework. In their study Lees and Lees (1987) devised a set of organisational characteristics of small business information system users. They noted that limited resources, dictatorial decision-making and negative employee attitude towards use of data processing typically characterise small businesses. They also found that small businesses are missing formalised systems, experience with technology and electronic data processing (EDP) resources.

There are differences in how computers are used in large and small organisations (Heikkilä et al., 1991). According to Kole (1983), SMEs typically cannot afford to develop their own IT solutions and therefore software packages combined with outside expertise is a commonly used alternative. Because software packages are preferred over custom designed systems traditional IT implementation approaches cannot be directly applied in the context of SMEs (Kole, 1983; DeLone, 1988). The absence of computer experience makes SMEs more dependent on external expertise than large companies (Thong et al., 1994). Because of these reasons IT implementation in small companies is different from IT implementation in large companies.

There is a conflict between what proper IT implementation requires to provide long-term advantage, and what is the easiest or cheapest short-term decision. A typical weakness of a SME is its tendency to act at short range (Boedeker et al., 1995) and not spend money if the benefits cannot be seen immediately. Implementation, to be successful, requires commitment, long-term planning and investments. SMEs often tend to think that purchasing and installing a new system means the same as implementation. For this reason they do not pay sufficiently attention to planning and managing the change process.

Introduction of new technologies is most likely to cause changes in the existing work environment of an organisation (Lassila and Brancheau, 1999). In order to manage the change and fully utilise new technology SMEs have to realise the importance of a well-planned and comprehensive IT implementation process and to understand implementation as a long-term project.

Several studies to measure implementation outcome and success have been done in the past by Cale and Curley (1987), Lucas (1978), Kole (1983) and Thong et al. (1994). Five sets of factors related to implementation outcome in small businesses have been identified in literature (see FIGURE 1): *organisational factors, end-user related factors, owner related factors, environmental factors* (Winston

and Dologite, 1999), and *technology factors* (Rogers, 1995; Kwon and Zmud, 1987).

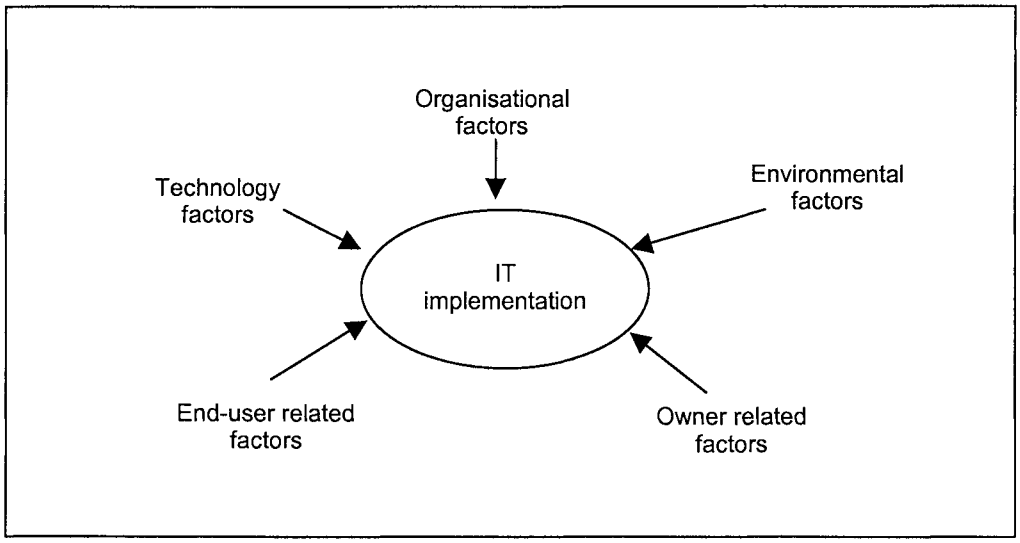

FIGURE 1. Factors related to implementation success in the context of SMEs

Winston and Dologite (1999) suggest that these sets of factors can be labelled as controllable, partially controllable, or uncontrollable depending on how rapidly they can be changed. In some circumstances uncontrollable factors, like end-users' or organisation's lack of IT experience, may oppose implementation. In the case of uncontrollable and partially controllable factors, which small companies cannot modify, extra-organisational factors, such as use of consultants, can offer a solution by replacing or complementing those factors and thus enhancing implementation process (Winston and Dologite, 1999).

In this study, IT implementation is viewed as a process. There are various process models presented in the literature. Typically, process models include an initiative stage (initiation, adoption) and a set of implementation stages. Here, the six-stage implementation model of Cooper and Zmud (1990) is used. It consists of the six stages: initiation, adoption, adaptation, acceptance, routinisation, and infusion. This study covers the stages from adaptation to infusion, i.e. implementation starts at the point where a new technology is brought into an organisation and installed, or when a new module or feature of

an old existing system is about to be taken into use. It ends when new IT application is infused in the work environment. The factors mentioned in FIGURE 1 may be stage-specific factors, which affect one or two of the stages of an IT implementation process, or general factors, which affect the whole implementation process.

1.2 Research problem

The goal of this study is to develop an understanding of the implementation of IT applications within the context of SMEs. In order to do this, the following questions have to be answered:

1. *Which factors, in the context of small businesses, are related to the IT implementation success?*
2. *Which success factors are stage-specific and which factors are common across the implementation stages?*
3. *Which factors are controllable, partially controllable or uncontrollable?*
4. *By which means can the controllable factors be modified in order to enhance the implementation process?*

Answering these research questions will provide information, which may enhance the managing of an IT implementation process. When one knows which factors to control or pay attention to during an implementation process the IT implementation success can be achieved with less work and effort. This way the valuable resources of a small company can be saved. The source of data for this study is a survey of scientific literature, which has been accumulated on IT implementation.

The study results can be utilised by consultants when planning and conducting IT implementation in SMEs. The results can provide help for small businesses

to understand the importance of an implementation phase within their IT strategy. Also vendors, when offering services to SMEs or developing new products, may find the results useful.

1.3 Structure

This study is organised as follows: In chapter 2, the concept and the characteristic features of small and middle size enterprises are studied. Also, the use of information technology and the external expertise is examined. In chapter 3, the IT implementation research streams and process models are surveyed. In chapter 4, the general IT implementation success factors are studied. Then, in chapter 5, the stage specific success factors are studied in the context of small businesses and their level of controllability is analysed. Chapter 6 presents the methods and reasoning for fabricating the instruments for studying the IT implementation success factors empirically. In chapter 7 the research methods of the case study are presented. Chapter 8 describes the results of the case study. Summary is presented in chapter 9. References and appendices are presented in the end of this study.

2 SMALL AND MIDDLE SIZE ENTERPRISES

Before one can understand the implementation process of IT applications in the context of *small and middle size enterprises* (SME) it is necessary to first study the characteristic features of the small business environment. In this chapter, the relevant issues related to the context of small and middle size enterprises are studied. The aim of this chapter is to provide a clear picture of what small and middle size enterprises are, what makes them unique and how their unique characteristics affect on their operations. The chapter is organised as follows: In section 2.1 the concept of small and middle size enterprise is defined, In section 2.2 the characteristic features of small and middle size enterprises are studied, i.e. the typical weaknesses and strengths of small organisations and how they differ from large businesses. In section 2.3 the focus is on small organisations' use and operation of information technology. In section 2.4 small and middle size enterprises' use of external expertise is examined, i.e. what kind of external expertise SMEs use and how the use of external expertise will complement their core competence.

2.1 SMEs in general

Small businesses are of great importance in Europe's economy and they cover the majority of businesses throughout Europe (Doukidis et al., 1992). According to the Pk-yritysraportti (1998), SMEs are the major employer in the European Union. In 1997 99,8% of all companies were SMEs and they employed 66% of all labour while producing 65% of the overall turnover. In Finland, the amount of SMEs has increased steadily since the 1980s (Pk-yritysraportti, 1998). More than 30% of SMEs operate in the service sector. About 15% of SMEs are occupied by the industrial sector and another 15% by the telecommunication sector (Pk-yritysraportti, 1998).

Defining the concept of SME precisely is not easy (Boedeker et al., 1995) because of various related aspects. It is common to define small and middle size companies according to their size (Boedeker et al., 1995). Often in research a small company is defined as employing a maximum of 500 employees (see for instance Riemenschneider and Mykytyn, 2000) but the definition varies from one country to the next. In Finland, for instance, a company with less than 50 or 100 employees is classed as small or middle sized, while in the United States and Great Britain the number is less than 250 and 200 employees respectively (Boedeker et al., 1995, p. 9). The number of employees alone is not sufficient in describing the real size of a company (Paasio and Heinonen, 1993). Paasio and Heinonen (1993) argue that before one is able to classify a company, as small or large, one should compare the number of employees and the annual turnover of a company to other companies within the same business sector. In this study, the following European Union (EU) definition of SME (The Commission of the European Communities, 1996) is used:

1. A company employing a maximum of 250 employees.
2. A company whose annual turnover is maximum 40 million ECU or an annual balance-sheet total is maximum 27 million ECU.
3. A company whose ownership is independent, i.e. not owned as to 25 % or more of the capital or the voting rights by one large enterprise, or jointly by several large enterprises.

An enterprise is classified as an SME if it meets all the conditions described above.

In literature, the terms *small business, small firms* and *small companies* are commonly used in describing SMEs. In this study, those terms are used in the same way referring to small and middle size enterprises. The main focus in this study will be on European enterprises, particularly Finnish based.

2.2 Characteristic features of SMEs

Small businesses have a set of features, which makes them unique and distinguishes them from large companies. "A small business is not a little big business" (Welsh and White, 1981, p. 18). Typically SMEs are perceived as flexible (Boedeker et al., 1995; Pk-yritysraportti, 1998; Paasio and Heinonen, 1993), innovative (Pk-yritysraportti, 1998; Paasio and Heinonen, 1993), and adaptive (Pk-yritysraportti, 1998). SMEs differ from large companies by their limited resources (Lees and Lees, 1987; Paasio and Heinonen; 1993, Winston and Dologite, 1999; Welsh and White, 1981), lack of internal technical knowledge and experience (Stair et. al, 1989), short-range management perspective (Boedeker et al., 1995; Thong et. al, 1994), lack of formal procedures (Stair et. al, 1989), flat organisation hierarchy (Paasio and Heinonen, 1993; Telem, 1989), centralised decision making (Paasio and Heinonen, 1993), lack of information systems (Boedeker et al., 1995), and highly centralised organisational structure (Blili and Raymond, 1993; Thong et al., 1996; Thong, 1999). The characteristic features of SMEs form a network where all features are interconnected and influence each other. With respect to strategic information systems, Blili and Raymond (1993) have classified the characteristic features of SMEs in five sets: 1) environmental features, 2) organisational features, 3) decisional features, 4) psycho-sociological features, and 5) information systems related features.

1) *Environmental features*

Blili and Raymond (1993) assert that in SMEs there is a relatively high level of environmental uncertainty in terms of new technological environments. External changes have a stronger impact on small businesses than on large companies (Welsh and White, 1981). This makes SMEs more vulnerable with respect to competitive forces, i.e. customers and suppliers.

2) *Organisational features*

Here an organisation is defined as "a stable system of individuals who work together to achieve common goals through a hierarchy of ranks and division of labor" (Rogers, 1995). Blili and Raymond (1993) argue that from an organisational point of view small businesses are characterised by an informal structure and resource poverty. It has been recognised in earlier literature (Lind et al., 1989; Montazemi, 1988) that simple organisational structure, as in SMEs, is one of the advantages related to small size because it encourages less formalised communication. Small businesses have little or no bureaucracy, which means that many functions can be performed informally and quickly (Lind et al. 1989). This type of informality can have negative consequences, however, such as lack of formal procedures or formalised systems. It has been noted (Stair et al., 1989; Thong et al., 1996) that in general SMEs have ineffective formal operating procedures and written documents concerning issues such as fire, power shortages, personnel, or information technology.

The relative flatness of organisation hierarchy increases synergy and makes small organisations more flexible (Paasio and Heinonen, 1993). Also, centralised decision-making reinforces flexibility (Boedeker et al. 1995). Flexibility, in turn, is one of the most important advantages of small enterprises. It enables small business to adapt to external changes more rapidly than large companies (Boedeker et al., 1995, p. 15) and, in production and management it provides an advantage when changes take place in business environments (Pk-yritysraportti, 1998). Flexibility in SMEs means rapid responds to daily problems (Paasio and Heinonen, 1993, p. 43) and guides every-day actions. Paasio and Heinonen (1993, p. 43) argue that flexibility in SMEs can be divided into external and internal flexibility. *External flexibility* represents the flexibility towards new markets and product development, and the capability to utilise co-operation between companies. *Internal flexibility* concerns mostly the use of company resources. In other words, internal flexibility means flexible use of work force and the capability of altering organisational structure in a way that

the workforce can be used in the most efficient way. Internal flexibility also includes innovativeness, which is seen in SMEs as a creative ability for renewal (Paasio and Heinonen, 1993) and adaptability. Adaptability describes the ability of SMEs to adapt to new things quickly.

Lack of various resources is a characteristic of small businesses and can be viewed as one of their major weaknesses. Due to their limited financial resources, funds are not easily spent if benefits cannot be seen immediately. Limited resources, such as time and workforce, may also form a barrier to change (Joyce et al., 1990). Lack of internal technical knowledge and experience increases the SMEs' dependency on external expertise (Thong et al., 1994). Due to lack of information systems SMEs often face difficulties when producing information for either internal or external use (Boedeker et al., 1995). In addition, SMEs have limited skills to utilise the received information. As a result of the limited resource pool, small firms prefer to specialise with regards to products, customers, and technologies (Paasio and Heinonen, 1993).

3) *Decisional features*

Decision-making in SMEs is typically centralised and can be considered more reactive than proactive (Blili and Raymond, 1993; Boedeker et al., 1995; Pk-yritysraportti, 1998). Boedeker et al. (1995) argue that management concentrates mainly on solving day-to-day problems, rather than considering possible future problems. This short-range management perspective is typical for SMEs and it can be seen as a weakness. Hurmerinta-Peltomäki and Paasio (1991) see short-range actions as a result of limited time and information resources. These in turn are results of operating at strategic and operative level simultaneously and a result of undeveloped information systems (see FIGURE 2.1). Blili and Raymond (1993) describe the decisional process as intuitive, experience based and focused on physical flows rather than information flows.

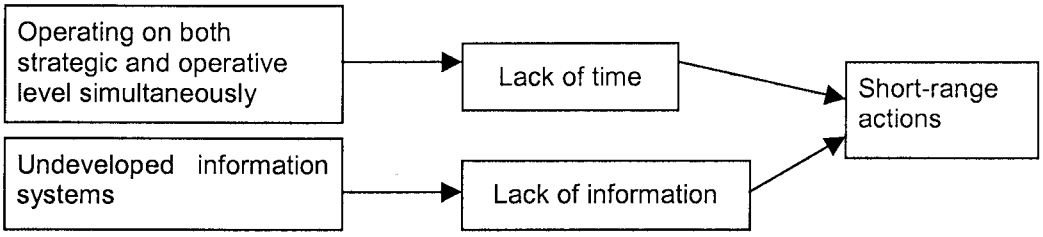

FIGURE 2.1. The time frame of SME (Paasio and Heinonen, 1993, p. 44)

4) *Psycho-sociological features*

SMEs are typically owned and managed by the same person. Owner-managers usually run the company by using their personal contribution and participate actively in all management activities (Paasio and Heinonen, 1993). Often, an owner-manager has a highly dominant role and this can be seen in limited information sharing and limited delegation of decision-making activities (Blili and Raymond, 1993). The owner-manager has a strong influence on the organisational climate (Blili and Raymond, 1993).

5) *Information systems related features*

Blili and Raymond (1993) have found that in SME's information systems have not reached very advanced stage and they are often subordinated to the accounting function. Also, Blili and Raymond (1993) have noted that information systems in small companies are mostly used to support administrative functions rather than managerial, are based on software packages and are often under-utilised. Information systems related features are discussed further in section 2.3.

These characteristic features of small businesses distinguish SMEs from large enterprises. There are advantages and disadvantages related to both small and large size. Large companies may achieve the benefits of small size by distributing their operations into smaller branches and by dividing their operations into subsidiaries. On the contrary, to achieve the benefits of large companies, small businesses may unite by forming business alliances or by forming effective business networks. (Paasio and Heinonen, 1993, p. 39).

2.3 Use of information technology

Information technology (IT) consists of two components, *information* and *technology*. Information can be defined as "...stimuli that has meaning in some context for its receiver. Some (if not all) kinds of information can be converted into data and passed on to another receiver" (The IT-Specific encyclopaedia, 2001). Rogers (1995) defines information as "a difference in matter-energy that affects uncertainty in a situation where a choice exists among a set of alternatives". According to Rogers (1995) "a technology is a design for instrumental action that reduces the uncertainty in the cause-effect relationship involved in achieving a desired outcome" and it usually consists of two components, hardware and software.

"IT ... is a term that encompasses all forms of technology used to create, store, exchange, and use information in its various forms (business data, voice conversations, still images, motion pictures, multimedia presentations, and other forms, including those not yet conceived). It is a convenient term for including both telephony and computer technology in the same word. It is the technology that is driving what has often been called "the information revolution" (The IT-Specific encyclopedia, 2001).

In addition to defining the concept of IT, it is relevant to define the term information system (IS) because, when integrated within an organisation an IT application changes into an IS. While IT only consists of the means of information processing, IS includes humans using those means. Thus, IS can be defined as a system consisting of humans, electronic data processing equipment, data transfer devises and software, the purpose of which is to emphasise or facilitate certain activities or enable those activities by processing data (ATK-sanakirja, 1997). However, The definition of the concept of IS varies depending on the authors and the context of its use (Iivari, 1989). Kwon and

Zmud (1987, p. 231) have defined information systems as follows: "An IS is a formal, deliberately planned technological innovation composed of man, machine, and procedures that is introduced into an organisation in response to a perceived need on the part of one or more organisational members". According to Lyytinen (1985, p. 61) "the very idea of an information system is, ..., to provide a means and an environment for *human communication*".

The use of IT applications in SMEs has been increasing since the "PC-revolution" in the mid 1980's when the prices of hardware and software started to decline and became more attractive to small companies (Riemenschneider and Mykytyn, 2000). Before that time, IT was mainly a privilege of larger and wealthier companies. Nowadays, IT can be seen as a critical success factor for small businesses (Stair et al, 1989) and it can provide small companies with a real advantage compared to their competitors (Bridge and Peel, 1999). Therefore, if small companies desire to maintain their competitive position they have to keep up with technological changes (Bridge and Peel, 1999; Riemenschneider and Mykytyn, 2000). However, the use of IT and information systems are not on a very advanced level in SMEs. Small companies are missing managerial expertise to plan, organise, and direct the use of information resources (Blili and Raymond, 1993).

The competitive advantage achieved by IT is one motivator when a company decides to invest in computer (Harrison et al, 1997). The study results by Iacovou et al. (1995) and Cragg and King (1993) show that external pressure from trading partners can also be a reason for small companies to start using IT. Another major motivator for IT growth in small businesses is the relative advantage gained through improved information processing, improved planning and control, and improved work life (Cragg and King, 1993). Cragg and King (1993) also noted a set of discouraging factors related to IT growth in small businesses including lack of IS knowledge and skills, lack of managerial

time, financial issues, unstructured technical system, and poor software support.

Palvia (1996) argues that before one can understand IT use in the context of small organisations it is necessary to explore the IT use in large companies. Heikkilä et al., (1991) surveyed computer use in small businesses and found that it differs from computer use in large organisations in three ways. Firstly, small businesses use computers for performing a specific task whereas large organisations use information systems as a communication channel within the organisation IT[1]. Secondly, they argue that due to the limited resources, small businesses cannot afford to develop their own applications like large companies and thus are more dependent on software packages. (Heikkilä et al., 1991). Kole (1983) noted this fact already in the beginning of the 1980s. Thirdly, in small companies power and politics do not play as important role as in large organisations and there are less competition and conflicting interests when dealing with information systems. In addition, it has been argued (Kole, 1983; Lees and Lees, 1987; Thong et al., 1994) that SMEs have limited experience with computers.

Accounting systems have been the most common application area in small firms until recent years (Cragg and Zinatelli, 1995; Heikkilä et al., 1991). The survey conducted by Stair et al. (1989) revealed that 67% of computer use in small businesses is routine type of work (including general ledger, accounts payable and receivable, and inventory control) and 33% is related to decision-making and management. In small businesses the computing skills of the

---

[1] Later on, however, Berg et al. (1999) found that the use of computers for communication purposes has increased in SMEs due to the use of electronic mail applications. However, electronic mail is still mostly used for outside/external communication and not as a communication channel inside the organisation. One reason for this perhaps is, since SMEs are small in size and simple in organisational structure, that there is no need for internal communication through electronic mail since communication takes place in person.

manager and employees affect the type of computer use (Foong, 1999). When studying computer-based IS success in Malaysian SMEs, Foong (1999) noted that computers were used the most in tasks related to accounting and finance. The second biggest application area was sales and marketing while in production, human-resource management, administration and planning the rate of computer use was low. Even though it seems that in most SMEs the use and operation of IT applications is not planned systematically enough, IT related improvements have taken place (Stair et al., 1989). As the study results of Stair et al. (1989) show, SMEs on average have gained in operating costs and increased in profitability due to computer systems.

Palvia (1996) argues that the main difference between large and small organisations' computing environment is the role of the user. He summarises that in large companies there are two types of computing environments, i.e. traditional data processing environments and end-user computing environments. In both of these environments there is often a management information systems (MIS) department that deals with consultants, vendors, and training companies and forms "a safety buffer" between the user and the outside IT world (see FIGURE 2.2 and FIGURE 2.3).

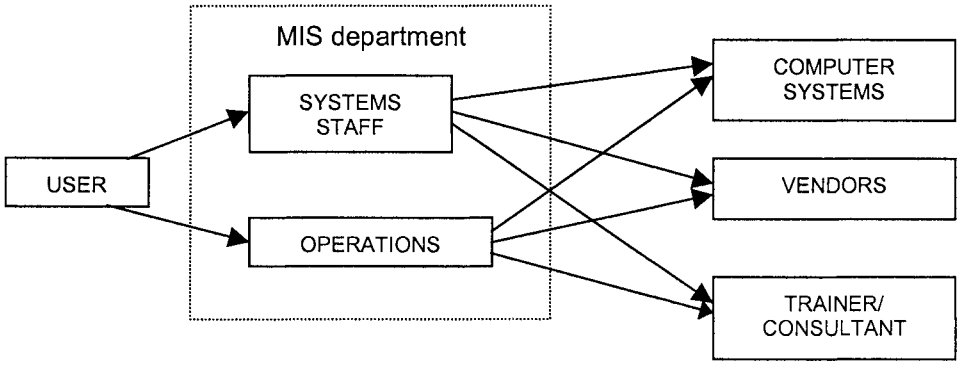

FIGURE 2.2. Traditional MIS environment. Adapted from Palvia (1996, p. 152).

In the traditional MIS environment the MIS-department consists of systems staff and operations and in the end-user computing environment it consists of

software, systems and operators and an information centre, which provides hardware and software support to the user.

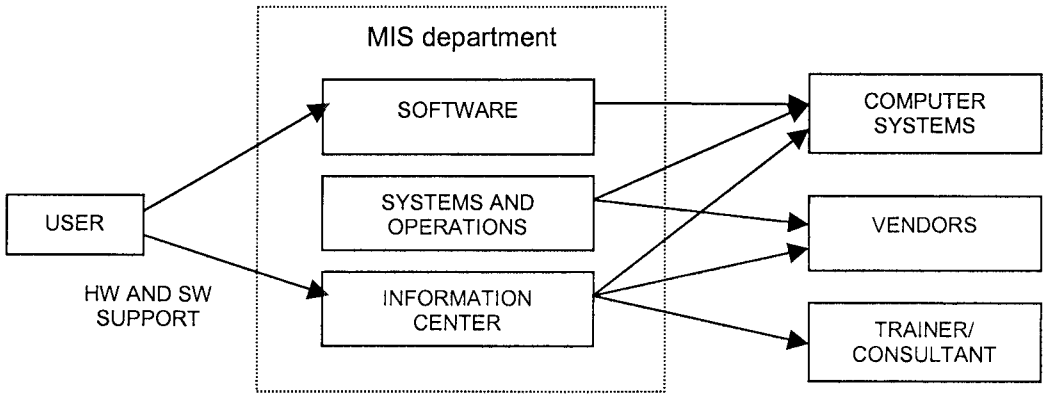

FIGURE 2.3. End-users computing environment. Adapted from Palvia (1996)

In the case of small organisations, the computing environment is different. Resources are limited and an MIS department, systems analyst (Montazemi, 1988), or electronic data processing (EDP) professionals (Lees and Lees, 1987; Telem, 1989) cannot be afforded. Usually it is the manager who then has to take care of those tasks. "...the small business user is the owner or manager, who also becomes the specialist in various facet of IS. He/she is the end user, system analyst/programmer, operator, etc., although not very well trained or adept in any of these roles. This person also has to deal with entities external to the organisation (i.e., vendors, consultants, educators, trainers)." (Palvia, 1996, p. 152). In other words, small organisations are missing the IT safety buffer. The small business computing environment is illustrated in FIGURE 2.4.

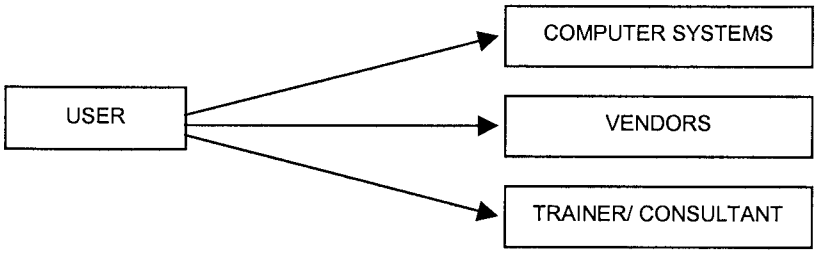

FIGURE 2.4. Small business user environment (Palvia, 1996, p. 153)

In SMEs, users tend to have a negative attitude towards computerisation (Lees and Lees, 1987). In addition, Telem (1989) found that in small organisations hardware usually consists of a few computers and software is developed by an external party. This increases the importance of education and training of both the end user and the top management (Stair et al., 1989).

2.4 Use of the external expertise

External expertise refers to the information, advising or consultancy, developing, and training services provided by an outside party (Pk-yritysraportti, 1998). The main focus is on external expertise with regards to IT.

A small company is typically built around the knowledge and experience of the owner-manager (Pk-yritysraportti, 1998). Because of the limited resources, it is not possible for the management to focus on strategic planning or hire specialised work force. As a consequence, external expertise is often needed to offset the weaknesses of small businesses in the field of getting international, marketing, information systems, and use of information (Boedeker et al., 1995). Boedeker et al. (1995) argue that the use of external expertise is of a great importance to small businesses. As mentioned previously, SMEs typically have limited resources and also limited knowledge and skills within their vital business areas. This is especially true for newborn companies. Boedeker et al. (1995) divide SMEs into three classes according to their level of need of external expertise (FIGURE 2.5)

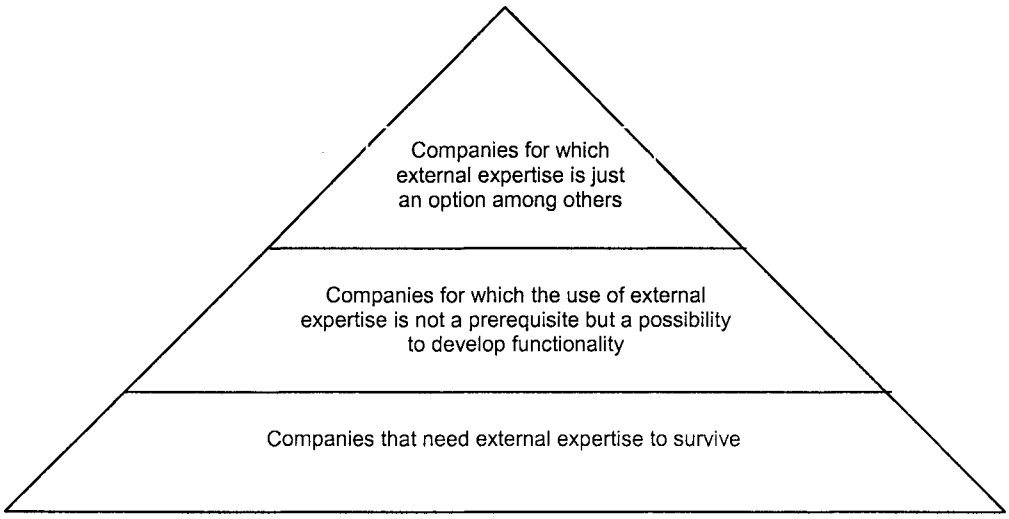

FIGURE 2.5. The hierarchy for SMEs need of external expertise (Boedeker et al., 1995, p. 23)

Firstly, there are companies that cannot survive without external expertise (see the bottom level in FIGURE 2.5). Companies belonging to the second class possess the knowledge and the skills necessary for running their business and they use external expertise as a source of information and as a tool to develop business operations. Thirdly, there are highly advanced SMEs for which the use of external expertise represents only one option for internal development. Most of the small or middle size companies belonging to the lowest section in the FIGURE 2.5 are newborn companies, which are highly dependent on external support and expertise (Boedeker et al., 1995, p. 22). More mature businesses usually know their own business operations and core competencies but need external expertise to complement the development of their information systems.

The main function of external expertise is to provide information but also to provide more specific guidance or support in the form of consulting (Boedeker et al., 1995). Boedeker et al. (1995, p. 85) have studied SMEs' use of external expertise in Finland. They found that the most used forms of external expertise in the first half of the 1990s were: specialised knowledge, consultancy and advising, and training. Also, the study results show that private companies were more popular as service providers than are services provided by

organisations or public sector. External expertise was mostly used in the field of business economics, including financing, bookkeeping and taxation, legal matters, and data processing. In the case of data processing, consultancy services and training were clearly preferred over specialised knowledge and the need for them was expected to grow in the future. In addition, external expertise was needed in relation to environmental and quality issues, marketing, human resource management, general management, and internationalisation. Cragg and King (1993) argue that consultant support can be an encouraging factor for IT use in small businesses especially if there is a regular contact with the consultant.

According to Thong et al. (1996), IT related external expertise can be divided in two categories, i.e. consultants and vendors. Vendors, in general, provide the computer hardware and software, technical support, and training. Consultants usually provide consultancy services and help in choosing a suitable combination of hardware and software and in managing the implementation process of IT applications. Depending on the situation it is possible to use both vendors' and consultants' expertise at the same time or rely only on one of them (see FIGURE 2.6 and FIGURE 2.7). If a consultant-vendor approach is chosen it is important that there is communication between all the parties (Thong et al., 1994).

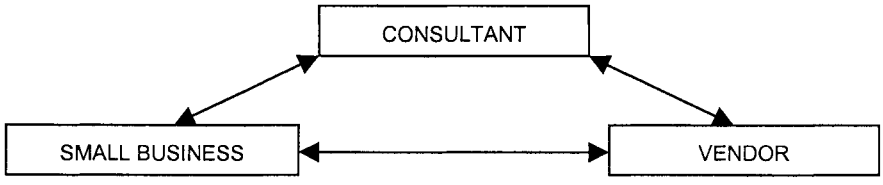

FIGURE 2.6. Consultant-Vendor 3-way network by Thong et al. (1994, p. 225)

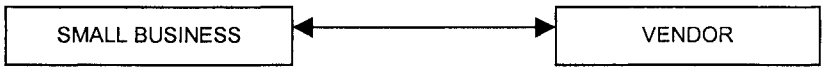

FIGURE 2.7. Vendor-Only 2-way network by Thong et al. (1994, p. 225)

There are several benefits, which can be gained by using outside expertise. It has been recognised previously (Kole, 1983; Lees and Lees, 1987; Thong et al., 1994, Thong et al., 1996; Lees, 1987) that small businesses have limited experience with technology and thus are more dependent on external IT expertise than are large companies (Gable, 1991; Thong et al., 1994; Thong et al., 1996; Lees, 1987). However, by using external expertise a small company can compensate for the lack of knowledge with lower cost compared to the hiring of a full-time internal expert (Gable, 1991). Additionally, a consultant, if independent, can provide project management and objective advice (Kole, 1983).

Engaging external expertise may be complex. Previous studies (DeLone, 1988; Lees, 1987) have shown that the use of external expertise does not have positive influence on SME's IT success unless other necessary factors have been taken care of. For instance, Gable (1991) has recognised that a good client-consultant relationship is important for IT projects to be successful. There seems to be a lack of consensus about the critical factors related to IT and IS success in small companies. DeLone (1988) argues that top management involvement is necessary for computer success and that external expertise can only complement it, whereas Thong et al. (1996) argue that external expertise is more important than top management support. Lees (1987) noted from his study results that consultant engagement with IT training is directly associated with positive results. Winston and Dologite (1999) argue that, in addition to consultants, also strategic alliances with other small companies may provide the needed technological information and reinforce the use of computers. Despite the fact that engagement of consultants would have a positive impact of IT use, SMEs seldom seek external support (Cragg and Zinatelli, 1995). Hiring a consultant may be too expensive or small firms may be missing internal experience in order to choose a suitable consultant (Cragg and Zinatelli, 1995).

2.5 The interrelation of the characteristic features of SMEs

The characteristic features of SMEs are often interrelated to each other and thus one has to consider not only single features but also cause-effect chains of features. The interrelations of the relevant characteristic features of SMEs' for this study are illustrated in FIGURE 2.8, which has been contrived mainly from Blili's and Raymond's (1993) division of small business characteristics.

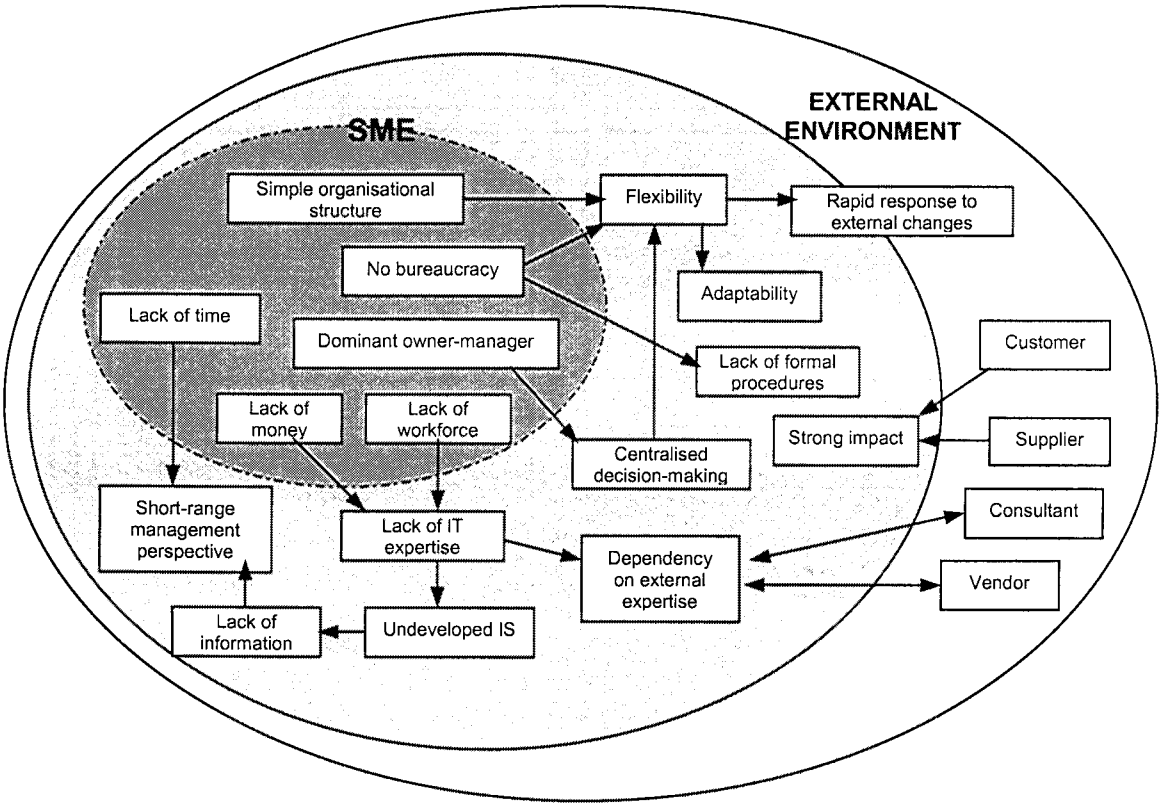

FIGURE 2.8. The interrelation of the characteristic features of small businesses

The dotted area in the middle (SME) represents the basic features (organisational and owner related features) of SME directly related to small size. The second area around it shows the secondary features, i.e. the features related to IT, which are due to the basic features. The outermost area (EXTERNAL ENVIRONMENT) represents a small company's external environment, which includes customers, suppliers, consultants, and vendors.

