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EXPERT SYSTEM IMPLEMENTATION

Managing Change in an International Expert System Implementation Process

Master's thesis in International Business

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1 INTRODUCTION

1.1 Background of the study

Because of the exponential development in the information technology during the second part of 20th century, there has been a tremendous boom in the usage of different kinds of information systems in every sector of society. It is widely acknowledged, that businesses have been sort of pathfinders as users of new technology, as also so many new managerial and organizational themes have included the wide usage of information systems as one of the key factors in e.g. providing better service in general or applying better support for different sectors of operations.

One developed form of business-supportive information systems are the so called Expert Systems (ES) that are capable of forming more complex decisions and propositions by mimicking human thinking (Hauser & Hebert 1992, 10; Turban 1988, 17) and in this sense also are capable of being used as a useful tool in establishing more quality customer service in general (Eppinette, Inman & Pick 1997, 63). Although ES is a rather established and known concept, these systems have gained most of their attractiveness during the nearby history because of the ever developing technology. Since the easier accessibility and increasing popularity, it is justified to claim that ES stand in the very spotlight when the context of "computers replacing humans" is being discussed (Hauser & Hebert 1992, 10). Furthermore, this is also supported by the fact that ES represent a totally new area of where machines are taking care of tasks earlier handled by people; decision making and complex reasoning.

Because of the special features of ES, the many benefits that these systems offer are also followed by new challenges, especially in the implementation phase. Moreover, ES implementation projects are known for having a rather poor success rate (Shim & Min 2002, 71). Managing change and implementing desired strategy by certain actions is nearly always a difficult task (Vandermerwe & Vandermerwe 1991, 174; Raps 2004, 49), particularly when a device that can be used to replace human efforts is involved (Barrett & Beerel 1988, 212; Hauser & Hebert 1992, 10). So there is an interesting phenomenon of present interest; because of the many obvious benefits that ES have, these systems are being increasingly frequently implemented everywhere in the society - at the same time, the very specifications of these systems, which make ES so superb, make them also rather hard to implement (Hauser & Hebert 1992, 10).

Most of the literature concerning systems implementation procedures do not empathize the theme purely from the change management's point of view; instead of this they put most of the weight on technical issues (Hauser & Hebert 1992, 10) or offer support through simple project management principles. This corresponds fascinatingly

with the current situation in everyday business life; system implementation processes are all too often managed as purely technical projects without concerning the situation as a more complex change process - this leads easily to neglecting the human view and this way usually more or less unsuccessful implementation processes (Nyman & Silén 1995, 136; Lanning, Roiha & Salminen 1999, 248; Rao 1991, 42). Conjoining change management to the implementation process should therefore offer good insights on how to govern the implementation more effectively.

Change in general as a phenomenon is not the easiest to describe; this is also the case when ESs are concerned. Information systems can work as a reason or vehicle for change (Nyman & Silén 1995, 134), but at the same time the system implementation process requires usually thorough change management activities *per se* at the same time. Thus, systems can work as both external and internal triggers (Lehto 1990, 13) for change and change management. Because of this dualistic role of change management being so clear and evident in the context of ES implementation, change as a phenomenon must be thoroughly defined before connecting it to ES implementation. Although the dualistic role of change is in this sense present, the main focus will be on inter-organizational change and change implementation, manifesting with and because of the ES implementation.

Moreover, as it could be claimed that great numbers of ESs are to be used in international environment and are implemented by transnational organizations, it could also be an appropriate idea to attach the concept of international management to the overall context. This will be done, after carefully discussing the other concepts. The structure of the study will be presented more thoroughly in below.

1.2 The purpose and structure of the study

As it was already presented in the previous chapter, much has been written about ES's. However, been focused largely on technical aspects, many of these studies lack the human resource aspect needed for more convenient and successful implementation process. In this research, it is tried to offer insights and guidelines on how ES implementation can be executed easier and more fruitfully by handling it as a strategic change process. The international scope will be attached to this. In this sense, **the purpose of the study is to examine how ES implementation project can and also should be managed as a change process in an international organization.**

This goal can be divided into two subcategories as followed:

- **To define ES implementation process as a change process.** This will be done by defining the independent concepts, ES and change management in general, by demonstrating that the ES implementation process really is a

change process and therefore can be handled as a one, and finally by discussing the phenomenon also in an international environment.

- **To find, present, analyze and discuss the critical issues having a special role in managing the ES implementation process in an international organization.** This will be done by finding and distinguishing the single issues that can be used particularly in the ES implementation, by explaining the dynamics between the specific issues, by discovering the dynamics and structures which attach these issues in ES implementation and finally by underlining and evaluating the certain issues that gain special meaning in international organization. When put together, these issues form an overall model, which will also be delivered as a graphical representation to make the general concept and especially the dynamics of these issues more easily accessible.

In this context it is also important to state the necessary limitations set for the research, most evident being the fact that the framework includes only implementation and utilization, not development efforts needed to put a certain ES in work. Thus, the basic assumption in the study is that there is an appropriate and good system already developed – now it would be the time to put it to work. This assumption has its own problems also, as certain themes rising already in the design- and development phases have a strong impact on the utilization phase also. All factors affecting the implementation in this way are still included, and the perspective is broadened when it comes to these issues.

In this study, the ES implementation process will be dealt as a change process, and after observing the general structures and dynamics behind change management, special issues and managerial factors offered by existing change and technology management literature will be used to form a model for tacking the problems that occur in the ES implementation projects. After this, the international context will be added to this framework. To evaluate the formed model, a case study will be performed. An ES implementation project, executed by a large international operator in the banking business, will be studied to provide empirical discussion about the model. The case study will be dealt with more thoroughly in the methodology -chapter.

As already presented above, the theoretical framework, spanning over the chapters 2–4, will include themes from four different types of scientific literacy. This subjective distinction of the literacy used is presented here to make it easier to understand the overall framework, which will in the end include rather heterogeneous set of concepts, terms and theoretical areas. Thus, here the structure of the theoretical framework is explained one more time for the convenience of the reader. This structure is represented in the figure 1.

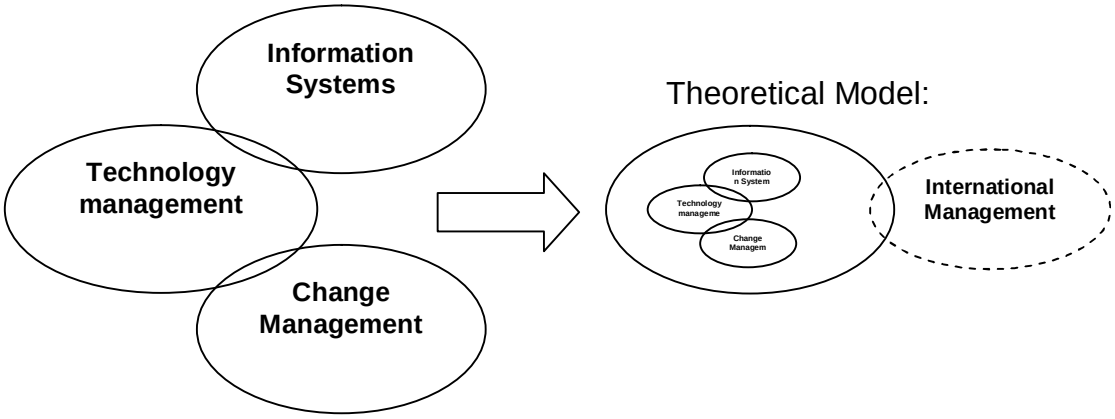

Figure 1 The structure of literature used in the theoretical framework

Firstly, there is the information systems literature offering insights and themes about the ESs in general. Secondly, the change management literature delivers the other main theme to the context. These both types of literature are supported by the third type, technology management literacy. The fourth counterpart is the literature concerning international business management, making it possible to attach also this area to the framework. To make the whole process convenient, the first three areas are first discussed to form the model itself, after this the international management will be conjoined with the model in the chapter 4.

2 PRESENTING THE KEY CONCEPTS

2.1 Expert systems

Expert Systems are a well established and known term in the information systems sciences - the formulation of the concept itself can be tracked all the way back to the 1950s when earliest, simple decision-making systems (DSS) were built (Ernst 1988, 19). The concept of ES followed rather rapidly, and there was already noteworthy development and utilization during the late sixties and early seventies (Barret & Beerel 1998, 18). As all the benefits, that working ES can offer for business have come increasingly established, it has come also easier to promote and understand ES and its relationship with different social sectors. Rapid development in technology has made the progress possible in the first hand; the soaring processing power and memory sizes made it possible to establish more complex systems already in the 1970s (Barrett & Beerel 1988, 18-19). Obviously the development has continued steadily (Wiig 1990, 12) so that it has become possible to build more and more complex systems with a reduced amount of financial contributions.

In this chapter ES will be discussed so that the term itself will be first broadly defined; after this the general benefits related with ES are presented. After this the focus will be moved to the relationship between the ES and the utilizing organization.

2.1.1 What are expert systems?

Most simply put, Expert Systems are computer programs that perform sophisticated tasks once thought possible only for human experts (Benfer, Brent & Furbee 1991, 3). England, Kiss, and Schwartz (1989, 58) claim that *"expert systems are computer programs that emulate human thinking processes in problem-solving situations "*, and their goal is to *"arrive at the same results that a specific human mental process would produce"*. Expert systems are also regarded as *"computer programs that represent human knowledge in the form of facts and heuristics. This information is usually provided by human experts within the organization and is used to provide a consistent method of solving problems"*. (Hauser & Hebert 1992, 10). General explanation is also supported by another definition, claiming that the term "expert system" describes a method of applying human knowledge captured in a computer to solve problems that normally require human expertise (Turban 1988, 17). Furthermore, expert systems can also be called synonymously *knowledge-based* systems, although this term is sometimes linked to the system using information that has been gathered from textbooks or other

non-human resources (Feigenbaum, Nii & McCorduck 1988, 31; Wiig 1990, 9) instead of human experts. It is also important to recognize the secondary tasks that ES handle to make the decision making and supporting possible; by asking relevant questions and providing reasoning the system really works like an expert (Ernst 1988, 4).

As it can easily be seen from the definition presented above, the basic purpose and describing theme for expert systems is *problem solving* and support for *decision making*. This rises another commonly used definition for expert systems; the comparison with more well-known *conventional* or *decision support systems (DSS)* (Walden 1992, 73; Eppinette et al 1997, 64; Barret & Beerel 1988, 32). Expert systems differ from traditional decision support systems in that the output of an expert system is a conclusion, recommendation or decision, whereas the output of a decision support system is information to be utilized in arriving at a conclusion, recommendation or decision (Eppinette et al 1997, 64). Eppinette et al (1997, 64) also claim that from a process's standpoint this implies that a traditional DSS has data as its input and input and information or data as output, but an ES has information or data as its input and a decision or conclusion as its output (Figure 2). In this sense, an ES is a step beyond a DS.

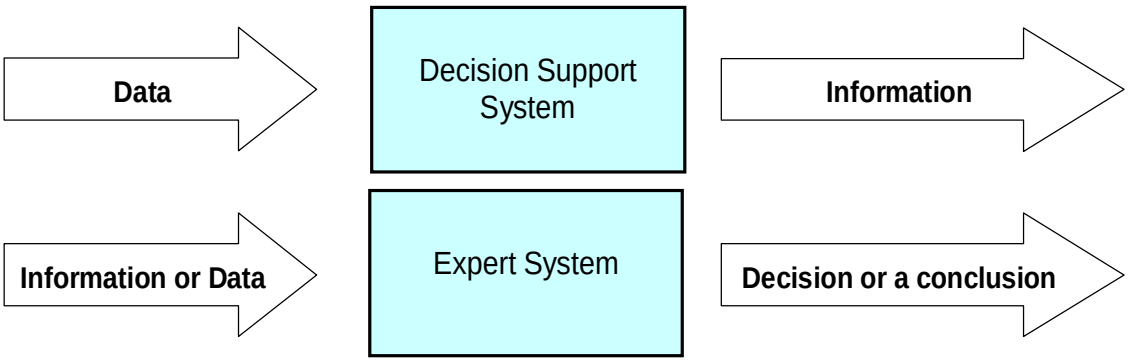

Figure 2 Decision Support System and Expert System (Adapted Epinette & Pick 1997, 63–64)

It is important to underline the basics that make the ESs to work; these systems are effective because of the quality of the knowledge they contain (Barrett & Beerel 1988, 35). Therefore, the logics making the system to use the knowledge aren't the most important thing but it is the information, or know-how (Barret & Beerel 1988, 79), that is transferred from human experts to system. This has a great effect to the development process of the system; builders of the system are usually called knowledge-engineers because of their duties in choosing the right knowledge presentation, selecting the reasoning methods that the system uses and, most importantly, making it sure that the system has all the right information it needs to solve the problems it should (Feigenbaum et al 1988, 32; Barret & Beerel 1988, 174).

2.1.2 General benefits of ES

The literature concerning ES is rather unanimous when benefits of ES are discussed. However, usually the accredited benefits that stem from ES usage are more qualitative than quantitative in nature (Ernst 1988, 5) and in this sense also vary depending on the current ES being evaluated. Hauser and Hebert (1992, 10–11) present four universal main categories to describe the general benefits that an ES can offer, thus four independent benefits that have been derived through the use of ES technology:

- Accuracy and reliability of decision making
- Timeliness of decision making
- Productive use of expert employees
- Documentation of decision making

Accuracy and reliability of decision making. ES encompass a formal representation of human knowledge that has been provided by one or more human experts. This knowledge, usually in the form of facts, rules and relationships consists of heuristics that experts tend to carry around in their heads, as well as the more formal expertise that exists in technical manuals and as operating procedures. Because of this explicit organization of knowledge, ES overcome some of the inconsistencies associated with human information processing, providing the capability to obtain consistent and reliable results over time (Hauser & Hebert 1992, 10). Moreover, compared to the traditional methods, ES makes it possible to represent knowledge about relatively complex phenomena (Benfer et al 1991, 13; Wiig 1990, 12), thus bringing pure computer-based calculating power to be used in the context of qualitative problem solving.

Timeliness of decision making. In addition to improving accuracy and reliability, there is evidence that ES improves the timeliness of decisions by making scarce expertise available to other members of the organization. In most domains, true experts are in short supply. This shortage can cause a delay in the decision making process. Cloning knowledge and skill via an ES enables organizations to provide expertise to a number of operations sites, thus increasing accessibility and reducing time delays (Hauser & Hebert 1992, 11). Moreover, timeliness and responsiveness of customer service can be improved (Wiig 1990, 12).

Productive use of expert employees. Expertise is usually developed through years of experience in performing a particular job. An organization invests time and money in developing their experts to solve problems that younger, less experienced workers are not capable of resolving. As such, expert employees are highly valued, well paid, and scarce. However, this precious knowledge can easily be lost if the employee dies, retires, or moves to another firm. An ES provides a method to record and document this

knowledge to a computer program. The organization has found a way to transfer the value of this knowledge from a human being into a more tangible asset - the ES.

A related benefit provided by the ES is improved accessibility to experts by other individuals who might be geographically dispersed within the organization. ES allow users in all geographic locations to access the former human knowledge through the computer program. Development of the ES can resolve in less dependence on experts to solve repetitive problems. Another advantage of ES is that it allows inexperienced employees to become productive in a short time period (Hauser & Hebert 1992, 11), Wiig (1990, 12) encompasses this same benefit by stating that with ESs it will come possible to provide high-knowledge-content services with less trained people.

Benfer et al (1991, 12) also encompass more systems oriented benefit stemming from the logics of expert systems; compared with simpler and more traditional systems, ESs are making it possible to represent knowledge about the domain at hand in a manner that is similar to that used by human experts. This property makes developing and updating of the system much easier than it would be with a less sophisticated system.

Documentation of decision making. Many experts within organizations make decisions based on heuristics that are carried in their heads, never written down. These decision rules are based on practical experience in solving recurring problems. Sometimes, however, these heuristics are not consistent from one expert to another. An ES requires the decision rules to be explicitly coded, documenting the decision rule and ensuring that everyone in the organization follows the same procedure (Hauser & Hebert 1992, 11). Also Wiig (1990, 12) presents this benefit by stating that with ESs it is possible to preserve and accumulate knowledge from departing or promoted personnel.

2.2 Expert systems and the utilizing organization

Traditionally the research efforts and offered guidelines for ES have generally discussed the theme from the information system science's viewpoint, thus most of the subject has been studied by keeping the focus on technology or systems design only. However, because of the deep-rooted relationship of ES and the business functions it affects, the overlapping concept of ES includes much more than just technological areas. Because of their pure performance and high influence on broad set of business functions, these systems tend to create and as well demand many alterations in the operational structure of the organization that is utilizing an ES. In this chapter these complex effects of ESs are discussed by first presenting problematical concepts usually connected to technology implementation, and then addressing direct effects that stem from ES

implementation particularly. Most weight will be put on the views offered by literature concerning technology management and direct ES utilizing operations.

2.2.1 Managing technological change

According to Frankel (1990, xv), the *technological change* can be understood as *advance of technology which may consist of new methods for existing products, new product designs to permit improved production of existing products, new products with important new characters, as well as new approaches to management, control, organization, and marketing which constitute or involve technological improvements or change.* As a whole this context remains a bit too broad one to be discussed completely thoroughly in this paper as it has so many social and behaviourist dimensions forming the overall concept - however, as it is observed from a very limited viewpoint in the context of this study, some simplifications can be done. Therefore, to contribute to the original scope of the research, the management of technological change is going to be discussed here only as organization's internal occasion, *acquiring* and *transferring* of new technology. Keeping these limitations in mind, some interesting entities can, and even should be utilized from the context at hand.

According to a very widely accepted view, managing technological change is practically always complex and often very difficult task (Frankel 1990, 1; Basil & Cook 1974, 48). One way to describe the complexity behind the theme is to present it through the metaphors of *wiring* and *growing* (Fisk 1999, 311–313). Especially in the international operating environment, *wiring* stands for the efforts to build systems and technological infrastructure to support the organization, employees and customers - *growing* means different methods making it possible and more convenient for the users to utilize the built systems in their everyday work. Popularly said, *wiring* brings the technology to the people as *growing* brings the people to the technology. *Wiring* comes first, but it is essential to move on towards *growing* when more sophisticated systems and culture are making this possible. This is done through more usable, user based systems and by handling the implementation in more employee- and customer-centered ways.

With the two metaphors, Fisk stated that the "hard", technology-oriented methods and ways to think must be partly replaced with more user-based thinking. This is a part of a more large-scale trend, where "softer" domains are being considered when new technology is being developed or implemented. In other words, *recognition of the need to examine the management, organizational and human factors associated with technological change is now widespread* (Bailey 1993, 3).

Summing up the things raised above, it is important to bring the more human oriented aspect to the technology acquisition. When this has been done, it possible to raise several crucial factors which must be empathized when transferring technology (Frankel 1990, 9) in general:

- Maintaining technology transfer flow
- Timing of introduction and updating of technology
- Effectiveness of the technology transfer
- Decisions regarding stepwise versus continuous technology transfer, and
- Feedback and feedforward of technology use information, particularly relative to changes in technology or its use in the new environment

2.2.2 Direct effects of the ES in the organization

Hauser and Hebert (1992, 11–12) claim that there are a number of issues that manager must also be aware of while implementing ES. These management concerns deal primarily with the effect of ES on issues like *job redesign, worker skill levels* and *employee attitudes*, presented in more detail below. Jobs are essentially *redesigned* in the area of information system implementation because the ES can even replace workers in making of well-structured decisions. This means that after expert system implementation the expert employee's job description will include new duties like monitoring and exception handling. Because of this, also the general job description for the ES user must be, in many cases, redesigned with care. This view is also supported in a broader technological context by Bailey (1993, 10), who underlines the importance of profoundly fulfilled work restructuring and job design when new technology is utilized. Within the context ESs in particular, Barret and Beerel (1988, 212) also share Hauser's and Hebert's (1992, 12) view.

Because of the changes in the user's job description mentioned above, it has been claimed by Hauser and Hebert (1992, 12) that the operational *skill levels* of expert users may decrease because of the ES. To overcome this problem, the users should be organizationally trained and continuously informed by the system to understand all the tasks that the ES performs and the logics behind these tasks. Continuously monitoring of user skills is also important. Finally, it is important to attach the users to the ES's development and updating process - this not only offers sophisticated information about the system itself, but also makes the users more familiar with it.

Both factors presented above, job redesign and decline in the skill levels can also affect the *employees' attitudes* towards their jobs (Hauser & Hebert 1992, 12–13). This can result in reduced motivation and job satisfaction, loss of power and status in the organization, and an increased stress level. These problems are not only solved by the

carefully executed job redesign mentioned in the first factor, but also by job enrichment an performance appraisal systems. Practically this means duties in the context of innovative and interactive leading, as also effective incentives.

2.2.3 Relationship between ES and its users

In ES literature, the most popular way to discuss the ES's place among the organization and its business processes has been to underline the relationship that will be formed between the system and its users; this view also corresponds with the *employee attitudes* of Hauser & Hebert, presented above. It could be claimed, that this relationship is formed in two stages, here presented through two metaphors; first, by *recognizing* and understanding the significance and competence that the system can deliver for the organization; then secondly, by *communicating* this significance for the users and the rest of the organization.

By *recognizing* the significance and competence of the system, the utilizing organization identifies the overall status of the system. This means first admitting that the system cannot replace or be better than people (Barret & Beerel 1988, 32–33), and then distinguishing the concrete tasks that the ES will actually perform (Wiig 1990, 106–107). This duty will obviously be performed in the early stages of the system development, but it has a tremendous effect on the definitive relationship that the system and its users will have. This view is widely emphasized in the general technology management literacy, for example by Bailey (1993, 108).