When dealing with the IT implementation in small businesses, the following interrelations should be payed attention to: 1) the amount of time, money and work-force that can be invested in IT projects is small because of the limited resourse pool, 2) because the IT department does not exist, small businesses are missing the IT safety buffer that larger enterprises have, 3) due to missing IT experience small businesses are dependent on external expertice with respect to information systems, and 4) because of the simple organisation structure, organisational flexibility, centralised decision-making, and lack of bureaucracy a small company is able to rapidly respond to any changes taking place in the external environment.

2.6 A summary of the characteristic features of SMEs

In this chapter the concept of SME has been studied in order to establish an understanding of the characteristic features of small businesses. This is necessary in order to understand an implementation process of IT applications in the context of small businesses, which is discussed further in later chapters.

Small companies have a set of features, which makes them unique and distinguish them from large companies. As a summary, one can say that small enterprises are flexible, innovative, and adaptive. They are built around their owner-manager, and both management perspective and decision-making process are short. SMEs have considerably smaller resource pool than large companies, and are often missing technical knowledge and IT experience. Small company, as an organisation, is also often missing formal procedures or developed information systems. SME's major strengths are flexibility, innovativeness, and adaptivity. The major weaknesses are a limited resource pool and lack of internal technical knowledge and experience.

When considering information technology implementation in the context of SMEs it is necessary to filter only relevant factors from the overall feature pool for further examination. From the basis of the literature survey in this chapter, the features utilised in the forthcoming chapters can be divided into four categories: *environmental, organisational, owner related,* and *IT use related* features. *Decisional* and *psycho-sociological features* discussed in section 2.2 are closely related to the owner related features and are later on in this study considered as a part of that group.

3 MODELS OF IT IMPLEMENTATION

Information technology implementation is a rather multi-dimensional and complex process and concerns both technical and social aspects within an organisation (Hirscheim et al., 1985; Levine and Rossmoore, 1993). Up until the 1980's implementation was seen as the last stage of the system life cycle, consisting of analysis, design, programming, and implementation, and was regarded "as little more than the delivery of a carefully constructed product to a client" (Hirscheim et al., 1985). Recently, however, the importance of successful implementation of IT is reflected in the increase of research publications in this field. The amount of publications dealing with implementation has more than doubled between the years 1976 and 1995 (Lai and Mahaptra, 1997). Implementation research has been inspired by the growing importance of IT (Lai and Mahapatra, 1997) and has been the reason behind an information system's success or failure (Kwon and Zmud, 1987). Despite the increased attention, the models of IS implementation still remain fragmented (Kwon and Zmud, 1987).

When an IT application is about to be embedded in an organisation, *implementation* occurs. Defining the concept of IT implementation varies according to the selected approach. For instance, Lucas (1992, p. 16) uses the term implementation when referring to installation of IT application but in his earlier studies (Lucas, 1978, pp. 76-77) he argues that "implementation is a component of organisational change and it has a long-term nature". Lai and Mahapatra (1997) studied IT implementation by analysing published management information systems (MIS) research during 1976-1995 and found that in most studies implementation is seen as one phase of a total technology transfer process. A simplified view towards implementation is that of Curley's and Gremillion's (1983, p. 205) where implementation is seen as "the process of getting a system into use". Kwon and Zmud (1987, p. 231) have viewed IT

implementation from a technology diffusion perspective and defined it as "an organisational effort to diffuse an appropriate information technology within user community". Kwon and Zmud (1987) include the target organisation (implementation context) into their definition. This is important because the introduction of new technology is likely to cause changes in the existing work environment of an organisation. (Cooper, 1994; Hirscheim et al., 1985; Joshi, 1991; Lassila and Brancheau, 1999). The introduction of a new technology can be seen as both a threat and a challenge to individuals and different interest groups. The difficulty of IT implementation lies in the unpredictability of human reactions (Hirscheim et al., 1985). In this study, the definition of IT implementation by Kwon and Zmud (1987) is used because the target organisation, i.e. small business, is in a central role.

In this chapter, the existing literature on different research streams within the field of IT implementation is studied. The chapter focuses on implementation process. In section 3.1 the major research streams are examined. In sections 3.2 - 3.5 the four major implementation process models are studied and analysed in more detail. Finally, the comparison and analysis of the stage models is presented in section 3.6. Also, the selection of a process approach for this study's framework is grounded.

3.1 IT Implementation research streams

In the field of IT implementation research five major research streams can be distinguished: the factors research stream, the mutual understanding research stream, the process research stream, the political research stream, and the prescriptive research stream (Kwon and Zmud, 1987).

According to Kwon and Zmud (1987), the *factors research stream* is the major research stream in IS implementation literature. It focuses on identifying

individual, organisational, and technological factors affecting the outcome of IS implementation. According to Lucas (1981, p. 45), a factor is defined as "one or a group of related variables in a study".

The mutual understanding research stream can be considered as a side stream of the factors oriented research stream. It focuses on the quality of designer-user interaction. The main argument is that a mutual understanding between a user and a designer has a positive impact on implementation outcome (Kwon and Zmud, 1987).

The process research stream views implementation as a sequence of stages and focuses on social change activities (Kwon and Zmud, 1987). Successful implementation takes place when commitment to change and to the implementation efforts exists and if project definition and planning occurs.

The political research stream concentrates on the diverse interests of all the stakeholders affected by a new technology (Kwon and Zmud, 1987). Successful implementation requires identifying and managing the diverse interests between individuals and groups (Markus, 1983). More recently, political research stream has been presented in the form of an equity-implementation model (Joshi, 1991).

The prescriptive research stream or "risk factor research stream" approaches IT implementation by identifying generic organisational risk factors and providing prescriptive strategies to manage them. Risk factors can be related to individuals, organisation or the implementation project itself. (Kwon and Zmud, 1987).

Besides the five major research streams described above, the *innovation (or technology) diffusion theory* has received attention in the implementation literature from various authors (see Attewel, 1992; Grover and Goslar, 1993;

Kwon and Zmud, 1987; Lai, 1997, Rogers, 1995). The innovation diffusion theory represents a broad view towards implementation and it focuses on factors and information flows (Attewel, 1992). Diffusion of information technology is closely related to process research stream. It has been argued (Cooper and Zmud, 1990) that technology diffusion models may not portray the actual implementation process but have proved useful in the case of off-the-shelf technologies, that is, products are not custom made.

When considering the characteristic features of small businesses and selecting a suitable implementation approach for them, it seems natural to choose a mixed approach, rather than choosing a single stream approach. This is because IT implementation can be a rather complex event and therefore it is not realistic to expect that it would be possible to cover it well enough from only one point of view. In small businesses, the introduction of a new technology often concerns the whole organisation and it can be seen as an innovation. Embedding the innovation in the organisation does not take place at once (Quaddus, 1995) but in stages and each stage can be influenced by various factors. Innovation diffusion theory combines the process research stream and the factor research stream and thus is chosen to be the basis of this study's framework. In addition, since technology diffusion models have proved useful for implementing off-the-shelf technologies (Cooper and Zmud, 1990), which are often used in small businesses, the technology diffusion approach appears to be suitable for this study.

3.2 Technology diffusion models

Quaddus (1995) categorises IT diffusion process models in two groups: stage models and dynamic models (see FIGURE 3.1). *Stage models* are implicitly time dependent and consist of stages, the duration of which are not fixed. *Dynamic*

models are explicitly time dependent models and deal with diffusion processes over time.

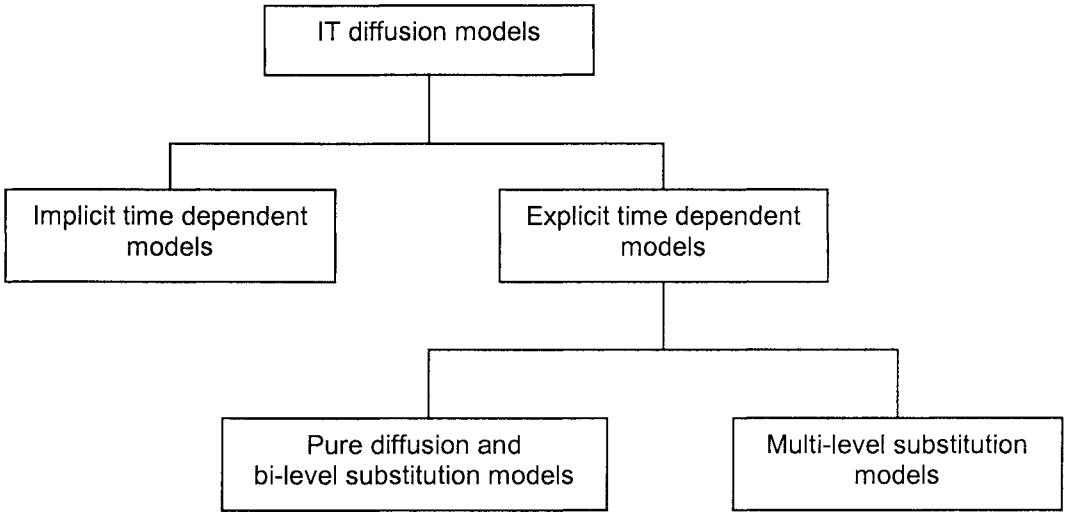

FIGURE 3.1. Classification of IT Diffusion Models (Quaddus, 1995, p. 193)

In this section, stage models are explored in more detail. Literature provides various stage models of the innovation diffusion theory (Quaddus, 1995). They have several similar features when compared to each other but seem to be missing a final consensus of the appropriate and necessary stages.

The innovation process is essentially captured in a stage-based process, which includes three stages: *initiation, adoption,* and *implementation* (Grover and Goslar, 1993; Kwon and Zmud, 1987; Quaddus, 1995). Initiation signifies a stage where an organisation feels pressure to change (from either need-pull or technology-push forces) and scans different IT alternatives. At the adoption stage, the decision is made to invest resources in an innovation (i.e. in a new technology) in order to respond to the pressure. Finally, the implementation stage includes development, installation, and maintenance of an innovation to increase organisational effectiveness. (Grover and Goslar, 1993; Kwon and Zmud, 1987). From an organisational perspective the introduction and implementation of an innovation requires changes in daily social habits. Lewin (1952) has presented a change model, which consists of the following three stages: *unfreezing, change*

and *re-freezing*. During unfreezing an organisation is prepared to change in order to adapt a new order, i.e. the existing group equilibrium is disrupted. Next, a change occurs and moves a group towards the desired level of equilibrium. When the desired level has been reached, re-freezing takes place and anchors the group life on the new level. (Lewin, 1952). Lewin's (1952) change model is now over 50 years old but it is still useful. In the following sections, it is used as a comparison model for the technology diffusion models under focus.

3.3 The six-stage IT implementation model

From the basis of innovation diffusion and organisational change theories an implementation research model has developed in literature in order to explain IT diffusion (Kwon and Zmud, 1987). Kwon and Zmud's (1987) model consists of six stages, is founded on Lewin's (1952) change model (see FIGURE 3.2) and consists of the following phases: initiation, adoption, adaptation, acceptance, use, and incorporation. The two first phases, initiation and adoption, are as described above. *Adaptation* refers to a phase where IT application is developed, installed, and maintained (compare to the implementation stage in stage-based model) and is available for use in the organisation (Cooper and Zmud, 1990). At the *acceptance* stage, the organisation's members are induced to commit to use the new technology and it is employed in organisational work (Cooper and Zmud, 1990). During the *use* phase, the new technology's performance and the user's satisfaction with it are determined. Finally, *incorporation* refers to the state where new technology is embedded into the organisation's every-day routine. (Kwon and Zmud, 1987).

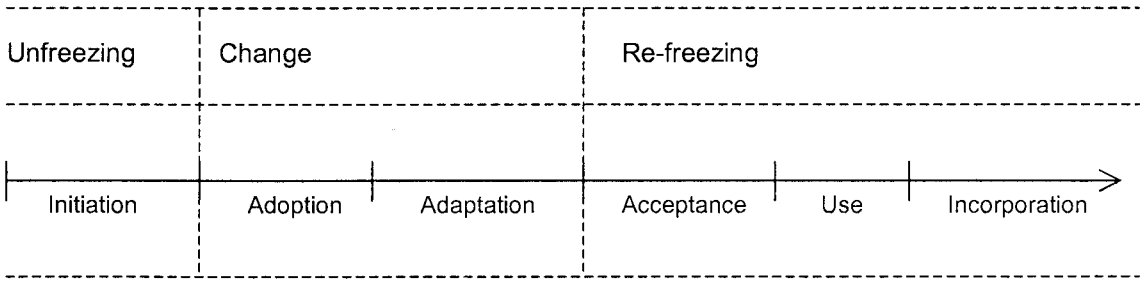

FIGURE 3.2. A six-stage view of the IS implementation process. Adapted from Kwon and Zmud (1987).

Cooper and Zmud (1990) modified the six-stage model and the re-specified model includes the following stages: initiation, adoption, adaptation, acceptance, routinisation, and infusion. In this model the last two phases, routinisation and infusion have been modified (see FIGURE 3.3). While the other four stages remain the same, *routinisation* refers to a phase where the use of a new technology is encouraged as a normal activity and is perceived as part of the routine work. At the *infusion* stage, IT application is used in a more comprehensive and integrated manner in order to increase organisational effectiveness, i.e. IT application is used to its fullest potential.

Premkumar et al. (1994) view the last four stages, adaptation, acceptance, routinisation, and infusion, of the six-stage model as the main stages of diffusion. While adoption is a single event, the diffusion process operates on a longer time scale. During diffusion, an organisation adapts to the changes caused by the innovation, accepts the new product initiated by innovation and transfers it into every-day work routines. Finally innovation is infused in an organisation and improves organisational effectiveness. During diffusion, organisational learning and adjustments, for managing innovation at work, occur. These changes happen slowly and, therefore, a gradual procession from one stage to another reinforces organisational success with the innovation. (Premkumar et al., 1994).

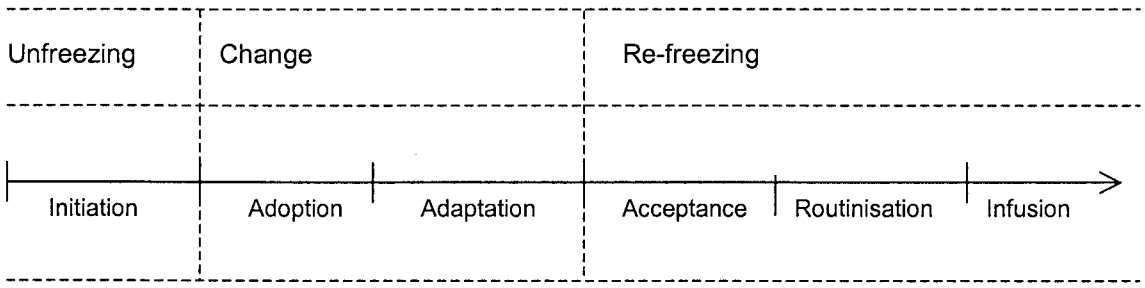

FIGURE 3.3. A six-stage model for IS implementation. Adapted from Cooper and Zmud (1990).

3.4 Implementation by cultural infusion

El Sawy (1985) presented a model for implementation by cultural infusion. It is designed especially for small organisations. It is based on the idea that an organisation has three sets of stakeholder groups: the computer service group, top management, and different kinds of user groups. The model has three stages: matching, cultural infusion, and inside-out diffusion (see FIGURE 3.4). The first stage, *matching*, is similar to the initiation phase in the model of Cooper and Zmud (1990) where potential applications are scanned and compared to the potential user needs, in order to find a matching IT application by computer services group. After that the matching IT application is purchased. In the second stage, *cultural infusion*, a small pilot group starts using the application and infusing it into the daily work activities by using cultural values to facilitate and sustain infusion. These cultural values include those, which encourage continuous learning and which clarify the roles of users and technology. Also included are values, which dissolve the stereotypes of computer users. After the pilot group has infused the new application into the workplace, with the assistance of computer service group, its cultural values diffuse to the rest of the users. This is known as *inside-out diffusion*. The pilot group helps other users in adapting the new application through training or coaching. After some time, both the pilot group and the other users become self-sustained and independent from the computer service group. (El Sawy, 1985). The idea of this type of

approach, where a pilot group is used to enhance the implementation process, is effective but if small organisations cannot afford to have a computer service group, this method may be difficult to apply.

El Sawy's implementation model does not neatly fit into Lewin's change model and hence FIGURE 3.4 is not quite truthful. This is because in cultural infusion change and re-freezing activities take place twice: first within the pilot group and second among the actual end users.

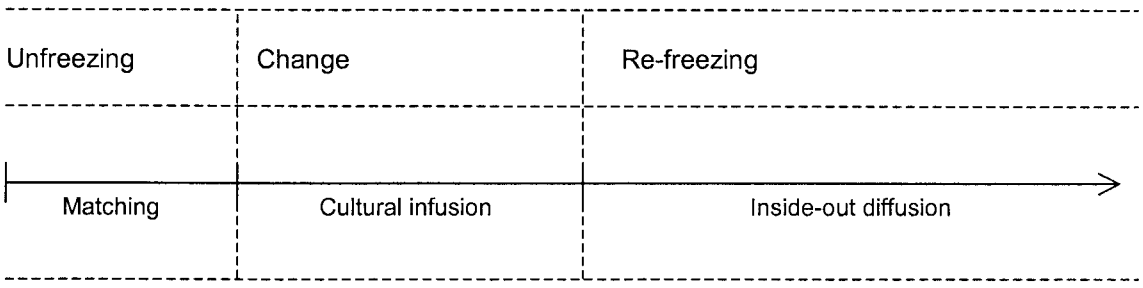

FIGURE 3.4. The stages of Implementation by Cultural Infusion. Adapted from El Sawy (1985).

3.5 The innovation process

Rogers (1995, p. 5) defines diffusion as follows: "Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system." In this definition, the key elements are innovation, channels of communication, time, and a social system. An *innovation* can be defined as an idea, a product, a technology or a program that is new to the adopting unit and concerns both organisational and individual levels (Grover and Goslar, 1993). The *channels of communication* are the way by which information is passed between individuals. *Time* refers to the capacity of the communication channels, the relative time with which an innovation is adopted, compared to other adopters, and the rate at which an innovation is adopted in a certain time period. A *social system* is a set of interrelated groups,

individuals or organisations that are working on a shared problem to attain a common goal. (Rogers, 1995, p. 11-23). Technology diffusion refers to spreading and utilising a new technology in a social system i.e. at a workplace (Attewel, 1992). In the case of technology diffusion the words "innovation" and "technology" are often used as synonyms (Rogers, 1995).

Rogers (1995, 389-404) has studied the innovation process in organisations. He states that the innovation process usually consists of five stages: agenda setting, matching, redefining/restructuring, clarifying, and routinising. The first two stages, agenda setting and matching, form an *initiation* phase during which the decision of adopting an innovation is made. The last three stages form the actual *implementation* phase during which the innovation is put into use within an organisation (Rogers, 1995, 389-404). The innovation process model is depicted in FIGURE 3.5.

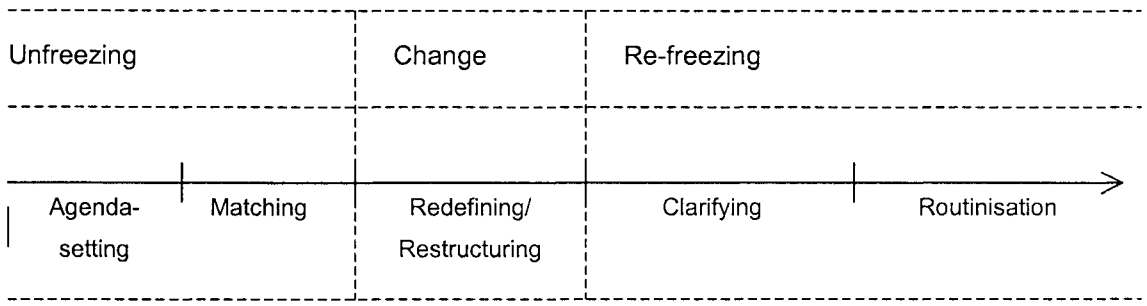

FIGURE 3.5. The innovation process in an organisation. Adapted from Rogers (1995).

Agenda setting takes place when a general organisational problem creates a need for an innovation. For example, the innovation process can be triggered by a contradiction between an organisation's expectations and its actual performance. *Matching* is the stage where an organisational problem is fitted with an innovation in order to define how an innovation could solve the perceived organisational problem. Agenda setting and matching, together, lead up to the decision whether to adopt or reject an innovation. At the *redefining/restructuring* stage, both the innovation and the organisation are being

modified in order to conform to each other. (Rogers, 1995). Tyre and Orlikowski (1994) state that, in innovation literature, it is often argued that adaptation is a gradual and continuous process but a study of innovations in three organisations show that there exists only a brief window of opportunity during which an innovation and adopting organisation can be modified. A mutual accommodation of the organisation and the innovation is a prejudice for a successful innovation process because the innovation rarely fits the organisation as such (Rogers, 1995). *Clarifying* occurs when the organisation gets more familiar with the innovation and uses it on a regular basis. *Routinising* is the final step of an innovation process and it refers to the stage where innovation is incorporated into an organisation's every-day activities and is no longer perceived as new. (Rogers, 1995).

3.6 A comparison and analysis of stage models

When comparing the implementation process models, one notices both the similarities and the discrepancies between them. The six-stage model by Kwon and Zmud (1987) presents the implementation stage clearly by dividing the process into small steps. However, these steps are not defined in detail as well as in the re-specified version by Cooper and Zmud (1990) and their content remains unclear. The modified version of the six-stage model by Cooper and Zmud (1990) offers a detailed description of each stage. It has been tested in previous research (Cooper and Zmud, 1990; Winston and Dologite, 1999) and is applicable within the context of small organisations. El Sawy's (1985) study shows positive results from the use of his model in practise. It has been tested in a small organisation environment and therefore seems suitable for this study's base. However, it is missing formalised and further tested stages and requires the existence of the pilot group. According to Quaddus (1995), Rogers' model is one of the most used stage models and its variations have been used in several

studies (see for instance Brancheau and Wetherbe, 1990; Huff and Munro, 1985[2]. The main focus of the innovation process model and the six-phase implementation model, by Cooper and Zmud (1990), appears similar. The redefining/restructuring stage (Rogers, 1995) is almost congruent with the adaptation stage of Cooper and Zmud (1990). Following this, the innovation model does not consider issues related to the acceptance and jumps straight to the clarifying stage. Additionally, the innovation process model has not been applied to small organisations. A comparison of the innovation diffusion stage models is shown in FIGURE 3.6.

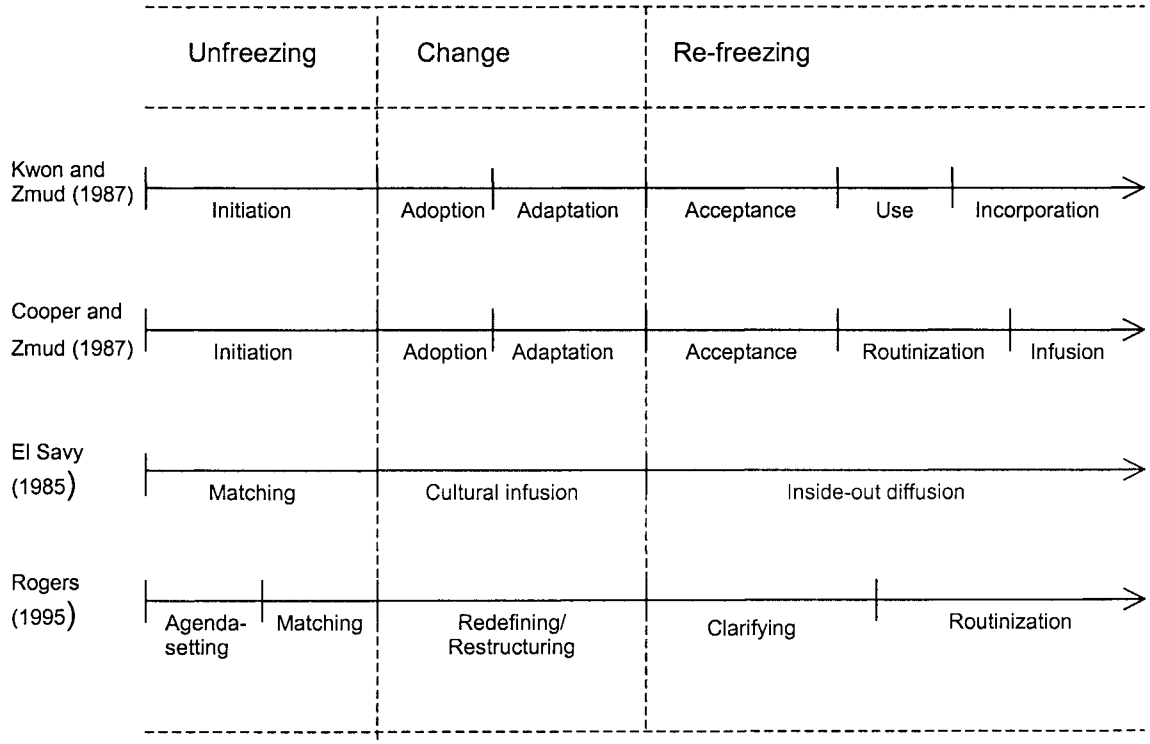

FIGURE 3.6. A comparison of the innovation diffusion stage-models. Adapted from Quaddus (1995).

The analysis of the stage-models shows that the modified six-stage model by Cooper and Zmud (1990) is the most suitable one for studying IT

---

[2]) Huff and Munro (1995) based their study on the earlier version of Rogers's innovation process model from the year 1962.

implementation in the context of small organisations. The focus is on diffusion, starting from the point where IT application has been purchased and installed. They mainly deal with re-freezing activities in an organisation but in the beginning, especially at the adaptation stage, change has an important role. Hence, the stages under further analysis (in terms of Cooper and Zmud (1990)) are adaptation, acceptance, routinisation, and infusion. The four stages under focus are depicted in FIGURE 3.2 and are shaded with grey.

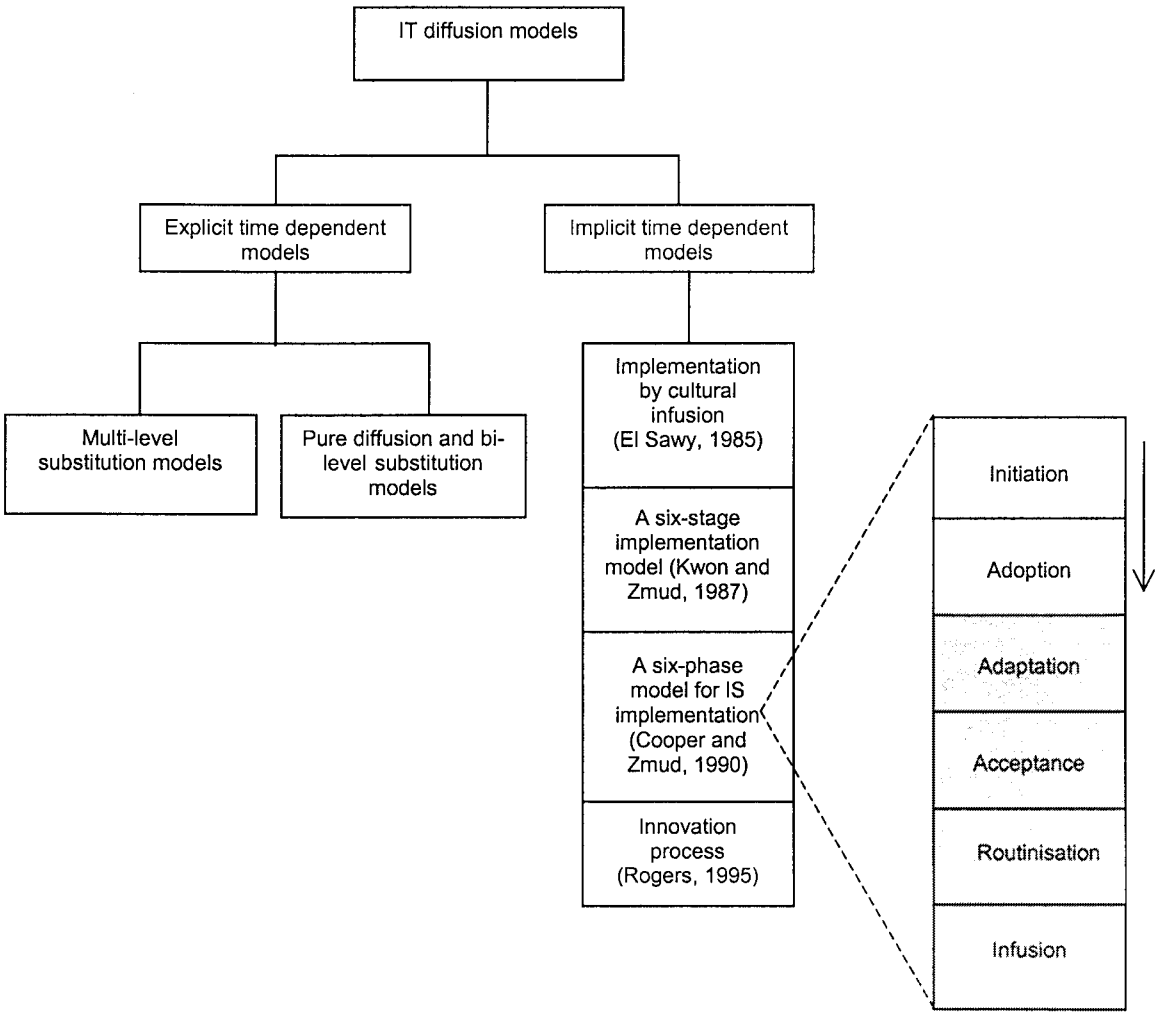

FIGURE 3.2. The derivation of the implementation research framework.

4 IT IMPLEMENTATION SUCCESS AND CRITICAL SUCCESS FACTORS IN SMEs

In implementation literature (Cale and Curley, 1987; DeLone and McLean, 1992; Grover and Goslar, 1993), several factors affecting the overall implementation success or outcome have been identified. In only a few studies (see Cooper and Zmud, 1990; Kwon and Zmud, 1987; Tyre and Orlikowski, 1994) has the implementation process been viewed at more detailed level and has the focus been on the factors affecting the different stages of the implementation process. In this section, the general success factors related to technology diffusion are viewed.

Markus et al. (2000) argue that *success,* in general, depends on the perspective of the evaluator. For instance, implementation consultants may consider an IT implementation project successful if it takes place in a planned time frame and within budget. The adopters of the new technology, however, may appreciate a smooth transition from an old system to a new one (Markus et al., 2000). Seddon (1997, p. 246) defines IS success from a user's viewpoint: "IS success is a measure of the degree to which the person evaluating the system believes that the stakeholder (in whose interest the evaluation is being made) is better off". Markus et al. (2000) state that in order to capture the different dimensions of enterprise resource planning (ERP) system success, in an organisational context, one should consider it from the following view points: 1) success in technical terms, 2) success in economic, financial or strategic business terms, 3) success in terms of smooth running of business operations, 4) success as perceived by the adopting organisation's managers and employers, and 5) success as perceived by the adopting organisation's customers, suppliers, and investors.

DeLone and McLean (1992) approached the concept of IS success by evaluating different *success factors* and came to the conclusion that there is no single success

factor but there are many. These factors can be divided into six categories: system quality, information quality, system use, user satisfaction, individual impact, and organisational impact (DeLone and McLean, 1992). These success factors can be viewed from different perspectives. Cale and Curley (1987) argue that implementation success is a subjective concept and, instead of measuring it as such, it is more reasonable to concentrate on measuring the actual *outcome* of an implementation effort. This can be done by studying those in an organisation who are affected by the new technology and to what extend. The implementation outcome is determined by whether the impact exceeds or falls short of expected results (Cale and Curley, 1987).

The rest of this chapter is organised as follows: In section 4.1 the concept of critical success factors is defined. In sections 4.2 - 4.6 the common success factors related to IT implementation in SMEs are studied. Those success factors are: Environmental factors, organisational factors, owner related factors, end-user related factors, and technology factors.

4.1 Critical success factors

"Critical success factors can be viewed as situated exemplars that help extend the boundaries of process improvement, and whose effect is much richer if viewed within the context of their importance in each stage of the implementation process." (Somers and Nelson, 2001, p. 2). In implementation literature various success factors have been identified. They can be roughly classified as follows: environmental factors (Grover and Goslar, 1993; Kwon and Zmud, 1987; Winston and Dologite, 1999), organisational factors (Grover and Goslar, 1993; Kwon and Zmud, 1987; Lai, 1997), owner related factors (Curley, 1983; Lai, 1997; Sarker and Lee, 2000; Winston and Dologite, 1999), end-user related factors (Kwon and Zmud, 1987; Winston and Dologite, 1999),

technology factors (Kwon and Zmud, 1987; Lai, 1997; Rogers, 1995; Cale and Eriksen, 1994), and task related factors (Kwon and Zmud, 1987).

Related studies (Grover and Goslar, 1993; Anderson, 1989) show, however, that task related factors are rather irrelevant when measuring the use and acceptance of new IT. According to Grover and Goslar (1993), task related factors are not relevant in the case of organisational implementation because they deal with individual adoption behaviour and are related to a specific task context rather than to an organisational context. Anderson (1989) gained similar results when studying implementation of computer based IS: Job and end-user characteristics have a minimal impact on implementation outcome. In conclusion, task related factors are not an issue in the context of small businesses and, consequently, are not studied here.

4.2 Environmental factors

Environmental factors refer to the level of uncertainty in the environment (Grover and Goslar, 1993; Kwon and Zmud, 1987), competition, concentration/dispersion, and inter-organisational dependence (Kwon and Zmud, 1987). *Uncertainty* is related to the instability and the turbulence of an organisation's external environment (Kwon and Zmud, 1987). Grover and Goslar (1993) studied the implementation of telecommunications technologies in 154 U.S. organisations. They found that implementation is positively influenced by environmental uncertainty because it forces organisations to pay more attention to the IT applications and their implementation in order to manage the greater technological requirements (Grover and Goslar, 1993). Environmental uncertainty is strong in SMEs (Blili and Raymond, 1993; Boedeker et al. 1995) and, therefore, a conclusion can be drawn that it promotes IT implementation in small organisations.

Competition refers to "environmental capacity (scarcity of resources) and population density" (Kwon and Zmud, 1987, p. 240). According to Kwon and Zmud (1987) Kimberly and Evanisko (1981) state that it has a favourable influence on the very first stages of IT implementation process (adoption). *Concentration/dispersion* "represents the extent to which resources are evenly spread throughout the environment" (Kwon and Zmud, 1987, p. 240). In SMEs, resource concentration is often low (Lind et al., 1989; Montazemi, 1988) and it may hinder IT implementation, which requires investments to be successful. *Inter-organisational dependence* (or extra-organisational situation) refers to the degree of strategic alliances, shared resources with other organisations (Kwon and Zmud, 1987), and use of IT consultants (Winston and Dologite, 1999). The benefits of the use of external expertise within IT implementation projects are acknowledged in literature (Kole, 1983; Thong and al., 1994). The better the accessibility of, and the more plentiful the supply of, resources in the external environment, the greater is the likelihood of IT success (Ein-Dor and Seveg, 1978). *Training* provided by vendor and informal expert consultation has a positive influence on implementation (Lai, 1997). Also the *possibility of using a vendor's project management tools* enhances implementation (Somers and Nelson, 2001). According to Kole (1983), the pre-conditions for successful implementation of management information system (MIS) in small businesses are top-management commitment, the use of outside consultants, and the use of software packages.

4.3 Organisational factors

Organisational factors are comprised of size, structure (Ein-Dor and Seveg, 1978; Grover and Goslar, 1993; Kwon and Zmud, 1987; Lai, 1997; Larsen, 2001), an organisation's IT experience (Winston and Dologite, 1999), and time frame (Ein-Dor and Seveg, 1978). Here, *size* is determined by annual sales and the number of employees as is defined in chapter 2. Small size affects the implementation

outcome indirectly; smaller organisations have less resources and less formalised systems and, therefore, IT implementation is more likely to fail in SMEs than in large companies (Ein-Dor and Seveg, 1978).

Structural factors include informal networks (Kwon and Zmud, 1987; Larsen, 2001), centralisation, formalisation (Grover and Goslar, 1993; Kwon and Zmud, 1987; Lai, 1997), and openness (Lai, 1997). *Informal network* has been identified as an important factor for IT implementation success according to various authors (see for instance Larsen, 2001; Rogers, 1995; Somers and Nelson, 2001). It refers to the degree of informality in an organisation's communication channels, i.e. interpersonal channels, which "...involve a face-to-face exchange between two or more individuals." (Rogers, 1995, p. 18). Informal communication, through interpersonal channels, is one of the major enablers of technology diffusion because most individuals evaluate the new technology on the basis of the information they receive from their peers, who have previously adopted the technology (Rogers, 1995, 18). Somers and Nelson (2001) studied ERP implementation in the context of medium and large organisations. Their study results show that inter-departmental *communication* and *co-operation* were the key success factors across the implementation stages. Since, in most cases, SMEs are not divided into departments like large companies and because different "departmental" tasks are handled by an individual, the communication and co-operation identified, in Somer's and Nelson's (2001) study can be viewed as *interpersonal communication and co-operation* in the context of SMEs. Co-operation here refers to the degree of individual involvement in IT implementation. It is a measure of co-operation and individual efforts that share the common goal (Somers and Nelson, 2001).