The way the recognized status and competence of the system is *communicated* has tremendous effect on the relationship it will have with its users. Barrett and Beerel (1988, 210, 212) promote internal communication in the context of ES implementation by claiming that the most important thing in handing the complete ES to users is to "sell the system for its users", this view is also partly supported by Feigenbaum et al (1988, 124). However, this does not only mean highlighting and demonstrating of the positive effect the system has for the business - this usually is not enough to secure successful implementation (Feigenbaum et al 1988, 123) - but also making it clear what is expected from the system and how it will affect the everyday life, thus making demand for job *re-design* of Hauser & Hebert, presented in the previous chapter.

The most convenient way to handle both of these stages is to *involve the users* already in the development phase, so that the information about the forthcoming role and level of operational significance of the system will become communicated in a natural and straightforward way. The involvement of the users is highly emphasized, almost a crucial factor in both the ES and general technology management literature, for

example by Barret & Beerel (1988; 205, 210), Hauser and Hebert (1992, 14) Bailey (1993, 37) and Hendry (1993, 85).

2.3 Change as a phenomenon

Seen today as a traditional part of general organization theory, change process management as an independent entity has been coming widely more and more valued - most evident reason for this can be found from the emerging interest and appreciation towards strategic business management. Companies obviously need to improve their strategy implementation activities (Carnall 1991, 1) and the implementation itself has many problems (Raps 2004, 49–50), being even more difficult than the strategy development in the first place (Allio 2005, 12). Followed from this, it has been very commonly recognized that only planning and building a good strategy or a business development project according this strategy is not enough. More is needed, especially in putting the designed strategy to work. Thus, the strategic thinking has taken one step further from acknowledging the importance of strategic planning to recognize also the significance of implementation phase. This subjective outlook of the researcher is supported by the mere quantity of literature concerning exclusively management and implementation of strategic change. Most often, especially in articles, the main focus is on problem solving: why strategy implementation processes fail? How to make strategy work? It is understandable, that the viewpoint is on normative problem solving in so many articles written about change management and strategy implementation; it has been claimed that the success rate of triumphant strategy implementation can be as poor as 10% to 30% (Raps 2004, 49). Living with change sure is difficult, usually because the task of changing the behaviour of organizations, groups and individuals is a complex, problematic and often frustrating endeavour (Nadler 1980, 89).

In this part of the study the structure, meaning and rationale of strategic change will be scrutinized by evaluating it by the meaning of the term itself, by different types of change in general, by dealing with change as a process, by factors affecting the change implementation, and by having a simple outlook on general problems most often faced with change management and strategy implementation.

2.3.1 Inside the phrase "strategic change"

It is rather difficult to deal simply with the term "change", as it describes both external pressures (e.g. changing environment) that affect the strategy work and makes it *per se* needed (Basil & Cook 1974, 3), as also the implementation process of designed strategy

and actions based on it (e.g. change in operations or techniques). More simply, the term "change" can describe both reasons and goals for the strategy process. One way to discuss this dualistic view is to divide the change into two separate factors; internal and external change drivers (Lehto 1990, 13). Thirdly, the term can also describe the process of reshaping a previously formed strategy. This general description for the term is also partly supported by the definition that sees strategic change as the *reshaping of strategy, structure and culture of an organization over time, by internal design, by external forces or by simple drift* (Grundy 1993, 19–20). Grundy also claims that the change projects can be tangible and specific - for example, implementing systems or structure changes - or they can be less tangible and/or wide reaching, such as quality or culture change programs. Obviously, change projects can also vary in size; they can be very large or equally very small.

Within the context of the study at hand, the term will be mostly discussed from perhaps the most traditional viewpoint - action's point of view. Thus, the term "strategic change" will mean reshaping of working habits, techniques or tasks that occur when the designed strategy is put into work by certain actions and measures. This viewpoint is supported also by Nyman and Silén (1995, 135), who use the definition of "business reengineering" together with change management. In spite of this definition, also dualistic view and in this sense also the external drivers will be superficially dealt with in the subchapter 3.1.1, where the role of ES as a change driver is discussed.

2.3.2 Different anatomies of change

As it was claimed above, change can take many forms as a general phenomenon and affect organization as an internal or external driver. To establish better understanding on change in general, one should start by recognizing that change does not always happen as a steady, incremental and homogenous event. At least three different, major types of change can be recognized; these are discontinuous, "smooth" incremental and "bumpy" incremental types of change (Grundy 1993, 24–26). Smooth, incremental change often takes place in businesses and situations where environment and drivers for change in general evolve in a slow and systematic way. "Bumpy" incremental change happen in differing speeds, thus the overall change process includes phaces like acceleration, slowing and readjustments. Compared to the "smooth" incremental change the "bumpy" one often occurs when the environment is more ore less unstable and includes possibly powerful catalysts for the change. Although discontinuous change is sometimes associated with "bumpy" incremental, it is more likely a break in the pattern of "smooth" incremental change - the change usually happen discontinuously when

structure, organization or techniques are altered strongly during a rather short time period. The different types of change are presented in the figure 3.

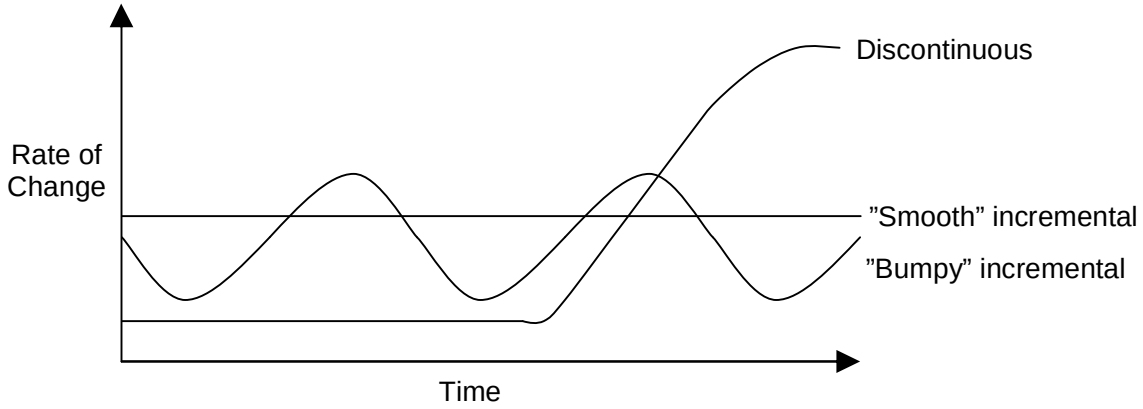

Figure 3 Major types of change (Grundy 1993, 25)

One must point out, that it is obvious that single change process being evaluated can include characteristics from all three different types of change. Much depends on the time period that is used when evaluating the process. Practically, it could be said that most change processes experienced follow the path of “bumpy” or “smooth” incremental change as the processes are being managed as step-by-step procedures (Quinn 1980, 65). According to Quinn, this means that change processes are rarely handled holistically and in a “textbook-type manner”, but tend to be reshaped and reformed during the process so that the actual change manifests in several waves instead of one big occasion. However, this approach, “logical incrementalism”, does not mean biased or chaotic management of change but cohesive, step-by-step movement towards ends.

To unfold the structure of change even more in general, also another distinction in *continuous* and *episodic* change could be made (Hayes 2007, 79). This theory divides the different forms of change in not three, but two types of change; the one that is created and implemented continuously in small steps, and in another that means incorporating change in larger, single transitions. The viewpoint is slightly different from that of Grundy’s; this method of distinguishing the two types of change tries to discuss the organization’s overall relation to change. The desired situation would be a one where organization could be delivered to the stage where it could live with continuous change, so that the need for episodic, discontinuous would be as little as possible.

2.4 Managing change

After defining the overall concept and structures of change, it is time to move on to the actual management procedures, needed in complex transition situations that can be perceived as change processes. One often used method to describe the overall concept is to present it as *unfreezing* and then again *refreezing* of the existing patterns to make the desired transition to happen (Johnson 1988, 62). According to Johnson, the existing paradigms within the organization and the processes it handles are the key thing when moving towards effective change procedures. In this chapter, that view is discussed by first dealing with the process likeness of change, then presenting as broadly as possible the direct domains and managerial efforts affecting the successful change management.

2.4.1 Change as a process

As strategic change is most usually implemented in a form of a more or less independent project, it is perhaps most convenient to initially explain it as a process and as a sum of different phases that form this process. However, as change implementation can rarely be considered as a highly rational or fully planned process (Grundy 1993, 24, 45; Quinn 1980, 65), the definition for the process and its phases can vary tremendously according to the specifications of a certain project. Nor is there a superb, overwhelming classification about change process that could explain every type of change processes. In spite of this, there are many models that try to describe the change process trough a set of different phases. These phases can again be used to deliver the right managerial actions needed in the holistic management of change.

2.4.1.1 Dynamic effects of change process

According to Carnall, who claims that the popularly discussed “resistance to change” and its countermeasures are not a sufficient approach to holistic discussion about the problems in change implementation (Carnall 1995, 141), there are five phases that form the change process and describe the effect that the change process will create in the organization; initially he presents this in a form of *coping cycle* (Carnall 1995, 143–148), which is also widely used by Grundy (1993, 45–49). Although these phases are initially derived to help the managing work of change implementation, they put most weight on the change acceptance (Carnall 1995, 74), impact on people’s self esteem (Carnall 1995, 143) and on how the change effects organization. Thus, this cycle model gives no straight normative model about how to divide the change process into

manageable phases, but tries to explain the phenomenon by dividing it into understandable steps. In this model the five phases are *denial*, *defence*, *discarding*, *adapting and internalizing*, creating changes in two factors representing the dynamics of change, *self-esteem* and *performance*:

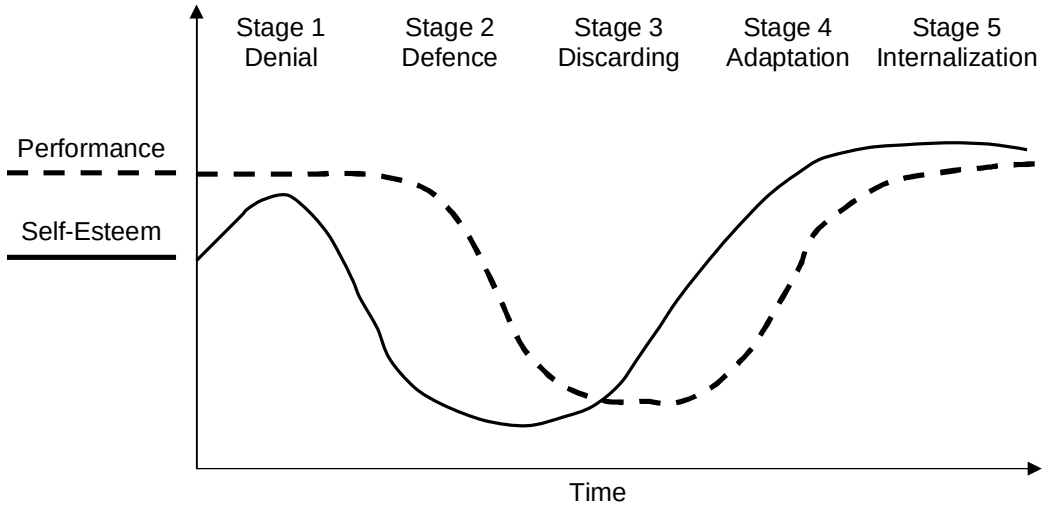

Figure 4 The coping cycle (Carnall 1995, 144)

The first phase, *denial*, manifests through comments like "We have always done things this way" and "Why change, we are making profit". Carnall (1995, 144) claims, that faced with forthcoming change, people tend to find new value from the existing circumstances - this tendency to deny the validity of new ideas seems to be a rather general reaction in organizations waiting changes to come. In this stage, two factors, *performance* and *self-esteem* are still on a rather high level, and *self-esteem* can actually increase among the denial personnel.