Openness refers to "the degree to which members of a system are linked to others who are external to the system" (Lai, 1997, p. 90). Openness has been recognised as important for successful implementation (Lai, 1997). It may be an

encouraging factor, for instance, when forming strategic alliances with other companies.

Formalisation refers to "the degree of reliance an organisation places on formal rules and procedures" (Lai, 1997, p. 91). In literature, formalisation is sometimes called organisational *maturity,* which, according to Ein-dor and Seveg (1978) refers to the degree of system formalisation and availability of relevant data for decision-making within an organisation. Typically, the level of formalisation in small companies is low. According to Grover and Goslar (1993), the degree of formalisation does not have an impact on the outcome of telecommunication technologies implementation but Lai's (1997) study result show the opposite.

Centralisation refers to "the degree of decision-making concentration" (Grover and Goslar, 1993, p. 145; Lai, 1997, p. 91). Centralisation together with environmental uncertainty (Grover and Goslar, 1993) positively influences implementation. Both of these factors are strong in SMEs (Blili and Raymond, 1993; Boedeker et al. 1995) and, thus, a conclusion can be drawn that IT implementation, in small organisations, is promoted due to their centralised structure and environmental uncertainty. Centralisation provides the structure needed to facilitate implementation. Environmental uncertainty forces organisations to pay more attention to the IT applications and their implementation in order to manage the greater technological requirements. (Grover and Goslar, 1993). There have been some divergent study results concerning the influence of centralisation on implementation outcome: Grover and Goslar (1993) state that centralisation is related to IT implementation outcome. Lai (1997) argues, that it is unessential for IT implementation success and Winston and Dologite (1999), in their literature survey, concluded that a decentralised, rather than centralised, organisational structure promotes implementation. Ein-Dor and Seveg (1978) recognised this same contradiction already over twenty years ago. Their conclusion was that the likelihood of success in centralised organisations is higher than in decentralised ones. This

discrepancy may be due to the implementation of a different type of IT applications in different types of organisations.

Organisational *IT experiences* indicates how long the organisation has been using IT (Winston and Dologite, 1999). It is not quite clear if IT experience has any effect on the implementation outcome. Obviously, IT experience may enhance implementation of a new technology (Winston and Dologite, 1999) but there are study results that suggest that it does not have any influence on it in the context of SMEs (DeLone, 1988). Most of the studies show, however, that computer experience has a positive influence on IT implementation outcome. Heikkilä et al. (1991) studied the success of software package implementation in SMEs. They found that organisational IT experience has a strong effect on implementation success. SMEs with the most IT experience were the most successful in implementing new IT applications. SMEs with a short history with computers faced compatibility problems during implementation. SMEs with no computer experience suffered from usability problems. (Heikkilä et al., 1991). IS dispersion in an organisation is related to IT experience and has a positive affect on implementation. Those organisations using technology in many functions are more likely to implement more IT applications in order to co-ordinate and integrate the dispersed hardware and data. (Grover and Goslar, 1993). Organisational electronic data processing (EDP) experience has a positive relationship with IT implementation outcome (Lai, 1994). Additionally, an on-site computer use is found to have a positive impact on computer use in SMEs (Delone, 1988). In SMEs, the organisational IT experience is often at a relatively low level, which may hinder IT implementation efforts.

Organisational *time frame* refers to the planning horizon and the average length of the decision process (Ein-Dor and Seveg, 1978). In SMEs the decision-making is usually concentrated on the owner and the time frame is naturally relatively short. Small companies are, however, also easily pressured into short decision cycles by competitive environments and fast changing technologies. This may

hinder the implementation of IT applications in SMEs. (Ein-Dor and Seveg, 1978).

4.4 Owner related factors

Owner related factors (Winston and Dologite, 1999), or management characteristics, (Curley and Gremillion, 1983; Lai, 1997) have a great significance on implementation outcome. It has been widely recognised in literature, that one of the most critical owner related success factor is top management support (DeLone, 1988; Foong, 1999; Kole, 1983; Kwon and Zmud, 1987; Lucas, 1981, p. 99; Somers and Nelson, 2001; Thong et al., 1996). Strong and committed leadership throughout the implementation process is a major social enabler for successful IT implementation (Sarker and Lee, 2000). Especially in the context of SMEs, the IS success is highly dependent on the *manager's computer knowledge and commitment to IT implementation* (Delone, 1988). "An owner that is knowledgeable about IT tends to be more involved in the implementation process" (Winston and Dologite, 1999, p. 32). Open and honest communication, and a balanced and empowered implementation team, may contribute to implementation success but only if strong management commitment exists (Sarker and Lee, 2000). Korunka et al. (1997) state that implementation projects are highly dynamic. Therefore, flexibility in management and therefore planned alternatives in schedules, resource and cost plans, and expected outcomes are needed (Korunka et al., 1997).

Inadequate project management has been identified as an inhibitor in large implementation projects from organisational point of view (Korunka et al., 1997). SMEs in general have a short-term management perspective (Paasio and Heinonen, 1993, 44) and a tendency for insufficient planning, which may have a negative impact on IT implementation. However, in small businesses, IS project planning has an effect on computer success primarily through manager's

involvement (Delone, 1988). Because of this reason, it is important that the IT planning process is adapted to the owner's strategic disposition. It is up to the owner's strategy whether the IT implementation process ever reaches the infusion stage. (Winston and Dologite, 1999). In SMEs the importance of top-management's *support* and *involvement* may be even more important than in large companies. Owner-manager is the only person who decides how the limited resources are spent. Since there is no slack resources available in small businesses the commitment of the manager is the only way of dedicating resources for IT implementation (Lucas, 1981, p. 99). By budgeting sufficiently resources for IT implementation process the likelihood of MIS success is increased (Ein-Dor and Seveg, 1978; Somers and Nelson, 2001). As Grover and Teng (1994, p. 82) express it, "Top management endorsement of a project typically translates into financial support and subsequently a 'green' light to aggressively implement.".

If the owner cannot be personally or directly involved in the implementation process, an authorised *project champion* can be used instead. A champion is a person in an organisation who actively and enthusiastically promotes the innovation to be adopted (Curley and Gremillion, 1983). Owner's involvement through a champion leads to commitment in similar manner as personal involvement (Winston and Dologite, 1999). The role of a champion is essentially social and political (Curley and Gremillion, 1983). The main function of a champion is to market the implementation project to the end-users and to manage the change process (Somers and Nelson, 2001). A champion can take a form of an opinnion leader, a change agent or a top-managements surrogate (Curley and Gremillion, 1983). *Opinion leader* in an organisation is usually an individual who is able to influence other individuals attitudes or behaviour informally (Rogers, 1995). A *change agent* is a central concept in innovation-decision process but it can be used also at the implementation stage to refer to an individual (e.g. consultants) who guides the implementation towards a desired direction (Rogers, 1995). *Top-managements surrogate* refers to a person,

who is trusted to use the powers of top-management in order to enhance the implementation process when the manager cannot be personally involved (Curley and Gremillion, 1983). Curley and Cremillion (1983, p. 208) state that "the presence of champion is often a significant factor in determining implementation success". The excistence of a champion is needed throughout the implementation process in order to get a new technology diffused into an arganisation (Curley and Cremillion, 1983).

4.5 End-user related factors

End-user factors (individual factors) include job tenure, cosmopolitanism, education (Kwon and Zmud, 1987), involvement (Kwon and Zmud, 1987; Winston and Dologite, 1999), incentives, experience, and training (Winston and Dologite, 1999). *Job tenure* refers to the degree of an individual's control over his or her profession. High job tenure usually results a positive attitude towards innovations. *Cosmopolitanism* includes the outside contacts of an individual and the breadth of his or her perspectives. *Education* refers to the individual's educational level. (Kwon and Zmud, 1987). *Incentives* refer to the facts that motivate users to promote an implementation process (Winston and Dologite, 1999). *Experience* includes the previous exposure to IT or computers and the previous implementation experience. *Involvement* stands for the participation in managerial activities or active user participation during implementation process (Kwon and Zmud, 1987; Winston and Dologite, 1999). Cosmopolitanism, involvement and education are typically associated with positive attitude towards change. (Kwon and Zmud, 1987).

Training means the amount of training provided to end-users and key personnel in relation to the implementation of a new IT application. The importance of training has been identified in MIS literature. According to Grover and Teng (1994, p. 81), "..., training aimed at providing customers with an understanding

of the system and its utility results in greater use of the system.". Training can be viewed as "a vital catalyst" for diffusing a new IT application into an organisational work (Grover and Teng, 1994). The lack of training is often a reason for implementation failures (Somers and Nelson, 2001). Anderson (1989) states that the characteristics of an end-user as an individual have only a faint impact on IS use. Yet again, training and education of the end-users have a major impact on the implementation success (Anderson, 1989).

4.6 Technology related factors

Innovation characteristics, i.e. relative advantage, compatibility, complexity (Kwon and Zmud, 1987; Lai, 1997; Rogers, 1995), trialability, and observability (Rogers, 1995) are important factors for successful implementation. They have been identified in various studies and are also known as *technology factors* (Kwon and Zmud, 1987).

Relative advantage "is the degree to which an innovation is perceived as better than the idea is supersedes"(Rogers, 1995). In SMEs, experienced relative advantage can be derived from improved information processing, improved planning and control, and overall work improvement (Cragg and King, 1993) and impact on business (Heikkilä et al., 1991). *Compatibility* "is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 1995). Compatibility, in other words, refers to the fit between a new technology and an organisation (Cooper, 1994). The compatibility of an IT application is relevant to the implementation success especially in the case of software packages (Heikkilä et al., 1991). In general, SMEs are able to adapt to new situations easily but since their IT applications are seldom custom made the adaptability of the new technology is of increased importance. Low compatibility of an application may prevent the whole implementation despite

of a well-planned implementation (Cale and Eriksen, 1994). Lai (1997) used stage-based process model when studying critical factors of integrated services digital network (ISDN) implementation and found a positive relationship between relative advantage, compatibility, and implementation outcome.

Complexity "is the degree to which an innovation is perceived as difficult to understand and use" (Rogers, 1995). Complexity has found to have only negative impacts on the implementation of IT applications (see for instance Cale and Eriksen, 1994; Kwon and Zmud, 1987; Lai, 1997; Precummar et al., 1994). *Trialability* refers to "the degree to which a potential adopter is allowed to experiment with an innovation prior to final commitment" (Cale and Eriksen, 1994, p. 167). It is mainly related to the initiative stage of implementation, i.e. IT selection and adoption, and hence is not relevant here. *Observability* (or visibility) refers to the degree to which the results of an innovation are visible and evident to the adopting individual and to the subordinates, peers, and superiors of the adopter (Cale and Eriksen, 1994; Rogers, 1995).

In this chapter, the general success factors related to technology diffusion have been discussed. Since IT implementation is a long-term process, it can be assumed that the influence of the success factors discussed above is not equal on every stage of the process. One factor is most likely to be more critical at one stage of the process than on another. In order to form a more comprehensive understanding of the critical success factors and their relation to the implementation process, the stage-spesific success factors should be identified. This is done in chapter 5.

5 STAGE-SPECIFIC SUCCESS FACTORS IN SMEs

In order to get a deeper understanding of implementation process, it is necessary to study each stage individually, and identify the relevant success factors influencing on them particularly. This is, because some factors may have a different, or even opposite influence on different stages (Cooper and Zmud, 1990). In this chapter, the stage-specific critical success factors are studied. The factors affecting the different implementation stages, i.e. adaptation, acceptance, routinisation and infusion, are explored in detailed level.

In section 5.1, success factors related to the adaptation stage are studied. Section 5.2 concentrates on the acceptance stage and section 5.3 studies the routinisation stage. In section 5.4, the success factors related to the infusion stage are studied. In section 5.5, the stage specific factors are compared to each other and analysed. In section 5.6, the controllability of success factors is examined and analysed.

5.1 Adaptation

Adaptation is a relatively short period of time (Tyre and Orlikowski, 1994) after a decision is made to invest resources in an innovation, during which an innovation is installed and organisational procedures are modified accordingly (Cooper and Zmud, 1990). As a result of adaptation "the IT application is available for use in the organization" (Cooper and Zmud, 1990).

It has been argued by various authors (Kwon and Zmud, 1987; Lai, 1997; Premkumar et al., 1994) that technological factors such as relative advantage, compatibility and complexity are related to the success of adaptation. Both relative advantage and compatibility have a positive impact on adaptation phase, while complexity of the new technology has a negative relationship

towards it (Kwon and Zmud, 1987; Lai, 1997). The compatibility of a new IT application is relevant for adaptation outcome because the more the innovation can be modified the less the adapting organisation needs to change. Yet again, if the IT application needs to be customised it usually increases the system costs, delays the implementation and may hinder the use of vendor's software maintenance and upgrades (Nelson and Somers, 2001). In a worst case, a sufficiently low compatibility may stop the implementation process as early as at the adaptation stage (Cale and Eriksen, 1994).

According to Kwon and Zmud (1987) individual factors, such as cosmopolitanism and favourable attitude towards change, have a positive influence on adaptation of new technology. Environmental factors including uncertainty and organisational dependence have a favourable impact on adaptation (Kwon and Zmud, 1987). Centralisation, informal network, and formalisation have a positive impact on adaptation phase; yet sometimes formalisation may have negative implications, too (Kwon and Zmud, 1987). In a study of ERP implementation across the implementation stages Somers and Nelson (2001) found that communication and co-operation, project team competence, dedicated resources, and the use of vendor's tools were the most critical success factors at adaptation stage.

5.2 Acceptance

"Technology has the opportunity to enhance productivity only if it is accepted and used" (Anderson, 1989, p. 174). User acceptance of IT is a complex phenomenon (Venkatesh and Davis, 2000) during which the members of an organisation are "induced to commit to IT application usage" (Cooper and Zmud, 1990, p. 124). As a result of acceptance the IT application is taken in use within an organisation (Cooper and Zmud, 1990).

According to Somers and Nelson (2001), the acceptance is determined by *organisational* and *owner related factors*. They state, that the five major enablers of ERP acceptance are communication and co-operation, top management support, project team competence, and education on new business processes. Education on new business processes is relevant only if the implementation of a new IT application causes changes in organisation's business processes. On the contrary, Cale and Eriksen (1994) emphasise that the degree of acceptance is determined by *innovation characteristics*. According to their research results, relative advantage, compatibility and observability enhance IT implementation success while the complexity of an IT application has a negative influence on it (Cale and Eriksen, 1994).

End-user related factors are critical at acceptance stage. End-users' positive attitude towards change reinforces acceptance (Kwon and Zmud, 1987). Korunka et al. (1997) state that according to Carayon and Smith (1993) the type and timing of information provided to end-users and the degree of end-user involvement (Anderson, 1989; Baronas and Louis, 1988) affects on the degree of acceptance. End-user involvement has been recognised as a promoting factor towards IT implementation in general (Kwon and Zmud, 1987; Winston and Dologite, 1999). It has been argued (Anderson, 1989; Baronas and Louis, 1988) that, even though user participation and involvement have been commonly recognised in literature as a major motivating factor for IT implementation, it only has a positive impact on the attitude towards and acceptance of the new IT application but not on the actual use. "Individuals who have participated in decisions feel they own a part of the solution and are more favourable toward it." (Lucas, 1982, p. 100). In SMEs, also incentives may enhance acceptance of IT (Winston and Dologite, 1999).

The experienced equity related to the new technology has been identified of having a positive relation to acceptance (Joshi and Lauer, 1999). From an equity perspective, individual who experience that a change caused by new

technology reduces his or her equity compared to his or her earlier equity status, is likely to resist the change (Joshi, 1991). In addition, it has been found that acceptance or reasons for resistance are dependent on the type of implemented IT application (Jiang et al. 2000) and the fit between new technology and organisational culture (Cooper, 1994). "A realignment of status, power, and working habits which can accompany the implementation of new technologies may violate some of a group's shared values and meanings, and result in culture-based resistance" (Cooper, 1994, p. 18). The role of a champion at acceptance stage is important because he or she can help the end-users to overcome their resistance to change and to accept the new technology easier (Curley and Cremillion, 1983).

User acceptance on individual level can be predicted by using technology acceptance model (TAM) (Venkatesh and Davis, 2000). The key idea in TAM is that user's behavioural intention (i.e. the intention to use and the consequently intention to accept) to use a new system can be determined by two terms: *perceived usefulness* and *perceived ease of use*. Perceived usefulness refers to the "extend to which a person believes that using the system will enhance his or her job performance" (Venkatesh and Davis, 2000). The concept of perceived usefulness is close to the definition of the concept of relative advantage. However, here those two terms are kept separate because perceived usefulness is strongly stage-specific while relative advantage is merely a general success factor. Perceived ease of use signifies "the extent to which a person believes that using the system will be free of effort" (Venkatesh and Davis, 2000, p. 187). The easier an IT application is to use and the more it promotes user's job performance, the greater is the level of acceptance (Kole, 1979, p. 31). Also, management support and external computing support have a direct positive influence on both perceived ease of use and perceived usefulness (Igbaria et al., 1997).

Krovi (1993) has studied acceptance from a change theory perspective. The change caused by a new technology in organisations may take place incrementally, radically or somewhere between those two extreme ends. *Incremental change* is triggered from inside the organisation and it often causes only minor changes. *Radical change,* on the contrary, is a reaction to changes in external environment and it may have a strong impact on organisation's strategic level. *The middle type of change* is more extensive than incremental change but it does not affect the strategic level. The type of change determines the reasons why resistance occurs. If a change is incremental, then the reasons for resistance usually are lack of commitment from top management, users perceiving job security threat, and resistance by IS personnel. If a change is radical the driving force is often strategic and there is a pressure on IS department to implement new technology fast and often with low budget. This may require more IS resources than are available and thus resistance may occur. If the change type is a compromise between incremental and radical change, resistance may occur if there is an absence of top management commitment, if a change is a threat to the existing power structure or to job security, if a change increases job complexity and if there is a lack of consensus about the need for the system. (Krovi, 1993). Small organisations are easily exposed to changes taking place in their external environment (Welsh and White, 1981). Thus, one could predict that changes due to IT implementation are either radical or middle type changes. In the case of radical changes resistance is likely to occur in SMEs, since they do not posses large quantities of IS resources in the first place (Thong et al., 1994). On the contrary, middle type change may confront only minor resistance in small business environment since the consensus of decisions is high (Boedeker et al., 1995), power structure is minimal (Heikkilä et al., 1991), and top-management is responsible for running the business by his or her personal contribution (Paasio and Heinonen, 1993). To promote the acceptance of a new technology Krovi (1993) suggests first identifying the type of change desired, then identifying the potential causes of resistance, and finally planning the implementation process accordingly.

5.3 Routinisation

Routinisation takes place after the new technology is accepted and employed in organisational work. During routinisation the use of new IT technology is encouraged as a normal activity and organisation's systems are adjusted to account for it. As a result of routinisation "The IT application is no longer perceived as something out of the ordinary" (Cooper and Zmud, 1990, p. 124).

The use of the IT application can be encouraged by communication and co-operation, top management support, vendor support (Somers and Nelson, 2001) or by a champion (Curley and Cremillion, 1984). A champion can both influence the organisational attitude towards the adopted technology and aid the end-user to understand its purpose and to use it (Curley and Cremillion, 1984). Kwon and Zmud (1987) studied routinisation based on their six-stage implementation model where routinisation consists of three elements: *use, satisfaction,* and *performance*. Individual factors like job tenure and education have a negative impact on use and satisfaction during routinisation stage but they do not seem to have any specific impact on performance. Attitude towards change reflects positively on performance and satisfaction (Kwon and Zmud, 1987). Centralisation affects negatively on performance and satisfaction but may motivate the use of new technology. Formalisation has a positive influence on performance and use but it may reduce satisfaction. Environmental uncertainty has a positive effect on use and performance at routinisation stage. (Kwon and Zmud, 1987).

Cale and Eriksen (1994) state that the success of continued use is mainly dependent on the complexity of the application and the accessibility of required training and skills for system and user support. It needs to be noted, though, that the study of Cale and Eriksen (1994) was directed at mainframe-base software packages in large organisations. The results may have been different

with microcomputer-based packages in the context of SMEs. Nevertheless, user training has been identified as one of the most critical success factors at routinisation stage (Somers and Nelson, 2001)

5.4 Infusion

Infusion is the last stage of technology diffusion and it is defined "as increased breadth and depth of IT application use" (Winston and Dologite, 1999, p. 28). Breath means the amount of users and IT applications and depth refers to the extend of individual IT use and satisfaction (Winston and Dologite, 1999). During infusion the organisational effectiveness is increased by utilising the IT application in a comprehensive fashion. As a result of infusion "The IT application is used within the organisation to its fullest potential" (Sullivan (1985) according to Cooper and Zmud, 1990, p. 125). Low-level infusion requires changes only in a part of an organisation while high-level infusion requires changes, which encompass the whole organisation. (Cooper and Zmud, 1990).

Winston and Dologite (1999) surveyed literature to identify the factors influencing small business IT infusion. They found that at infusion stage a decentralised organisational structure reinforces implementation in small businesses because it offers various information channels and a great amount of information exchange (Winston and Dologite, 1999). The importance of communication has been recognised in literature by other authors as well: According to Somers and Nelson (2001) communication is the number one enabler of infusion while Kwon and Zmud (1987) state that informal network promotes the infusion of technological information related to the new IT within an organisation.

Formalisation, in general, has a positive relationship to infusion. It helps SMEs to adjust to the requirements of a new IT application (Winston and Dologite, 1999). Also, co-operation reinforces infusion. It is particularly important in the case of cross-functional IT applications, like ERP systems, which require attention of all business processes (Somers and Nelson, 2001).

Kwon and Zmud (1987) state that *individual factors* like cosmopolitanism and education affect positively on infusion stage. However, individual perspectives in the form of bureaucratic self-interest may inhibit infusion and hence the importance of control manoeuvrings is high at the infusion stage. This control can be attained by committed senior management actively co-ordinating and involving the implementation process (Cooper and Zmud, 1990). According to Winston and Dologite (1999), incentives can be used in the final steps of implementation to encourage and motivate end-users to infuse the IT application into their work. Training can be used to convince the members of an organisation that the individual costs are worth of the advantages a fully infused innovation is expected to bring along (Cooper and Zmud, 1990). Training can be arranged by an external IT consultant or together with other SMEs. The accessibility of IT consultants and strategic alliances reinforce IT infusion also by providing resources, information and expertise required in IT implementation (Winston and Dologite, 1999). Additionally, vendor support and the partnership with vendor increase the infusion success (Somers and Nelson, 2001).

Owner's involvement until the end of the innovation process is important (Cooper and Zmud, 1990; Sarker and Lee, 2000; Winston and Dologite, 1999), and therefore it can be considered important at infusion stage, too. Besides involvement, owner's support (Somers and Nelson, 2001), knowledge and implementation strategy are related to the breadth and depth of infusion (Winston and Dologite, 1999).

According to Kwon and Zmud (1987), also *technological* and *environmental factors* influence the infusion outcome. Compatibility and relative advantage enhance infusion of new technology in an organisation, while the complexity of new technology inhibits infusion. Environmental factors, i.e. resource concentration/dispersion, uncertainty and organisational dependence promote infusion.

5.5 A comparison and analysis of the success factors

From the literature survey, it can be noted that not all of the identified factors impact all the stages of implementation. Additionally, it can be noted that, despite of the various implementation process models, implementation in literature is still often viewed as one event (see Heikkilä et al., 1991; Cale and Eriksen, 1994). Because of that reason, not all the IT implementation success factors occurring in literature can be appointed to a specific stage and due to that have to be considered as related to all the stages.

Both general and stage specific success factors are presented in tables 3.1 - 3.5. In the tables, "[+]" indicates a positive relation to IT implementation outcome, "[-]" indicates a negative relation and "[+/-]" indicates that the relation can be either positive or negative. In literature, there are cases where some authors have classified some factors as general while others have identified them influencing only one or two specific implementation process stage. If a factor has been identifies as general and stage specific it then occurs in both of the groups in the tables. The name of the author who has suggested the grouping is shown in brackets after the factor's name.

Table 3.1. A comparison of the environmental factors

ENVIRONMENTAL FACTORS	
General environmental success factors	
Competition [+] (Kwon and Zmud, 1987) Training and consultation provided by an external party [+] (Lai, 1997) External help in project planning and managing [+] (Ein-Dor and Seveg, 1978) Possibility to use an external consultant [+] (Kole, 1983)	
Stage specific environmental success factors	
Adaptation	Uncertainty [+] (Kwon and Zmud, 1987) Inter-organisational dependence [+] (Kwon and Zmud, 1987) Use of vendor's project management tools [+] (Somers and Nelson, 2001)
Acceptance	-
Routinisation	Uncertainty [+] (Kwon and Zmud, 1987), Vendor support [+] (Somers and Nelson, 2001) Training [+] (Somers and Nelson)
Infusion	Uncertainty [+] (Kwon and Zmud, 1987) Inter-organisational dependence [+] (Kwon and Zmud, 1987) Concentration/dispersion [+/-] (Kwon and Zmud, 1987), Accessibility of IT consultants and strategic alliances [+] (Winston and Dologite, 1999), Vendor support [+] (Somers and Nelson, 2001) Partnership with vendor [+] (Somers and Nelson, 2001)

Table 3.2. A comparison of the organisational factors

ORGANISATIONAL FACTORS	
General organisational success factors	
Small size [-] (Ein-Dor and Seveg, 1978) Limited resources [-] (Ein-Dor and Seveg, 1978) Informal communication network [+] (Larsen, 2001; Rogers 1995; Somers and Nelson, 1999) IT experience (Delone, 1988; Grover and Goslar, 1993; Heikkilä et al., 1991; Lai, 1994) Communication [+] (Somers and Nelson, 2001) Co-operation [+] (Somers and Nelson, 2001) Centralisation [+] (Blili and Raymond, 1993; Boedeker et al., 1995) Short organisational time frame [-] (Ein-Dor and Seveg, 1978) Openness [+] (Lai, 1997)	
Stage specific organisational success factors	
Adaptation	Centralisation [+] (Kwon and Zmud, 1987) Formalisation [+/-] (Kwon and Zmud, 1987) Informal communication network [+] (Kwon and Zmud, 1987)
Acceptance	-
Routinisation	Centralisation [+/-] (Kwon and Zmud, 1987) Formalisation [+/-] (Kwon and Zmud, 1987) System and end-user support (Cale and Eriksen, 1994),
Infusion	Centralisation [-] (Kwon and Zmud, 1987) Formalisation [+] (Kwon and Zmud, 1987) IT experience [+/-] (Winston and Dologite, 1999) Informal communication network [+] (Kwon and Zmud, 1987)

Table 3.3. A comparison of the owner related factors

OWNER RELATED FACTORS	
General owner related success factors	
Top management support [+] (DeLone, 1988; Foong, 1999; Kole, 1983; Kwon and Zmud, 1987; Lucas, 1981, p. 99; Somers and Nelson, 2001; Thong et al., 1996) Computer knowledge [+] (Delone, 1988) Involvement [+] (Cooper and Zmud, 1990; Sarker and Lee, 2000; Winston and Dologite, 1999) Strategy [+/-] (Winston and Dologite, 1999) Commitment [+] (Delone, 1988; Sarker and Lee, 2000) Appointing and authorising a project champion [+] (Curley and Cremillion, 1983) Dedicated resources [+] (Ein-Dor and Seveg, 1978; Grover and Teng, 1994)	
Stage specific owner related success factors	
Adaptation	Project team competence [+] (Somers and Nelson, 2001) Dedicated resources [+] (Somers and Nelson, 2001)
Acceptance	Lack of commitment [-] (Krovi, 1993), Top management support [+] (Igbaria et al., 1997; Joshi and Lauer, 1999; Somers and Nelson, 2001) Existence of a champion [+] (Curley and Cremillion, 1984), Project team competence [+)](Somers and Nelson, 2001)
Routinisation	Existence of a champion [+} (Curley and Cremillion, 1984), Top management support [+] (Somers and Nelson, 2001)
Infusion	Computer knowledge [+] (Winston and Dologite, 1999) Support [+] (Somers and Nelson, 2001)

Table 3.4. A comparison of the end-user related factors

END-USER RELATED FACTORS	
General end-user related success factors	
Computer experience [+/-] (Winston and Dologite, 1999) Training and education [+] (Anderson, 1989)	
Stage specific end-user related success factors	
Adaptation	Cosmopolitanism [+] (Kwon and Zmud, 1987) Positive attitude towards change [+] (Kwon and Zmud, 1987)
Acceptance	Participation and involvement [+] (Anderson, 1989; Baronas and louis, 1988; Lucas, 1982) Attitude towards change [+/-] (Kwon and Zmud, 1987) Perceived job security threat [-] (Krovi, 1993) Increase in job complexity [-] (Krovi, 1993) Lack of consensus about the need for the system [-] (Krovi, 1993) Experienced increase in equity related to the new technology [+] (Joshi, 1991; Joshi and Lauer, 1999) Incentives [+/-] (Winston and Dologite, 1999) Education on new business processes [+] (Somers and Nelson, 2001) Type and timing of information provided [+/-] (Korunka et al., 1997)
Routinisation	Positive attitude towards change [+] (Kwon and Zmud, 1987) Job tenure [+/-] (Kwon and Zmud, 1987) Education [+/-] (Kwon and Zmud, 1987) Training [+] (Somers and Nelson, 2001)
Infusion	Bureaucratic self interest [-] (Cooper and Zmud, 1990) Cosmopolitanism [+] (Kwon and Zmud, 1987) Education [+] (Kwon and Zmud, 1987) Incentives [+] (Winston and Dologite, 1999) Training [+] (Cooper and Zmud, 1990; Winston and Dologite, 1999)

Table 3.5. A comparison of the technology related factors

TECHNOLOGY RELATED FACTORS	
General technology related success factors	
Complexity [-] (Cale and Eriksen, 1994; Kwon and Zmud, 1987; Lai, 1997; Premkumar et al., 1994)	
Stage specific technology related success factors	
Adaptation	Relative advantage [+] (Kwon and Zmud, 1987) Compatibility [+] (Cale and Eriksen, 1994; Heikkilä et al., 1991; Kwon and Zmud, 1987; Lai, 1997; Premkumar et al., 1994)
Acceptance	Relative advantage [+] (Cooper, 1994) Compatibility [+] (Cooper, 1994) Visibility [+] (Cale and Eriksen, 1994) Type of IT application [+/-] (Jiang et al. 2000) Perceived usefulness [+] (Venkatesh and Davis, 2000) Perceived ease of use [+] (Kole, 1979; Venkatesh and Davis, 2000)
Routinisation	-
Infusion	Compatibility [+] (Kwon and Zmud, 1987) Relative advantage [+] (Kwon and Zmud, 1987)

In conclusion, one can say that organisational and owner related factors are the most critical ones throughout the whole IT implementation process in SMEs. Owner's involvement, support, commitment and dedicated resources are a vital success factors across the implementation stages. Especially the role of top management or owner's support has been emphasised by various authors (see DeLone, 1988; Foong, 1999; Kole, 1983; Kwon and Zmud, 1987; Lucas, 1981, p. 99; Somers and Nelson, 2001; Thong et al., 1996). Informal and interpersonal communication and co-operation, IT experience and centralised decision making are the main organisational factors enhancing IT implementation process at its all stages. The main hindrance throughout the implementation process is the complexity of the IT application.

Adaptation stage is affected by all the factor groups fairly evenly. There is no outstandingly important or unimportant set of factors influencing the success of adaptation. Adaptation has not been gaining much attention in the literature compared to other implementation stages. This can be one reason why there is fewer factors identified impacting adaptation outcome.

At acceptance stage, end-user factors and technology factors have a significant role. The third group influencing the outcome of acceptance stage is owner related factors. In literature, acceptance has been receiving plenty of attention by various researchers in recent years. Since acceptance is a major precondition of the actual use, it has been studied a lot and various acceptance theories, including TAM (see Venkatesh and Davis, 2000), change theory (see Krovi, 1993), and equity theory (see Joshi, 1991, and Joshi and Lauer, 1999), have been developed. Surprisingly, it can be noted from tables 3.1 and 3.2 that organisational and environmental factors have no influence on acceptance stage at all.

Routinisation is the only stage, which is, according to the literature (see Cale and Eriksen, 1994), dependent on the system and end-user support provided by the organisation. Routinisation is not influenced by any specific technology factor. Only the complexity of the IT application may hinder routine use as all the other stages, too.

According to literature, the success of infusion stage, where changes take place no more, is dependent on the level of end-users' bureaucratic self-interest (Cooper and Zmud, 1990) and the accessibility of IT consultants and strategic alliances (Winston and Dologite, 1999). The closer examination of the tables 3.1 - 3.5, presented above, shows that environmental factors, in general, have the most significant influence on infusion stage. Also, there are a number of end-user related factors affecting the IT implementation success in SMEs.

5.6 Controllability of the implementation success factors

There is no point of contemplating implementation success factors unless one is able to alter or control them to be more favourable towards IT application implementation. Factors affecting implementation outcome can be categorised

according to their controllability depending on in what extend they can be changed or modified (Ein-Dor and Seveg, 1978; Winston and Dologite, 1999). The controllability of IT implementation success factors has not received much attention in literature recently. The classification of success factors in this section is based on the research of Ein-Dor and Seveg (1978) and Winston and Dologite (1999). Their work, however, does not cover all the success factors that have been identified in this study. Therefore, a suggested classification of those factors has being made by the author and its validity requires empirical testing. This was done in the case study.

Uncontrollable variables are those factors, which cannot be changed in the time frame of IT, implementation process or simply are not under the control of an organisation (Ein-Dor and Seveg, 1978). Uncontrollable variables include the size of an organisation, the structure of an organisation (centralisation), organisational time frame (i.e. response or reaction time) (Ein-Dor and Seveg, 1978), and IT experience (Winston and Dologite, 1999). Extra-organisational situation is included in the group of uncontrollable variables (see Ein-Dor and Seveg, 1978) because in general SMEs have only a little or no control over their external environment. In some occasions uncontrollable factors, like end-user's or organisation's IT experience, may oppose implementation (Winston and Dologite, 1999).

Partially controllable variables are the ones that can be modified within the time frame of IT implementation process to some extend in the desired direction (Ein-Dor and Seveg, 1978). Partially controllable variables include organisational resources (Ein-Dor and Seveg, 1978), formalisation, end-user training and involvement, and owner's knowledge and strategy (Winston and Dologite, 1999). For instance, smaller organisations tend to face more IT problems raising from insufficient resources than large companies (Ein-Dor and Seveg, 1978).

Controllable variables are the ones, which are fully under the control of top management (Ein-Dor and Seveg, 1978). According to Ein-Dor and Seveg (1978), they include the rank and location of the responsible executive, the steering committee and end-user incentives, and owner involvement (Winston and Dologite, 1999). Since the responsible executive in SMEs most likely is the owner himself and a steering committee often does not exist (due to the limited resources), those factors are not included in controllable factors here. In the case of uncontrollable and partially controllable factors, which small companies cannot change or their ability to modify them is limited, extra-organisational factors, i.e. consultants or strategic alliances, can be used to replace or complement them and thus to enhance implementation process (Winston and Dologite, 1999). The classification of factors is illustrated in Table 3.6.

The analysis of factors being controllable or uncontrollable is important, because that way one can find out which factors it is advantageous to concentrate on in order to enhance implementation and which factors are not worth of an effort. "By emphasising only *relevant* criteria at each phase, the change agents can greatly enhance their efficiency and effectiveness" (Karahanna et al., 1999, p. 185).

In Table 3.6 the interesting factors, from implementation point of view, are those that are either fully or partially controllable. There is a great amount of partially controllable (and uncontrollable) factors but only a few fully controllable factors. It is relieving to notice that the most important owner related factor, i.e. involvement, is fully controllable. Since owner involvement leads to commitment (Winston and Dologite, 1999) and through commitment to support and dedicating resources, one may draw a conclusion that those factors are fully controllable as well. End-user related factors is the second group containing fully controllable factors, including user incentives (Winston and Dologite, 1999) and user training (Anderson, 1989). According to Anderson (1989), end-user training is a fully controllable factor but Winston and Dologite

(1999) argue that it should be included in the group of partially controllable factors. This discrepancy in the literature requires empirical testing to be solved.

From Table 3.6 one may notice that, from the implementation point of view, formalisation, informal network, resources, openness, communication, and co-operation are of importance because they can be partially modified in order to enhance implementation. Owner's knowledge and strategy are partially manageable. This is relevant, since owner's strategy is important across the implementation stages. It is up to owner's strategy if a champion is used and how competent the project team is. There is no direct indication in the literature whether the technology factors are controllable or not but there are study results that suggest that part of them can be modified (see Cale and Eriksen, 1994). For instance, the relative advantage of an IT application is easier to "market" to end-users in the cases where users are having problems with current tools (Cale and Eriksen, 1994). Therefore the author is suggesting that partially controllable technological factors include observability, relative advantage, perceived usefulness, and perceived ease of use. Depending on the situation, environmental factors may all be uncontrollable. However, here it is assumed that inter-organisational dependence, vendor support, and partnership with vendor are under the implementer's control partially. Partially controllable end-user factors include attitude towards change, bureaucratic self-interest, experienced equity, and education on new business processes. Bureaucratic self-interest of individuals' that may hinder infusion can be controlled by political and organisation-wide manoeuvrings (Cooper and Zmud, 1990). According to Anderson (1989) most of the essential factors enhancing implementation and use of IS are related to implementation considerations and, thus, are manageable.

Table 3.6. A suggested[3] classification of factors affecting IT implementation. Adapted from Winston and Dologite (1999) and Ein-Dor and Seveg (1978).

	Uncontrollable	Partially Controllable	Fully Controllable
Environmental factors	Uncertainty Competition Concentration/dispersion Accessibility of external resources (Ein-Dor and Seveg, 1978) Inter-organisational dependence	Inter-organisational dependence Vendor support Partnership with vendor Use of vendor's tools Training and consultation provided by an external party Possibility to use an external consultant External help in project planning and managing Use of vendor's project management tools	
Organisational factors	Centralisation (Ein-Dor and Seveg, 1978) IT experience (Winston and Dologite, 1999) Size (Ein-Dor and Seveg, 1978) Time frame (Ein-Dor and Seveg, 1978)	Formalisation (Winston and Dologite, 1999) Informal network Resources (Ein-Dor and Seveg, 1978) Openness Communication Co-operation System and end-user support	
Owner related factors	IT experience	IT knowledge (Winston and Dologite, 1999) Strategy (Winston and Dologite, 1999) Project team competence Existence of a champion	Involvement (Winston and Dologite, 1999) Commitment Support Dedicated resources Appointing and authorising a project team
End-user related factors	IT experience (Winston and Dologite, 1999) Job tenure Cosmopolitanism Education	Involvement (Winston and Dologite, 1999) Training (Winston and Dologite, 1999) Attitude towards change Bureaucratic self-interest Experienced equity Education on new business processes	Incentives (Winston and Dologite, 1999) Training (Anderson, 1989)
Technology factors	Compatibility Complexity Type of IT application	Observability Perceived usefulness Perceived ease of use Relative advantage	

5.7 Summary

In this chapter, IT implementation success factors have been studied with relation to the four stages of IT implementation process. As can be noted from the literature review presented in chapters 4 and 5, literature provides various

[3] The classification of the factors with no reference is suggested by the author.

factors with potential influence on IT implementation outcome. Nevertheless, the knowledge of these factors is not sufficient itself to produce more successful implementation projects in real life. What is important to know is how these factors can be modified and controlled after their existence has been realized. On the basis of section 5.6, it can be summarised that not much research has taken place within recent years in order to identify, which success factors can be controlled in order to achieve the best possible results of IT implementation projects in small companies. Additionally, in the literature reviewed in this study, no attention was paid on the methods of modifying the identified success factors. In order to diminish this gap between implementation research and real life implementation projects, an additional empirical research is needed. For that reason, a case study, presented in the following chapters, was conducted.

6 METERS OF IT IMPLEMENTATION SUCCESS FACTORS AND THEIR CONTROLLABILITY

In the previous chapters, various IT implementation success factors have been identified on the basis of a literature research. In order to study the validity of these success factors in real life context and to answer this study's research questions, proper investigation tools had to be prepared. In this study, the tools for investigating IT implementation success factors in practice are a questionnaire (see Appendices A and B) and an interview (see Appendices C and D). The purpose of this chapter is to build a bridge between the theoretical framework and the empirical research of this study.

This chapter is organised as follows: Section 6.1 describes how the questionnaire was derived from the literature review. Section 6.2 describes how the interview questions were formed.

6.1 The questionnaire

The purpose of the questionnaire was to complement the previous literature findings by providing an answer to the research questions 1 and 3: *Which factors, in the context of small businesses, are related to the IT implementation success? Which factors are controllable, partially controllable or uncontrollable?*

The questionnaire consists of three sections: 1) background information, 2) the factors affecting the IT implementation success, and 3) the controllability of the success factors. The meaning of the background questions was to clarify issues related to the IT implementation experience, types of implemented IT applications, and current work status of the respondents. The purpose of the second section was to test the validity of the success factors identified in the literature and, also, to identify possible new ones. The purpose of the third

section was to identify factors that can be controlled during an IT implementation process in SMEs.

The success factor related questions were formed on the basis of literature findings in chapters 2, 4 and, 5. Chapter 2 studies the basic characteristic features of SMEs. Chapter 4 describes the general critical success factors if IT implementation process and chapter 5 concentrates on the stage-specific success factors. These three approaches towards implementation process in SMEs provide a fruitful basis for a comprehensive questionnaire in order to study the influence of different factors on IT implementation success in SMEs.

The questionnaire was formed mainly on the basis of the literature findings in Chapters 4 and 5. Literature provides various implementation success factors and the important issue was to filter out the relevant factors for this study. Those are the ones, which have been identified critical in SMEs particularly. The IT implementation success factors and their classification, presented in Chapter 4, form the basic structure of the questionnaire. Consequently, the questionnaire was divided in the following categories: *organisational factors, environmental factors, owner related factors, end-user related factors,* and *technology factors.*

Almost all of the identified success factors relevant to SMEs were included in the questionnaire. For the questionnaire, the names of some factors were altered in order to be unambiguous and easy to understand for the respondents. Some of the factors identified in literature, are relatively close to each other by definition. In the questionnaire, those factors were combined and renamed. The questionnaire form is presented as normal text and the original factor name, or the combined factor names, are presented in brackets afterwards.

The following *organisational success factors* presented in chapter 4 were included: small size, limited monetary, time, and employee resources (limited resources), informal communication culture (communication and informal communication

network), informal operation mode (formality), centralised decision making (centralisation), IT experience, inter-personal co-operation (co-operation), short range planning perspective (short organisational time frame). Openness was not included in this category because it was considered more as an external factor. This category was complemented with two stage-specific success factors identified in chapter 5: system support offered by the organisation (system support) and end-user support offered by the organisation (end-user support). The influence of the characteristic features of SMEs on IT implementation process has not been extensively studied previously. However, on the basis of the literature review, it can be concluded that they have at least an indirect influence on IT implementation outcome in small businesses. Therefore, the most likely influencing factors from chapter 2 were included in organisational factors category. Those factors are: low organisational hierarchy, flexibility and, innovativeness.

The following *environmental success factors* presented in chapter 4 were included in the questionnaire: competition, inter-organisational dependence, training and consultation provided by an external party, external help in project planning and managing, and a possibility to use an external consultant. Competition was included even though, according to literature (see Kwon and Zmud, 1987), it only influences the second stage of implementation process, i.e. adaptation, which is not included in the scope of this study. The reason for this is that the influence of competition has not been extensively studied and it may have impacts on IT implementation outcome on latter stages, too.

This category was complemented with the stage specific success factors identified in chapter 5. Those are uncertainty, resource dispersion (concentration/dispersion), dependency on other companies (inter-organisational dependence), possibility of using vendor's project management tools, user support provided by vendor (vendor support), partnership with vendor, accessibility of external IT consultants (accessibility of IT consultants),

corporate networks (accessibility of strategic alliances). Additionally, vendor dependency, which was identified to be typical for SMEs in chapter 2, was included. In case of the environmental factors, it seemed relevant to include a few factors that were not mentioned in the literature. Those factors are customer demands, supplier demands, interactive co-operation between a small company and a consultant, and consultant's experience on company's industrial field. The reason why they were added arised from the authors practical work experience gained when participating IT implementation projects in SMEs.

The next category in the questionnaire was *owner related factors*. In chapter 4, the following success factors related to small business owner were found: support (top management support), computer knowledge, involvement, commitment, appointing and authorising a project champion (appointing and authorising a project champion and existence of a project champion), taking IT implementation into account in business strategy (strategy), and dedicated resources. These were all included in the questionnaire. From Chapter 5 the following stage-specific factors were included: project team competence. Additionally, it seemed relevant to add in this category a factor pointing out whether owner's positive attitude towards the implemented IT application is related to the implementation success. In chapter 2 it was emphasised that a small business owner often is very dominant and controlling and has a strong influence on the company's behaviour and ways of acting. Therefore, this factor was added to the owner related factors category. Also, on the basis of chapter 2, it can be expected that owner's computer experience and short-term management perspective most likely have an influence on IT implementation outcome in small businesses. Therefore, they were added in the questionnaire.

The third category in the questionnaire is *end-user related factors*. On the basis of chapter 4 the following factors were selected: training and education. Factors selected from Chapter 5 were participation (involvement and participation),

positive attitude towards change, incentives, job tenure, cosmopolitanism, perceived job security threat, provided information about implementation process (type and timing of information provided), experienced increase in equity related to the new technology, experienced job complexity due to the new technology (increase in job complexity), bureaucratic self-interest, and education on new business processes. Lack of consensus about the need of the new IT application was not included in the questionnaire because in SMEs the consensus of decisions is usually high due to the strongly centralised decision making structure. Besides these factors, end-user's computer experience, positive attitude towards the new technology, motivation and receiving feedback were included to this category. Feedback was added because it measures interaction between the end-users and a consultant. It is assumed, that the more a consultant pays attention to the end users (observes and listens) and gives feedback to the end-user on their performance, the more motivated for implementation they become.

The last category, *technology related factors*, consists of five factors. From chapter 4 complexity was included. From chapter 5 the following stage-specific factors were included: usefulness (relative advantage), compatibility, visibility, and ease of use. Type of IT application was excluded since it can be considered as something that cannot be influenced if a certain type of application is needed. This category is seemingly more abridged than the previous categories. This set of factors, however, has been frequently identified as the most significant technology related implementation success factors in literature (see for instance Cale and Eriksen, 1994; Cooper 1994; Kwon and Zmud, 1987; Lai, 1997; Rogers, 1995). Therefore, they were considered sufficient for this study, too.

Because the purpose of the second section of the questionnaire was to clarify whether the factors described above have a favourable or unfavourable impact on IT implementation success, the answering scale was chosen accordingly. The scale is from 1 to 5, where 1 stands for an option "extremely negative impact", 2

stands for "negative impact", 3 expresses an option "no impact or cannot say", 4 stands for "positive impact" and number 5 refers to "extremely positive impact".

The third section of the questionnaire concerned the controllability of the IT implementation success factors. The same factors were used as in the second section but the answering scale had four options instead of five: 1 = "not possible to modify", 2 = "possible to modify to some extent", 3 = "possible to modify completely" and 4 = "cannot say".

6.2 The interview

The purpose of the interview was to complement both the previous literature findings and the questionnaire responses on the controllability of the success factors by providing an answer to the research question number 4: *By which means can the controllable factors be modified in order to enhance the implementation process?* Literature did not provide much of a guideline for fabricating the interview questions because no previous studies investigating the means of influencing the success factors was found.

The questionnaire consists of two sections: 1) general background questions and 2) the means of influencing the IT implementation success factors.

The purpose of the IT implementation background information was also to define on which stages of IT implementation (adaptation, acceptance, routinisation and infusion) the respondents had gained experience. The description of each stage was explained to the interviewees in the beginning of the interview. Also, the interviewees were asked whether they could recognise these stages from the IT implementation projects they had been participating.

The main focus of the interview was in the second section. The central question in this section was: "What are the means that a consultant can use to modify the success factors in order to enhance the IT implementation process?" This question was asked on the basis of the controllability section of the questionnaire and only if the respondents had selected one of the options "possible to modify to some extent" and "possible to modify completely".

7 CARRYING OUT THE EMPIRICAL RESEARCH

In previous chapters, the IT implementation process and the relevant success factors have been studied on the basis of literature. In this chapter, the research methods for studying the success factors and their controllability empirically are described. The empirical research consists of a case study. Case study approach was chosen because it is a comprehensive research strategy, which can be based either on quantitative or qualitative evidence or a combination of the two (Yin, 1994, p. 14). In literature (see Galliers, 1992, p. 151; Yin 1994, p. 3), case study approach has been recommended for investigation of a complex social phenomenon in a single organisation while holding on to its real-life context. It should be noted that the empirical research also has features of action research since the author was a member of the group from which the case study is taken (see Eskola and Suoranta, 1998, pp. 128-132; Heikkinen, 2000).

In the case study, both quantitative and qualitative research methods, i.e., questionnaire and interviews, were used. The goal of quantitative research is to gather numeric data from a relatively large sample. On the contrary, the goal of qualitative research is to analyse data from a case concisely and to describe and understand the activity being explored (Eskola and Suoranta, 1998, pp. 61-62). Eskola and Suoranta (1998, pp. 61-62) note, that in qualitative research the relatively small sample is chosen appropriately according to the specifications of the research in question.

Data for the case study was acquired from the IT consultants of Information Technology Research Center (ITRI) of Jyväskylä University, Finland. In the following section, the phases of the case study are presented. In section 7.2, the data acquisition methods are described. The target organisation is described in section 7.3 and the methods for data analysis are described in section 7.4.

7.1 Phases of the case study

The case study took place in the summer of 2001 and it was done in six phases. In what follows, each of these phases are described. The sequence of the phases is visualised in FIGURE 7.1.

Phase 1: Forming the meters for the case study. During April 2001, the tools for implementing the case study were formed. These tools included a questionnaire form and interview questions. Both of them were compiled on the basis of the previous literature review, which is described in detail in Chapter 6. Before the conducting the actual survey, the suitability of the questionnaire was tested. An employee of ITRI, who possessed sufficient background knowledge on the research topic, filled in the questionnaire and gave comments, and suggestions for improvements. The questionnaire was then modified accordingly.

Phase 2: Survey. In the beginning of May 2001, fifty questionnaires were handed out to the employees of ITRI and five to the former employees of ITRI who had only recently changed to other companies. Total of fifty-five questionnaires were handed out. To the knowledge of the author at the time being, there were six employees in ITRI who had been consulting SMEs in IT implementation projects. Nevertheless, the questionnaire was handed out to all the employees of ITRI in order to find out if there were more IT consultants in the organisation. In consequence, eleven completed questionnaires were expected to be returned. Within the next three weeks, ten completed questionnaires were returned. Only one of the IT consultants did not return the questionnaire. Within the questionnaire two things were surveyed: 1) which factors affect the IT implementation outcome in SMEs and 2) which of those factors can be controlled during the implementation process (see Appendix A for the complete questionnaire).

Phase 3: A preliminary analysis of the survey results. The questionnaire responses were analysed in order to ascertain the partially and fully controllable factors.

Phase 4: Interviews. Interviews were conducted on the basis of the questionnaire results. A total of nine respondents were interviewed on the basis of their responses. In the interviews, the main objective was to clarify how the fully or partially controllable factors can actually be controlled in a real life context. All those factors, which the respondents had claimed to be either partially or fully controllable, were processed. All the interviews were recorded on audiotape.

Phase 5: Transcription. The interviews were transcribed from tape into digital format with MS Word. Data from the questionnaires was inserted into MS Excel on two spreadsheets.

Phase 6: Data analysis. The transcribed and Excel-formed data was analysed. The goal of the data analysis was to answer the research questions presented in the beginning of this study. The methods of data analysis are described in section 7.4.

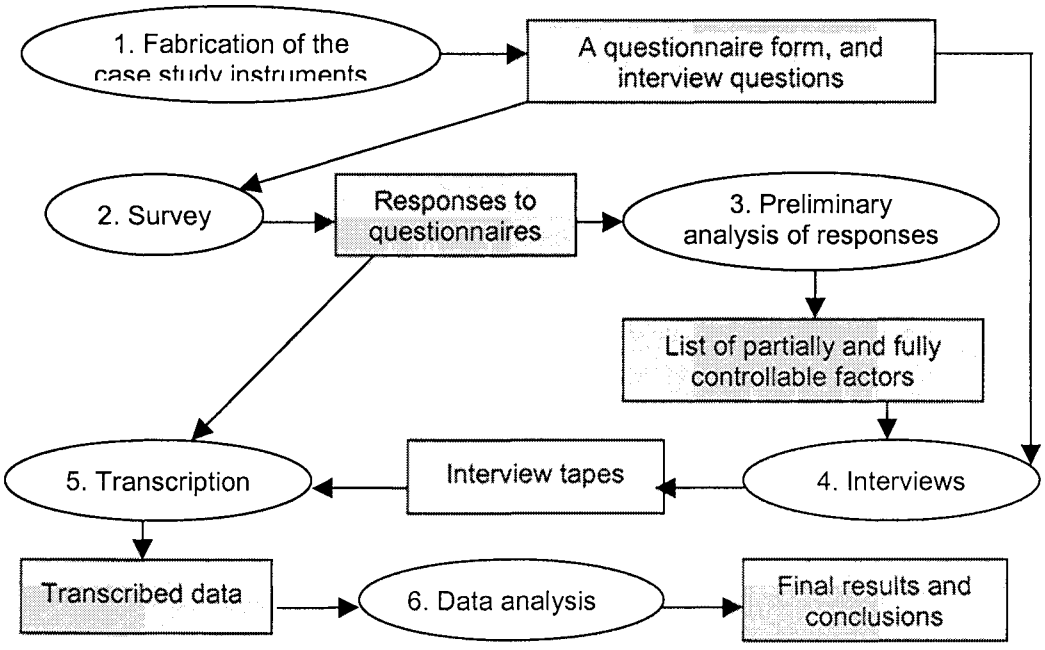

FIGURE 7.1. Phases of the case study.

7.2 Data acquisition methods

Relevant data for this case study was acquired by using a questionnaire and semi-structured theme interviews. In other words, both quantitative and qualitative methods were used. This was done in order to form a concise understanding of the case.

The main benefit of quantitative research is that one can acquire specific data in a consistent form from a large pool and with small effort. In the case study, a questionnaire was used for two purposes: Firstly, to filter a potential sample of IT consultants for further interviews and secondly, to create a basis for the later interview questions. The questionnaire consisted the total of sixty-seven questions. Scales from 1 to 5 and from 1 to 3 were used for answering.

In this case study, semi-structured theme-interviews were used as a qualitative research method. In a semi-structured interview the form and the order of the questions are the same for everyone. The interviewee answers to the questions with his or her own words and additional questions can be made if needed. (Eskola and Suoranta, 1998, pp. 86-87). In qualitative research, interviews are often the main method of data acquisition. The main benefit of interviews as a data acquisition method is that they are modifiable depending on the situation and the interviewees. An interview can be carried out as a single, pair or a group interview. (Hirsjärvi et al., 1997, pp. 200-207). If a pair or a group interview is used then the interviewees should form a homogenous group. Everyone in a group should understand the questions and concepts in the same way and a fluent conversation should be possible. (Eskola and Suoranta, 1998, p. 98).

The complete questionnaire is described in Appendices A and B. The interview form is presented in Appendices C and D. The questionnaire and the interview

form are both presented in the original language of the case study (Finnish) and in English.

7.3 Target organisation

Data for the case study was gathered from IT consultants who have participated in IT implementation projects in small businesses. They all were either present or former employees of ITRI.

ITRI is a project organisation whose goal is to promote the use of IT within the fields of industry and commerce. The projects of ITRI are funded both by public corporations and private companies. The main services of ITRI are development projects, business analysis, training, and consultancy services. ITRI can be considered as an independent consultancy provider because it is not developing or selling commercial software. The customers of ITRI are large industrial companies, SMEs, and public corporations. The focus of ITRI is to promote scientific research in the various areas of IT within a real life context.

The major weakness of the case study approach is that it is restricted to a single case or organisation. Because of this, the results cannot be generalised as such. (Galliers, 1992, p. 151). In order to be able to generalise the results, one needs to acquire a rational sample of data. This can be done by selecting a group of interviewees with the following qualities:

1) the interviewees should have similar experiences related to the study topic,
2) the interviewees should possess some knowledge concerning the research problem, and
3) the interviewees should be interested in the study. (Eskola and Suoranta, 1998, p. 66).

When selecting the proper sample these guidelines of Eskola and Suoranta (1998) were used.

The interviewees formed a rather homogenous sample. They can be characterised as a dynamic and enthusiastic group of people. Three of the interviewees were project managers, four were project analysts, one was a system manager and one was a chief technology officer. They all had gained experience in various ITRI's projects with SMEs and therefore had a similar world of experiences related to the study topic. All of them had been consulting SMEs in IT implementation projects. One of the interviewees, however, considered himself more like a consulting researcher than a consultant. At the time of the interviews, three employees had changed jobs but their IT implementation experience took place while working in ITRI.

All the interviewees have a scientific background on information systems and most of them have a degree in information system science. They possessed a good general knowledge of the IT implementation processes. The IT implementation experience of the interviewees varied slightly depending on what kind of projects they had been working in. The number of IT implementation projects each consultant had participated in varied between two and four. A total of thirteen projects formed the basis for the acquired data. Most of the implementation projects took place within other, larger projects of ITRI. Six of the projects were related to ERP implementation and four were related to document management system implementation. Additionally, there was one groupware, one hotel-booking system and one desktop maintenance implementation project. Eight of the IT applications taken into use concerned the whole organisation and the remaining five cases concerned a specific group of the organisations.

Only a few consultants had taken part in all the stages of IT implementation processes. Eight of the interviewed IT consultants had taken part in the *adaptation* phase of IT implementation process. Four of them had taken part in the *acceptance* phase, five in the *routinisation* phase and four in the *infusion* phase. Nevertheless, it can be concluded that by combining the experiences from the different stages of the implementation process a holistic picture can be formed.

The implementation projects took place in eight different industrial sectors. Most of the projects were done for SMEs in the metal industry. Two projects were done for both small businesses in printing and publishing and research services sectors. Single projects were done for SMEs in the electronics industry, the construction industry, training services, car retail sales, and hotel industry.

The role of the interviewees in the implementation projects mentioned above was to manage the project and to provide advice and consultancy. This included various affairs such as settling matters related to the projects and providing help from a system specialist point of view. Some of the consultants also performed information classification, user group definitions, system installations, and training (especially in document management and groupware projects). The tasks of the consultants in ERP implementation projects included the evaluation of new ERP systems for the company, enhancing the use of the existing ERP modules, consulting, process modelling, making requirement specifications, and interacting with the ERP-vendor and system maintenance. The role of the consulting researcher included developing the implementation from the point of view of the ERP-system vendor.

7.4 Methods of data analysis

Before the data from the questionnaires could be analysed, it was inserted into MS Excel on two spreadsheets. On the first spreadsheet, the success factors were positioned in the first column and the answering options (*highly negative, negative, insignificant/cannot say, positive* and *highly positive*) were placed as the column headings. For each factor, the total number of each answer was then counted, i.e. how many respondents had answered "positive" and how many "highly positive", etc. On the second spreadsheet, the same was done for the answers concerning the controllability of the success factors. The options on this sheet were *uncontrollable, partially controllable* and *fully controllable*. After this, graphs were generated using MS Excel.

The analysis of the responses was done by comparing the numbers of the answers of each factor and by defining the most popular answering options. These results were then compared to the findings in the literature. The analysis took place in the following way: Firstly, it was extracted from the responses what kind of influence each factor has on IT implementation process in SMEs. The options for this were *highly negative, negative, insignificant/cannot say, positive* and *highly positive*. Secondly, it was determined from the responses whether these factors can be controlled or not. The options were *uncontrollable, partially controllable* and *fully controllable*. Only the partially or fully controllable factors were of interest here and were investigated further in the interviews.

As a result of the interviews, the qualitative data, concerning the means by which the partially or fully controllable factors can be controlled, was received. The analysis of the qualitative data was conducted by using Kiviniemi's (1999) two-phase method, where the analysis of the data consists of analytical and synthetical phases. In the analytical phase the data is classified and arranged into different theme-areas, which can be manipulated more easily than raw

data. In the synthetical phase, the "red-string" or the plot of the data is extracted. (Kiviniemi, 1999, p. 77). The main idea of this method is to find the relevant themes from the data in order to solve the research problem (Eskola and Suoranta, 1998, 167). The main themes in this study are the five groups of success factors identified in chapter four. Each of these themes divides into smaller sub-themes, i.e. single factors. Because the interviews were based on the questionnaires, the answers were relatively easy to divide into different themes and sub-themes. The main controlling methods were grouped, compared to each other and, finally, written down. Because of the factor group division, a cross-comparison of the methods and means was also possible between different factor groups.

8 RESULTS OF THE CASE STUDY

In this chapter, the results of the case study are presented. The results are formed by combining the transcribed data from the questionnaire and the interviews and analysing them as described before. Data from the questionnaires has been presented in the form of percentages and the data from the interviews has been presented in text format including direct citations. Graphical presentation has been used to illustrate the questionnaire answers in the end of each factor group.

The main focus of this chapter is to clarify the means of controlling the different success factors related to IT implementation success in SMEs. Therefore only those factors, which can be partially or fully controlled, are discussed. The complete questionnaire results on the influence of the success factors are presented in table format in Appendix E and the complete questionnaire results on the controllability of the success factors are presented in Appendix F.

This chapter is organised as follows: Case study results on the controllability and control methods of organisational factors are presented in section 8.1 Section 8.2 discusses how the environmental factors can be controlled during IT implementation process, while section 8.3 concentrates on the owner related factors. In section 8.4, the focus is on the controllability of end-user related factors, and finally, the control methods of technology related factors are presented in section 8.5.

8.1 Organisational factors and their controllability

In the interviews, it occurred that an external IT consultant is not able to affect the size or the structure of an organisation within the time frame of IT application implementation project.

According to Ein-Dor and Seveg (1978) **small size** of an organization has an indirect negative influence on IT application implementation outcome. On the contrary, 60 % of the consultants agreed that small size has a positive effect on IT application implementation. The difference in the results can be explained with the different viewpoints: Ein-Dor and Seveg (1978) had a resource-based approach and claimed that since the available resources for IT implementation in small businesses are less than in large organisations the implementation is most likely to fail. Here, one should take into consideration the fact that the research of Ein-Dor and Seveg (1978) is over twenty years old. In that time, the development of IT has taken a great leap. Most applications are available off-the-shelf and small businesses can have more advanced IT applications with less money than was possible in the end of the 1970. The interviewed consultants saw small size from the adopting and learning point of view. They claimed that a small company is able to adopt and implement new IT applications more fluently and flexibly than large organisations. 70 % of them claimed that it is impossible to influence on the actual size of an SME, even if necessary. This supports the previous research results of Ein-Dor and Seveg (1978) that organisation's size is an uncontrollable factor.

A new result, which has not been mentioned in the literature before, was that the consultants said that it was possible to affect the *size of the adopting groups*, instead. It is possible to ease the implementation process by dividing both the process and the organization into small steps and groups. Instead of making the whole organization to take the application in use at once, a small pilot group should be used to adopt it first and then used to spread it further within the organization. The consultants agreed, that a small group adapts new things faster than a large group. Also, it is beneficial to use existing work groups, which have formed in an organization. This result shares the same principle with El Sawy's (1985) implementation model, cultural infusion, where a pilot

group first implements a new IT application and then helps the rest of the users with the implementation.

40 % of the consultants had experienced that a **low organizational hierarchy** can have a positive affect on the implementation process but 20 % though the opposite. Half of the consultants felt that they had no power of altering the organizational structure or hierarchy even if needed. However, it appeared to be possible to modify the *business processes* and through that enhance the use of the IT applications. One of the consultants stated, that it is not necessary or even rational to try to change the organizational structure in order to enhance the implementation process or the use of IT but instead to take an effort to modify the processes in which the system is in use and which are dependent on it. This is also a finding that has not been mentioned in the literature.

60 % of the consultants responded that **informal communication** has a negative impact on the implementation of IT applications. This response is controversial to the previous results in literature. For instance, Rogers (1995, 18), Larsen (2001) and Somers and Nelson (2001) emphasize that informal communications in SMEs is one of the major enablers of IT diffusion. The interviewed consultants stated that the implementation and utilisation of group or organisation wide IT applications often require more formal ways of communication that SMEs tend to have. They, however, agreed that in some cases informal communication might work out well, because it is faster and simpler than formal communication. 70 % of the respondents had experienced that it is possible to alter the ways of communication in an SME if needed. If the communication in an organisation is very informal a consultant is able to affect on it *with his or her own example.* It appeared from the interviews that it is very important how the consultant him or herself communicates and acts. According to the consultants, it was possible to modify the ways of communication in an organisation for instance with *careful planning* and by arranging *regular meetings with the project group.* One of the consultants said that it is probably the best way

of improving the communications, when the whole project group sits down on the same table and talks about the prevailing problems related to the IT application implementation project. This is a simple, yet effective, way of enhancing communication. Additionally, the consultants noticed that it is necessary to "sense the atmosphere" in a company in order to find the best suitable channels of communication for each organisation and each situation. In some organisations informal ways of communication may work better than strictly formal means of communication. The key issue is not the form of communications but whether it works or not.

In the interviews, it also appeared, that communication is closely related to the general working procedures in an organisation. If the implementation of a new IT application requires a change in the prevailing means of communication it requires changes also in the ways of thinking and acting. One of the most challenging tasks of a consultant is to deal with the change.

"It is important to get the people to understand that things can be done in a new or different way". (Project manager)

It is possible to affect the communication by *going through the present ways of communication and thinking about ways to get them more due*, so that certain events would always take place with the same procedure. For instance the project group would always be informed the same way (in a meeting, by e-mail, etc.).

One of the tasks of a consultant is *to inform the client about the communication requirements related to IT application implementation and use.* It is beneficial that the client is aware of the possible results of poor communication and gets advise from a consultant on how to improve it. The consultants also pointed out in the interviews, that since the duration of implementation projects is often fairly short, about three to six months, it is not possible to affect on the cultural issues much. One of the interviewees described IT implementation projects as "hit and

run" type of projects, where the change intensity is high and the duration of the project is short. In those kinds of projects, a consultant can give advice and offer different tools for developing the ways of communication. It is impossible to carry out any large-scale change process during the implementation project where, after all, the focus is on getting an application implemented, not to change the whole organisation. A consultant can only affect on the communication means within the implementation project, which in turn may catalyse a wider change process in an organisation.

In literature, **centralised decision-making,** i.e. centralisation, has been identified to be beneficial for a small company when implementing a new IT application (see for instance Grover and Goslar, 1993 and Kwon and Zmud, 1987). 50 % of the consultants said that centralised decision making have, in their experiences, a positive affect on the IT implementation projects. The interviews revealed that centralisation had the two sides of a coin. It guarantees a fast decision making process but at the same time it offers a minimum amount of democracy for the employees outside the core decision-making group. According to Ein-Dor and Seveg (1978), centralisation is an uncontrollable factor. The interviewees were slightly more positive about it, though. 40 % of the respondents said that centralised decision-making is an uncontrollable factor but the other 40 % stated that there are some ways of affecting it. One of the interviewees said, that it depends on the personality of the manager whether you can affect on the degree of centralisation or not. In some cases the owner might listen to the advice of a consultant if there is a need, for instance, to distribute the decision-making but in most cases the consultants felt that advising had little effect. In the case of an IT implementation project, the decision-making can be distributed somewhat by including a few employees outside from the "decision making ring" in the project board.

In the literature review, it was noted that in small businesses management concentrates on solving day-to-day problems, instead of planning in the future

(see Boedeker et al., 1995), i.e. the **organisational time frame**, i.e. management perspective, is rather short (see Ein-Dor and Seveg, 1978). According to the consultants, this same phenomenon can be identified in the case of IT implementation projects. 80 % of the consultants stated that **short-range management perspective** has a negative affect on the IT application implementation process. One of the consultants described the situation in SMEs in the following words:

"Usually small companies do not make business plans or IT application implementation plans. It is, that you just install the software and start using it."(Project analyst)

The respondents were surprisingly concurrent about the controllability of the short-range management perspective. All the consultants (100%) agreed that it is partially controllable, that is, there are some ways of modifying it within the implementation project if necessary. This result differs from the research results of Ein-Dor and Seveg (1978) who stated that organisational time frame is an uncontrollable factor.

It appeared from the interviews that the main way of controlling the management and planning perspective was *guiding and advising*. One of the tasks of a consultant is to bring up issues, which should be considered and planned with respect to the implementation project. A consultant should *inform the company about the possible consequences of short-range actions,* for instance in terms of money and time. Often it is beneficial to stop and consider the magnitude of an IT application investment and the length of its pay back time. It is necessary *to clarify the total length of an implementation process.* Usually it is longer than expected. Also, it is important to stress out that IT applications require long-range planning and include, for instance, user training and other "additional activities" before they can start paying themselves back. However, it is important to select a rational long-term planning perspective. There is no use to make detailed plans for the next ten years but for a few years in advance.

Sufficient planning relies on a realistic comprehension of the prevailing state of the company's IT-maturity and the computer skills of the employees. Here, a consultant can offer help by *defining the present IT state of the company.* On the basis of this evaluation the owner can make more realistic plans for the future when knowing the preconditions for a successful IT implementation. This all, however, can be very challenging:

"I myself have noticed that when ever you are trying to suggest that it would be beneficial to do some planning, the first reaction is that we really do not have time to plan now, let´s just do it". (Project analyst)

60 % of the respondents said that **informality**, i.e. the lack of formalisation, in SMEs have a negative impact on the implementation of IT applications. This supports the results of Kwon and Zmud (1987) that formalisation has positive influence almost throughout the whole implementation process. When asked the reasoning for this, most of the consultants replied that information systems in general require systematic and formal operation modes in order to function efficiently. However, there were arguments on behalf of the informality, too. Some of the consultants claimed that the level of operation does not necessarily have to be strictly formalised. The implementation process may be successful in an organisation with informal ways of operation as long as there is a balance between informal and formal procedures and everyone knows which tasks require more formality than others. Formality has two sides of a coin, too. The more informal the organisation is, the easier it is to introduce new formal methods when there are no "good old habits", which the organisation is not willing to give up easily. On the contrary, if an organization is not used having formal procedures or rules, it can be a difficult task to introduce them without resistance. 90% of the consultants claimed that formality is a partially controllable factor. This supports the research results of Winston and Dologite (1999) who stated that formality is a partially controllable factor. The consultants agreed that their influencing possibilities were dependent on the

organisation´s prevailing formality-degree. However, the consultants agreed that it was important to *modify the organizational procedures* to support the IT application. For instance, if an IT application is planned to replace or automate a process or parts of it, then it suites to the purpose to rectify or formalise that process in order to smoothen the implementation process. A mean for doing this is *modelling* of the processes. A new desired process is first modelled and then introduced to the organisation. When the organization members know what the new procedures are and what they should and why, then they are more likely to do it, too. One of the consultants emphasised the fact, that often an IT application forces an organisation to accomplish certain tasks in a certain way in order to be able to use the application in the first place. From this point of view, the application itself helps to formalise and build up organisational procedures.

In the literature **flexibility** has been seen as a positive factor within IT application processes in small businesses. This is because implementation projects are often highly dynamic and thus flexibility, for instance, in management practices is required (Korunka et al., 1997). Similarly, most of the consultants (70 %) thought that flexibility has a positive effect on the IT implementation process. The consultants recognized that flexibility is a reverse side of formality. When the amount of one increases the amount of the other decreases. Since both formality and flexibility were seen as positive factors a balance between those two opposite ends seems to be very important. The implementation of IS or other organisation wide IT applications, usually requires formal procedures, creating of which may reduce organizational flexibility in a small company. Yet, as a result of the use of an IS, the amount of flexibility and innovativeness may increase on some other areas that were not covered before.

Half of the consultants agreed that they were able to increase the flexibility of a small organization if needed. They said that flexibility can be increased after the

organisational basic functions and routines work in a proper manner. Only then it is beneficial for the organisation to consider the things that require changes and, therefore, flexibility. When asked how it is possible to influence on organisational flexibility, the only means the consultants know was through *conversations*.

"Often the situation is that the usage of the resources is already 110 % and in that way there is not very much one can do about it. ... In some cases it is possible to alter it through conversations, suggesting that maybe this person would do better in that task, that other person in somewhere else, etc. That way the message goes through easier." (Project analyst)

Innovativeness was considered as a difficult question and the answers of the questionnaire had a wide range. In the literature, it has been called as one of the basic features of small companies and is seen as a creative ability for renewal (Paasio and Heinonen, 1993). However, there are no research reports about the influence of innovativeness on IT application implementation. 40 % of the interviewees were unable to say whether it had a positive or negative impact. 30 % stated that it has a positive impact and 10% that it has a strong positive impact. On the contrary, 20 % of the respondent experienced that innovativeness has a negative affect on the implementation process in SMEs. In the interviews, different perspectives towards innovativeness came out. Firstly, innovativeness as a general characteristic feature of small businesses was questioned. One of the consultants stated that not all the SMEs are necessarily innovative if some of them are. Another consultant claimed that successful SMEs most likely are innovative but there are lots of those who are not innovative at all. Secondly, there was an opinion about the dual nature of innovativeness. In small companies, innovativeness is easily invoked but sometimes, especially when concerning IT, difficult to have control over. One of the consultants said the following about this viewpoint:

"Often the people in charge in SMEs are very innovative and have to figure out new [business] possibilities. Sometimes they tend to be even too innovative and then one [an IT consultant] has to drop them back to earth, because it is not possible to execute all the ideas within the existing budget and timescale. This occurs quite often; particularly in small companies where there are no dedicated IT personnel who would have know-how on IT related issues. There is a financial manager or the chief executive manager to whom a consultant has been talking to and got convinced and there is no way of holding that guys horses then and to make him understand the reality related to that idea." (Project analyst)

A third opinion was about the relation between innovation and other organisational factors. If the organizational basic features and processes are established then there are more resources to be innovative. The reverse argument is that, if the organisational procedures are very formal they may "freeze" the situation in a state where everyone believes that no more innovativeness is needed.