In the second phase, *defence*, both factors presented above start decreasing, as the realities of change start to become clearer. This is because of the feelings of depression and frustration, created usually because of the difficulties in deciding how to deal with these changes. These feelings manifest in defensive behaviour, raising comments like "this won't work" or "it's unusable for my tasks". However, this phase is important as it creates time and space to deal with the concerns related with the change (Carnall 1995, 146). In this sense, it is important to give the people the opportunity to go through this stage.

The third phase, *discarding*, is seen as the important turning point in the change process - after perceiving and understanding the importance and/or necessity of the change people start to look more forward and even tend to take more active role in the process. Thus, this is the point where *self-esteem* starts to increase again (Carnall 1995, 146).

Adaptation, the fourth phase, makes also the performance to increase again as individuals start learning and interacting with the new situation and/or systems, thus coping with the overall change. According to Carnall, this is the phase where most energy is used; inconveniences in this point may create even anger, which is however not because of change resistance, but consequence of trying to make the new solutions, systems or operating methods to work. Technical and operational premises and systems should be fully ready in this point to support the adaptation - otherwise significant problems will occur as new frustration may arise (Carnall 1995, 147)

After the adaptation, people start to truly understand the new work situation - this leads to the last phase, *internalization*. This is a cognitive process through which people make sense of what has happened, and the new behaviour becomes part of the "normal" behaviour (Carnall 1995, 147). If everything has gone as it should, in this point at least performance should be on a higher level than before the cycle started.

It is easy to find the relations between the different phases of Carnall's coping cycle and appropriate managerial efforts used during the change process. These connections will be dealt with in the following subchapter, where direct domains of change management work are discussed.

2.4.1.2 Stages of the management of Change

In the previous subchapter the change process was discussed by diving it into phase-like effects that usually manifest in chronological order, representing the ways organization reacts for the occurring change. For a more guideline-like demonstration, the change process can also be divided in five simple stages, which describe how the change processes are usually executed and managed. According to Grundy (1993, 50), these five stages of change are:

- Diagnosis
- Planning
- Implementation
- Control
- Learning

Also Hayes (2007, 83) and McCalman and Paton (1992, 30) present models almost similar to this. The five stages are not actually anything very normative *per se*, usually change management processes manifest rather naturally in this chronological order. What is important for managing the change process is to recognize the existence of these phases and lead the process so that the actions correspond properly with the current stage being carried out. This view is also supported by Carnall (1991, 57), who

proposes that the “project management” approach should be utilized in the change process management.

Another important element in leading the change implementation process is to put the right amount of time and effort to each single stage. The most interesting generalization is that most often those change processes, which have been more diagnosis- and planning-oriented, seem to have been also more successful; on contrary, those change processes which have not been such a successes, seem to have been mostly just implementation-oriented. Sadly, very often the weight is put only on the raw implementation phase and diagnosis and planning phases are more or less neglected (Grundy 1993, 51). Carnall (1991, 57) emphasizes this by stating that the lack of clear goals and lack of flexibility in planning are some of the typical pitfalls of corporate change management. The stage of control can not be overemphasized - the controlling measures, which usually manifest in the form of different monitoring and tracking systems, are among the most often offered direct change management guidelines that one can find from the literacy.

2.4.2 Direct organizational characteristics affecting strategic change implementation

The purpose of this subchapter is to present and discuss the key organizational issues and most evident areas that need special care in change management, thus are also affecting most on the proper methods to be used to control and manage the change implementation process. As an effort has been made to describe the basic anatomy and dynamics of change in the earlier chapters, it is now logical to proceed to the unanimously recognized organizational characteristics that shape the way that change can be tolerated and handled. It is not intended to offer only a simple list about these factors, but to discuss holistically the broader field of these factors.

Understandably, there are quite a few models that can reflect the different factors affecting the change process; Raps (2004, 50) claims that there are four factors that shape the process. In this model the focus is on strategy implementation, not change processes in general, but as the focus of the study is kept on change processes that describe expressly the actions utilized to implement desired strategy, it is reasoned to expect that the particular model can offer useful insights to the phenomenon dealt with.

Acording to Raps (2004, 50), the four affecting factors that should be reconsidered when managing the strategy implementation process are *culture, organization, people and existing control systems & instruments*. Below these factors are scrutinized and connected to the same kind of factors offered by other change management literacy.

The first factor, *culture*, affects the strategy implementation through the quality of organization's internal environment; extent of coordination, degree of dedication and level of strategic thinking within the organization (Raps 2004, 50). Thus, in this context the question is not about national culture which affects the behaviour of the people forming the organization, but the internal culture of the organization itself. This domain is highly appreciated in overall literacy; it is has been handled through concepts like *employee commitment* (Beer, Eisenstat & Spector 1990, 99), *change-responsive climate* (Basil & Cook 1974, 184) and *acceptance for change* (Carnall 1995, 74). Motivation of employees is a mutual factor for all of these concepts. Obviously, the right way to react managerially with these variables is to support not only the overall motivation of employees but also internal communications within organization.

The *organization* affects the implementation process through two aspects; its structure and decision-flow processes (Raps 2004, 51). The structure in this case corresponds with the means and premises, offered by the existing organization, that the company can utilize to achieve its goals, objectives and mission. Decision-flow processes, or *managerial hierarchies* (Basil & Cook 1974, 202) and simply *management structures* (Carnall 1995, 17), are the systems that are used to link the functions of developing, implementing and decision making with the results achieved. In this context, increasing and supporting internal transparency and *organizational coordination* (Beer et al 1990, 99) so that everyone can see the linkage between actions and results also makes it more possible to have the support of the whole organization in the implementation process. Basil & Cook (1974, 202) present this by underlining the importance of interlinking the organizational structure and climate.

People, or more clearly human resources, represent the most precious intangible asset for the organization, and are more and more often sawn as the key success factor within strategy implementation processes. As human resources are in the end the true operators that implement the actual change, it is extremely important to involve these concrete operators to the strategic implementation process, moreover in the right way and also by simply giving people time (Carnall 1995, 156). This all has really much in common with the Carnall's *coping cycle* and *self-esteem*, presented in the chapter 2.4.1.1. In the human resource context, managerial and therefore also communicational and training aspects arise; communications, training and managing have an undeniable importance in connecting the people to strategic change (Raps 2004, 51). Hayes (2007, 87), who approaches the theme through the concept of *people issues*, suggests these same efforts to be used when dealing with the most important stakeholders of change.

Control systems and instruments are in the end secondary, but still essential tool for managing the change process and strategy implementation. In this context, Raps means basically those activity- and performance-monitoring systems and structures that are already integrated in the business structures of the organization, this is view is

supported by Carnall (1995, 75). In practice these systems provide means to control and meter performance and success of the change process during and after the primary implementation process. There is still a transition phase from manual arrangements to more automatic (IT) systems in progress when controlling systems are concerned; as the general usage of IT in management functions comes more popular, also systems used in controlling change processes come more popular (Raps 2004, 52).

3 CONJOINING THE CONCEPTS, FORMING THE MODEL

3.1 ES implementation process - a change process

After presenting the concepts of Expert Systems and Change Management, it is now time to link these with each other to actually model the ES implementation process. This is done by first discussing the existing perceptions and factors stating that ES implementation can be described as a change process, from both internal and external view as presented in the chapter 2.3.1. After this, the structure of ES implementation as a change process is being evaluated by stating an assumption where the model of "major anatomies of change" (Grundy 1993, 25), presented in chapter 2.3.2, is adapted to correspond with the typical structure of ES implementation project. This will be followed by the managerial issues, stemming from the characteristics of both ESs and the utilizing organization, presented already in the chapters 2.2 and 2.4 respectively. Finally, these managerial efforts are presented together with the adapted change curve and coping cycle to provide a summarizing figure about the whole context.

Keeping the basic assumptions regarding ES and change management - presented during the previous chapters - in mind, it is rather easy to deal with ES implementation as a change process. Firstly, as it has been presented in the chapter 2.1, the purpose of ESs is to incorporate new and effective methods in handling the existing business processes, in this way change is automatically involved. A statement could be made, that the utilizing of a new ES cannot be done without implementing change. Secondly, basic, fundamental questions related exclusively with ES implementation process are undisputedly same in nature as the ones most often raised with general change process. These corresponding factors are discussed later in this chapter to provide an outlook about the phenomenon in general. Thirdly, ES implementation also promotes its role as change process by corresponding with the dualistic role of change - the present chapter will be started with this topic.

3.1.1 The dualistic role of ES in the context of change

As it was claimed in the chapter 2.3.1, change can occur as an external force that requires actions in the organization, e.g. "changing environment" (Lehto 1990, 13), but at the same time change is an inter-organizational mission that involves reorganizing and altering of existing structures and arrangements to implement a desired strategy (Grundy 1993, 19–20). Definition of ES fits to this problematic description by having

both of these roles; it is at a same time a thread in the hands of your rivals, but also a tricky system to be implemented by yourself.

In the present situation, where developed technology makes it rather easy to build complex and powerful information systems, many organizations can and also must utilize these systems to maintain and develop their operations and competence (Nyman & Silén 1995, 134; Lanning et al 1999, 246), meaning that they must keep up with their competitors who obviously will also utilize more complex technology to overtake their own competitors. On the other hand, ES implementation requires successful inter-organizational change to be created so that the benefits of the new system can really be utilized (Hauser & Hebert 1992, 10–14) and harnessed - and this is also the very phenomenon that this particular study tries to unravel. However, although the ESs role as an external change driver is here being discussed only on a rather shallow level, it is certainly not suggested that this factor should be totally neglected in the ES implementation process. Actually, it may even be utilized in motivating of some parts of the implementing organization.