50 % of the respondents claimed that innovativeness is partially controllable while the rest 50 % stated that it was an uncontrollable factor. When asked how innovativeness can be controlled the consultants answered that mainly by *encouraging the organization members to bring up ideas* on how the new IT application could be implemented or used in the best possible way. If the duration of the implementation project is longer, then *idea-meetings* are one way of increasing and encouraging innovativeness. This, however, requires a more comprehensive developing project than pure IT application implementation projects usually are.

According to Ein-Dor and Seveg (1978), small organisations have more limited resources (financial, human and time) than large corporations and this, in consequence, has a negative impact on IT implementation. This was confirmed by the case study results. Limited **financial resources** were considered having a

negative (60 %) or extremely negative (30 %) impact on the implementation success in small companies. Unfortunately, most of the consultants (60 %) claimed that they have no power of improving the economical situation of SMEs. 30 % of the consultants were optimistic about this and claimed that it is possible to improve the financial situation of SMEs, at least indirectly. These results are slightly more negative than the previous results in literature. Ein-Dor and Seveg (1978) claim that all the resources, in general, are partially controllable in SMEs within the time frame of an IT implementation process. One of the means of increasing the financial resources is *informing* the company about the various support systems and development projects provided by public organisations. Another way of improving the financial situation in SMEs is careful planning with respect to IT implementation. By making the right decisions in the beginning money will not be spent for unnecessary expenses.

The consultants agreed that the lack of skilful employees (**human resources**) has either a very negative (60 %) or negative (40 %) impact on the implementation project outcome. 50 % of the respondents claimed that it was partially possible to influence on the human resource factor in SMEs. They said that it is possible to improve the effectiveness of the existing staff, for instance, by *pointing out and repairing defects in business processes*. An "outsiders" view of things is often welcomed. A consultant is rather a neutral party and is able to see those defects in an organization at which people working in the organization have become blind to. The human resource factor can be influenced also by careful *planning*. It is possible to get more results out of the staff when one plans their tasks and responsibilities well. Another, a little bit more radical, way is to suggest that the owner should *hire more employees*. This requires good argumentation, though. If it can be seen that, for instance, hiring an IT specialist will clearly benefit the IS success then it should be recommended to the owner. Money is an effective argument when negotiating with the owner. However, a completely opposite argument to this was presented in the interviews, too. One of the consultants said that

"If a company does not have enough resources to accomplish the project then it is reasonable not to start it at all. If the project is carried out only by external expertise, then it does not diffuse into the organisation." (Project analyst)

It appeared that the most crucial resource related factor to the IT implementation success is **time**. Lack of time was considered to have a very negative (70 %) or negative (30 %) impact on the implementation outcome in SMEs. Luckily, half of the consultants said that it is possible to affect on the amount of time available to some extend (30 %) or more (20 %). In the interviews, *planning* was mentioned as a number one means of dealing with limited time resources. As one of the consultants said:

"You cannot get more time but you can always choose how you use the time you have – by planning things carefully." (Project manager)

A consultant can encourage the company for more detailed planning by *telling about the consequences of not planning*. For instance clarifying the impacts on production in terms of money usually motivates the organisation and especially the owner for planning.

According to Cale and Eriksen (1994), system and end-user support are preconditions for continuous use of a new IT application. Their study was done about large corporations but the importance of end-user and system support was also seen in the results of this case study. 40 % of the consultants agreed that **system support offered by the organization** has a positive relation with the IT implementation process. In the interviews the importance of SMEs own system support was stressed out, too. Typically, small companies are dependent on the system support provided by the vendor because they do not possess sufficient administrative skills and knowledge. This leads to two kinds of problems. Firstly, since SMEs usually are not major customers for their IT

application vendors, they often have to wait for help services or answers for help inquiries. Secondly, since SMEs do not posses sufficient IT knowledge they do not necessarily know precisely what to ask from the vendor when problems occur and therefore receive "wrong" answers or no help at all. If the organization has system support of its own it is not dependent on the vendor and can repair the problems itself. Also, it can define the problems more easily and identify the ones, which require external expertise from the ones, which are organisation-related and require more work and consideration within the organisation.

The respondents mainly agreed (60 %) that it was possible for IT consultants to affect on the fact whether or not system support was offered. A consultant can help to define what kind of system support the new IS requires and then help to arrange it. If a small organisation cannot provide system support for itself then a consultant can either arrange *training for the support personnel* or give suggestions of external service providers from whom the system support can be purchased. Again, the consultants emphasised the fact that if it is an external party who suggests for instance training for system administrators, the training is more likely to be arranged compared to the situation where the administrator is craving for the training himself. One of the consultants said that system support is often not in the house because the training and maintenance of the support personnel is too expensive. In this kind of situation, a consultant can state arguments for the importance of in-house system support. One of those arguments is presented below:

"If you compare IS to any other machinery, you can recognise that also they need a special caretaker in case something goes wrong. One cannot presume that a regular end-user is able to know what is wrong with the IS and what are the reasons for the problem. You need an expert for that." (Project analyst, consulting researcher)

Half of the consultants agreed that **user support offered by the organization** has a positive (30 %) or very positive (20 %) relation with the IT implementation process. 90 % of the respondents answered that it was either partially (60 %) or fully controllable (30 %) whether the organization offered user support or not. The outsider's role of a consultant was considered as a powerful tool when arranging training for end-users. Most of the consultants claimed that the need for training has often been identified in an organisation but the inquiries do not lead to action. A consultant is often listened by the owner and other responsible persons in an organisation and therefore they have a good opportunity to validate the training requests of the end-users. Additionally, a consultant can state arguments for the benefits gained by a user support person. For instance, if one person could help all the end-users to use the system more efficiently then there is no reason not to have a user support person in an organisation. Additionally, if there is a person in an organisation who knows lots about the system use then a consultant can encourage that person to distribute the knowledge to his or her peers. One of the consultants stated, that this might be difficult because the user who knows how to use the system has a power over the other users and this "power-user" may not be willing to give up that position.

60% of the consultants agreed that interpersonal **co-operation** within the organisation has a positive impact on the implementation success. This finding supports the previous finding of Somers and Nelson (2001) that co-operation is one of the key success factors across the implementation stages. 70 % of the respondents claimed that it was possible to alter the level of co-operation if it was necessary due to the implementation of a new IT application. When asked how they could increase the amount of co-operation within an organization, most of they answered that having *joint meetings* where all the employees involved with the new IT application could attend. The purpose of these meetings is to clarify the information chain to the members of an organization

so that it is clear to everyone what consequences each one can cause by doing or not doing something. Like one of the consultants said,

"When the employees see themselves as a part of a process, they most likely will take more responsibility of their own actions. That itself increases the commitment of the end-users and promotes reaching the infusion stage. " (Chief technical officer)

The second purpose of the meetings, in order to promote co-operation, is to get a mutual understanding of the need and usage of the new system. It is important not to settle things only with the owner because orders without consensus may cause resistance. If there is a need for smaller groups, for instance for group-work, within these meetings, then there are two ways of dividing the groups. The first way, one of the consultants said, is to follow the natural division in an organisation and choose to each group the employees who have similar jobs or work together daily. This way the internal co-operation of each group is good. The second approach, advocated by another consultant, is to mix these traditional groups and to put people in new roles and in new groups. This way those people produce new ideas more willingly and the co-operation between different working groups may increase.

Several researchers (Heikkilä et al., 1991; Grover and Goslar, 1993; Lai, 1994 and DeLone, 1988) have found that **computer or IT experience** has a positive influence throughout the implementation process. This view was supported by this case study´s results. 50 % of the consultants had the experience that an organizational computer experience has an extremely positive impact on IT implementation success. This supports the previous study results of Winston and Dologite (1999). According to one of the interviewees, those organisations with more experience can request and demand more from IT applications compared to those ones with little or no experience. 60 % of the consultants said that computer experience was a partially controllable factor. This is contradictory to the study results of Winston and Dologite (1999) who stated

that computer experience is an uncontrollable factor. According to all the consultants, the main way of controlling the organizational computer experience is *training*. They realised that experience is something that accumulates during time but, yet, they were optimistic about the influence of training. By making problem-analysis of the use of the system a consultant can help to focus the training on a particular and important part of the IS and give suggestions of necessary trainings. When implementation process is planned in advance the experience on the process and the new system accumulate during the project. Also, participation was considered as a relevant factor with computer experience. When the end-users take part to the implementation process their experience increases.

In addition to computer experience, general and organization-wide *computer knowledge* was mentioned as a positive factor with respect to IT implementation process. This was not mentioned in the previous study results or found in the literature.

As a summary of organisational factors one can say that computer experience, inter-personal co-operation, flexibility, centralised desicion making and low organisational hierarchy have the most positive influence on IT implementation outcome in SMEs (see FIGURE 8.1.1). On the contrary, the lack of resources, informal working procedures, short-range management perspective and informal communications are major inhibitors of IT implementation success.

According to the questionnaire responds, almost all of the organisational factors can be controlled during the IT implementation process to some extent. The most easily controllable factors are communication, short-range management perspective, informality, limited human resources, system and end-user support provided by the organisation, and interpersonal co-operation.

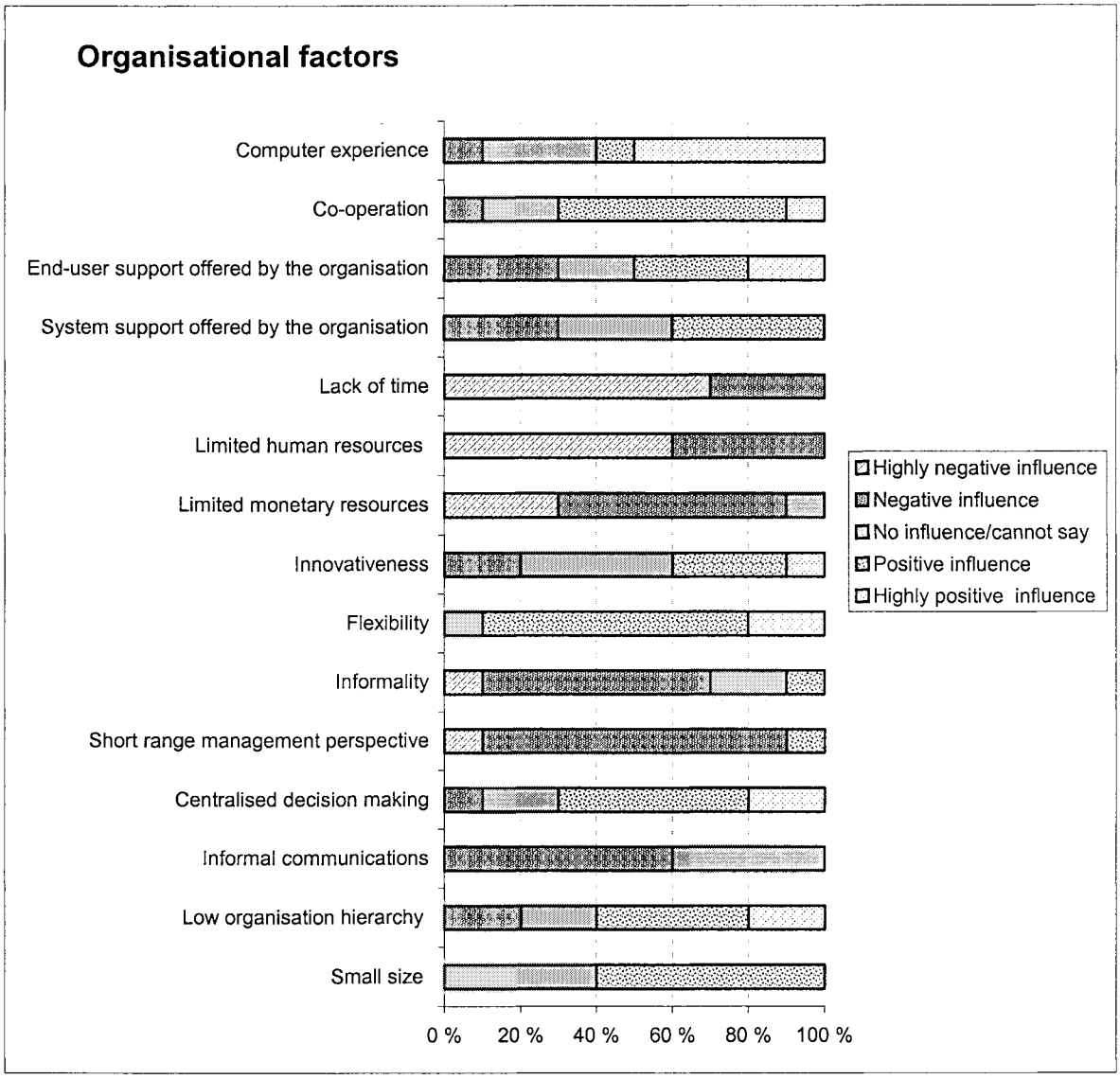

FIGURE 8.1.1 Summary of organisational factors

The main methods with which an external consultant is able to control these factors are providing information, examining the current state of the SME, showing reasoning or consequences of actions, providing help in project planning, and introducing more formal communication methods within the organisation. A summary of the controlling methods is presented in FIGURE 8.1.2. The methods are arranged in the list by the amount of their appearance in the interviews in a way that the most often mentioned method is the first and the most seldom mentioned method the last.

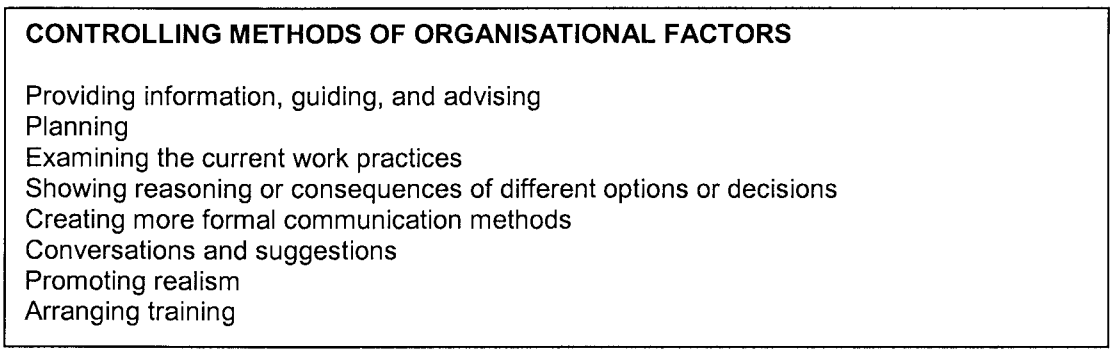

FIGURE 8.1.2 The controlling methods of organisational factors.

It can easily be noticed that the roles of information exchange and communication are central when attempting to influence organisational factors. A consultant should provide as much information as possible to a small business concerning the critical success factors of IT implementation process. The information should be as realistic as possible in order to avoid extreme reactions (high hopes or strong resistance) within the organisation. A consultant can promote the IT implementation success by advising the organisation on what to do and how, and by providing professional help in planning of the IT implementation project. An effective mean of communicating these important issues in the organisation is to have regular meetings or having face-to-face conversations with the members of an organisation. The examination of the current working practices is necessary if the business processes or organisational working procedures have to be modified due to the implementation and use of an IT application.

8.2 Environmental factors and their controllability

70 % of the consultants replied that **competition** does not conduce to the IT implementation success. All of them considered it as an uncontrollable factor. One of the consultants stated that after adaptation phase competition does not have any influence on the implementation process any more. It should be considered when the selection of the IT application is made.

Unlike Kwon and Zmud (1987), most of the consultants (80 %) stated that **uncertainty** has a *negative* impact on the IT implementation success. 50 % of them agreed that uncertainty is a partially controllable factor whereas 50 % said that is an uncontrollable factor. Those consultants who claimed that uncertainty is partially controllable said in the interviews that it is not possible to influence on the uncertainty itself but on how it has been taken into consideration in advance and how the organization has been prepared for it.

50 % of the consultant thought that **customer demands** have a positive influence on IT implementation success. However, two sides of a coin were identified in the interviews. On one hand customer demands are positive if they lead to system development and adopting useful IT applications. On the other hand then they can be negative if the continuous demands put a lot of pressure on implementing new applications in rapid pace. If SMEs major customer demands changes in IS, usually a small business has no choice but to do what it is told to do and implement a new system if required. In such a case customer demands create either positive or negative pressure within the organisation, which sometimes may lead to faster IT infusion than without the external pressure. Also, the acceptance phase becomes rather artificial if the small company has no choice but to accept the system. Customer demands is a factor that most of the consultants (70 %) feel that they cannot control. According to the 30 % or the consultants it is possible to control it with the following ways. Firstly, an SME can have a procedure for regularly collecting information on customers' demands and wishes. This way they can be ahead of the customers, i.e. proactive, and be prepared for the demands in advance. A consultant can provide help if he or she has experience and knowledge about the state of the art. Secondly, a consultant can act as a mediator between the customer and the SME in question and transmit information to the customer whether the demands are feasible or unreasonable.

Supplier demands do not seem to be as relevant to the IT implementation success as the customer demands. 60 % of the consultants considered them to have either no impact or did not have experience on them affecting the implementation outcome in SMEs. Also, most of the consultants (70 %) agreed that supplier demands was an uncontrollable factor. Those 30 % of the consultants who considered that it is partially controllable claimed that the methods of control are the same than with the customer demands.

According to Kole (1983), the use of an external consultant is one of the pre-conditions of a successful IT implementation. The study results support this statement. According to the questionnaire responses, if the small company has **a possibility to use an external consultant** within the implementation project it has a positive (70 %) or very positive (20 %) impact on the IT application implementation success. Half of the consultants considered that the possibility to use an external consultant as a partially controllable factor and the other half as a fully controllable factor. A consultant can *suggest what kind of knowledge and external expertise is needed*. If he or she does not posses the required skills and knowledge then he or she can *recommend* somebody who has those skills. Besides providing information, an external consultant can suggest training if needed and, for instance, make the possible training more efficient. This takes place by *helping the end-users to prepare for the training in advance* and to prepare necessary questions for it.

In relation to the use of external consultant, it appeared from the questionnaire results that **external help in project planning and managing** in general have a positive (50 %) or very positive (40 %) impact on the IT implementation outcome in SMEs. These results support the early results of Ein-Dor and Seveg (1978). It shows that the same principles that held over twenty years ago are still true today; the better the accessibility of, and the more plentiful the supply of, resources in the external environment, the greater is the likelihood of IT success (Ein-Dor and Seveg, 1978). According to Ein-Dor and Seveg (1978), the

accessibility on external resources is an uncontrollable factor. The consultants, however, considered this factor as either partially controllable (40 %) or fully controllable (60 %) factor. Most of the controlling factors were the same as in the previous question in the case of external consultant. Additionally, it appeared from the interviews that if an organisation has good experiences about the use of external expertise then they are most likely willing to use external help in project planning and managing in the future again. It is important to gain trust and make the small company feel that a consultant is not just selling services whether they were needed or not but to really help the SME. One of the consultants claimed, that trust and finding a common language with the organisation is very important. Only through those it is possible to talk about the real problems the SME is facing and what is its real situation with respect to IS. A consultant can provide assistance and professional help on those areas on which an organisation does not have knowledge or skills itself. It is also important that the consultant is as neutral as possible in order to be able to recommend a best solution for the company.

90 % of the respondents agreed that **training or guidance provided by an IT consultant** has a positive relation to the implementation outcome. These results support the previous research results, which emphasize that training has a positive influence on the IT implementation outcome (see Lai, 1997). This factor was considered as either fully controllable (60 %) or partially (40 %) controllable. Most of the consultants stated that the amount of training small companies purchase from external consultants is highly dependent on their financial situation. The only way a consultant can increase the training provided to the end-users is to try to *convince the owner and other decision-making personnel about the need of the training*. This, in turn, is related to the length of co-operation and the amount of trust between the consultant and the SME. The most effective way of convincing the owner of the importance of training is to tell about the possible consequences if they do not train the personnel.

According to the consultants, **training or guidance provided by a vendor** has a positive relation (60 %) to IT implementation project outcome but not as positive as training provided by an IT consultant. 70 % of the consultants answered that it is possible to affect on this factor to some extent. They agreed that a consultant can influence on the quality and amount of training provided by the vendor by *acting as an interpreter* between the small business and the vendor. A consultant can guide the small business to ask for right kind of training and help the vendor to target the training in the most suited way. A consultant has a more experience on different vendors and therefore can view the offered training more objectively and critically. If needed, he or she can translate what a vendor actually means when providing this and that and whether is a good offer or not.

Interactive co-operation between an SME and a consultant was considered to have a positive (80 %) or highly positive (20%) effect on the IT implementation outcome in SMEs. According to 60 % of the respondents, this factor was partially controllable while 40 % considered it as fully controllable factor. It greatly depends on the consultant him/herself, whether an interactive co-operation occurs or not. The means of increasing interaction are *keeping in touch regularly* and *talking a language the customer understands.* Interactive communication increases also mutual trust and makes co-operation more relaxed. In the interviews, *trust* was identified as a motivating factor for more open and fluent communication between a consultant and the SMEs. A consultant can gain trust by being open and honest. Without good interactive communication the organisation may start hiding information, which is not beneficial for implementation process. Communication can be done by phone or email for instance but as one of the consultants said

"The best way of interaction is to go over and find the right people to talk to. The owner is naturally a central person since he has the decision-making power but manager level

does not necessarily know what happens in the grass root level. In that sense it is necessary to go deeper into the organization." (Project analyst, consulting researcher).

The more the **consultant has experience on the company's (customer's) industrial field** the better it is with respect to IT implementation outcome. 70 % of the respondents claimed the consultant experience to have a very positive relation to IT implementation outcome in SMEs. This factor was considered as partially controllable (40 %) or fully controllable (30 %) factor. In the interviews the consultants said that one way of increasing the experience on the company's industrial field is to study it in advance. However, this takes time therefore it is always better if a consultant has experience and knowledge, which has accumulated within several projects in a certain industrial field. Also a personal job experience is an advantage. Some of the consultants claimed that the only way one can affect on this factor is to choose a consultant who already has experience on the industrial field in question.

According to Lind et al. (1989) and Montazemi (1988), in SMEs, resources often are dispersed unevenly throughout the environment, which may have a negative impact on IT implementation. The questionnaire results support these findings in literature. 70 % of the consultants answered that **dispersion** of resources had a negative impact on IT implementation success in SMEs. Most of them (50 %) thought that they were not able to modify this factor, while 40 % thought that it was partially controllable. However, when asked in the interviews what were the methods of controlling resource dispersion they could not tell.

According to Winston and Dologite (1999), **strategic alliances** enhance IT infusion by providing resources, information and expertise. Most of the respondents (50 %) considered that strategic alliances (business networks) have a positive impact on IT implementation success in SMEs, if they exist. However, most of the consultants (50 %) claimed that this was an uncontrollable factor for

them. Those consultants who claimed that it is possible to alter this factor to some extend, said that it is possible to act as a facilitator between SMEs. Especially, if a consultant has knowledge of the local SMEs, he or she can recommend a strategic alliance or some level of co-operation for those companies to whom it might be beneficial for.

Resource sharing with other organizations (inter-organisational dependence) was mainly considered as a non-affecting factor with relation to IT application implementation in SMEs. This result differs from the earlier research results of Kwon and Zmud (1987). They state that inter-organisational dependence has a favourable impact especially on adaptation and infusion stages. 50 % of the consultants responded that resource sharing has no influence on the IT implementation outcome in SMEs. 60 % of the respondents said that it was partially possible to control this factor, if needed. The means of affecting resource sharing were mostly same as in strategic alliances. If a consultant knows other companies implementing similar IT applications then he or she can *recommend co-operation and resource sharing* with those companies. Resource sharing in those kinds of cases means shared training and experiences, for instance in the form of workshops, etc. It is important *to inform SMEs about the IT projects of other local small companies*. This way they can utilize shared resources more efficiently.

According to Somers and Nelson (2001), the **possibility of using a vendor's project management tools** enhances implementation success. The questionnaire responses, however, indicated that the consultants were not familiar with the situation where a vendor would offer tools for project management. 80 % of the respondents claimed that this factor either had no influence on IT implementation outcome or that they could not say because were missing experience on it. Yet, 60 % of the consultants said that they were partially capable of altering this factor. The means of affecting this factor are informing the organisation about the importance of project management tools and

recommending what kind of tools would be the best for the project in question. One of the consultants said that small organisations are rather willing to listen to this kind of advice, especially if the consultant is independent, consulting researcher.

According to Somers and Nelson (2001), **vendor support** and the **partnership with vendor** increase the implementation, and particularly infusion, success. The questionnaire results supported these previous findings. 60 % of all the respondents claimed that vendor support has a positive influence on IT implementation outcome in SMEs. 50 % of the respondents answered, that the partnership with vendor has even more positive influence on it. When asked about the controllability of those factors, the consultants answered that vendor support was partially controllable (40 %) but that partnership with vendor was more difficult or even impossible to control. In the interviews, the consultants agreed that the most effective way of influencing vendor support is to *act as a middleman* between the SME and the vendor and to *complement the missing IT know-how* of the small company. A consultant provides an objective view on what kind of support a small company needs and communicates these requirements to a vendor. Also, he or she can defend the client's rights by offering information about the vendor's responsibilities and IT laws. All the consultants, who claimed that it was possible to alter the level and quality of vendor support, emphasised that in most cases small businesses are completely dependent on their vendors and are not in the position to require more support or better quality support. One of the consultants summarised the situation in the following way:

"Very often the problems between SMEs and vendors occur because vendors want to sell what suits them the best and the buyers [SMEs] do not know what they should buy. In those cases, the buyer needs expertise and know-how, in order to be able to require user support. A vendor does not necessarily understand to look at the situation in the clients point of view and, for that reason, there has to be someone who can see the

situation from both perspectives and can give the client advice on what to stipulate from the vendor." (System manager)

The less computer knowledge an organisation has the more it needs the help of a consultant in order to receive all the necessary support from a vendor. Most of the consultants mentioned that it is better that a consultant interacts/deals with the vendor for the small company instead of the client dealing with them directly. From the experience of the interviewed consultants, vendors approach the requirements of IT consultants differently (more respectfully) than the claims of the SMEs themselves. One of the consultants reminded that this kind to interaction requires mutual trust between a client and a consultant.

According to the consultants, the ways of influencing partnership with vendor are few. However, two ways were identified: organised *meetings* between the client, vendor and a consultant and making sure that the co-operation has been built on a healthy basis, i.e. *the vendor is able to offer what the client needs.* Meetings tighten the relationship between the both parties and make the vendor more familiar with the particular needs of its client. When this happens it is easier for the small company to reach the infusion stage of IT implementation process and also easier for the vendor to provide sufficient and allocated support and training. Assuring that the co-operation has been built on a healthy basis is a precondition for partnership. A consultant can use same methods here as in dealing with vendor support. It is necessary to recognise the possible risks and the present situation, what is offered and what is needed.

Vendor dependency was mainly considered having a negative impact on IT implementation success (50 %). The consultants thought that it was either uncontrollable (40 %) or partially controllable factor (60%). The means of altering the dependency of a vendor are not many. A consultant can inform the SME about other options for a service provider or can inform the client organisation about the legal matters of the contract.

Besides the factors listed in the questionnaire, two additional factors influencing IT implementation success were mentioned. Those are the *industrial field* of a small business and the *communication with other organisations* and SMEs. The industrial field of an organisation was mentioned to have a strong influence on the timing of implementation and development projects in SMEs. One of the consultants said the following about role of an industrial field:

"It is the speed and development of an industrial sector. For instance, wood-processing industry has strong business cycles. That means that there are quiet times and times when you have to work around the clock. It is important that one can utilise the quiet time and schedule the IS investments and projects on that time period. During the busy time it is not possible to do development work but to make profit. Timing is important." (Chief technology officer)

Another additional finding was that communication with other organisations was considered important. It was something that a consultant is able to encourage to some extent. This is very similar to *openness*, identified in the literature as an organisational factor (see Lai, 1997). The fact that it was brought up with the environmental factors supports the authors view that it is more of an environmental factor than an organisational factor.

As a summary of environmental factors one can say that in general they have a positive influence on IT implementation outcome in small businesses. Particularly factors like interactive co-operation between a consultant and the small business, consultant's experience on the SME's industrial field, external help in project planning and managing, and possibility to use an external consultant have positive influence on IT implementation outcome. Strongly negative influence is caused by vendor dependency, resource dispersion, and environmental uncertainty (see FIGURE 8.2.1).

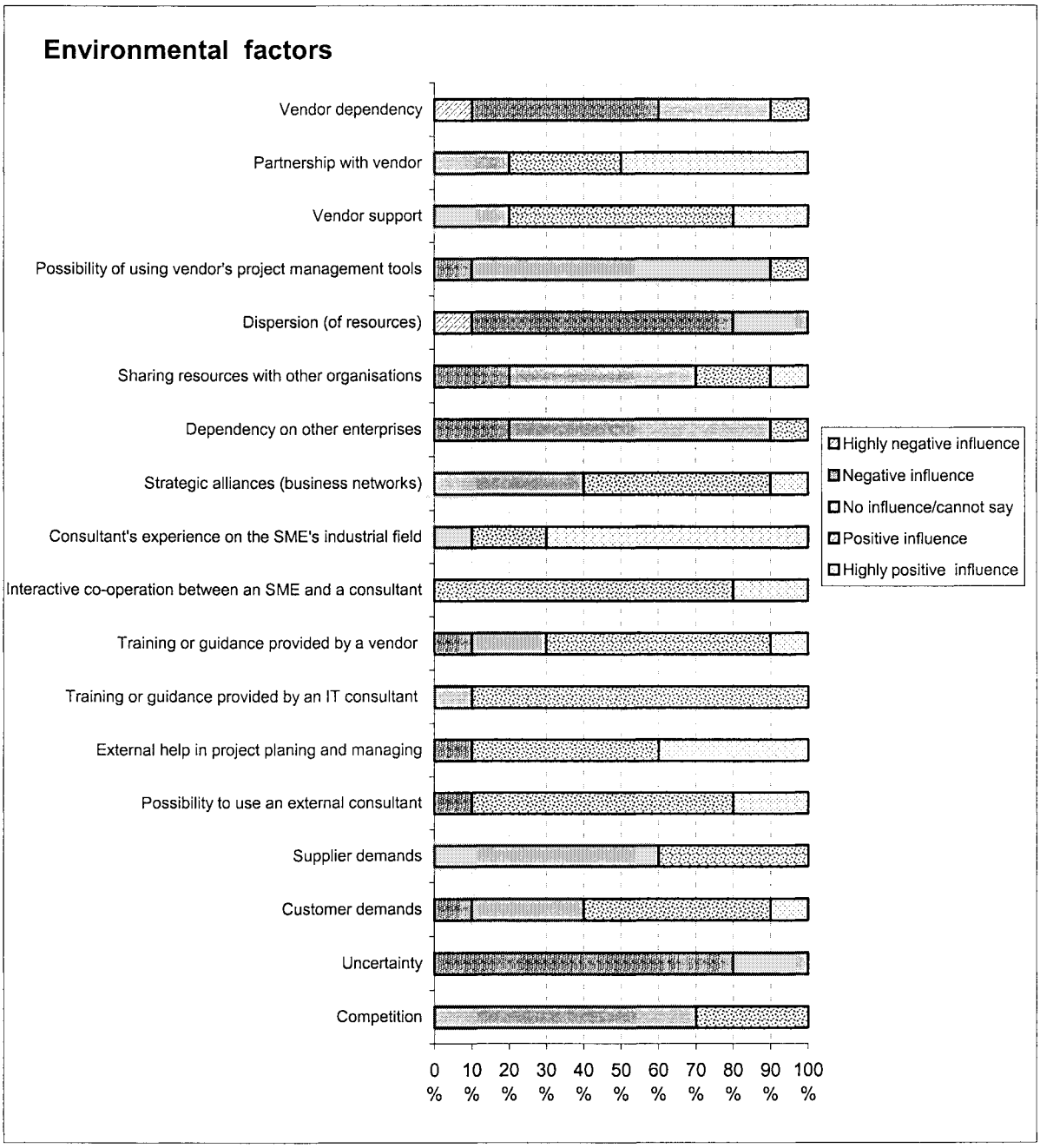

FIGURE 8.2.1 Summary of environmental factors

The responses of environmental factors had more "no influence/cannot say" answers than organisational factors. This may indicate that they are not that much of an importance in IT implementation projects in small businesses that they would have actively paid attention to them. Yet again, it may indicate that they are important but not meat as often as for instance organisational factors and therefore seem not to have direct impact on IT implementation success.

When considering the overall controllability of external factors one can notice that the changes of control are much more limited than those of organisational factors. Almost all of the external factors are more uncontrollable than controllable. Those few factors that can be modified are possibility to use an external consultant, use of external help in project planning and management, training and guidance provided by a consultant, and interactive co-operation between SME and a consultant.

The main controlling methods of environmental factors are: Acting as a mediator/middleman between SME and third parties involving in IT implementation process, informing small company about relevant issues, encouraging pro-activity concerning the external environment, providing assistance and professional help, and using the same language with the SMEs when communicating. A summary of the controlling methods is presented in FIGURE 8.2.2. The methods are arranged in the list by the amount of their appearance in the interviews in a way that the most often mentioned method is the first and the most seldom mentioned method the last.

CONTROLLING METHODS OF ENVIRONMENTAL FACTORS

Acting as a mediator/middleman between SME and third parties
Gaining the trust of SME
Informing
Adopting and talking the same language with the SMEs
Encouraging pro-activity
Providing assistance and professional help
Giving suggestions of what kind of external expertise is needed
Making recommendations of the best practices
Helping the end-users to prepare for training
Showing arguments for useful issues, training, etc.
Keeping in touch regularly
Recommending co-operation with other businesses
Organising meetings between SME and external parties

FIGURE 8.2.2. The controlling methods of environmental factors

Nearly all of the control methods of environmental factors that appeared in the interviews are possible only if two preconditions are met. Those preconditions

are mutual **trust** between a consultant and SME and **communicating with the same language** that both parties understand. Unlike in large companies, all the activities in SMEs are more personal, including co-operation with a consultant, and if there is lack of trust towards an external consultant the co-operation is more likely to fail. For instance, without trust the guidance or help provided by a consultant may not be accepted or not considered reliable.

8.3 Owner related factors and their controllability

The questionnaire results show that **owner's computer experience** is important for IT implementation success. In all 70 % of the consultants answered that owner's computer experience has either positive or very positive influence on the IT implementation outcome. However, it is not an easy task to increase owner's computer experience within the time frame of IT implementation process. 60 % of the consultants said that it was impossible, while 40 % said that it was possible in some ways. Those ways are mainly related to the general computer knowledge, which accumulates during the implementation process.

Delone (1988) stated that, in SMEs, the IS success is highly dependent on the owner's computer knowledge. 70 % of the respondents answered that **owner's computer knowledge** had a positive influence on IT implementation success and 20 % claimed it to be very positive. Winston and Dologite (1999), defined owner's computer knowledge as a partially controllable factor. Similarly, most of the consultants (50 %) considered owner's computer knowledge as a partially controllable factor. The way of altering the level of owner's computer knowledge is mainly through *conversations* about the nature of the IT application and its implementation process in order to increase the owner's knowledge. Also, it is important to stress out the fact how a particular IT application would fit in the SME in question. In conversations, a consultant can increase the owner's computer knowledge about the state of IT usage of the

company's industrial field in general. This may give a broader perspective towards the IT implementation process and its importance. According to one of the consultants, the magnitude of the impact, however, is dependent on the owner's personality:

"It depends so much on the personality that one can not generalise that [the influencing possibilities]. Some owners you can influence more and some less. It depends much about the relationship that has formed and many other factors, too. You can affect on it in a way, that when you see the level of the knowledge you can chat about the matter so that the owner will understand what he or she understands and what he or she does not understand. When this comes clear in the conversations then the knowledge of the owner has already increased. " (Project analyst)

All of the respondents agreed that the **owner's positive attitude towards the new technology** is positively related to IT implementation outcome in SMEs. Yet, in the interviews, they added that positive attitude might have negative consequences, too, if the attitude is over-positive. In those cases, owners usually like to purchase and implement new and exiting IT applications without further consideration whether they are really needed or compatible with the existing IS. Most of the consultants said that they had come up with this kind of situations. One of them said that positive attitude is good if the owner has computer knowledge and experience. Then he or she has more realistic approach towards new IT trends and is more cautious about them and is able to evaluate their compatibility in the organisation. On the contrary, if the owner has very little or no computer knowledge and experience and is very excited about new IT trends, then it is quite likely that the implementation will not succeed.

In consequence, the attitude of small business owners sometimes needs encouraging and sometimes discouraging. 60 % of the consultants claimed that owner's attitude is a partially controllable factor. The main way of modifying

the attitude towards IT is *conversation*. If the attitude is too positive, then a consultant can inform the owner about the realistic possibilities and risks related to IT. If the owner's attitude is very negative a consultant can bring up things like the general IT usage in the company's industrial field, what are the requirements of the customers and how IT could improve the market position. Often the pressure for IS comes from the external environment of SMEs and it is important for small business manager to be aware of those requirements.

60 % of the respondents claimed that **owner's short-range management perspective** has a negative influence on IT implementation outcome. 60 % of the respondents said that it is possible to control this factor partially. If the business cycles are clear in a company, then a consultant can suggest that IT projects should be allocated at the quiet seasons of the cycle. Additionally, a consultant can inform the owner about the benefits of long-term planning vs. short-term actions. Those changes that IT implementation cause in an organisation often do take place as fast as the owner would like and the reasons for that should be clarified in detail.

Including the IT implementation process in the business **strategy** has, according to the consultants, either positive (30 %) or very positive (20 %) influence on implementation outcome. This result supports the previous study results of Winston and Dologite (1999). They state, that it is extremely important that IT planning and implementation process is taken into consideration in the owner's strategic disposition. When asked about the controllability of this factor the answers were distributed almost evenly within the different options. 40 % of the consultants stated that it was not possible to control this factor, 30 % said that it was partially controllable and 20 % said that it was fully controllable. One of the consultants said that it is possible to affect on this factor when the company is either creating or renewing its business plan. In other times, it is rather difficult or even impossible. Another consultant stated, that according to his observations, the owner very often has the strategy and the implementation

combined at thought level (in his head) but it is seldom written down and distributed throughout the organisation. The way of influencing the fact that the owner would include the IT implementation process in the business plan is *to inform the owner about what kind and how much resources the IT project requires* and that it should be planned with respect to other possible projects and available resources. One of the consultants emphasised the fact that, in SMEs, the strategic plans are often related to certain employees and if the load of work and responsibility for one person gets too high, then there is a danger of project failure.

According to most of the respondents (80 %) **a dominant and controlling owner** is not, at least not directly, influencing the IT implementation outcome. Also, it was considered as one of those factors upon which a consultant has no control. In the interviews, it was also questioned whether it was necessary at all to try to interfere with this factor.

Centralised decision-making was considered to have either no influence (50 %) or positive influence on the IT implementation success. 80 % of the respondents claimed that it was impossible to affect on the degree of centralisation in SMEs. In the interviews, the consultants said that it is up to the owner's personality whether it is possible to suggest a more distributed decision-making process for instance in the project group.

The importance of **owner's participation** in IT implementation process has been widely emphasised in literature (see Cooper and Zmud, 1990; Sarker and Lee, 2000; Winston and Dologite, 1999). According to most of the respondents, owner's participation in the implementation project was seen as a positive factor (70 % positive, 20 % highly positive). In the interviews the consultants said that the participation of the owner has several positive impacts on the implementation outcome. Firstly, it makes the employees more interested in the project and encourages the staff to participate more eagerly. One of the

consultants had following experiences about owner's participation in an in-house developed ERP system implementation in a small company manufacturing electronics:

"... the others got interested in the project and the whole process was carried out faster when the owner was involved. It was not the way that the owner would have told the employees to participate but he was clearly interested in how the project would succeed and wanted to see how it [the new system] would affect on the production. The fact that he followed the development of the production at a practical level, motivated the staff to adopt the new routines more willingly than they would have if the owner did not show any interest." (System manager)

Secondly, the more the owner shows interest towards the project the more he gets involved in it which in turn leads to higher level of commitment. Thirdly, the owner's behaviour reflects on the staff. For instance, if the owner actively starts using the new ERP-system, then the employees simply follow the example and start using the system, too.

According to Winston and Dologite (1999), owner participation is one of the few factors within the IT implementation process in small businesses that can be fully controlled. In this study, 80 % of the consultants emphasized that owner participation is a partially controllable factor and 10 % claimed that it is a fully controllable factor. According to the consultants, the ways of increasing the amount of owner's participation are the following: *conversation, motivation* and *role definition*. Through conversations the owner should understand the importance of his or her participation and the consequences of non-participation. To reach this understanding a consultant can give information about the benefits of participation and commitment. Motivation can be increased when the owner receives more information about the IT application to be implemented and gets more familiar with it. A useful tool for motivation is training or other related events personally aimed at the owner. Role

definition means that a certain role in the implementation project is defined for the owner. When he or she has a clear role and responsibility then the amount of participation increases. Most of the consultants emphasized that it is important that the owner participates in the project right from the beginning. One of the consultants stated that

"If you cannot make the owners to participate in the beginning then it is impossible to get them to participate later on. In the beginning, motivation occurs and that is a way to influence the level of participation and commitment. It is important that the owner participates from the beginning to the end in order to see the whole implementation process." (Project analyst)

According to the consultants the role of the owners changes during the IT implementation process. In the beginning they tend to participate personally but on the later phases the nature of their participation changes into resource administration.

All the respondents considered that **commitment** had either a positive (50 %) or extremely positive (50 %) impact on IT success in SMEs. This supports the previous research results of Delone (1988), who states that, in SMEs, IS success is highly dependent on owner's commitment to IT implementation. When asked about their ability to control this factor, most of the consultants (70 %) answered that it is a partially controllable factor. The rest (30 %) considered it as an uncontrollable factor. According to the consultants, the ways of altering the level of owner's commitment are similar to those of controlling participation.

Top management support has been widely recognised as one of the most critical owner related success factor in literature (see DeLone, 1988; Foong, 1999; Kole, 1983; Kwon and Zmud, 1987; Lucas, 1981, p. 99; Somers and Nelson, 2001; Thong et al., 1996). The responses of the consultants affirm this statement. Support provided by the owner was considered having either highly positive

(20 %) or positive (80%) influence on IT implementation outcome. Half of the respondents asserted that they were able to conduce partially to this factor. The methods appeared to be very similar to those of controlling both participation and commitment. Participation quite naturally leads to support and allocation of sufficient resources. One of the consultants said that the owner's support arises from participation.

Establishing a project team was considered to be very important with respect to the success of IT application implementation in SMEs. Almost all of the respondents (80 %) claimed that the existence of a project group had either a positive or highly positive influence on IT implementation success. 60 % of the consultants claimed that it is possible to influence this factor. A consultant can *inform the owner about what kind of people should be included in the project team.* However, most of the consultants said that it depends on the company and the owner how much a consultant can manipulate the composition and, in general, establishing the project team. If the project team has been already selected by the owner there is little a consultant can do in order to change that composition. On the contrary, if the owner is willing to listen to the advice of an external consultant he or she can suggest the selection of the most suitable employees, in order to get a well-balanced project team. This means that the group consists on different kinds of interest groups of the organization and employees who have IT experience or experience on IT implementation projects.

According to 90 % of the consultants, **project team competence** has a positive relation with the IT implementation success. Whether they are able to affect on it or not varied slightly: 40 % thought that it was impossible to alter this factor while the other 40 % of the consultants thought that it is possible to affect on it to some extent. Those consultants who considered this factor partially controllable said, that the means of influencing to the project team competence is related closely to the establishment of the project team. A competent project team can be obtained by selecting suitable and competent employees in it.

According to literature (see Curley and Cremillion, 1983), **appointing and authorising a project champion** has a positive relation to IT implementation outcome. Similarly, it was considered as an important success factor by the consultants. All of them responded that it had either positive (50 %) or very positive (50 %) influence on the IT implementation outcome in SMEs. Also, 60 % of the consultants emphasized that they are partially able to affect on the fact whether the champion was appointed or not. According to the consultants, the means of doing that are similar to the means of promoting the establishment of a project group. Firstly, a consultant can give reasons why the appointment and authorisation is important. Secondly, if a consultant has identified a potential project champion in the organisation he or she can suggest to the owner the selection of that person as a project leader. However, owners usually have their own opinions about who is capable of acting as a project champion and who is not. Most of the consultants agreed that the authorisation of a project champion is a more difficult and harder to influence than simply appointing one. One of the consultants said the following about this:

" Well, they always name somebody as a person in charge but the problem is the distribution of the power...and delegation. As to my experience, the persons in charge, despite of the appointment, have no power to make decisions but his or her role is more like a secretary's. " (Project manager)

Because of this reason, it is important that the project champion is a person who already posses power in organisation before the appointment. According to three of the consultants, a project champion should have a relatively high position in an organization and through that position authority over the rest of the employees. Also, the higher the position the more the project champion is able to spend resources for the project. One of these three consultants pointed out that:

"It is not meaningless who has been named as a person in charge of the project. ... If you think about, for instance, a project organisation and the person in charge of the implementation project is a successful project manager, then this person in charge can be seen as a project champion. If he or she takes the project for himself and actively promotes it, it has an extremely high influence [on the success] then." (Project analyst)

However, if the chosen project champion is not a high level manager with power and authority, it is extremely important that a consultant can convince the owner of the inevitability of the authorisation. Like one of the consultants said,

" A consultant has to underline the fact that the base of the role of a champion will fall off if he or she is given responsibility but no power. That is the only way a consultant can influence on this factor. " (Chief technology officer)

Other consultants mainly agreed with this approach. The owner needs to realise that an implementation project may cause changes in the regular daily routines, requires time and resources and cannot be managed "just beside all the other tasks". A firm decision has to be made by the owner that resources and decision-making power will be given to the project champion.

According to various authors (see Grover and Teng, 1994; Lucas, 1981; Ein-Dor and Seveg, 1978; Somers and Nelson, 2001) **dedicated resources** by the owner has a positive influence on IT implementation outcome. Similarly, 60 % of the respondents answered that if owner dedicates resources for implementation project it has a highly positive impact on the IT implementation success. 50 % of them said that it was possible to influence on this factor to some extent. All of these five consultants claimed that the best way to assure that sufficient amount of resources is dedicated to the IT implementation project is *to state arguments for and to justify the need of the resources* to the owner. Good arguments are, for instance, calculating the costs of sustained implementation process or the

possible problems of unsuccessful implementation process. Additionally, it is relevant to point out all the possible expenses in the beginning of the IT implementation process in order to avoid expensive surprises in later stages of the project. One of the consultants, a project manager, said the following about the advantages of an independent consultant:

"An independent consultant can let the manager know the total price of the project right in the beginning [of a project]. It may often happen that resources are solely allocated to the early stages of the implementation project, in order to get the system into use somehow. However, in order to reach the infusion stage half more money is needed for training and other expenses. It could be that when the contract of sale is being done, the vendor does not provide information about all the possible "hidden costs" of the project in order to make the total costs seem lower and the customer to make a purchase. On the contrary, when the total concrete costs are presented in the beginning and the company still decides to accept them then it can be anticipated that it [the IT implementation project] will be conducted properly. But it the company takes the project because it is so inexpensive it most likely will cost much more later on and the reaction can be that we are not going to use this [the implemented IS] then at all." (Chief executive officer)

In addition to the factors listed in the questionnaire, a few new factors were brought up, too. Three of the consultants argued that **owner's own example** has a great influence on the use of the new system. If the owner uses the new system it encourages the employees to use it, too. On the contrary, if the owner is not committed to use the new system, also the rest of the organisation's members are more likely to avoid the use. Two of the consultants emphasised that the role of the owner-manager is central in SMEs with the following words:

"The owner has an extremely great influence on implementation success in SMEs because he or she is such a central person in the small business environment and if the owner is resisting then it is not going to work out. But if he or she encourages and

motivates all groups [of employees] to implement and to gain benefits then that will advance the project." (Project analyst)

"The role of the manager is central in SMEs. It does not matter how much planning and doing takes place, but if the manager is not in it the whole project will eventually fail. That eats away the trust and spirit in a company." (Project analyst, a consulting researcher)

An additional new finding was owner's **age**. It appeared that the younger managers tend to have more positive attitude towards IT in general. This naturally promotes the IT implementation processes in SMEs. One of the consultants said that:

"In some places, even if they were in metal industry, younger managers see it [IT] in a completely different way. The older managers comprehend IT as a necessary evil and as a support function, while younger managers consider it as a central issue and think that it has rather an important role [in business]. It is a kind of a generation question." (Project analyst.)

As a summary of owner related factors it can be concluded that almost all of the studied factors have positive influence on IT implementation outcome in SMEs. Nevertheless, there are a few exceptions. Dominant and controlling owner as a success factor can be distinguished because it received the largest amount of "no influence/cannot say" responses. Short-range management perspective received the highest number of "negative influence" responses. None of the owner related factors were considered having an extremely negative influence on IT implementation success. A summary of the influence of owner related factors is presented in FIGURE 8.3.1.

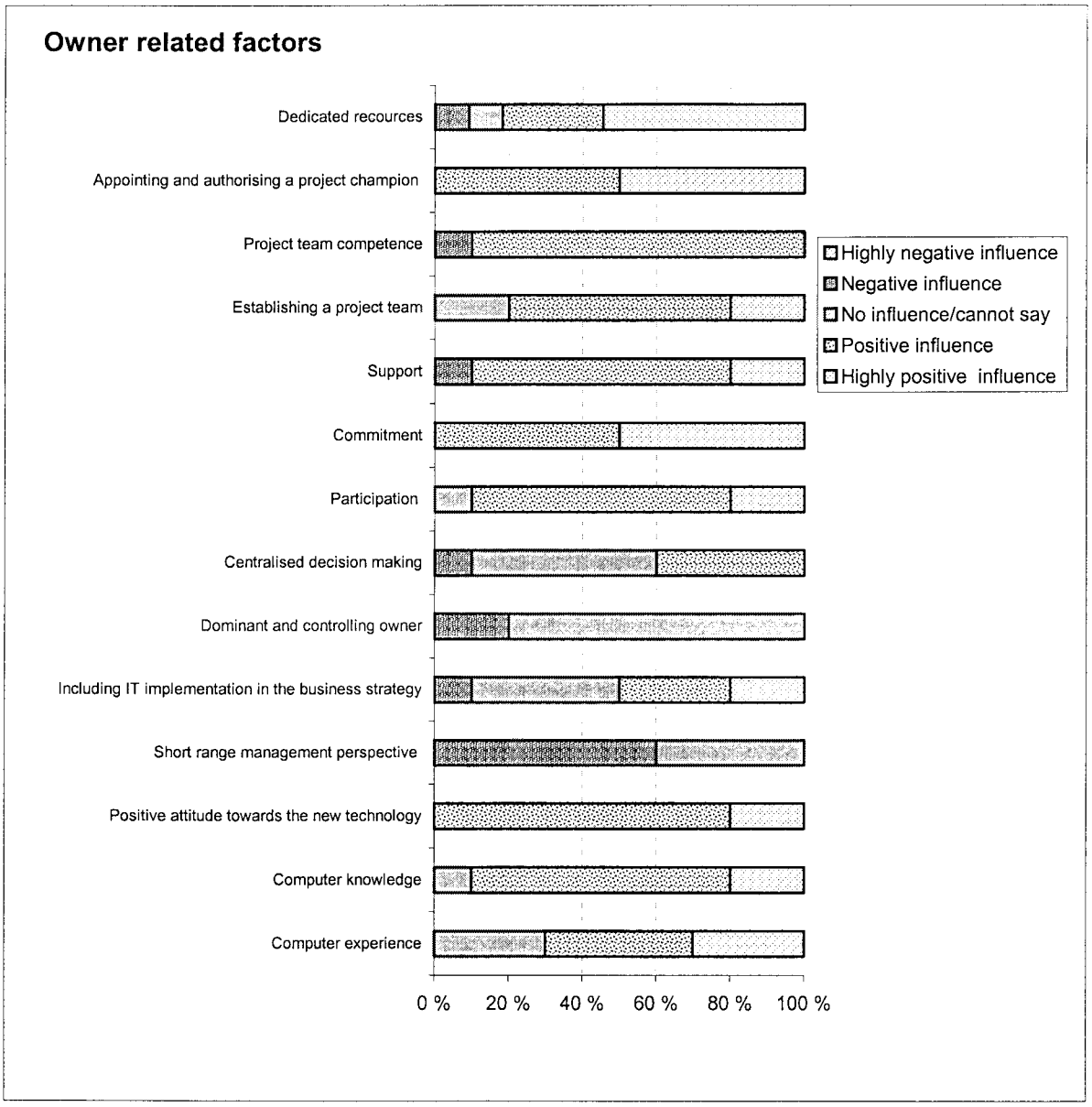

FIGURE 8.3.1 Summary of owner related factors

The case study results show that most of the owner related factors are partially controllable. Those factors that are considered mainly as uncontrollable are computer experience, dominant and controlling owner, and centralised decision-making. The main controlling methods of the partially controllable owner related factors are conversations, promoting realistic thinking when planning the IT implementation project and defining resources for it, informing the owner of relevant matters, and justifying necessary and important

investments or issues. A summary of the controlling methods of owner related factors is presented in FIGURE 8.3.2. The methods are arranged in the list by the amount of their appearance in the interviews in a way that the most often mentioned method is the first and the most seldom mentioned method the last.

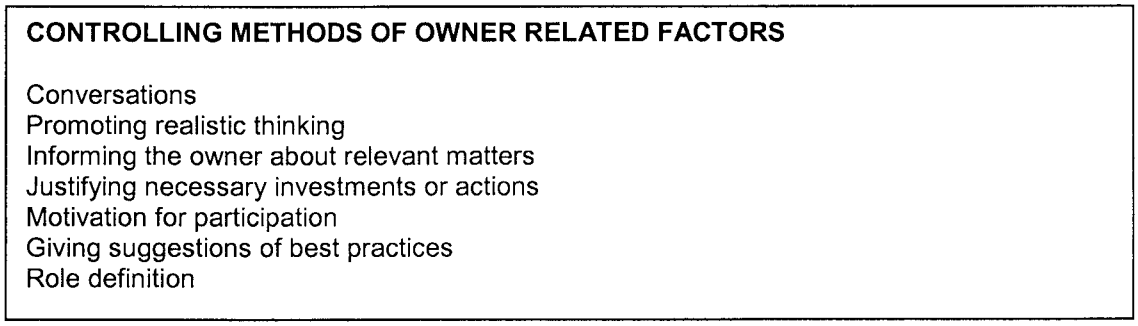

FIGURE 8.3.2 The controlling methods of owner related factors

Face-to-face conversation is often the best practical way of influencing the opinions of a small business owner. It is important that a consultant brings up the issues related to IT implementation process as realistically as possible because the owner needs to understand the total costs and resource requirements right from the beginning of the project. A consultant can influence on the choices and decisions of the owner by giving suggestions and providing information. Motivation for participation is important because if the owner shows commitment and interest towards the IT application then the rest of the organisation is more likely to show commitment, too.

8.4 End-user related factors and their controllability

80 % of the consultants emphasized that **end-users' computer experience** had a positive (50 %) or very positive (30 %) relation to IT implementation outcome. When asked if they were able to increase the amount of computer experience of the end-users most of them (60 %) answered that it was not possible. Also,

Winston and Dologite (1999) concluded in their study that computer experience of end-users is an uncontrollable factor.

90 % the respondents said that the **end-users' positive attitude towards change** has positive (30 %) or highly positive (60 %) influence on the success of IT application implementation projects in SMEs. This supports the statement of Kwon and Zmud (1978). 80 % of the respondents claimed that they, as IT consultants, were able to modify the attitude of the end-users if needed. This takes place with two means: *informing* and *justifying*. Three of the consultants had recognized in their work that when the end-users are informed about the IT project and know what is being implemented and why their attitude is more positive towards change. One of the consultants said that the reason for negative attitude is often poor internal communications:

"One can influence on this [attitude towards change] by telling what is going on. The worst problem often is that the end-users have not been informed about the implementation project of why the new system is about to be implemented. There has been only a command that now we are going to implement this. So, the means of influencing is informing. The end-users can often be those hundred employees in the shop and that is where the information should go, and this is where a consultant can provide help." (Project manager)

Another means is to justify the implementation of the new IT application. Three of the consultants agreed that if reasons for the implementation of the new system are given to the end-users they feel more positive about the change process. It was noticed, however, that the arguments for the end-users differ from those for the owner-manager. Owner-manager is motivated better with arguments related to cost savings or improvements in the overall functionality of the company. On the contrary, the justification for end-users consists of arguments related to their own work environment and tasks, i.e., how the new IT application will affect on the end-users' roles and relations to other roles and

tasks. Additionally, one of the consultants stated that the example shown by the owner-manager creates the basis for the end-users attitude towards change. Therefore, it is important to get the manager involved in the project in order to increase positive attitude of the others.

On the basis of these interview results, it seems that it is not possible to influence the end-users' attitude towards change directly but through the increase of information and justification given and by getting the owner to show interest towards the project.

Positive attitude towards the new technology was considered to have a positive (70 %) or very positive (30 %) impact on the IT implementation outcome. 70 % of the consultants thought that this factor was partially controllable and 30 % thought it was fully controllable. The means of influencing the attitude of the end-users towards a technology appeared to be the same than when modifying the attitude towards change, i.e. informing and justification. A consultant can tell the end-users realistically about the facts related to the new IT application and what kind of changes it will possibly bring along. One of the consultants said that a powerful argument is to speculate what can happen in the future if the new system is not implemented and used. The attitude of the end-users' is more positive when they know why the new IS or IT application is necessary and that it is possibly vital for the existence of their own jobs.

Motivated end-users were considered to have a positive (40 %) or extremely positive (50 %) impact on IT implementation outcome in SMEs. 90 % of the consultants answered that there are ways of altering the level of motivation of the end-users. The influencing methods here are almost the same than in the case of attitude towards change and attitude towards the new technology. Justification was mentioned as an important motivating factor. Again, when end-users know what is being implemented and why, their motivation

increases. Most of the consultants agreed that these three factors were closely linked to each other and can be improved with similar manners. One of the consultants listed some of the practical working methods for motivating end-users:

"If you are able to convince the end-users about the consequences of the new technology and how it will affect on the work of the end-users, that, in most cases, is where the motivation originates. Part of the end-users you see in the meetings. Interviews can be done in order to find out the opinions and requirements of different user groups. Those are the ways of finding out what the end-users are thinking." (Project analyst)

Incentives were either considered to have no influence (40 %), positive influence (40 %) or extremely positive influence (20%) on the IT implementation outcome. Winston and Dologite (1999) claim that the use of incentives may result in more successful implementation outcome and are the only fully controllable end-user related factor. 40 % of the consultants claimed that this is a partially controllable factor but in the interviews they were more wary about the usefulness of the use of incentives. They thought that instead of using incentives, giving feedback is more beneficial in the long run. Only one of the consultants mentioned that if the incentives are seen as a good thing in a company, then a consultant can try to increase the use of them by suggesting it to the manager.

80 % of the respondents claimed that the **feedback received by the end-users** influences positively (60 %) or highly positively (20 %) on IT implementation outcome in SMEs. Consultants agreed that it was possible for them to partially (40 %) or fully (60%) alter this factor. The means for this is simply giving more feedback to the end-users themselves. The consultants mentioned three kinds of issues on which they think are important to give feedback of. Firstly, it is important to give feedback and "neutral" information about the present state of

the project, i.e. how it is proceeding when compared to the plans, how are the goals met and how the users advancing in general.

"When an information system is being implemented, it is important to inform people about the progress. It needs to be planned and kept open, so that it is possible to verify how it has been proceeding. ... For instance, that now we are not doing so well on this but are on the way of getting there. That way the employees get a comprehensive picture of the whole process. " (Project analyst, consulting researcher)

Secondly, a consultant should convey positive feedback concerning the performance of the end-users, i.e., about things that are going well and as planned. This feedback can be personal or about the performance of a group. Below there are comments of two consultants about positive feedback.

"It is up to a consultant how much he or she gives feedback. It is important and has a big role that end-users will be informed how their performance is advancing. ... Whether they are doing things right at all and whether it benefits the whole process. That is what interests them." (System manager)

"I aim to boast, because people like it that they are doing something right. A general problem is that they [implementation projects] are so problem-centered. It is easy to only concentrate on the things that do not work properly because the goal is to fix problems. This easily generates a perception that they [end-users] know nothing at all. For that reason, it is important to discuss about the things that are going well, too. Through that, people remain motivated to work." (Project analyst)

Thirdly, it is important and necessary to concentrate in the possible problems related to the IT implementation project. This does not necessarily mean negative feedback but bringing up the present challenges and problems that need to be solved.

"Certainly, one of the most important roles of a consultant is to bring up good things and problems in order to encourage conversation about them. Problem-analysis [a method used in ITRI's projects] is a good example in a way that regular workers, managers and a couple of vendor's representatives were participating. In those problem-analysis meetings both groups were giving feedback to each other and discussed about issues, which may have never been talked about without the meeting. Also, there were usually neural parties present, too, like a consultants." (Chief executive officer)

The opposite side of end-users receiving feedback from their performance is to *encourage the end-users to give feedback themselves*. Most of the consultants mentioned this issue. One of the consultants said that, according to his experience, it is easier for end-users to give feedback to a consultant, who is an external person, than to the manager for instance. However, in order to be able to give and receive feedback from the end-users, a *mutual trust* between all the stakeholders has to exist. A trust between a consultant and end-users can be gained if a consultant identifies the status of the end-users within the organisation, "blends in" and speaks the same language with them. Also, the means of giving feedback vary slightly according to the situation. The most used medias are personal interaction (face-to-face conversation) or email. One of the consultants emphasized that face-to-face conversation is more efficient than questionnaires etc, especially when requesting feedback and information from the end-users.

Literature does not provide earlier research results on the influence of feedback received by end-users. The results of this case study show, however, that it is a significant success factor because it has a positive relation to the IT implementation success and it can be almost fully controlled by an IT consultant alone.

The questionnaire responses partly affirm the statement of Anderson (1989) that **education** has a positive relation with IT implementation outcome. According

to 50 % of the consultants education has a positive impact on IT projects while 40% of the respondents claimed that it has no influence on it. Most of them (80 %) recognized that it was impossible to change this factor. No actual means of altering methods were mentioned in the interviews.

70 % of the consultants responded that **cosmopolitanism** has a positive influence on IT implementation success. This support the statement of Kwon and Zmud (1987), saying the more end-user has outside contacts and the broader the end-user's perspective the more it enhances adaptation and infusion stages particularly. 80% of the respondents claimed that this factor is fully uncontrollable. No methods of influencing it were identified in the interviews either.

In literature (see Anderson, 1989; Baronas and louis, 1988; Lucas, 1982), **end-user participation** and involvement in IT implementation process have a positive relation to the acceptance of the implemented IT application. In the questionnaire responses, end-user participation was considered as a major positive enabler of IT implementation projects in SMEs. 30 % of the consultants said it has a positive influence and 60 % answered that it has a highly positive influence on IT implementation success. Also, in the interviews the importance of end-user participation was emphasized. Two of the consultants put it in the following way:

"Participation has a great meaning on the later use of the system. Without end-user involvement implementation is going to be difficult. There will be resistance. If we can get the end-users in the project right from the beginning the resistance of change hopefully will diminish. When they [end-users] are located in different parts of an organization, they reduce the resistance in their own work groups because they know what is going on [with relation to the implementation project]. If there are no end-users participating there will be greater resistance if only the top managers are striving the implementation of a new system." (Project analyst)

"One can never stress out too much the importance of participation. Or even if it was stressed out, in practice it never gets to be emphasised too much." (Project analyst, consulting researcher)

According to Winston and Dologite (1999), end-user participation is a partially controllable factor. Similarly, 70 % of the consultants answered that it was possible to affect on this factor to some extent. According to the consultants, the means of increasing end-user participation are *motivation, commitment* and the *establishment of a project group*. Motivation is needed to raise the interest of the end-users, which makes them more curious about the new system. Motivating arguments can be that if end-users participate they are able to influence on what is being done and that the infusion phase can be reached faster and with less pain than without their participation and are able to see the "big picture" and overall influences of the new system. One of the consultants said that motivation can be difficult if end-users are very fond of the existing IS and are not willing to implement and use a new one. On the contrary, it is easier to motivate the end-users to participate if they perceive the existing system bad and difficult to use. Besides motivation, the end-users need to be committed to the project in order to participate. Commitment can be increased for instance by establishing a project group, which includes the right people or representatives of the end-users. One of the interviewees emphasised, that a right level approach needs to be maintained when end-users are participating. It is important not to go too deep on details but to concentrate on higher-level issues in order to clarify "what this is all about" and to see the bigger picture.

Korunka et al. (1997) state that according to Carayon and Smith (1993) the type and timing of information provided to end-users impacts the degree of acceptance. In the case study, **informing the end-users** about the proceeding of the implementation project was considered as important. 60 % of the consultants answered that it had a positive impact and 40 % answered that it

has a very positive relation to on IT implementation success in SMEs. 70 % of the consultants said that it was possible for them to affect on this factor by actively providing information about the present state of a project. Where and how information is provided can vary depending on a company and a project. However, the most used way seemed to be informing end-users in project meetings or through e-mail. Additionally, a consultant can make handouts to be distributed throughout the whole organisation or to suggest issues related to the implementation project to be discussed in the staff meetings. It should be considered in which format the information is given to the end-users. According to one of the consultants

"It is important that people are kept up to date on how the project is proceeding because otherwise it easily forgotten, which phase is on, what should be done and why something has been done or not. Informing should take place in practical level so that end-users understand the message. Media itself is not so important here but the things should be told in a concrete level enough. ... When you tell how it [implemented IT application] influences end-users daily work it illustrates the situation much better." (Project manager)

In literature, **end-user training** has been identified as an important success factor across implementation stages (see Anderson, 1989). Some authors have defined it as more stage specific factor. For instance Somers and Nelson (2001) emphasise that end-user training is one of the most critical success factors at routinisation stage. Cooper and Zmud (1990) state that the role of training is significant at infusion stage. According to 90 % of the consultants, training has either a very positive (60 %) or positive (30 %) impact on IT implementation outcome in SMEs. According to Anderson (1989), end-user training is a fully controllable factor while Winston and Dologite (1999) claimed that it is a partially controllable factor. 60 % of the consultants answered they were fully able and 40 % said that they were partially able to control whether training is arranged or not for the end-users. The main way of doing this is to inform both

the owner-manager and the staff about the importance of training. *Informing the owner* is relevant because he or she usually decides if the training is arranged or not. Owner-managers in SMEs often are reluctant to invest in training because of the price. Therefore, a consultant has to give arguments for the importance of training and telling about the possible consequences if training is not done.

"It is important that new working procedures are learnt. Usually entrepreneurs pay more attention to the price of the software and are not willing to pay from the training because they consider it less substantial. One [a consultant] have to underline the importance of training so that they would start using the implemented IS correctly right from the beginning. This was not the case in this company [a small printing and publishing company where implementation of an ERP system implementation was between acceptance and routinisation stages]. They had started to use the system and adopted certain wrong ways of doing so. It was very difficult to start changing that. It would have been much easier if they would have had training and started the use in a correct way in the first place. If there is some resistance in other respects already and then one should start using a system and use it for a while and then someone comes and tells you that you are using it in a wrong way – that, if anything, gets on the nerves of the users." (Project analyst)

Informing the end-users motivates them to participate in the training. Two of the consultants said that employees in SMEs are often keen on participating in trainings because they are not offered so often in small businesses as in large corporations.

Once the owner has decided to invest in training a consultant's duty is to identify the needs of the end-users and find suitable training for them. According to three of the consultants, training should be planned on the basis of the organisation's and end-users' needs. Two of the consultants said that a good way is to train certain end-user group at a time in order to provide them allocated and task-specific training. It is important how the groups are formed.

One of those two consultants said the training groups should follow the existing and natural work group division so that the employees in a group speak the same language and understand each other. They usually have the same kind of tasks or they work together which means that they know each other and feel comfortable about learning new things together. Another one of them continued that, also, it is beneficial to give an overall training about the whole system in order to increase the understanding about the relations and links between single tasks. In some cases, a consultant can offer training him or herself if the implemented IT application is familiar to him or her. In most cases, a consultant recommends or arranges training given by an external party. A third consultant claimed that trainings are more efficient and useful if end-users and a consultant make a list of the problems and unclear spots in the system in advance and are motivated to solve them in the training session. This way the users have a goal for the training and can ask more specific questions from the trainer. This only works in cases where a system has reached a routinisation stage, i.e. has been in use from one to two years.

In literature, Somers and Nelson (2001) emphasised the importance of **training on new business processes** but the questionnaire responses gave opposite results. Training for new business processes was not seen as important as training for the use of the new IT application. 70 % of the respondents answered that it has a positive relation to IT implementation success. 50 % of the respondents answered that it was possible to alter this factor partially. The means of doing it appeared to be the same as in the case of user training. It was agreed that if the user training is done properly then the learning of the new business processes takes place together with that.

The respondents were surprisingly concurrent about the importance of **job tenure**. All of them answered that it has a positive relation to the IT implementation outcome in SMEs. In literature, job tenure has been identified as a positive factor mainly on routinisation stage (see Kwon and Zmud, 1987).

40 % of the respondents considered it as a partially controllable factor. The rest of the respondents claimed that it was an uncontrollable factor (50 %) or did not know (10 %). Those four consultants who considered this factor as partially controllable said that there are two ways of increasing job tenure. The first one is motivation. This takes place by informing the end-users about the realistic effects of the new system on their jobs. The second way is training. Through training the understanding of the whole process increases, when end-users realize what is the relation between their own tasks and the performance of the whole organization.

Bureaucratic self-interest of end-users has been identified as a negative factor related to IT implementation (Cooper and Zmud, 1990). Similar results were gained from the case study. 60 % of the consultants responded that Bureaucratic self-interest has a negative influence on IT implementation outcome. 10 % claimed that the influence is highly negative and 20 % stated that it has no influence on implementation process success. Most of the respondents (60 %) said that it is an uncontrollable factor and 20 % could not say whether it could be controlled or not.

According to Joshi and Lauer (1999), the **experienced equity related to the new technology** has a positive relation to acceptance. Half (50 %) of the consultants considered that experienced increase in equity related to the new technology has a positive relation to IT implementation outcome in SMEs. Another half stated that it has no influence on implementation outcome in SMEs. Only 30 % of them thought that there were some ways a consultant could modify this factor in the context of SMEs. The main way of increasing the feeling of equity among the end-users is to provide an access to the implemented IT application even-handedly to all the users. One of the consultants emphasised that it is important to infuse the new IT application into the organisation as fast as possible in order to avoid conflicts and perceived decrease of equity. Another

interviewee said that a consultant should notice the situations where inequity is about to take place and inform the owner about them:

"For instance, if the people in the office have a possibility to use an electronic message board then one [consultant] should assign that why don't you [owner] give the same possibility to guys in the shop so that all the staff could equally access the message board. " (Chief technology officer)

Krovi (1993) has stated that if the end-users experience increase in job complexity due to the new IT application it most likely hinders the acceptance of the application. In the questionnaire, **experienced increase in job complexity due to the new technology** was considered having an extremely negative (10 %) or negative (60 %) impact on the success of IT application implementation in SMEs. 40 % of the consultants claimed that there was some ways of controlling this factor but other 40 % considered that there was no way of doing it. Those consultants, who said that it is possible to alter this factor, mentioned the following ways of doing it. First one is preparing to the change in the daily tasks in advance. A consultant can inform the end-users about the possible changes in their jobs and they may be able to do something in order to reduce the possible complexities. The second way is to show the end-users only the necessary parts of a system. The daily routines of each user has to be defined with respect to the new system and then taught to the end-users, step by step. Once end-users have memorised this new routine it does not feel so complex any more. The third way is positive attitude. The changes should be taken as challenges, not as problems. When, for instance, a new ERP-system has been installed and should be used, it may feel like the daily tasks are getting more complex even if they did not, they can just be a little bit different than before.

If the implementation of a new IT application causes **a job security threat** for the end-users it, according to the responded consultants, has either a negative (50 %) or very negative (40 %) impact on the IT application implementation

efforts. These responses yield the same results as were found in the literature review (see Krovi, 1993). Most of the consultants agreed that there was nothing (30 %) or only little (20 %) they could do in order to diminish a perceived job security threat. One of the ways is *informing*. Three of the interviewees said that a consultant can inform the end-users about the realistic consequences from the implementation and use of the new IT application. When the end-users do not know what the IT application is being implemented for the project can be easily perceived as a threat to job security.

In addition to the factors listed in the questionnaire, an additional end-user related issue was adduced. **End-users' computer knowledge** was seen as a meaningful factor with respect to the IT implementation outcome in SMEs.

"It affects a lot what is the level of the end-users' computer knowledge. If they have been only using regular PCs and spreadsheet applications, which is completely different compared to using shared applications then the knowledge is on weak basis. Then again, if the users have a basic comprehension of what computers and information systems are, that is helpful in a project. It helps to understand the limitations and, in general, what the project is all about. Computer knowledge certainly reinforces the accomplishment of the project, increases the understanding and encourages end-users to participate. " (Project analyst)

As a summary of end-user related factors it can be said that there are various issues that can influence whether end-users will resist or promote the implementation of an IT system in SMEs. End-users' positive attitude, previous computer knowledge, job tenure, and training for the use of a new system have a positive relation with IT implementation outcome in general. Perceived job security threat or equity have negative impact on the implementation project (see FIGURE 8.4.1).