3.1.2 Anatomy of ES implementation as a change process - the change curve

When the amount of occurring change is considered, typical ES implementation process happens in two stages. From the user's viewpoint the implementation process involves first the phase where the system is actually put to work at the first time, which will then be followed the practically mandatory refinements, adjustments and updating of the system (Barret & Beerel 1988, 211). The utilization then creates a larger amount of short-time change, as the forthcoming updates and refinements in working routines generate lesser change, but on a longer time period. Together these stages form a hybrid change curve, presented in the figure 5.

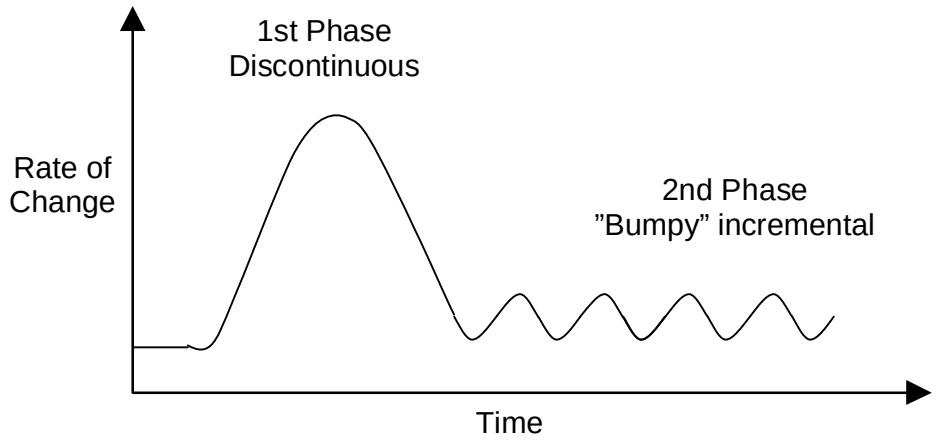

Figure 5 The hybrid change curve of a typical Expert System implementation process (Adapted Grundy 1993, 25)

For some occasions, the figure may overemphasize the magnitude of the “bumpy” incremental, second phase change. However, it would be much more reckless to underestimate this issue as ESs tend to require much more or at least as much post implementation care and reforming than information systems in general (Barret & Beerel 1988, 212–213). According to Barret & Beerel, this maintenance may include also rather extensive restructuring projects, and depending on the system and business processes it is connected with, these can also occur in a rather fast phase. This means that first renewal projects may even manifest before the whole planned implementation period even has ended. Thus, the whole implementation process may not include only a single utilizing event, but usually encompasses also one or more smaller renewals. The amount of change these renewals create depends obviously on the nature of the renewal itself. The concept of second phase change also relates to the idea about continuous change of Hayes’s, presented also in the chapter 2.3.2. According to this view, it would even be desirable not to completely end the implementation project, but to left the utilizing organization to a stable situation of steadily happening change where small-scale implementations of new versions from the system would be incorporated on a regular basis.

3.1.3 Phases of change in an ES implementation process

If the phases of change, presented in the Carnall’s *coping cycle*, and the characteristic *change curve* of ES implementation would be joined together, this would presumably make the *self-esteem curve* to first sink when the new system is being utilized, and then start to again rise when the things would start to settle again. However, if handled

poorly, the forthcoming updates and renewal processes may end up slowing down the *adaptation* phase. This would result as the incrementally increasing self-esteem curve, presented in the figure 6.

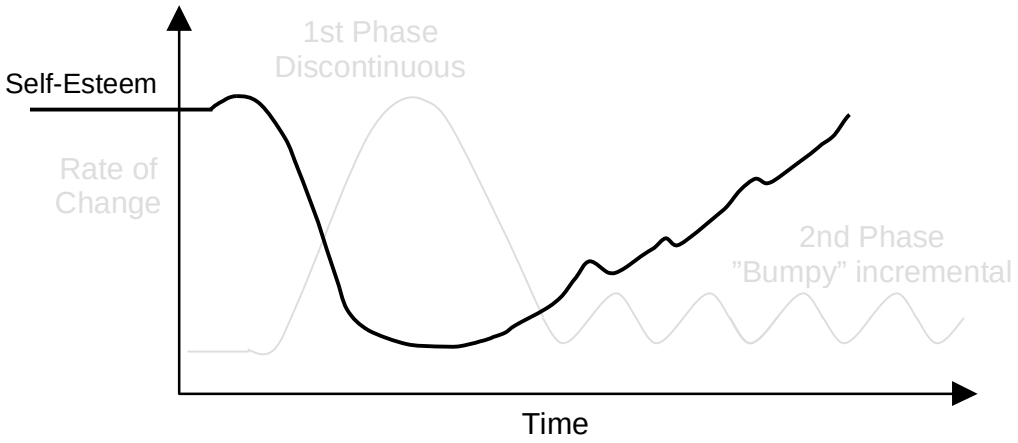

Figure 6 Hybrid change curve and coping cycle (Adapted Grundy 1993, 25; Carnall 1995, 144)

It is utmost important to consider that the dynamic effects presented in the figure 6 are a result of forceful simplifications and assumptions; however, the logics behind the change magnitude and its effect on the coping cycle are something rather natural, and therefore something that can be used when discussing the structure of change in this context. The most important notion is that the magnitude of change and coping cycle's characteristics are highly case sensitive; the most dependable on the system and organization at hand. Some systems do not need immediate renewal processes, and even if these are needed, the nature of these processes may still vary so that the direct effect on coping cycle may differ even drastically. What should be in common, though, with different organizations, is that the change occurring because of the later renewal processes should introduce lesser impact on the coping cycle that the first ones do as the organizations should also "learn by doing"; gain understanding and new abilities on how to tolerate change in this context. Moreover, not only do the ES itself come more "business as usual", but also the updating and renewal processes come part of the everyday life of the organization. In any case, the facts presented in the previous chapter defend this kind of approach, which should be included when the overall concept is being discussed.

3.1.4 Stages for the management of ES implementation

ES implementation process should be handled as an independent project, and the implementers should also have adequate resources to accomplish this mission. Sadly, as the overall ES projects tend to get managed as technical pursuits, also the implementation activities may get seen as a “necessary evil” or secondary task.

As it was presented in chapter 2.4.1.2, paying special care on the stages of *planning* and *diagnosing* in the early phase of change implementation are important, but still often neglected in practical change situations. This setting, offered by Grundy (1993, 50) has even greater position in ES implementation process. Rao (1991, 42) promotes strongly preparation and planning as the most crucial phases of successful technology transfer of ESs. Because technical and systems aspects tend to get so easily overemphasized, it may require special effort to even perceive the implementation procedures as an independent project. In a situation like this, it may be very difficult to give the planning and diagnosing activities the status and resources they deserve, yet this would probably prove very useful in the later stages of the implementation project.

3.1.5 Managerial issues

Above it has been claimed, that the implementation process of an ES causes and also requires performing of an inter-organizational change process - furthermore, because of the special qualities and wider influence of ES, implementation of these more complex systems require even greater care and dedication. Here general specifications of ES implementation are linked with traditional viewpoints of change management and strategy implementation through the very managerial issues, one could say guidelines, offered in the traditional change management, ES and technology management literature so that the themes discussed in previous chapters would be most effectively taken into account. Thus, there are independent issues rising from a rather heterogeneous range of literacy, discussed so that only those themes emphasized in all three types of literacy are chosen to be included in the context. Also the dynamics between the issues, thus how separate issues affect other issues, are discussed.

The issues are distinguished in *structural and organizational* and *people* factors. This distinction is not done only to make the entity more convenient to approach, but also simply because of different natures of the two groups of these factors. Structural and organizational issues have the nature of more formal and systems-like arrangements, something that can be achieved by straight managerial decisions. People issues tend to be more intangible, as they usually have more complex internal structure and also require more difficult efforts to be achieved.

Structural and organizational issues are important (Raps 2004, 51–52; Hauser & Herbert 1992, 14), but this is just a part of the whole truth. As ES utilization has tremendous effects on human resources of the organization (Hauser & Hebert 1992, 12) like change processes usually have (Nyman & Silén 1995, 95), particularly "soft" facts like human and cultural aspects need also to be considered (Raps, 2004, 50–51). The concepts of Carnall's *coping cycle* and in particular *self-esteem* support this view. Below the structural and organizational, as well the human resource issues are discussed respectively.

3.1.5.1 Structural and organizational issues

Clear and established **management structures** or decision-flow systems are an important factor for any organization in any situation; this is the case particularly in change management as in strategy (Raps 2004, 50; Carnall 1995, 16–17) and technology (Bailey 1993, 108, 110–111) implementation. These claims are supported also by Barrett & Beerel (1988, 174, 204) and Wiig (1990, 51), who define established roles for people taking part in the ES development and implementation process, and specially promote the importance of operations management with direct responsibilities for the functional tasks that are to be automated. Defining the process owners etc. is vital for a complex and influential project to succeed.

Another way to approach this issue is to do it through the concept of organizational *coordination* - this means arranging the internal environment of the organization so that seamless co work can be achieved between the many stakeholders taking part in the implementation. In the general implementation of strategic decisions, successful coordination of participants is one of the key aspects (Alexander 1985, 250).

Traditional models on information systems implementation also promote the importance of task allocation in the information system projects; Forsman (1995, 22) defines the participants of information system to *owner*, *control team*, *project team* and *users*. Although this distinction is used only to describe the project-organization of the system development and implementation process, not the organization in general, it supports the importance of established roles during the implementation process.

Hauser and Hebert (1992, 12) claim that other important factor in implementing ES is **job redesign**. Basically this means reforming and reshaping of job descriptions in such a manner, that the negative effects of ES implementation on users, including e.g. boredom or frustration, could be minimized. Managerial techniques like job refreshment or job rotation can also be utilized to prevent these effects (Hauser and Hebert 1992, 14). The view that promotes the importance of job redesign is also provided in other literature, concerning both ES, technology management and change implementation in

general; Basil and Cook (1974, 167) discuss the *internal conditioning in the firm* and *job security* meaning same procedures that are included in job redesign; Willcocks and Mason (1987, 93) name neglecting of job design as one of the most important causes of anxiety when daily work is being computerized; Barret and Beerel (1988, 212) also see this context important, particularly in ES implementation. Moreover, Bailey (1993, 110) claims that job design and alternative forms of work organization could help tremendously in achieving more satisfactory match between the needs of people concerned and their organizations; this would increase the benefits the new systems could offer.

There is also the concept of **technical reliability**, concerning the implemented ES it self, which has major impact on how successfully the utilization can be managed. Practically this factor has effect on the implementation process through two other concepts that will be presented later; *user involvement* and *training*. The new system should gain trust among its users during the early parts of the implementation, and the fully working and nominal system is also an important part of the training efforts, as most lucrative way to train the users is often to give them the opportunity to "play" with the system (Barret & Beerel 1988, 210–211). If the system doesn't work or handles the given tasks wrongly in this point because of the lack of technical reliability or poorly handled 2nd phase updates (Barret & Beerel 1988, 212) presented also in the chapter 3.1.3, major damage can happen among the utmost important *user attitudes*. This view can be easily linked with the Carnall's coping cycle; especially the phases of *discarding* and *adapting* are vulnerable for technical problems and inconveniences (Carnall 1995, 146–147). Bad setbacks and problems may even stop the coping cycle; in any case, winning the trust of the users after technical disappointments can be much harder than in the very beginning.

The list of organizational issues, which can be used for supporting the change implementation, also in ES utilization, continues with **controlling and monitoring systems**. The importance of these is in particular supported by Raps (2004, 52–53), who claims that control systems and continuing monitoring of change success is one of the four key elements in strategy implementation. From the ES's point of view, also Barret and Beerel (1988, 211) support the significance of this type of data collecting by mentioning measures like *user documentation* and *feedback channels*. Monitoring is also important because it makes *rewarding systems* possible in the first place. It also has close relationships with *management structures* and *intra-organizational communication* as a significantly important information source.

Effective, encouraging and rightful **rewarding systems** are mentioned often in the literacy concerning change management – these measures are put here under organizational and structural factors, although they could as well belong to the more human actions because of their strong correspondence with human, inter-organizational

relations. For an example, Lanning et al (1999, 159) mention *"good old carrot and stick measures"* in forming an attractive goal. Rewarding corresponds with motivation on deeper level; the key thing is to motivate through underlining *personal benefit* – this effect can be achieved also by supporting internal transparency and reasoning in personal context (Lanning et al 1999, 158), discussed in more detail in human resource factors. Also Hauser and Hebert (1992, 14) promote the importance of effective rewarding systems in the context of ES implementation.

3.1.5.2 People issues

First here presented human resource issue is appropriate **internal culture**. Also this factor is empathized in most of the literature concerning change implementation, as in ES utilization. Raps (2004, 50) lifts the appropriate culture as one the four key elements in successful strategy implementation - also Basil and Cook (1974, 184) support this view; they label the context of culture "change-responsive climate". Together with organizational structure, the proper organizational climate balances conflicting objectives and demands (Basil & Cook 1974, 184). Willcocks and Mason (1987, 33) mention culture as the first defining aspect when possible resistance to technological change, as Frankel (1990, 8) emphasizes the technology acceptability constraints in acquisition of new technology. According to Bailey (1993, 126–127), culture does not only affect though the basic attitudes, norms, expectations and values, of the organization, but has also to do with the way things can be communicated and managed in the organization. Thus, culture also affects also at least two of our other factors; *communications* and *management structures*.

As already claimed in the subchapter 2.4.2, in this context the term culture relates to the internal culture of the organization, not the national culture affecting the behaviour of the people forming the organization. However, as the national culture does this way also affect the organizations internal culture, it cannot be fully neglected when discussing this issue. National cultures gain special importance in international organization where there are more than one national cultures and maybe even differing histories of country organizations affecting the behaviour and stands of the people in organization. National culture will be examined more in depth in the subchapter 4.3.2.

Among the other issues, **intra-organizational communication** has a special role in supporting the change implementation; as a mechanism used to *increase transparency* and *reason change* it really has motivating and encouraging effect among respondents and participants as they begin to understand the occurring change (Raps 2004, 51; Carnall 1995, 124). Lehto (1990, 154) brings up this issue on higher and more general level by stating that there should be an established linkage between the existing

communication strategy and change implementation strategy. If a more promotional stand is taken, it could be claimed that also pure endorsement efforts are also needed, as ESs seldom sell themselves only because of their good functionalities and abilities (Feigenbaum et al 1988, 123). Also Barrett and Beerel (1988, 210, 212) promote internal communication in the context of ES implementation in this way, by claiming that the most important thing in handing the complete ES to users is to "sell the system for its users"; however, the new system should not be "oversold" neither (Leonard-Barton and Kraus 1985, 231). Lanning et al (1999, 54) encompass the high importance of communications by claiming that communications are not only important in the change implementation phase itself, but also *before* the process; by communicating the existing problems to the participants of change forehand the later phases of the process will be much easier to handle. It is important make it possible to span the communication routes on every level of the organization, so that communication can help the implementation also on a very pragmatic, daily level (Clark 1995, 214).

Communications also have a great effect on the next factor, *user involvement* (Frankel 1990, 9), as feedback/feedforward of technology use information depend much on the communication possibilities at hand. Leonard-Barton and Kraus (1985, 227) present the concept of marketing perspective in the context of new technology implementation. According to their view, instead of just promoting the useful features of the new technology and its applications, they claim that a more marketing-like stand should be taken. Understandably, this practically means involving of the users and integrating of also their perspectives already in the development phase.

Involving users effectively to the designing- and development process is greatly empathized, especially in the literature concerning ES and technology management. As the system will usually have great effect on the users and their daily routines, it is very important to include them to the development process in as early phase a possible (Barret & Beerel 1988; 205, 210). Also Hauser and Hebert (1992, 14) see this as a powerful measure to make the ES more efficient and easier for the users to accept. The involving procedures stand in the spotlight also in the general change management literature; e.g. Lanning et al (1999, 170) regard the *participating development* as a crucial factor in successful change management. Carnall also joins in this view (1995, 156–157), but also states the possible problems that can occur in user involvement; especially in larger organizations involving the people is very time consuming and difficult. As stated in the end of chapter 2.2.3, by involving all in the development project from the very beginning, it is not only possible to utilize more information, but to also promote the benefits of the change and in this way as well motivate the users in a natural way. Moreover, the concept of *involving* suits also in the utilization phase of the system; here it could be used to describe the efforts to get the users to initial contact with the system, thus engaging them to try and see the system in use. Here also *training*

can be utilized. Involving users does not either end when the initial implementation project ends, it is also important to use for an example satisfaction surveys and other feedback methods to get insights from the larger group of users.

Last, but certainly not the least, “soft” issue mentioned here is **training**. In the organization of today the training activities are so well empathized that in many cases “implementation activities” are seen mainly as “training activities”. Undoubtedly, training is important - this is claimed trough many propositions in both information system and change management literacy. Lanning et al (1999, 276) and Eppinette et al (1997, 64) share this view, but also underline the significance of valid and appropriate, strategically reasonable training procedures. This is also done by Nanton (1984, 241), who incorporates the “touching faith” in the merits of the training process and its applicability to effecting valuable change. Training activities should be carefully linked with the change process at hand. In literacy concerning ES, training is seen just as important as in other IS literacy. Barret and Beerel (1988, 210) claim that the most important task of training is not to help users to overcome difficulties but to encourage them to use the ES, thus engage them as claimed with previous factor. As already stated in the previous chapter in the context of *technical reliability*, according to their view, with ES, the most effective training method is to “play” with the system itself and in this way learn by doing. In this way, the benefits that the system can offer come evident for the users and may create interest and faith towards the system. Furthermore, they propose that getting familiar with the system should be made fun. Also Hauser & Hebert (1992, 13–14) emphasize the training activities.

3.2 Enabling change management to ES implementation - dynamics behind the issues

In this chapter the issues discussed above will be collected to a single framework and presented in a distinct model to establish an easily comprehendible view to the whole subject; **expert system implementation as a manageable change process**. The purpose of this is not to sum up everything that has been presented; this would lead to much too oversimplified and probably even false presentation about the subject. Thus, the intention is not to offer an overwhelming theory that would explain the issue definitely. Instead of this, the goal is to explain the dynamics that occur between the managerial issues presented in the previous chapters, and how they relate with the different structures and qualities of ES implementation project as a change process, presented in earlier chapters. Because of the rather heterogenic literature and broad set of concepts, it is also convenient to offer a one more representation, where these rather distant domains are conjoined all at the same time - this also makes it easier to access

the research itself as the complete area can be perceived with the help of the depiction (Figure 7).

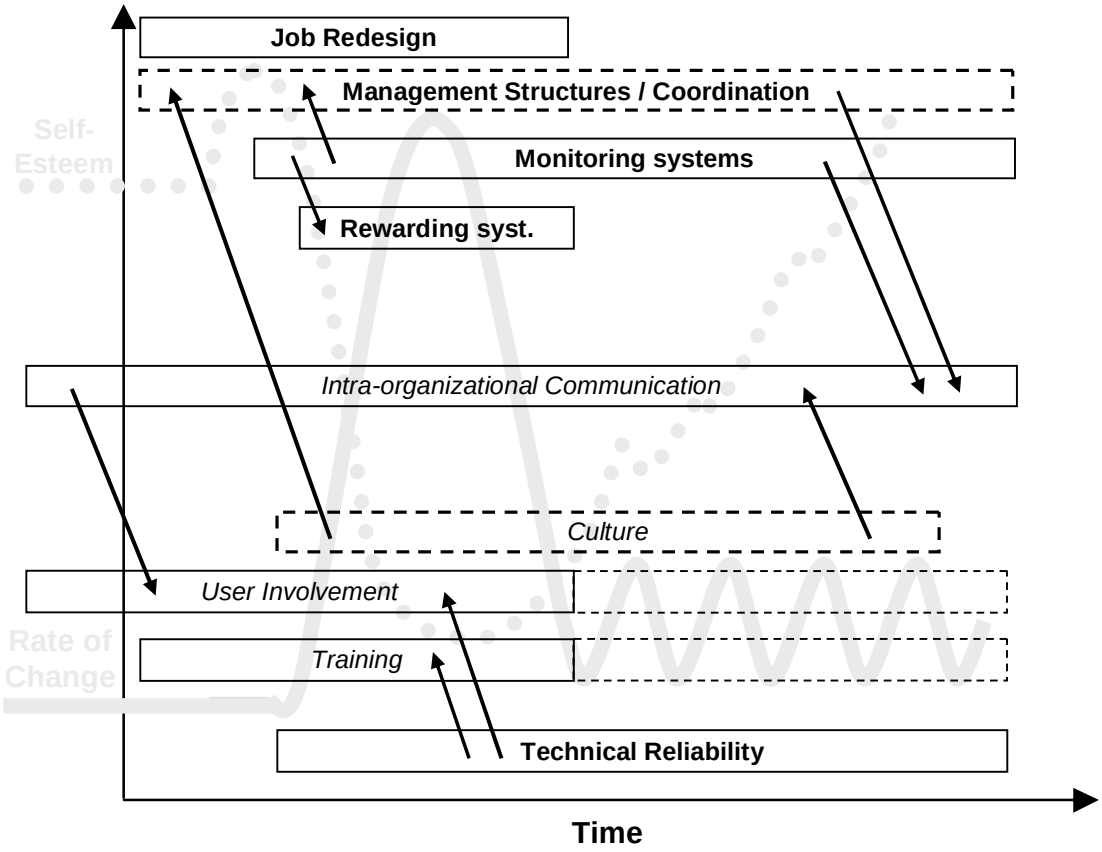

Figure 7 The representation of the Expert System Implementation Change model

As it can easily be seen, the basic frameset of the model is the *hybrid change curve of ES implementation*, presented already in the previous chapters, accompanied by the *self-esteem curve*. Thus, model has two dimensions; 1. time and 2. change magnitude and self-esteem. There are at least two reasons to use this frameset to present the overall concept. Firstly, it is useful to use an existing pattern to describe the structures and issues. Secondly, and much more importantly, *change magnitude*, *self-esteem* and changes in them have very strong influence on the need of managerial issues which should be placed in the very same representation.