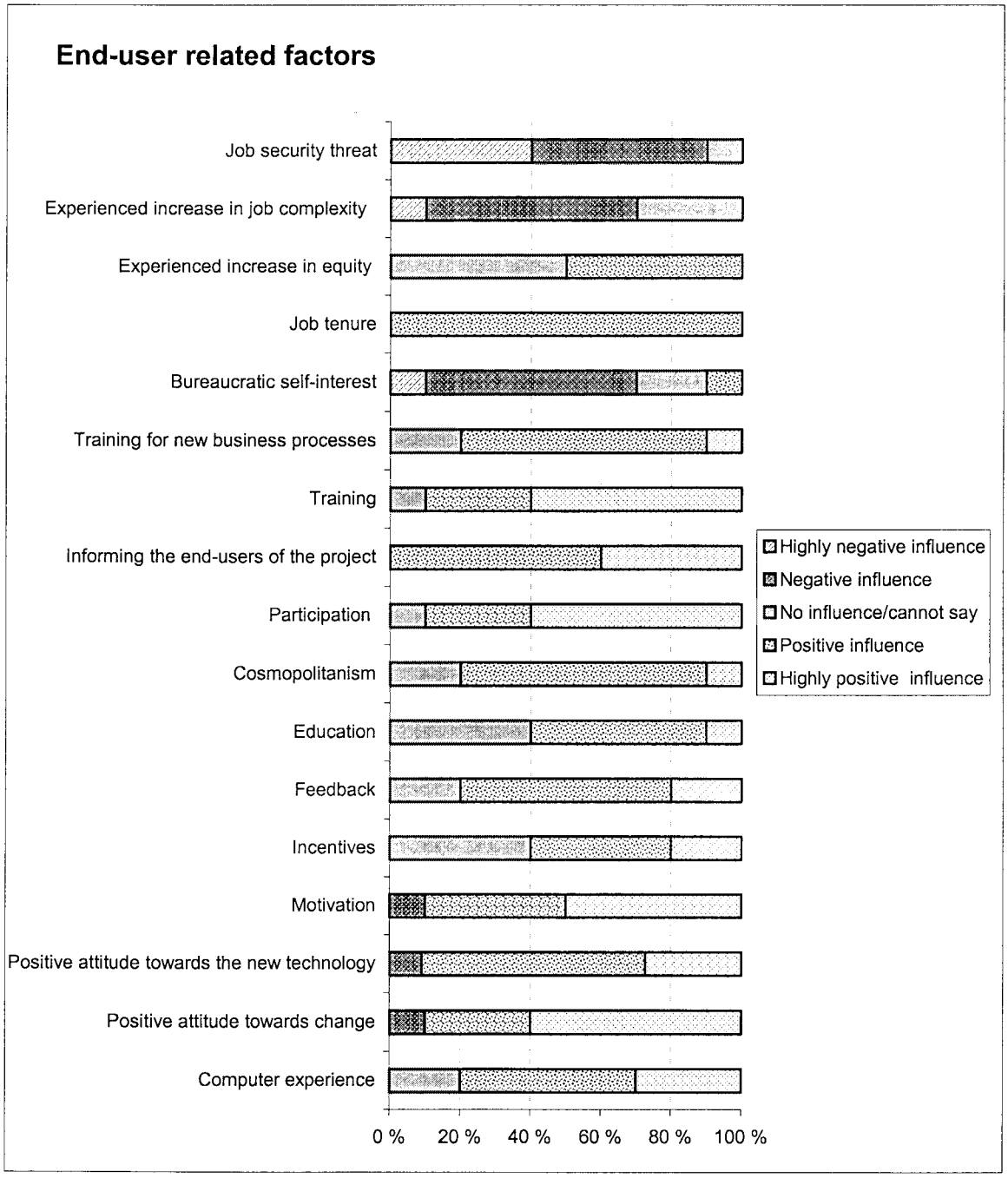

FIGURE 8.4.1 A summary of end-user related factors

The main controlling methods of end-user related factors are: informing the end-users about the practical consequences of the new IT application, promoting realistic thinking concerning its influence on daily work procedures, justifying necessary changes that has to be made, motivating the end-users to participate, and promoting fluent communications about within the end-users

who are participating in the implementation project. An important method is giving feedback to the end-users about the progress of the project and to encourage the users themselves to give feedback to the consultant and the manager.

CONTROLLING METHODS OF END-USER RELATED FACTORS

Providing information about the progress of the implementation process
Promoting realistic thinking concerning the implemented IT application
Justifying necessary changes or decisions
Motivating for participation
Promoting fluent communications
Giving feedback and encouraging the end-users to give feedback
Encouraging for commitment

FIGURE 8.4.2 The controlling methods of end-user related factors

Before interactive feedback exchange between the end-users and a consultant is possible a mutual trust between both parties has to be gained. Trust can be gained more easily if the consultant can identify to the end-users and uses the same language with them. These preconditions are the same, which occur with the organisational factors.

8.5 Technology related factors and their controllability

In literature, the importance of the fit between a new technology and an organisation has been widely recognised (see for instance Cale and Eriksen, 1994; Cooper, 1994; Heikkilä et al., 1991). Identically, all of the respondents answered that **compatibility** has either a positive (60 %) or very positive (40 %) impact on IT success in SMEs. 60 % of the consultants agreed that it was possible to affect on this factor to some extent in order to promote the IT implementation success. Most of the consultants said that the compatibility issues should be considered when selecting an IS or IT application. If the application has been purchased already the ways of influencing on

compatibility are smaller. The means of altering compatibility are tailoring, configuration, or changing organisational procedures. Tailoring, i.e., customising the software on the basis of the customer's needs, was mentioned by five of the consultants but was not recommended as the best solution in general. Configuration means selecting the best-fit options and forming a best possible combination of the IT application. Tailoring was mentioned as a potential option if the co-operation between a consultant, a customer and a vendor is good and reliable. Also, the consultants emphasised the fact that tailoring goes hand in hand with the organisational procedures. SMEs, in general are considered to be flexible and the more an organisation can change to fit the system the less tailoring is needed. One of the consultants said that:

"It is not beneficial to tailor the software. A small business should rather change its working procedures than tailor. Since the SMEs are flexible, so why wouldn't they be flexible with this issue? " (Project analyst, consulting researcher)

According to two of the consultants, tailoring is not always a recommended option because it is difficult, or even impossible, to get updates on tailored software. A second reason is that due to undeveloped system development tools vendors are not able to manage the tailored environment for different clients and simply may forget what changes has been done to and to whose system. One of the consultants said the following about this issue:

"If organisational working processes and procedures function well and there is no need to change them, then tailoring can be done. Then again, if it can be seen that by changing the procedures the need for tailoring is less and the processes would become more efficient, then changing them should be done. It has to be considered case by case. Tailoring requires money and if you do not have capital or enough work force then it may not be rational to do it if it cannot be done properly. It may be that later on the software cannot be updated if there has been tailoring done." (Chief technology officer)

Most of the consultants stressed out that it is important that end-users understand that they may need to change some working procedures. In some cases both tailoring and modification in procedures has to be done in order to gain a compatible IT application. Adaptation from both sides, users and IT application, is required.

The second way of increasing compatibility is choosing the best composition of the selected IT application. Three of the consultants pointed out that information systems nowadays are versatile and can be customised by selecting necessary features or modifying them to meet the organisation's needs. Customisation requires know-how from the person who is about to do it. Two of the consultants said that, according to their experience in SMEs, carelessly done customisation may lead to problems and may be difficult to locate later on. Therefore, they recommended thorough planning and consideration of the customisation. This can be done together with a consultant or a representative of the vendor.

Relative advantage provided by the new technology has a favourable influence on the implementation of it in SMEs (Cragg and King, 1993; Heikkilä et al., 1991). The responded consultants considered relative advantage gained through the new IT application even more important than compatibility. 40 % said it has a positive impact and 60 % answered that it has a highly positive impact on IT implementation success. 50 % of the respondents claimed that there was some ways a consultant could modify the degree of the relative advantage and 30 % said that there was lots of ways to alter this factor. The main way of doing this, according to the consultants, is to set arguments for the advantages in the context of the company in question. From the end-users viewpoint this may mean informing them how easily data can be inputted in the system and, on the contrary, how easily it can be received in a form of a report, etc. One of the consultants said, that it is important to find out exactly how the system affects in the production, sales and marketing and then it can

be compared how much money those activities cost before and after the implementation of the new IT application. Always the advantages or benefits cannot be seen directly, but have to be filtered through many layers. One way of doing this is, like another consultant said, a data analysis.

"Data analysis is one way to make the benefits visible when figuring out what kind of information is flowing and how, and who is using it. It can be easily seen, that the amount of data flows are huge and that their form is often undefined. With this IT application, especially if we are talking about an ERP system, a more centralised solution can be gained where the benefits can be seen. Also, it is possible to consider the advantages through business processes and compare how they take place without and with the use of the IS." (Project analyst, a consulting researcher)

Visibility, i.e. how well the advantages of the IT application can be seen, was also seen as an important factor within IT implementation projects. In literature, visibility has been associated with successful implementation and particularly successful acceptance (see Cale and Eriksen, 1994). All of the respondents answered that visibility has either a positive (50 %) or an extremely positive (50 %) impact on the IT implementation outcome in SMEs. 70 % of the respondents claimed that a consultant is able to alter this factor to some extent in order to promote the implementation process. A consultant can influence on the visibility of the advantages by stressing out the benefits of the system, both obvious and less obvious. Two of the consultants said that the benefits are difficult to measure if one has not been in the project from the beginning and seen how things were before the implementation project. Also, sometimes the benefits turn visible after a longer period of time and cannot be seen before the IT application has been fully infused in the organisation. One of the consultants said the following:

"The benefits can be seen when comparing how things have been done earlier and how they are taken care of presently. For instance, maybe previously when you wanted to get

a report and you got it after a month and now you can get it the next day or maybe even after an hour. But it is very much up to the system how many benefits it can provide." (Project analyst)

Kole (1979) and Venkatesh and Davis (2000) have recognised that perceived ease of use is one of the technology factors positively influencing acceptance stage. All of the consultants answered that the **perceived ease of use** of the new IT application has a positive (80 %) or very positive (20 %) impact on the implementation process. 70 % of them answered that it was possible to influence on this factor to some extent. The perceived ease of use can be considered already when the small business is selecting the IT application. After selecting certain software or other application there is usually a possibility to select a customised collection of the components. One of the consultants said that the use of the system is much easier if only the necessary components of functions are visible to the end-users and they do not have to see how all the modules operate.

Two of the consultants mentioned tailoring as one means of making the use easier. It can be used to achieve a better fit between an organisation and a implemented IT application. Three of the consultants agreed that user training is one of the major ways of increasing the ease of use. When trained for the use of the system end-users know how to use a system in a correct and the most efficient way. In the actual training session a consultant can ask related questions from the vendor in order to find out all the necessary aspects related to the use of the IT application. Nevertheless, even training or a compatible system is not enough to guarantee the ease of use unless the basic infrastructure of hardware does not exist. It is important that the necessary equipment for the system use is available for the users. In practice, it can mean for instance that there is a sufficient amount of computers available and all the users have an easy access on them. The role of a consultant is of importance if the user interface of a system is poorly done and needs to be improved. One of the

consultants emphasised that if negotiations are needed in order to change the user interface then a consultant can act as a middleman and to ease the communications between the vendor and the client (small business). Usually a consultant acts as a translator, so that both the client and the vendor understand each other and can speak the same language.

Complexity is the only identified technology factor that has a negative impact in IT implementation throughout all the stages (see Cale and Eriksen, 1994; Kwon and Zmud, 1987; Lai, 1997; Premkumar et al., 1994). Likewise, the consultants were concurrent about the impacts of the **complexity** of the new IT application. 40 % answered that it has a very negative and 60 % answered that it has a negative impact on IT success in SMEs. 50 % of the consultants claimed that there are some ways they could alter this factor. The ways of decreasing complexity are training, finding routines and implementing only the most relevant parts of a system. If the complexity is of an IT application only based on the prejudice then training can be used to reduce the perceived complexity. If the system is complex and difficult to use then pre-maid routines can make it simpler. The end-users tasks need to be identified and then a routine path from beginning to an end of the tasks has to be formed. A user then memorises these routines and a can use them fluently in every day work and without having feeling complexity and frustration. Complexity can be diminished also by carefully planned customisation. This means that only the necessary functions of an application are implemented and the rest is left aside or for later implementation.

In addition to the factors described above, *safety of use* as a new success factor influencing the IT implementation outcome in SMEs appeared in the interviews.

"IT applications should be relatively safe to use in order to minimise the amount of errors so, that nobody has a change, not even by accident, to stop the production, etc.

These kinds of experiences may affect reaching the infusion level... for instance, if an ERP system crashes down a small company may not necessarily get the support it needed. This may cause long stops in production." (Chief executive officer)

As a summary of technology related factors it can be said that only complexity has a negative influence on IT implementation outcome. The rest of the factors have either positive of highly positive influence on it. A summary of the influence of technology related factors is presented in FIGURE 8.5.1

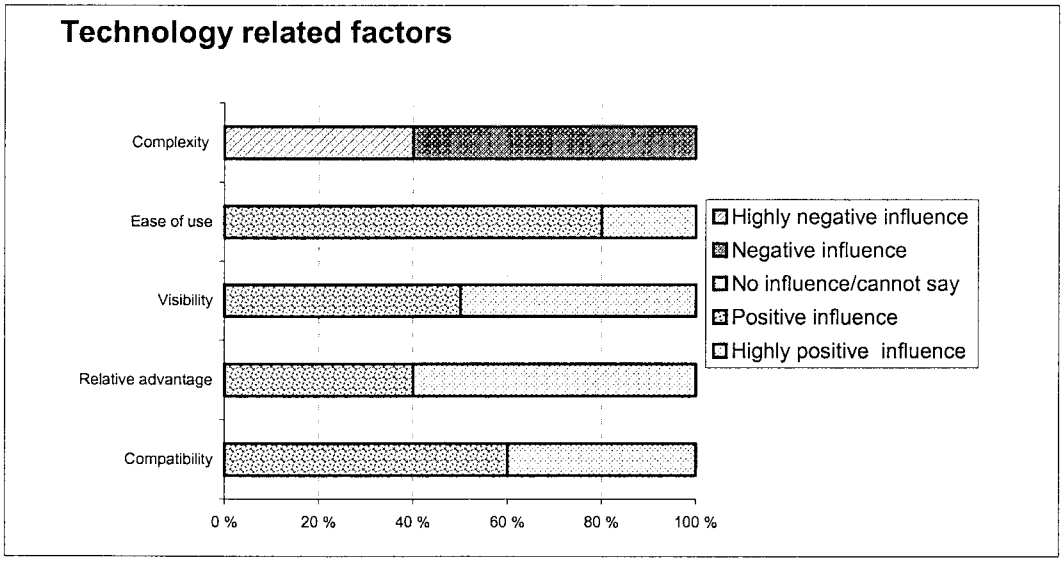

FIGURE 8.5.1 A summary of technology related factors.

Technology related factors were mostly considered as partially controllable or uncontrollable. Compatibility, relative advantage, and visibility were considered the most controllable in general. Three types of controlling methods were mentioned in the interviews: modifying the IT application, modifying the organisation and working procedures, and acting as a middleman between the SME and the system vendor. A summary of the controlling methods of owner related factors is presented in FIGURE 8.5.2. The methods are arranged in the list by the amount of their appearance in the interviews in a way that the most often mentioned method is the first and the most seldom mentioned method the last.

CONTROLLING METHODS OF TECHNOLOGY RELATED FACTORS

Altering organisational processes
Tailoring and configuration
Planning
Showing arguments for relative advantage
Providing user training
Acting as a middle-man in negotiations between SME and system vendor
Finding and establishing user routines
Customisation

FIGURE 8.5.2 The controlling methods of technology related factors

Tailoring or customisation of the IT application was mentioned several times during the interviews but it was not recommended as a sustainable solution. On the contrary, the organisational and end-user related factors were highlighted. Many of the technology problems can be solved if only the users are ready to adapt the new IT application. A consultant can help with this by providing user training, finding new user routines with the users, and participating in planning activities.

9 SUMMARY

In this thesis, IT implementation process and the control methods of related success factors have been studied from IT a consultant's perspective. The goal of this thesis was to complement previous research findings by defining practical methods with which an IT consultant is able to control the critical IT implementation success factors in SMEs.

IT implementation success factors and process models were studied with a literature review. The six-stage IT implementation model of Cooper and Zmud (1990) was used as a framework to describe the process nature of IT implementation. From this model, the following stages were under focus: adaptation, acceptance, routinisation and infusion. From literature, five categories of IT implementation success factors can be identified: environmental factors, organisational factors, owner related factors, end-user related factors, and technology related factors.

The controlling methods were studied empirically with a case study. Data for the case study was acquired from ten IT consultants of ITRI, from the University of Jyväskylä. A total of sixty-seven success factors and related control methods were studied with both a questionnaire and interviews. As a summary of the case study results, one can say that in IT implementation process human aspects are in major role. The two most central figures influencing the IT implementation outcome are small business owner and the end-users. According to the results of the case study, these two factor groups are also the most controllable in SMEs. This means, that by concentrating on influencing on both owner and end-user related factors, a consultant is able to increase the success of IT implementation. Environmental and technology related factors are less controllable than owner and end-user related factors as such but can be influenced indirectly through the alteration of human factors.

According to the case study results, a consultant can control the organisational factors by arranging regular project meetings, advising and providing professional help in planning of the IT implementation project, and in change management. An examination of the current working practices together with the organisation is an effective method for determining the links of the business processes that need to be modified.

A consultant's most important method for controlling environmental factors is to act as a middleman between SME and third parties involved in IT implementation process. A consultant helps the external parties and small business to communicate with each other and to understand each other's supply and needs. A consultant can also control the environmental factors by encouraging pro-activity concerning the external environment of a small business. When a small company is more aware of the possible changes of its external environment it can prevent the possible negative influences on IT implementation process in advance.

The case study results strongly support the previous research results of the great importance of the owner related factors within the IT implementation success. The most efficient way of promoting IT implementation success in small businesses is through the owner's commitment and involvement. A consultant can influence owner related factors by having face-to-face conversations with the owner and promotion realistic thinking concerning the total costs and resource requirements of a project.

There are various issues that determine whether end-users will resist or promote the implementation of an IT system in SMEs. The main controlling methods of end-user related factors are informing the end-users about the progress of the implementation process, providing realistic information of the consequences of the new IT application on daily work procedures, justifying

necessary changes that have to be made in current work practices, encouraging the end-users to participate, and promoting interpersonal communications. It is important to give feedback to the end-users about their performance on the implementation process, and to encourage the end-users to give feedback themselves.

There are three types of controlling methods an external IT consultant can use in order to alter the technology related factors. The first one is the accommodation of the organisational working procedures. The second one is the modification the IT application. The third one is acting as a middleman between the SME and the system vendor. The case study results emphasize that, in most cases, tailoring of the IT application may have unwanted side effects. A consultant should not recommend tailoring as a first option but to analyse how the organisation can be accommodated. In the case of complex IT applications, a consultant can help by providing user training, and finding alternative working routines for the end-users.

An interesting additional finding was, that the communication and co-operation between a consultant and an SME requires mutual trust as a precondition. Case study results show, that trust is related to the controllability of all the studied success factor groups. Trust is an enabler of all communication and interaction between a consultant and an SME, and possible third parties, including system vendor. Trust can be more easily gained if a consultant can identify him or herself to the people participating in the IT implementation project, and if he or she speaks and understands their language, i.e., professional terms and expressions. The amount of trust can also increase if an IT consultant is familiar with the industrial field of his or her client.

A few words of criticism should be said about these study results. Firstly, the case was taken from a single organisation and therefore the results cannot be generalised as such. Additionally, different interpretations of the case study

results are possible (see Galliers, 1992, pp. 154-155). One interpretation of the gathered data has been presented in this thesis. Secondly, the connecting of the success factors to the four levels of implementation process was not studied as extensively as it should have been. In order to do this, a larger sample from different organisations would have been needed. This would have also required the use of a large-scale questionnaire with free answering options. Thirdly, there would possibly have been other types of research approaches for this research topic. Members of small businesses could have been included in the interviews or specific implementation cases could have been taken under focus. Despite of that, the research results of this thesis are of importance to both small businesses and IT consultants. They provide new and practical information on the methods of managing IT implementation process in SMEs. When it is known, which factors can be controlled, and what are the methods of doing that, the IT implementation success can be achieved more efficiently and without wasting the valuable resources of a small business.

In the end, a handful of future research topics, which arised during the creation process of this thesis, are presented. First of all, the role of trust is a potential subject for further studying. Its importance between a consultant and SME has not received much of attention in literature but since it received such a great amount of attention in the interviews of this study, it most likely is worth of studying in the future. Another issue for closer investigation is the deeper nature of the control methods discovered in this thesis. This case study provides a general level picture of a wide range of control methods. Concentrating in more detail on factors such as owner or end-user factors could provide useful, in depth, information for IT consultant dealing with the IT implementation projects in SMEs. Additionally, it would be fruitful to study the connection of single success factors to different stages of IT implementation process. This way, the discovered control methods could be more specifically pointed at particular stages of the IT implementation process. Lastly, in addition to the factor groups presented previously, a sixth factor group, *project management*

factors, can be underlined. The importance of planning, project management and change management can clearly be noted from the case study results. This suggests that it might be necessary to study the role of project management activities as a separate entity in the future.

REFERENCES

Anderson E. E., The Implementation of Information Systems for Workers: A Structural Equation Model. Information and Management, Vol. 16, No. 4, 1989, 171-186

ATK-sanakirja, Finnish Dictionary of Information Technology, 9th edition, Tietotekniikan liitto ry:n sanastotoimikunta, Suomen Atk-kustannus Oy, Jyväskylä, 1997

Baronas A. K. and Louis M. R., Restoring a Sense of Control During Implementation: How User Involvement Leads to System Acceptance. MIS Quarterly, Vol. 12, No. 1, 1988, 111-123

Berg V., Huhtiniemi M. and Karttunen H., Pk-yritykset Internetin hyödyntäjinä, tutkimus 1999. Libris Oy, Helsinki, 1999

Blili S. and Raymond L., Information Technology: Threats and Opportunities for Small and Medium-Sized Enterprises. International Journal of Information Management, Vol. 13, 1993, 429-448

Boedeker M., Hurmerinta-Peltomäki L. and Nummela N., Asiantuntijapalvelut nyt ja tulevaisuudessa - yrittäjän näkökulma. Publications of the Turku School of Economics and Business Administration, Paino-Raisio Oy, 1995

Brancheau J. C. and Wetherbe J. C., The Adoption of Spreadsheet Software: Testing Innovation Diffusion Theory in the Context of End-User Computing. Information Systems Research, Vol. 1, No. 2, 1990, 115-143

Bridge J. and Peel M. J., Research Note: A Study of Computer Usage and Strategic Planning in the SME Sector. International Small Business Journal, Vol. 17, Issue 4, 1999, 82-87

Cale E. G. Jr. and Curley K. F., Measuring Implementation Outcome: Beyond Success and Failure. Information and Management, Vol. 13, No. 5, 1987, 245-253

Cale E. G. Jr. and Eriksen S. E., Factors affecting the implementation outcome of a mainframe software package: A longitudial study. Information and Management, Vol. 26, 1994, 165-175

Cooper R.B., The inertial impact of culture on IT implementation. Information and Management, Vol. 27, 1994, 17-31

Cooper R.B. and Zmud R.W., Information technology implementation research: A technology diffusion approach. Management Science, Vol. 36, No. 2, 1990, 123-139

Cragg P.B. and King M., Small-Firm Computing: Motivators and Inhibitors. MIS Quarterly, March 1993, 47-60

Cragg P.B. and Zinatelli N., The evolution of information systems in small firms. Information and Management, Vol. 29, 1995, 1-8

Curley K. F. and Cremillion L. L., The Role of the Champion in DSS Implementation. Information and Management, Vol. 6, No. 4, 1983, 203-209

Delone W. H., Determinants of Success for Computer Usage in Small Business. MIS Quartery, March 1988, 51-59

DeLone W. H. and McLean E. R., Information System Success: the Quest for the Dependent Variable. Information System Research, Vol. 3, No. 1, 1992, 60-95

Doukidis G. I., Smithson S. and Lybereas T., Approaches to computerization in small businesses in Greece. In Proceedings of the 13th International Conference on Information Systems, Dallas, Texas, 1992, 139 - 148

Ein-Dor P. and Seveg E., Organisational Context and the Success of Management Information Systems. Management Science, Vol. 24, No. 10, 1978, 1064 - 1077

El Sawy, O. A., Implementation by Cultural Infusion: An Approach for Managing the Introduction of Information Technologies. MIS Quarterly, June, No. 2, 1985, 131-140

Foong S. Y., Effect of End-User Personal and Systems Attributes on Computer-Based Information System Success in Malaysian SMEs. Journal of Small Business Management, Vol. 37, No. 3, 1999, 81-87

Gable G.G., Consultant engagement for computer system selection. Information and Management, Vol. 20, No. 2, 1991, 83-93

Galliers R., Choosing Information Systems Research Approaches. In Galliers R. (Ed.), Information Systems Research: issues, methods and practical guidelines, Blackwell, Oxford, 1992, 144-162

Grover V. and Goslar M. D., The Initiation, Adoption, and Implementation of Telecommunications Technologies in U.S. Organisations. Journal of Management Information Systems, Vol. 10, No. 1, 1993, 141-163

Grover V. and Teng T. C., Facilitating the implementation of customer-based inter-organisational systems: an empirical analysis of innovation and support factors. Information Systems Journal, Vol 4, No. 1, 1994, 61-89

Harrison D. A., Mykytyn P. P. Jr. and Riemenschneider C. K., Executive Decisions About Adoption of Information Technology in Small Business: Theory and Empirical Tests. Information Systems Research, Vol. 8, No. 2, 1997, 171-195

Heikkilä J., Saarinen T. and Sääksjärvi M., Success of software packages in small businesses: an exploratory study. European Journal of Information Systems, Vol. 1, No., 3, 1991, 159-169

Heikkinen H. L. T, Toimintatutkimus. Jyväskylän yliopisto, Tietotekniikan tutkimusyksikkö, 2000.

Hirscheim F., Land F. and Smithson S., Implementing computer-based information systems in organisations: Issues and strategies. In Shackel B. (ed.), Human-Computer Interaction - INTERACT'84, Elsevier Science Publishers B.V., North-Holland, 1985, 855-860

Huff S. L. and Munro M. C., Information Technology Assessment and Adoption: A Field Study. MIS Quarterly, December 1985, 327-340

Hurmerinta-Peltomaki L. and Paasio A., Pienyrityksessäkin: Ponnahdus kansainvälistymiseen. In Juurikas L. (ed.): PK-yrityksen haasteet vuosituhannen lopulla, Turun Kauppakorkeakoulu, Turku, 1991

Iacovou C. L., Benbasat I. and Dexter A. S., Electronic Data Interchange and Small Organizations: Adoption and Impact of Technology. MIS Quarterly, Vol. 19, No. 4, 1995, 465-485

Iivari J., Levels of abstraction as a conceptual framework for an information system. Information System Concepts: An In-depth Analysis, Falkenberg E.D. and Lindgreen P. (Eds.), Elsevier Science Publishers B.V. (North Holland), IFIP 1989, 323-352

Igbaria M. and Zinatelli N. and Cragg P. and Cavaye A.L.M., Personal Computing Acceptance Factors in Small Firms: A Structural Equation Model. MIS Quarterly, September 1997, 279-303

Jiang J. J., Waleed A. M. and Klein G., User resistance and strategies for promoting acceptance across system types. Information and Management, Vol. 37, 2000, 25-36

Joshi K., A Model of User's Perspective on Change: The Case of Information Systems Technology Implementation. MIS Quarterly, Vol. 15, No. 2, 1991, 229-242

Joshi K. and Lauer T. W., Transition and Change During the Implementation of a Computer-Based Manufacturing Process Planning System: An analysis using the Equity Implementation Model. IEEE Transactions on Engineering Management, Vol. 46, No. 4, 1999, 407-416

Joyce P., Woods A., McNulty T. and Corrigan P., Barriers to Change in Small Businesses: Some Cases from an Inner City Area. International Small Business Journal, Vol. 8, No. 4, 1990, 49-58

Karahanna E., Staub D. W. and Chervany N. L., Information Technology Adoption Across Time: A Cross-Sectional Comparison of Pre-Adoption and Post-Adoption Beliefs. MIS Quarterly, Vol. 23, No. 2, 1999, 183 - 213

Kiviniemi K. , Toimintatutkimus yksilöllisenä projektina. In Siinä tutkija, missä tekijä - Toimintatutkimuksen perusteita ja näköaloja. Heikkinen H. L. T., Huttunen R. and Moilanen P. (Eds.), WSOY - Kirjapainoyksikkö, Juva, 1999

Kole M. A., A Behavioral Approach to Implementation of Computer Based Management Information Systems. Ph.D. Thesis, University of Massachussets, University Microfilms International, Michigan, U.S.A, 1979

Kole M. A., Going outside for MIS Implementation. Information and Management, Vol. 6, No. 5, 1983, 261-268

Korunka C., Weiss A. and Zauchner S., An interview study of 'continuous' implementations of information technology. Behaviour and Information Technology, Vol. 16, No. 1, 1997, 3 - 16

Krovi R., Identifying the causes of resistance to IS implementation. Information and Management, Vol. 25, No 6, 1993, 327 - 335

Kwon T. H. and Zmud R. W., Unifying the fragmented models of information systems implementation. In Boland R.J. Jr. and Hirscheim R.A. (Eds.), Critical Issues in Information Systems Research, New York, John Wiley, 1987, 227-251

Lai V. S., Critical Factors of ISDN implementation: An exploratory study. Information and Management, Vol. 13, 1997, 87 - 97

Lai V. S., A survey of rural small business computer use: Success factors and decision support. Information and Management, Vol. 26, No. 6, 1994, 297-304

Lai V. S. and Mahapatra R. K., Exploring the research in information technology implementation. Information and Management, Vol. 32, 1997, 187-201

Larsen K. R. T., Antecedents of Implementation Success: a Comprehensive Framework. Proceedings of the 34th Hawaii International Conference on System Sciences, 2001. http://www.computer.org/proceedings/hicss/0981/volume%208/09818070abs.htm (Read 28.5.2001)

Lassila K. S. and Brancheau J. C. Adoption and Utilization of Commercial Software Packages: Exploring Utilization Equilibria, Transitions, Triggers, and Tracks. Journal of Management Information Systems, Vol. 16, No. 2, 1999, 63 - 90

Lees J. D., Successful Development of Small Business Information Systems. Journal of Systems Management, Vol. 38, No. 8, 1987, 32 - 39

Lees J. D. and Lees D. D., Realities of Small Business Information System Implementation. Journal of System Management, January 1987, 6 - 13

Levine H. G. and Rossmoore D., Diagnosing the Human Threats to Information Technology Implementation: A Missing Factor in System Analysis Illustrated in a Case Study. Journal of Management Information Systems, Vol. 10, No. 2, 1993, 55 - 73

Lewin K., Group Decision and Social Change. In Readings in Social Psychology, Revised edition. Swanson G. E., Newcomb T. M., Hartley E. L. et al. (Eds.). Holt, New York, 1952, 459 - 473

Lind M. R., Zmud R. W. and Fischer W. A., Microcomputer Adoption - The Impact of Organizational Size and Structure. Information and Management, Vol. 16, 1989, 157-162

Lucas H. C., Jr., Unsuccessful Implementation: The Case Of a Computer-Based Order Entry System. Decision Sciences, Vol. 9, No. 1, 1978, 68-79

Lucas H. C., Jr., Implementation: The key to successful information systems. Columbia University Press, New York, 1981

Lucas H. C., Jr., The analysis, design, and implementation of information systems, 4th edition. McGraw-Hill, New York, 1992

Lyytinen K. J., Implications of Theories of Language for Information Systems. MIS Quarterly, March 1985, 61-74

Markus M. L., Power, Politics, and MIS Implementation. Communications of the ACM, Vol. 26, No. 6, 1983, 430-444

Markus M. L., Axline S., Petrie D. and Tanis C., Learning from adopters' experiences with ERP: problems encountered and success achieved. Journal of Information Technology, Vol. 15, No. 4, 2000, 245-265

Montazemi A. R., Factors Affecting Information Satisfaction in the Context of the Small Business Environment. MIS Quarterly, June 1988, 239-256

Paasio A. and Heinonen J., Perheyrittäjyys Suomessa. Suomen yrittäjäin keskusliitto ry., Tietosykli Oy, Starr-Offset Oy, Helsinki, 1993

Palvia P. C., A model and instrument for measuring small business user satisfaction with information technology. Information and Management, Vol. 31, 1996, 151-163

Pk-yritysraportti 1998. Kauppa- ja teollisuusministeriön tutkimuksia ja raportteja, 21/1998. Kauppa- ja teollisuusministeriö, yrityskehitysosasto. Helsinki, Oy Edita Ab.

Premkumar G., Ramamurthy K. and Nilakanta S., Implementation of Electronic Data Interchange: An Innovation Diffusion Perspective. Journal of Management Information Systems, Vol. 11, No. 2, 1994, 157-186

Quaddus M.A., Diffusion of Information Technology: An Exploration of the Stage Models and Facilitating the User's Choice by Systems Approach. In Proceedings of the 1995 Pan Pacific Conference on Information Systems, National University of Singapore, Singapore, 29 June -2 July, 1995, 191 - 199

Riemenschneider C. K. and Mykytyn P. P. Jr., What small business executives have learned about managing information technology. Information and Management, Vol. 37, 2000, 257-269

Rogers E. M., Diffusion of Innovations, 4th edition, The Free Press, New York, 1995

Sarker S. and Lee A. S., Using a case study to test the role of three key social enablers in ERP implementation. In Proceedings of the twenty first international conference on information systems (ICIS'00), Brisbane Australia, Dec 10th-13th, 2000, 414-425, http://www.acm.org/pubs/articles/proceedings/misc/359640/p414sarker/p414sarker.pdf (Read 27.3.2001)

Seddon P. B., A Respecification and Extension of the DeLone and McLean Model of IS Success. Information System Research, Vol. 8, No. 3, 1997, 240-253

Somers T. M. and Nelson K., The Impact of Critical Success Factors across the Stages of Enterprise Resource Planning Implementation. Proceedings of the 34th Hawaii International Conference on System Sciences, 2001. http://dlib.computer.org/conferen/hicss/0981/pdf/09818016.pdf (Read 7.5.2001)

Stair R. M. Jr., Crittenden W. F. and Crittenden V. L., The Use, Operation, and Control of The Small Business Computer. Information and Management, Vol. 16, No. 3, 1989, 125-130

Telem M., Managing information growth and information in small organisations. Information Processing and Management, Vol. 25, No. 4, 1989, 443-452

The Commission of the European Communities, EUR-Lex: Community legislation in force, Document 396X0280, Official journal NO. L 107, 30/04/1996 P. 0004 - 0009, http://europa.eu.int/eur-lex/en/lif/dat/1996/en_396X0280.html (Read 28.3.2000)

The IT-Specific encyclopedia - a techtarget.com Community, whatis?com, http://whatis.techtarget.com/WhatIs_Definition_Page/0,4152,214023,00.html (Read 15.3.2001)

Thong J. Y. L., An Integrated Model of Information Systems Adoption in Small Businesses. Journal of Management Information Systems, Vol. 15, No. 4, 1999, 187-214

Thong J. Y. L., Yap C. S. and Raman K. S., Engagement of External Expertise in Information Systems Implementation. Journal of Management Information Systems, Vol. 11, No. 2, 1994, 209-231

Thong J. Y. L., Yap C. S. and Raman K. S., Top Management Support, External Expertise and Information Systems Implementation in Small Businesses. Information Systems Research, Vol. 7, No. 2, 1996, 248-267

Tyre M. J. and Orlikowski W. J., Windows of Opportunity: Temporal Patterns of Technological Adaptation in Organizations. Organization Science, Vol. 5, No. 1, 1994, 98-118

Venkatesh V. and Davis F. D., A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies, Management Science, Vol. 46, No. 2, 2000, 186-204

Welsh J. A. and White J. F., A small business is not a little big business. Harvard Business Review, Vol. 59, No. 4, 1981, 18-32

Winston E. R. and Dologite D. G., Achieving IT Infusion: A Conceptual Model for Small Businesses. Information Resources Management Journal, Jan-Mar, 1999, 26-38

APPENDICES

Appendix A.

Dear respondent!

The purpose of this questionnaire is to clarify factors influencing IT implementation success in small and middle size companies (SMEs) from the point of view of an IT consultant.

In the questionnaire, it is surveyed, which characteristic features of SMEs are related to the IT implementation success and which ones of these factors can be modified in order to enhance the implementation outcome. This questionnaire takes a broad approach to the implementation process: Implementation begins when a new IT application has been installed. Implementation ends when the application has been fully integrated into the organisation, i.e. infused.

This questionnaire is aimed at persons who have been participating in IT implementation projects (the whole project or a specific stage) in SMEs. SME is defined as an enterprise with less than 250 employees. In this questionnaire, an IT application means a software or information system, which purpose is to support business operations of a company.

This questionnaire is part of a master's thesis. By responding, you can influence on the plotting of different IT application success factors and promote the development of research methods.