Both types of managerial issues described in the chapter 3.1.5 are placed in the figure, according to their effect and the time perspective of that effect. Some of the factors will span over the whole implementation process, some may be important for only a shorter time period. Moreover, some issues have an effect on others, or even affect the implementation process and the occurring change through them. These structures and dynamics are also included in the representation. The *structural and*

organizational issues are presented in bold as *people issues* are written in italics. Moreover, the "given" factors that cannot be altered for a one single project are surrounded by a dashed line.

When assessing the model through the representation, one should also remember the stages of change, presented in the chapter 2.4.1.2; before the implementation process every factor and its effect should be carefully planned and after that executed as a part of the implementation. During and after the process, the made decisions and actions should be controlled and learned from. As the stages affect every issue separately but at the same time occur in the overall project structure, it is not convenient to attach them into the graphical representation.

In this representation, structural and organizational issues, most of them placed in the upper side of the representation, have very altering durations. *Job redesign* and *rewarding systems* should quite logically be more episodic in nature, as *management structures and coordination*, *technical reliability* and *monitoring systems* are needed almost at any time. People issues tend to have rather long time span over the whole process

The many interrelations between the specific issues are as follows:

- Monitoring systems have a strong effect on how the implementation can be managed as information on the usage and user satisfaction of the system is of utmost importance in coordinating the ongoing implementation. Moreover, in some applications of communication the information of system usage is needed. At the same time neither possible *rewarding systems* cannot be developed if the same information is not accessible. Thus *Monitoring systems* affect all *management structures and coordination*, *intra-organizational communication* and *rewarding systems*.
- Management structures and coordination affect strongly the way things can be communicated in the organization as the routes and routines for internal communication must be fully coordinated and ready to use at the time of the implementation. Thus, *Management structures and coordination* affect *intra-organizational communication*.
- Culture affects very strongly the methods and possibilities there are to manage and coordinate the implementation as it defines many conditions in the organization. At the same time, also communicational styles and applications take their form according to the specifications of the internal culture. Thus, *culture* affects both *intra-organizational communication* and *management structures and coordination.*
- User involvement can be greatly supported by the means of successfully applied communication efforts. Thus, *intra-organizational communication* affects *user involvement*.

- Training is usually the initial method in engaging the users to the system. Thus, *training methods* affect *user involvement*.
- Technical reliability makes both the successful and user-convincing training efforts and also straightforward user involvement support possible. Thus, *technical reliability* affects both *user involvement* and *training*.

4 THE IMPLEMENTATION PROCESS OF AN INTERNATIONAL ES – MANAGING CHANGE IN A LARGER CONTEXT

4.1 Engaging the international aspects

To keep the overall structure of the study as simple as possible, the international context will be presented here in as a separate chapter. This is done not only to make the core concept more understandable, but also to promote the special features of international environment by presenting them in a distinguished form. It is a good idea to attach international context in ES system implementation - this is because of three distinct factors. Firstly, during these days of international organizations and widely used IT, it is very common that a new ES is to be run within international environment. Secondly, because of their features, ESs can offer much for particularly transnational organizations. Thirdly, international environment affects the system and also its implementation process in many ways.

All the aspects presented above will be dealt with in this chapter respectively, so that it will finally be possible to attach the influence of international environment to the context of overall study. Some of the aspects offered consider only information systems generally, not ESs exclusively, because of the limitations in existing literature. This limits the possibilities for totally overlapping conclusions, but does not make it completely impossible to handle the subject; international aspects affecting the ES implementation process tend to be most often either technical or cultural aspects, which then use other issues as their vehicles to affect the implementation process.

4.2 International information systems of international firms

Global information systems are a natural part of modern, international management. The new technologies of the past decades have affected the ways and places where firms do work in many ways, and their impact will be even greater in the future as the technologies evolve and firms gain experience in implementing the changes enabled by them (Applegate, McFarlan & McKenney 1996, 282). It is obvious, that most multinational corporations operate as organizations on such a technically sophisticated level, that established and complex information systems are vital for them – by providing the communication and analytical power that firms need for conducting trade and managing businesses on a global scale (Laudon & Laudon 2002, 5). Because of the

qualities and roles of these systems, surprisingly many of them can also be considered as ESs (Byrd 1995, 3).

In the internal environment of a multinational corporation, information system management confronts few special issues, stemming from the rather traditional structures of international perspective. Roche (2000, 57) presents three issues like this, which are 1. geographical dispersion of the value chain, 2. historical development and sequencing of the value chain, and 3. administrative culture. *Geographical dispersion* drives different system requirements, *historical development* means existence of isolated, geographically dispersed data centers, and *cultural factors* create bias in the communicating and leading of the new IT technology. Although the first and second factor may seem like rather technical issues, requiring care mainly in development phase, they tend also to affect the stages of implementation process by using the *technological reliability* as a vehicle. The third issue has rather straightforward effect on the implementation efforts; however, like the ES implementation model suggests, also this aspect has the effect through communication and management structures.

No MNC would survive without its information systems (Fatehi 1996, 513) - because of the wide geographic distances separating the organizations operations from each others, information systems play a critical role in strategic planning, implementation and control of MNCs (Fatehi 1996, 522). According to Globerman (1986,401), the demand for multinational computer systems has been stimulated by increased competition and complexity in international business along with economies of scale in sharing on-line software and information data bases.

Applegate et al (1996, 283) promote the concepts of *global networking* and *expertise sharing* within the reasons that justify the great demand for multinational information systems. With this they mean that with these systems, *"global sources of knowledge can be quickly tapped, the barriers and time zones swept away, and the overall response time to problems sharply altered"*. When we compare this definition with the basic benefits of ESs, presented in the chapter 2.1.2, it is easy to find interrelations with the traditional ES advantages. In this way, it could be claimed that with the special qualities of ES, it is possible to overcome problems within the context of expert work and knowledge source utilization, particularly in more widespread, international organization.

4.3 International environment affecting the implementation process

Although ESs can offer much for an international organization, as claimed in the previous subchapter, the larger and more complex environment also makes it also more

difficult to utilize the benefits of the system; usually several problems arise when multinational firms attempt to build “global” information and communication systems (Blaine & Bowen 2000, 51). Aspects stemming from the international setting, presented in the chapter 4.2, have rather clear effect on some of the managerial issues used to model the “simple” implementation process described earlier. This raises interesting, although rather traditional viewpoints to the framework. Here both of those *structural and organisational* and *people* issues, experiencing alterations and greater importance because of international organization are being discussed together with the new methods stemming from these changes.

4.3.1 Structural and organizational issues

Technical reliability is the first and most evident issue that is being affected by international setting; geographical dispersion and historical development make it much more complicated to secure technological functionality. Questions concerning hardware, software and telecommunications pose special technical challenges in an international environment (Laudon & Laudon 2002, 511) which must be considered. Obviously these issues are something that has to be considered during the development of new system, although because of the complex nature of ESs, it may not even be possible to make sure that not a single malfunction would occur. Thus, more effort and care must be put on securing the technical reliability if it the ES being implemented is going to work in international environment.

System integration is the major way to overcome these problems (Berg & Mantelaers 2000, 248), but one has to understand that the integration process itself may also require new change to be implemented and managed; for an highly simplified example, if some regional divisions of the international organization are currently using IBM-compatible system and others are using UNIX-based system and the new system requires IBM environment to work, those divisions using UNIX may have to change their working habits entirely (Adapted Laudon & Laudon 2002, 512). This may lead to a much greater change process than the one originally predicted.

Managing the change occurring with and because of international ES implementation requires also more appropriate **management structures**. This manifests now even more evidently through the concept of *coordination*, also presented in the chapter 3.1.5.1. This is something that for an example Berg & Mantelaers (2000, 249) suggest to be crucial when international systems are utilized. As there are more stakeholders, working in a possibly more complex organization, also more weight should be put in organizing the taskforce handling the implementation.

Moreover, the arranging of the management structures involved in the implementation raise the traditional question in international management; the question of whether to localize or globalize. In this context this means practically deciding, how largely the implementation will be handled as a local, and how much as a centralized project.

4.3.2 People issues

Not surprisingly, the **culture** issue also comes more important when the implementation is being handled in a multinational organization – it is possible that instead of the intra-organizational culture being affected by only one national culture, there may be more cultural diversity making also the internal culture of the organization more heterogeneous, making it more difficult or easier to handle the implementation. Shortly put, cultural diversity makes the whole area more complex. Culture has a tremendous impact on both the use and acceptance of advanced computer and telecommunications technologies in international firms (Blaine & Bowen 2000, 51). Blaine and Bowen also claim that *"by shaping the way individuals and societies communicate, and process and interpret information, culture and social institutions have a critical effect on the way IT is used - both by individuals and within organizations"*. Thus, IT is not culture-neutral, but it has a strong social and contextual dimension.

When considered on a more general level, the more complex context of culture also affects the overall change implementation; this happens because it will be more complicated to diagnose and design the implementation procedures needed in local organizations, where differing cultures may require different methods to be utilized. At the same time, the existing culture may make it simply more difficult to implement the system in some regions than in others because of the varying change tolerance levels. This diversity could be managed by cooperating more to build group decisions, tolerating uncertainty, respecting everyone's experiences and by sharing the own ones as much as possible (Mead 1994, 15).

One more important factor which rises from the multicultural structure of international organization, and has an utmost close relationship with the previous issue of *culture*, is **communication**. As already presented in the previous chapters, communication is one of the most crucial things in effective change management. In an international organization the communication evolves to *cross-cultural* communication (Adler 2002, 73–74), and much more care must be put on the designing and carrying out of the inter-organizational communications in a change situation like information system implementation.

Laudon and Laudon (2002, 510) promote the significance of **user involvement** by presenting *cooptation* as an overall implementation tactic. When using cooptation, the international organization brings the local opposition into the process of designing and implementing the new system without fully giving up control of the direction and nature of the change. Although the cooptation needs some organizational structures to be used as an implementation tactic, the effects of the technique are very “human-effecting” in nature. In this sense, it is possible to see the cooptation as a pure human resource factor. *User involvement* has a logical, great positive effect on the international implementation process as it brings the system much closer to its users - in a transnational organization any activity like must be considered as positive. As the positive effects may be hinged, however, because of inconveniences and administrative difficulties (Carnall 1995, 156–157), it is good to have methods like *cooptation* to be used as intermediate tools.