NOTE! Some response options may seem self-obvious. It important, however, that you answer to the questions only based on your own experiences.

Thank you for your participation, your response is valuable!

Best regards,

Irja Kankaanpää
Information Technology Research Institute
Agora
PL 35
40351 Jyväskylä
irja.kankaanpaa@titu.jyu.fi

Appendix A.

Dear respondent!

The purpose of this questionnaire is to clarify factors influencing IT implementation success in small and middle size companies (SMEs) from the point of view of an IT consultant.

In the questionnaire, it is surveyed, which characteristic features of SMEs are related to the IT implementation success and which ones of these factors can be modified in order to enhance the implementation outcome. This questionnaire takes a broad approach to the implementation process: Implementation begins when a new IT application has been installed. Implementation ends when the application has been fully integrated into the organisation, i.e. infused.

This questionnaire is aimed at persons who have been participating in IT implementation projects (the whole project or a specific stage) in SMEs. SME is defined as an enterprise with less than 250 employees. In this questionnaire, an IT application means a software or information system, which purpose is to support business operations of a company.

This questionnaire is part of a master's thesis. By responding, you can influence on the plotting of different IT application success factors and promote the development of research methods.

NOTE! Some response options may seem self-obvious. It important, however, that you answer to the questions only based on your own experiences.

Thank you for your participation, your response is valuable!

Best regards,

Irja Kankaanpää
Information Technology Research Institute
Agora
PL 35
40351 Jyväskylä
irja.kankaanpaa@titu.jyu.fi

Background information

What is your title?

List in the table below

1) The industrial sector of the companies whose IT implementation project you participated
2) The type of implemented IT applications
3) The purpose of the implemented IT applications
4) The magnitude of the implementation project: organisation wide (O), a certain group (G), a single user (S)

1) Industrial sector	2) Type of IT application	3) Purpose	4) O / G / S

What was your role in the IT implementation projects mentioned above?

Factors influencing IT implementation success

Which of the following factors have an influence on IT implementation success in SMEs? Answer by selecting a number that describes the influence of each factor the best.

1. Organisational factors

	Highly negative influence	Negative influence	No influence/ cannot say	Positive influence	Highly Positive influence
Small size	1	2	3	4	5
Low organisational hierarchy	1	2	3	4	5
Informal communications	1	2	3	4	5
Centralised desicion-making	1	2	3	4	5
Short range management perspective	1	2	3	4	5
Informality	1	2	3	4	5
Flexibility	1	2	3	4	5
Innovativeness	1	2	3	4	5
Limited financial resources	1	2	3	4	5
Limited human resources	1	2	3	4	5
Lack of time	1	2	3	4	5
System support offered by the organisation	1	2	3	4	5
User support offered by the organisation	1	2	3	4	5
Co-operation within the organisation	1	2	3	4	5
Computer experience	1	2	3	4	5
Other, what?	1	2	3	4	5

1. Organisational factors

	Uncontrollable	Partially controllable	Fully controllable	Cannot say
Small size	1	2	3	4
Low organisational hierarchy	1	2	3	4
Informal communications	1	2	3	4
Centralised desicion-making	1	2	3	4
Short range management perspective	1	2	3	4
Informality	1	2	3	4
Flexibility	1	2	3	4
Innovativeness	1	2	3	4
Limited financial resources	1	2	3	4
Limited human resources	1	2	3	4
Lack of time	1	2	3	4
System support offered by the organisation	1	2	3	4
User support offered by the organisation	1	2	3	4
Co-operation within the organisation	1	2	3	4
Computer experience	1	2	3	4
Other, what?	1	2	3	4

2. Environmental factors

	Uncontrollable	Partially controllable	Fully controllable	Cannot say
Competition	1	2	3	4
Uncertainty	1	2	3	4
Customer demands	1	2	3	4
Supplier demands	1	2	3	4
Possibility to use an external consultant	1	2	3	4
External help in project planning and management	1	2	3	4
Training or guidance provided by an IT consultant	1	2	3	4
Training or guidance provided by a vendor	1	2	3	4
Interactive co-operation between SME and a consultant	1	2	3	4
Consultant's experience on the SME's industrial field	1	2	3	4
Strategic alliances (business networks)	1	2	3	4
Dependency on other enterprises	1	2	3	4
Sharing resources with other organisations	1	2	3	4
Dispersion of resources	1	2	3	4
Possibility to use vendor's project management tools	1	2	3	4
Vendor support on IT application use	1	2	3	4
Partnership with vendor	1	2	3	4
Vendor dependency	1	2	3	4
Other, what?	1	2	3	4

3. Owner related factors

	Uncontrollable	Partially controllable	Fully controllable	Cannot say
Computer experience	1	2	3	4
Computer knowledge	1	2	3	4
Positive attitude towards a new technology	1	2	3	4
Short-range management perspective	1	2	3	4
Including IT implementation in business strategy	1	2	3	4
Dominant and controlling owner	1	2	3	4
Centralised decision-making	1	2	3	4
Participation	1	2	3	4
Commitment	1	2	3	4
Support	1	2	3	4
Establishing a project team	1	2	3	4
Project team competence	1	2	3	4
Appointing and authorising a project champion	1	2	3	4
Dedicated resources	1	2	3	4
Other, what?	1	2	3	4

4. End-user related factors

	Uncontrollable	Partially controllable	Fully controllable	Cannot say
Computer experience	1	2	3	4
Positive attitude towards change	1	2	3	4
Positive attitude towards new technology	1	2	3	4
Motivation	1	2	3	4
Incentives	1	2	3	4
Feedback	1	2	3	4
Level of education	1	2	3	4
Cosmopolitanism	1	2	3	4
Participation	1	2	3	4
Informing the end-users about the proceeding of the project	1	2	3	4
Training	1	2	3	4
Training for new business processes	1	2	3	4
Bureaucratic self-interest	1	2	3	4
Job tenure	1	2	3	4
Experienced increase in equity related to new technology	1	2	3	4
Experienced increase in job complexity due to the new technology	1	2	3	4
Job security threat	1	2	3	4
Other, what?	1	2	3	4

2. Environmental factors

	Highly negative influence	Negative influence	No influence/ cannot say	Positive influence	Highly positive influence
Competition	1	2	3	4	5
Uncertainty	1	2	3	4	5
Customer demands	1	2	3	4	5
Supplier demands	1	2	3	4	5
Possibility to use an external consultant	1	2	3	4	5
External help in project planning and management	1	2	3	4	5
Training or guidance provided by an IT consultant	1	2	3	4	5
Training or guidance provided by a vendor	1	2	3	4	5
Interactive co-operation between SME and a consultant	1	2	3	4	5
Consultant's experience on the SME's industrial field	1	2	3	4	5
Strategic alliances (business networks)	1	2	3	4	5
Dependency on other enterprises	1	2	3	4	5
Sharing resources with other organisations	1	2	3	4	5
Dispersion of resources	1	2	3	4	5
Possibility to use vendor's project management tools	1	2	3	4	5
Vendor support on IT application use	1	2	3	4	5
Partnership with vendor	1	2	3	4	5
Vendor dependency	1	2	3	4	5
Other, what?	1	2	3	4	5

3. Owner related factors

	Highly negative influence	Negative influence	No influence / cannot say	Positive influence	Highly Positive influence
Computer experience	1	2	3	4	5
Computer knowledge	1	2	3	4	5
Positive attitude towards a new technology	1	2	3	4	5
Short-range management perspective	1	2	3	4	5
Including IT implementation in business strategy	1	2	3	4	5
Dominant and controlling owner	1	2	3	4	5
Centralised decision-making	1	2	3	4	5
Participation	1	2	3	4	5
Commitment	1	2	3	4	5
Support	1	2	3	4	5
Establishing a project team	1	2	3	4	5
Project team competence	1	2	3	4	5
Appointing and authorising a project champion	1	2	3	4	5
Dedicated resources	1	2	3	4	5
Other, what?	1	2	3	4	5

4. End-user related factors

	Highly negative influence	Negative influence	No influence / cannot say	Positive influence	Highly Positive influence
Computer experience	1	2	3	4	5
Positive attitude towards change	1	2	3	4	5
Positive attitude towards new technology	1	2	3	4	5
Motivation	1	2	3	4	5
Incentives	1	2	3	4	5
Feedback	1	2	3	4	5
Level of education	1	2	3	4	5
Cosmopolitanism	1	2	3	4	5
Participation	1	2	3	4	5
Informing the end-users about the proceeding of the project	1	2	3	4	5
Training	1	2	3	4	5
Training for new business processes	1	2	3	4	5
Bureaucratic self-interest	1	2	3	4	4
Job tenure	1	2	3	4	5
Experienced increase in equity related to new technology	1	2	3	4	5
Experienced increase in job complexity due to the new technology	1	2	3	4	5
Job security threat	1	2	3	4	5
Other, what?	1	2	3	4	5

5. Technology related factors

	Highly negative influence	Negative influence	No influence/ cannot say	Positive influence	Highly Positive influence
Compatibility	1	2	3	4	5
Relative advantage	1	2	3	4	5
Visibility	1	2	3	4	5
Ease of use	1	2	3	4	5
Complexity	1	2	3	4	5
Other, what?	1	2	3	4	5

Influencing the IT implementation success factors

On which of the factors, mentioned above, it is possible to influence in order to promote IT implementation and to what extent? Select the number that corresponds your opinion the best.

Appendix B.

Hyvä vastaaja!

Tämän kyselyn tarkoituksena on selvittää tietotekniikkasovellusten käyttöönoton onnistumiseen vaikuttavia tekijöitä pk-yrityksissä tietotekniikkakonsultin näkökulmasta.

Kyselyssä kartoitetaan, mitkä pk-yrityksen ominaispiirteistä vaikuttavat käyttöönoton onnistumiseen ja mihin näistä piirteistä on mahdollista vaikuttaa käyttöönoton edistämiseksi. Tässä kyselyssä käyttöönotto alkaa siitä, kun uusi tietotekniikkasovellus on tuotu taloon ja asennettu käyttövalmiiksi. Käyttöönotto päättyy, kun sovellus on saatu integroitua kohdeorganisaation päivittäiseen toimintaan ja saatettu ns. hyötykäytön asteelle.

Kysely on tarkoitettu henkilöille, jotka ovat osallistuneet käyttöönottoprojekteihin pk-yrityksissä. Kyselyssä pk-yrityksellä tarkoitetaan yritystä, joka työllistää alle 250 työntekijää. Tietotekniikkasovelluksella tarkoitetaan mitä tahansa tietoteknistä laitetta, ohjelmaa tai ohjelmistoa, jonka tarkoitus on tukea liiketoimintaa.

Kysely on osa pro gradu -tutkielmaa. Vastaamalla voit vaikuttaa käyttöönottoprojektien onnistumistekijöiden kartoittamiseen ja sitä kautta menetelmien kehittymiseen. Kyselyn viimeinen palautuspäivä on torstai 14.6.2001.

HUOM! Vaikka jotkut vastausvaihtoehdot saattavat tuntua itsestään selvyyksiltä, niin on tärkeää, että vastaat kysymyksiin vain omien kokemustesi perusteella.

Kiitos osallistumisesta, vastauksesi on arvokas!

Ystävällisin terveisin,

Irja Kankaanpää
Tietotekniikan tutkimusinstituutti
Agora
PL 35
40351 Jyväskylä
irja.kankaanpaa@titu.jyu.fi

Taustatiedot

Mikä on toimenkuvasi/työnimikkeesi?

Listaa alla olevaan taulukkoon

1) Millä toimialalla yritykset, joissa käyttöönotot tehtiin, toimivat?
2) Millaisia sovelluksia niissä otettiin käyttöön?
3) Mikä oli käyttöönotettavien sovellusten käyttötarkoitus?
4) Oliko kyseessä koko organisaatiota (O), tiettyä käyttäjäryhmää (R) vai yksittäistä käyttäjää (Y) koskeva käyttöönottoprojekti?

1) Toimiala	2) Tietotekniikkasovellus	3) Käyttötarkoitus	4) O / Y / R

Mikä oli roolisi tai tehtäväsi em. käyttöönottoprojektissa?

Käyttöönottoon vaikuttavat tekijät

Mitkä seuraavista tekijöistä vaikuttavat käyttöönoton onnistumiseen pk-yrityksissä?
Vastaa valitsemalla kunkin tekijän vaikutusta parhaiten vastaava numero.

1. Organisatoriset tekijät

	Hyvin negatiivinen vaikutus	Negatiivinen vaikutus	Ei vaikutusta/en osaa sanoa	Positiivinen vaikutus	Hyvin positiivinen vaikutus
Yrityksen pieni koko	1	2	3	4	5
Matala organisaatiohierarkia	1	2	3	4	5
Epämuodollinen viestintäkulttuuri	1	2	3	4	5
Keskittynyt päätöksenteko	1	2	3	4	5
Suunnittelun lyhyt aikajänne	1	2	3	4	5
Epämuodolliset toimintatavat	1	2	3	4	5
Joustavuus	1	2	3	4	5
Innovatiivisuus	1	2	3	4	5
Vähäiset rahalliset resurssit	1	2	3	4	5
Vähäiset henkilöstöresurssit	1	2	3	4	5
Ajan puute	1	2	3	4	5
Organisaation tarjoama järjestelmätuki	1	2	3	4	5
Organisaation tarjoama käyttäjätuki	1	2	3	4	5
Organisaation sisäinen yhteistyö	1	2	3	4	5
Tietotekniikkakokemus	1	2	3	4	5
Muu, mikä?	1	2	3	4	5

2. Toimintaympäristöön liittyvät tekijät

	Hyvin negatiivinen vaikutus	Negatiivinen vaikutus	Ei vaikutusta / en osaa sanoa	Positiivinen vaikutus	Hyvin positiivinen vaikutus
Kilpailu	1	2	3	4	5
Epävarmuus	1	2	3	4	5
Asiakkaiden vaatimukset	1	2	3	4	5
Alihankkijoiden vaatimukset	1	2	3	4	5
Mahdollisuus käyttää ulkopuolista konsulttia	1	2	3	4	5
Ulkopuolinen tuki projektin suunnittelussa ja hallinassa	1	2	3	4	5
Tietotekniikkakonsulttien tarjoama koulutus tai neuvonta	1	2	3	4	5
Teknologiatoimittajan tarjoama koulutus tai neuvonta	1	2	3	4	5
Vuorovaikutteinen yhteistyö yrityksen ja konsultoivan tahon välillä	1	2	3	4	5
Tietotekniikkakonsultin kokemus yrityksen toimialasta	1	2	3	4	5
Yritysverkostot	1	2	3	4	5
Riippuvuus muista yrityksistä	1	2	3	4	5
Resurssien jakaminen muiden yritysten kanssa	1	2	3	4	5
Resurssien hajautuneisuus	1	2	3	4	5
Mahdollisuus käyttää toimittajan projektinhallintavälineitä	1	2	3	4	5
Toimittajan tarjoama sovelluksen käyttötuki	1	2	3	4	5
Liikekumppanuus toimittajan kassa (pitkäaikainen)	1	2	3	4	5
Riippuvuus toimittajasta	1	2	3	4	5
Muu, mikä?	1	2	3	4	5

3. Pk-yrityksen johtajaan (tai johtaja-omistajaan) liittyvät tekijät

	Hyvin negatiivinen vaikutus	Negatiivinen vaikutus	Ei vaikutusta / en osaa sanoa	Positiivinen vaikutus	Hyvin positiivinen vaikutus
Tietotekniikkakokemus	1	2	3	4	5
Tietotekniikkatietoisuus	1	2	3	4	5
Positiivinen asenne uutta teknologiaa kohtaan	1	2	3	4	5
Toimintastrategian lyhyt aikajänne	1	2	3	4	5
Käyttöönoton huomioiminen liiketoimintastrategiassa	1	2	3	4	5
Dominoivuus ja kontrolloivuus	1	2	3	4	5
Keskittynyt päätöksenteko	1	2	3	4	5
Osallistuminen	1	2	3	4	5
Sitoutuminen	1	2	3	4	5
Tuki	1	2	3	4	5

Projektiryhmän nimeäminen	1	2	3	4	5
Projektiryhmän pätevyys	1	2	3	4	5
Projektin vastuuhenkilön nimeäminen ja valtuuttaminen	1	2	3	4	5
Resurssien varaaminen	1	2	3	4	5
Muu, mikä?	1	2	3	4	5

4. Loppukäyttäjään liittyvät tekijät

	Hyvin negatiivinen vaikutus	Negatiivinen vaikutus	Ei vaikutusta / en osaa sanoa	Positiivinen vaikutus	Hyvin positiivinen vaikutus
Tietotekniikkakokemus	1	2	3	4	5
Positiivinen asenne muutosta kohtaan	1	2	3	4	5
Positiivinen asenne käyttöönotettavaa teknologiaa kohtaan	1	2	3	4	5
Motivoituneisuus	1	2	3	4	5
Kannustimet	1	2	3	4	5
Palautteen saanti	1	2	3	4	5
Yleinen koulutustaso	1	2	3	4	5
Avoin mieli, laaja maailmankatsomus	1	2	3	4	5
Osallistuminen käyttöönottoprojektiin	1	2	3	4	5
Tiedotus käyttöönottoprojektin etenemisestä	1	2	3	4	5
Käyttökoulutus	1	2	3	4	5
Koulutus uusiin liiketoimintaprosesseihin	1	2	3	4	5
Oman edun tavoittelu	1	2	3	4	4
Työtehtävien hallinta	1	2	3	4	5
Tasa-arvoisuuden lisääntyminen uuden teknologian myötä	1	2	3	4	5
Työtehtävien monimutkaistuminen uuden teknologian myötä	1	2	3	4	5
Uhka työn- tai toimenkuvalle	1	2	3	4	5
Muu, mikä?	1	2	3	4	5

5. Käyttöönotettavaan tietotekniikkasovellukseen liittyvät tekijät:

	Hyvin negatiivinen vaikutus	Negatiivinen vaikutus	Ei vaikutusta / en osaa sanoa	Positiivinen vaikutus	Hyvin positiivinen vaikutus
Yhteensopivuus organisaation kanssa	1	2	3	4	5
Hyödyllisyys	1	2	3	4	5
Hyötyjen näkyvyys	1	2	3	4	5
Käytön helppous	1	2	3	4	5
Monimutkaisuus	1	2	3	4	5
Muu, mikä?	1	2	3	4	5

Tekijöihin vaikuttaminen

Mihin em. tekijöistä on mahdollista vaikuttaa käyttöönottoa edistävässä mielessä käyttöönoton vaatimalla aikajänteellä ja missä määrin? Valitse kunkin tekijän vaikutusta parhaiten vastaava numero.

1. Organisatoriset tekijät

	Ei mahdollista vaikuttaa ollenkaan	Mahdollista vaikuttaa jossain määrin	Mahdollista vaikuttaa paljon	En osaa sanoa
Yrityksen koko	1	2	3	4
Organisaatiohierarkia	1	2	3	4
Viestintäkulttuuri	1	2	3	4
Päätöksenteon keskittyneisyys	1	2	3	4
Suunnittelun aikajänne	1	2	3	4
Toimintatapojen muodollisuus	1	2	3	4
Joustavuus	1	2	3	4
Innovatiivisuus	1	2	3	4
Rahallisten resurssien määrä	1	2	3	4
Henkilöstöresurssien määrä	1	2	3	4
Käytettävissä olevan ajan määrä	1	2	3	4
Järjestelmätuki	1	2	3	4
Käyttäjätuki	1	2	3	4
Organisaation sisäisen yhteistyön määrä	1	2	3	4
Tietotekniikkakokemuksen taso	1	2	3	4
Muu, mikä?	1	2	3	4

2. Toimintaympäristöön liittyvät tekijät

	Ei mahdollista vaikuttaa ollenkaan	Mahdollista vaikuttaa jossain määrin	Mahdollista vaikuttaa paljon	En osaa sanoa
Kilpailu	1	2	3	4
Epävarmuus	1	2	3	4
Asiakkaiden vaatimukset	1	2	3	4
Alihankkijoiden vaatimukset	1	2	3	4
Mahdollisuus käyttää ulkopuolista konsulttia	1	2	3	4
Ulkopuolinen tuki projektin Suunnittelussa ja hallinnassa	1	2	3	4
Tietotekniikkakonsulttien tarjoaman koulutuksen tai neuvonnan käyttö	1	2	3	4
Teknologiatoimittajan tarjoaman koulutuksen tai neuvonnan käyttö	1	2	3	4
Yhteistyön vuorovaikutteisuus yrityksen ja konsultoivan tahon välillä	1	2	3	4
Tietotekniikkakonsultin kokemus yrityksen toimialasta	1	2	3	4
Yritysverkostot	1	2	3	4
Riippuvuus muista yrityksistä	1	2	3	4
Resurssien jakaminen muiden yritysten kanssa	1	2	3	4

Resurssien hajautuneisuus	1	2	3	4
Mahdollisuus käyttää toimittajan projektinhallintavälineitä	1	2	3	4
Toimittajan tarjoaman sovelluksen käyttötuen määrä ja laatu	1	2	3	4
Liikekumppanuuden muodostaminen toimittajan kassa	1	2	3	4
Riippuvuus toimittajasta	1	2	3	4
Muu, mikä?	1	2	3	4

3. Pk-yrityksen johtajaan (tai johtaja-omistajaan) liittyvät tekijät

	Ei mahdollista vaikuttaa ollenkaan	Mahdollista vaikuttaa jossain määrin	Mahdollista vaikuttaa paljon	En osaa sanoa
Tietotekniikkakokemuksen määrä	1	2	3	4
Tietotekniikkatietoisuuden aste	1	2	3	4
Asenne uutta teknologiaa kohtaan	1	2	3	4
Toimintastrategian aikajänteen pituus	1	2	3	4
Käyttöönoton huomioiminen liiketoimintastrategiassa	1	2	3	4
Dominoivuus ja kontrolloivuus	1	2	3	4
Päätöksenteon keskittyneisyys	1	2	3	4
Osallistumisen aste	1	2	3	4
Sitoutumisen aste	1	2	3	4
Tuen määrä	1	2	3	4
Projektiryhmän nimeäminen	1	2	3	4
Projektiryhmän pätevyyden takaaminen	1	2	3	4
Käyttöönottoprojektin vastuuhenkilön nimeäminen ja valtuuttaminen	1	2	3	4
Resurssien varaaminen	1	2	3	4
Muu, mikä?	1	2	3	4

4. Loppukäyttäjään liittyvät tekijät

	Ei mahdollista vaikuttaa ollenkaan	Mahdollista vaikuttaa jossain määrin	Mahdollista vaikuttaa paljon	En osaa sanoa
Tietotekniikkakokemuksen määrä	1	2	3	4
Asenne muutosta kohtaan	1	2	3	4
Asenne käyttöönotettavaa teknologiaa kohtaan	1	2	3	4
Motivoituneisuus	1	2	3	4
Kannustimien tehokkuus	1	2	3	4
Palautteen saanti	1	2	3	4
Yleinen koulutustaso	1	2	3	4
Avoin mieli, laaja maailmankatsomus	1	2	3	4
Osallistuminen käyttöönottoprojektiin	1	2	3	4
Tiedotus käyttöönottoprojektin etenemisestä	1	2	3	4
Käyttökoulutus	1	2	3	4
Koulutus uusiin liiketoimintaprosesseihin	1	2	3	4

5. Technology related factors

	Uncontrollable	Partially controllable	Fully controllable	Cannot say
Compatibility	1	2	3	4
Relative advantage	1	2	3	4
Visibility	1	2	3	4
Ease of use	1	2	3	4
Complexity	1	2	3	4
Other, what?	1	2	3	4

Thank you for your response!

Mihin em. tekijöistä on mahdollista vaikuttaa käyttöönottoa edistävässä mielessä käyttöönoton vaatimalla aikajänteellä ja missä määrin? Valitse kunkin tekijän vaikutusta parhaiten vastaava numero.

1. Organisatoriset tekijät

	Ei mahdollista vaikuttaa ollenkaan	Mahdollista vaikuttaa jossain määrin	Mahdollista vaikuttaa paljon	En osaa sanoa
Yrityksen koko	1	2	3	4
Organisaatiohierarkia	1	2	3	4
Viestintäkulttuuri	1	2	3	4
Päätöksenteon keskittyneisyys	1	2	3	4
Suunnittelun aikajänne	1	2	3	4
Toimintatapojen muodollisuus	1	2	3	4
Joustavuus	1	2	3	4
Innovatiivisuus	1	2	3	4
Rahallisten resurssien määrä	1	2	3	4
Henkilöstöresurssien määrä	1	2	3	4
Käytettävissä olevan ajan määrä	1	2	3	4
Järjestelmätuki	1	2	3	4
Käyttäjätuki	1	2	3	4
Organisaation sisäisen yhteistyön määrä	1	2	3	4
Tietotekniikkakokemuksen taso	1	2	3	4
Muu, mikä?	1	2	3	4

2. Toimintaympäristöön liittyvät tekijät

	Ei mahdollista vaikuttaa ollenkaan	Mahdollista vaikuttaa jossain määrin	Mahdollista vaikuttaa paljon	En osaa sanoa
Kilpailu	1	2	3	4
Epävarmuus	1	2	3	4
Asiakkaiden vaatimukset	1	2	3	4
Alihankkijoiden vaatimukset	1	2	3	4
Mahdollisuus käyttää ulkopuolista konsulttia	1	2	3	4
Ulkopuolinen tuki projektin Suunnittelussa ja hallinnassa	1	2	3	4
Tietotekniikkakonsulttien tarjoaman koulutuksen tai neuvonnan käyttö	1	2	3	4
Teknologiatoimittajan tarjoaman koulutuksen tai neuvonnan käyttö	1	2	3	4
Yhteistyön vuorovaikutteisuus yrityksen ja konsultoivan tahon välillä	1	2	3	4
Tietotekniikkakonsultin kokemus yrityksen toimialasta	1	2	3	4
Yritysverkostot	1	2	3	4
Riippuvuus muista yrityksistä	1	2	3	4
Resurssien jakaminen muiden yritysten kanssa	1	2	3	4

Resurssien hajautuneisuus	1	2	3	4
Mahdollisuus käyttää toimittajan projektinhallintavälineitä	1	2	3	4
Toimittajan tarjoaman sovelluksen käyttötuen määrä ja laatu	1	2	3	4
Liikekumppanuuden muodostaminen toimittajan kassa	1	2	3	4
Riippuvuus toimittajasta	1	2	3	4
Muu, mikä?	1	2	3	4

3. Pk-yrityksen johtajaan (tai johtaja-omistajaan) liittyvät tekijät

	Ei mahdollista vaikuttaa ollenkaan	Mahdollista vaikuttaa jossain määrin	Mahdollista vaikuttaa paljon	En osaa sanoa
Tietotekniikkakokemuksen määrä	1	2	3	4
Tietotekniikkatietoisuuden aste	1	2	3	4
Asenne uutta teknologiaa kohtaan	1	2	3	4
Toimintastrategian aikajänteen pituus	1	2	3	4
Käyttöönoton huomioiminen liiketoimintastrategiassa	1	2	3	4
Dominoivuus ja kontrolloivuus	1	2	3	4
Päätöksenteon keskittyneisyys	1	2	3	4
Osallistumisen aste	1	2	3	4
Sitoutumisen aste	1	2	3	4
Tuen määrä	1	2	3	4
Projektiryhmän nimeäminen	1	2	3	4
Projektiryhmän pätevyyden takaaminen	1	2	3	4
Käyttöönottoprojektin vastuuhenkilön nimeäminen ja valtuuttaminen	1	2	3	4
Resurssien varaaminen	1	2	3	4
Muu, mikä?	1	2	3	4

4. Loppukäyttäjään liittyvät tekijät

	Ei mahdollista vaikuttaa ollenkaan	Mahdollista vaikuttaa jossain määrin	Mahdollista vaikuttaa paljon	En osaa sanoa
Tietotekniikkakokemuksen määrä	1	2	3	4
Asenne muutosta kohtaan	1	2	3	4
Asenne käyttöönotettavaa teknologiaa kohtaan	1	2	3	4
Motivoituneisuus	1	2	3	4
Kannustimien tehokkuus	1	2	3	4
Palautteen saanti	1	2	3	4
Yleinen koulutustaso	1	2	3	4
Avoin mieli, laaja maailmankatsomus	1	2	3	4
Osallistuminen käyttöönottoprojektiin	1	2	3	4
Tiedotus käyttöönottoprojektin etenemisestä	1	2	3	4
Käyttökoulutus	1	2	3	4
Koulutus uusiin liiketoimintaprosesseihin	1	2	3	4

Appendix C.

1. Background information

Name of the interviewee:

Describe briefly the IT implementation you participated in.

On which stages you were participated (adaptation, acceptance, routinisation, infusion)?

Can these stages be identified in IT implementation projects in SMEs?

Was the IT implementation process proceeding according to some other model than the one described before?

2. Inffluencing the IT implementation success factors

By which means a consultant is able to influence the success factor "X" in order to promote IT implementation success?

(X = factors, which the interviewee responded as "fully controllable" or "partially controllable" in the questionnaire.)

How much is it possible to influence on factor "X"?

3. Additional questions

Which factors, according to your experience, are the most important ones influencing the IT implementation success in SMEs? (mention 3 in the order of their importance)

Do you have other observations or useful experiences related to IT implementation process in SMEs?

Oman edun tavoittelu	1	2	3	4
Työtehtävien hallinnan aste	1	2	3	4
Tasa-arvoisuuden lisääntyminen uuden teknologian myötä	1	2	3	4
Työtehtävien monimutkaistuminen uuden teknologian myötä	1	2	3	4
Uhka työn- tai toimenkuvalle	1	2	3	4
Muu, mikä?	1	2	3	4

5. Käyttöönotettavaan tietotekniikkasovellukseen liittyvät tekijät

	Ei mahdollista vaikuttaa ollenkaan	Mahdollista vaikuttaa jossain määrin	Mahdollista vaikuttaa paljon	En osaa sanoa
Yhteensopivuus organisaation kanssa	1	2	3	4
Hyödyllisyys	1	2	3	4
Hyötyjen näkyvyys	1	2	3	4
Käytön helppous	1	2	3	4
Monimutkaisuus	1	2	3	4
Muu, mikä?	1	2	3	4

Kiitos vastauksestasi!

Appendix D.

1. Taustatiedot

Haastateltavan nimi:

Kuvaile lyhyesti käyttöönottoa, johon osallistuit.

Mihin käyttöönoton vaiheisiin osallistuit (sopeutuminen, hyväksyminen, rutiinikäyttö, hyötykäyttö)?

Voidaanko pk-yrityksissä tietotekniikkasovellusten käyttöönottoprojekteissa havaita tai erottaa edellä mainitut vaiheet?

Etenikö käyttöönotto mielestäsi jonkin muun kuin edellä esitetyn mallin mukaisesti?

2. Käyttöönoton menestystekijöihin vaikuttaminen

Mitkä ovat ne keinot, joilla konsultti voi vaikuttaa tekijään "X" käyttöönottoa edistävässä mielessä?

(X = tekijät, jotka haastateltava on merkinnyt "mahdollista vaikuttaa paljon" tai "mahdollista vaikuttaa jossain määrin" -vaihtoehdon kyselyssä.)

Missä määrin tekijään "X" on mahdollista vaikuttaa?

3. Muuta

Mitkä tekijät ovat mielestäsi tärkeimmät käyttöönoton onnistumiseen vaikuttavat tekijät pk-yrityksessä? (mainitse 3 tärkeysjärjestyksessä)

Onko sinulla muita mainitsemisen arvoisia havaintoja tai kokemuksia tietotekniikkasovellusten käyttöönotosta pk-yrityksissä?

Appendix E.

	Highly negative influence (1)	Negative influence (2)	No influence /cannot say (3)	Positive influence (4)	Highly positive influence (5)
Organisational factors					
Small size			4	6	
Low organisation hierarchy		2	2	4	2
Informal communications		6	4		
Centralised decision making		1	2	5	2
Short range management perspective	1	8		1	
Informality	1	6	2	1	
Flexibility			1	7	2
Innovativeness		2	4	3	1
Limited financial resources	3	6	1		
Limited human resources	6	4			
Lack of time	7	3			
System support offered by the organisation		3	3	4	
End-user support offered by the organisation		3	2	3	2
Co-operation within the irganisation		1	2	6	1
Computer experience		1	3	1	5
External factors					
Competition			7	3	
Uncertainty		8	2		
Customer demands		1	3	5	1
Supplier demands			6	4	
Possibility to use an external consultant		1		7	2
External help in project planning and management		1		5	4
Training or guidance provided by an IT consultant			1	9	
Training or guidance provided by a vendor		1	2	6	1
Interactive co-operation between an SME and a consultant				8	2
Consultant's experience on the SME's industrial field			1	2	7
Strategic alliances (business networks)			4	5	1
Dependency on other enterprises		2	7	1	
Sharing resources with other organisations		2	5	2	1
Dispersion of resources	1	7	2		
Possibility to use vendor's project management tools		1	8	1	
Vendor support			2	6	2
Partnership with vendor			2	3	5
Vendor dependency	1	5	3	1	
Owner related factors					
Computer experience			3	4	3
Computer knowledge			1	7	2
Positive attitude towards the new technology				8	2
Short range management perspective		6	4		
Including IT implementation in the business strategy		1	4	3	2
Dominant and controlling owner		2	8		
Centralised decision-making		1	5	4	
Participation			1	7	2
Commitment				5	5
Support		1		7	2
Establishing a project team			2	6	2
Project team competence		1		9	
Appointing and authorising a project champion				5	5
Dedicated resources		1	1	3	6
End-user-related factors					
Computer experience			2	5	3
Positive attitude towards change		1		3	6
Positive attitude towards the new technology		1		7	3
Motivation		1		4	5
Incentives			4	4	2
Feedback			2	6	2
Education			4	5	1
Cosmopolitanism			2	7	1
Participation			1	3	6
Informing the end-users about the proceeding of the project				6	4
Training			1	3	6
Training for new business processes			2	7	1
Bureaucratic self-interest	1	6	2	1	
Job tenure				10	
Experienced increase in equity related to the new technology			5	5	
Experienced increase in job complexity due to the new technology	1	6	3		
Job security threat	4	5	1		
Technology related factors					
Compatibility				6	4
Relative advantage				4	6
Visibility				5	5
Ease of use				8	2
Complexity	4	6			

Note! The number in each cell signifies the amount of responses concerning a particular factor (on the left hand side) and a response options (on the top).

Appendix F.

	Not possible to control (1)	Partially controllable (2)	Controllable (3)	Cannot say (4)
Organisational factors				
Small size	7	1	2	
Low organisation hierarchy	5	3	1	1
Informal communications	2	7	1	
Centralised decision making	4	4	1	1
Short range management perspective		10		
Informality	1	9		
Flexibility	4	5	1	
Innovativeness	5	5		
Limited monetary resources	6	3	1	
Limited human resources	3	5	2	
Lack of time	5	3	2	
System support offered by the organisation	2	6	2	
End-user support offered by the organisation	1	7	3	
Co-operation	1	7	3	
Computer experience	4	6		
External factors				
Competition	10			
Uncertainty	5	5		
Customer demands	7	3		
Supplier demands	7	3		
Possibility to use an external consultant		5	5	
External help in project planning and managing		4	6	
Training or guidance provided by an IT consultant		4	6	
Training or guidance provided by a vendor		7	3	
Interactive co-operation between an SME and a consultant		6	4	
Consultant's experience on the SME's industrial field	2	4	3	1
Strategic alliances (business networks)	5	3		2
Inter-organisational dependence	6	3		1
Sharing resources with other organisations	3	6		1
Dispersion of resources	5	4		1
Possibility to use vendor's project management tools	3	6		1
Vendor support	3	4	2	1
Partnership with vendor	7	1	2	
Vendor dependency	4	6		
Other, what? Communication with other companies		1		9
Owner related factors				
Computer experience	6	4		
Computer knowledge	3	5	2	
Positive attitude towards the new technology	3	6	1	
Short-range management perspective	2	6		1
Including IT implementation in the business strategy	4	3	2	1
Dominant and controlling role	9	1		
Centralised decision making	8	1		1
Participation	1	8	1	
Commitment	2	7	1	
Support	2	5		3
Establishing a project team	2	6	2	
Project team competence	4	4	1	1
Appointing and authorising a project champion	2	6	2	
Dedicated recourses	3	5	1	1
End-user-related factors	1	2	3	4
Computer experience	6	1	2	1
Positive attitude towards change		8	2	
Positive attitude towards the new technology		7	3	
Motivation		9	1	
Incentives	2	4	2	2
Feedback		4	6	
Education	8	2		
Cosmopolitanism	8	2		
Participation	1	7	2	
Informing the end-users about the proceeding of the project		3	7	
Training		4	6	
Training for new business processes	1	5	3	1
Bureaucratic self-interest	6	2		2
Job tenure	5	4		1
Experienced increase in equity related to the new technology	4	3		3
Experienced increase in job complexity due to the new technology	3	4		3
Job security threat	3	2	1	2
Technology related factors				
Compatibility	2	6	2	
Relative advantage	2	5	3	
Visibility	2	7	1	
Ease of use	3	7		
Complexity	4	5		1

Note! The number in each cell signifies the amount of responses concerning a particular factor (on the left hand side) and a response options (on the top).