5 METHODOLOGY

5.1 Design for the research

The research method used here is qualitative, prestructured case research. The relationship between qualitative and quantitative research has been an extremely interesting dilemma in the social sciences for the last 30–40 years. As the pure amount of qualitative research has boomed since 1960's (Morgan & Smircich 1980, 491), it has become widely and increasingly admitted that qualitative and quantitative research have became more or less equal in conducting a research (Silverman 1985, xv). However, the picture has not still completely cleared, and there is still very much conversation going on about the subject; not only about which type of research could be considered as dominant (Silverman 2000, 1–2, 11), but also about how much they can interrelate (Tauber 1987, 7). One thing that well describes the situation is the fact that still very often, nearly always, qualitative research method is presented in first hand as an antonym for quantitative research (Koskinen, Alasuuteri & Peltonen 2005, 30), not usually vice versa. As the purpose of this research is to map and understand the change occurring in implementation process of an expert system, does also the qualitative research fit naturally as the research method, providing tools for observation and testing of suggestions made earlier.

The idea of using a case study in the research needs some explaining. When conducting a research about a phenomenon that has happened in real life, it is rather tempting to only say that "this is a case study", end of story. However, the concept of conducting a case study is not all that simple and easy. How to describe case study? According to Hamel, Dufour and Fortin (1993, 1) it can be shortly described as an in-depth study of the cases under consideration. This leads to another, maybe most problematic theme concerning case study (Koskinen et al 2005, 154); is case study a method or an approach? Although the sometimes used term case method suggests case study is a method, it is most often claimed that case study should be treated as an approach because of the various methods it itself employs (Hamel et al 1993). As an overall method case studies sure are a used method in business studies; they can so naturally be utilized to provide insight into an issue, a management situation or new theory (Ghauri 2004, 109) - this view is supported by Berg (2004, 258) who states that *"the scientific benefit of the case study method lies in its ability to open the way for discoveries"* and that *"it can easily serve as the breeding ground for insights and even hypotheses that may be pursued in subsequent studies"*.

As mentioned above, prestructured case (PC) was chosen as the primary research method for conducting the qualitative research. The case involved was the

implementation project of an international, distinguished expert system utilized in a large, multinational bank organization. The system was to be used as a supporting application in direct customer counselling.

PC as a method uses a *case outline*, formed before any data is collected, to work as a shell for the data to come (Miles & Huberman 1994, 84). PC requires a rather precise set of research questions, and a quite established theoretical framework so that these questions can be formed. The mindset of prestructured case controlled the research process from the design of data acquirement all the way to the data analysis phase. While PC offered most convenient method for carrying out the process, there were also some important issues to be addressed with the rationale behind using it in the research. Firstly, PC usually comes to question when there are several cases to study (Miles & Huberman 1994, 84–85); in this research there was only one single case to scrutinize. However the case, international implementation process of a distinct ES, can be divided in two independent but much alike regional implementation processes - this gave an opportunity to compare the two "sub-cases", and therefore to also cope with the lack of multiple cases. Secondly, PC usually demands several field visits and also, in some occasions, several homogenous interviews to provide reliable data (Miles & Huberman 1994, 84); in this research there were not multiple interviews conducted with the same interviewees, but many homogenous interviews among different interviewees.

5.2 Empirical data collection

Empirical data for the research was acquired with eight interviews, performed during the summer 2007; one of these was had with the main developer of the international solution, two were had with the persons who were responsible for the regional implementation processes in Finland and Sweden and five were had with persons who had gathered wide understanding towards the system as both trainers and users.

There are three ways in which interview data can be collected; Positivism, Emotionalism and Constructionism (Silverman 2001, 86). Emotionalism with its unstructured, open-ended interviews was chosen for interviewing technique, as it is regarded as the most powerful interview type to provide authentic insights into people's experiences (Silverman 2001, 90–91). In this sense, because the focus was on understanding and mapping the process and dynamics of change in expert system implementation, emotionalism seemed to be as the most convenient alternative for interviewing method.

Combining the demand for rather structured question framework (demanded by the prestructured case method) and open-ended set of interviewing questions was not actually so difficult task; because the whole case study deals with a process including

certain issues and aspects discussed already in the theoretical framework, the whole case outline - based on this framework and model - supplied a well-structured configuration and also sampling plan in one form. This “fishbone” hold together the open-ended questionnaire, and in the end made it possible to operate the prestructured case with open-ended, rather informal questions. Interview outlines were slightly altered according to the roles of the interviewees; however, the same basic issues can be found from every conversation.

The interviews were done in various locations and researcher met the interviewees at the premises of the bank. Interviews had the length of 35 to 80 minutes. Every interview was digitally recorded and archived in .mp3 -format. Carefully done transliteration of the interview audio material resulted as 70 sheets of written documentation.

5.3 Data analysis

The analysing work was practically conducted by processing of the opinions of the interviewees, all having close relationship but different viewpoints for the system, and then comparing these comments to the suggestions and propositions offered in the model formed with the theoretical framework. The prestructured case study approach, described earlier in the chapters above, offered also a powerful tool for this task. Previously conducted forming of the theoretical framework and the model offered by it could be utilized to form the interview questionnaire that was used; in this way it was easy to carry out also the data analysis process with the help of these existing structures. This also connected the analysis process closely to the techniques suggested to be used with prestructured case method; all phases of the research including field work, emerging conclusions and the report presented were this way driven by the previously formed case outline, like Miles and Huberman (1994, 84) suggested.

As presented above, therefore the phases of description, meaning the “making of complicated things understandable by reducing them to their component parts” and explanation, meaning the “making complicated things understandable by showing how their component parts fit together according to some rules” (Bernard 1988, 317), were carried out respectively in a one single analysing process. A word processor was used as a concrete tool during the process, and the actual analysis was conducted by joining the theoretical model as case outline and transliterated interview data to form a single display (description phase); after this, conclusions were drawn from the display (explaining phase). It is important to point out the importance of display, being *“a visual format that presents information systematically, so the user can draw valid conclusions and take needed action”* (Miles & Huberman 1994, 91).

5.4 Reliability and trustworthiness of the research

There are many effective models for evaluating qualitative analysis. In this research the model provided by Mäkelä (1990, 47–48) was used for this action; in this representation the analysis is evaluated with the help of criteria that is formed by three factors;

- Significance of the material and relationship with the society or culture; *"Aineiston merkittävyys ja yhteiskunnallinen tai kulttuurinen paikka"*
- Sufficiency of the material and coverance of the analysis; *"Aineiston riittävyys ja analyysin kattavuus"*
- Estimability and repeatability of the qualitative analysis; *"Analyysin arvioitavuus ja toistettavuus"*

5.4.1 Significance of the material and relationship with the society or culture

When evaluating the analysis in accordance with significance, the basic idea is to verify that the research material really is worth researching. It is not easy to present preliminary criteria for the importance or significance of certain material, but the researcher can be requested to present certain position of his/her material in society and culture (Mäkelä 1990, 48). In the context of this research, there is fortunately a rather natural connection with the surrounding environment, as the issues presented in the initial purpose of the study are of present interest among many organizations and operators.

As significance is being evaluated, one must also regard the *truthfulness* of the data being acquired; when the data acquisition has been carried out with interview, truthfulness and authenticity of the opinions and information given by the interviewee should be evaluated (Mäkelä 1990, 49). In the interviews in question there are not any obvious reasons to regard the interviewees to have given false or forcefully "coloured" information. As the researcher/interviewer is also a worker of the organization at hand, it is possible to expect that there are not any problems in the context of "giving information to outsider"; problems in themes like *establishing a good human contact* (Blum 1948, 39). Furthermore electronic recording of the interview as *thorough transliteration* done later makes the information and therefore also the material obviously more significant. The context of mother tongues and *language* used in the interviews is not as simple. Five interviews were made using the common mother tongue of the interviewer and interviewee, this did not affect the quality of the interviews. However, three interviews were done in other languages than the mother tongues of the counterparts - this fact has an inevitable effect on the trustfulness of the acquired data.

The original case outline was made much simpler in the process of forming of the interview questionnaire; although the interviewees were specialists, there is an undisputed distance between the “true life” and theoretical framework. Thus, the risk for not being able to form a “mutual language” in the interview situation was tried to be minimized by forming the questions so that the terminology and case themes would not overwhelm or frustrate the interviewees. This can be seen as both decreasing and increasing aspect for the trustworthiness of the research; at the same time the significance of the information was improved because the mutual understanding in the interviewing situation was better, however, there is always the risk of losing and important theoretical contact when themes in the theoretical framework are simplified in this way. The fact that structured, but open-ended questionnaire was used, gives greater significance for the material. This is also supported by the interactive interviewing situation.

5.4.2 Sufficiency of the material and coverance of the analysis

As a single case study, the research has some quite obvious limitations in how profound generalizations or conclusions it can offer. An effort has been taken to overcome these inconveniences by offering a rather extensive theoretical framework, limiting the amount and boldness of the conclusions made and by studying the single case included as profoundly as possible. According to Mäkelä (1990, 52), there are no simple guidelines or meters that could be used to tell when there is enough material to conduct a trustworthy qualitative research, unlike when using quantitative methods. He addresses that it is best to start with a rather small material and then, if needed, to move on by growing the size of the research material to provide more sufficient information. The eight profound interviews conducted though, are a broad material to analyze with qualitative methods in any case; the transliteration of the interview recordings created in total 70 full pages of conversation. Obviously the mere amount of material is not an overwhelming indicator to tell the sufficiency of data gathered, but it could be claimed that it gives even some kind of directions about the satisfactoriness in this context. What is more important, is the fact that the interviewees had very powerful, although unanimous opinions, which will lead to utmost easy conclusions drawing. In this sense, the accumulation of data, presented by Mäkelä, seems to support the overall sufficiency. Mäkelä also claims that it is important to keep the sample size in manageable and processable form - the eight interviews are still a rather controllable amount of interviews, so this issue should not have caused problems.

The theme of *coverance of the analysis*, presented by Mäkelä, can be more profoundly discussed by doing it through the issue of *validity*, most often used in the

literature concerning qualitative research. Simply put, validity of the research suffers when false statements are considered to be right, or when true statements are rejected (Silverman 2001, 232). Silverman (2001, 233–236) also claims that the methods of *triangulation* and *respondent validation* are inappropriate methods to be used to secure the validity of the research. Instead of these, he presents five methods that could be used in the analyzing phase; these are *analytic induction*, *constant comparative method*, *deviant-case analysis*, *comprehensive data treatment* and *using of appropriate tabulations*. In the research at hand it was possible to use the constant comparative method, which meant simply inspecting and comparing all the data fragments that arose within the single case being scrutinized (Silverman 2001, 238–239). This was possible because of the fully transliterated research data and the analyzing procedures which included assessing every respondent's views simultaneously. The second method used was comprehensive data treatment, which meant that full, true generalizations were done only if it was possible to apply them fully to every single gobbet of relevant, collected data (Silverman 2001, 240).

5.4.3 Estimability and repeatability of the qualitative analysis

In the context of estimability, Mäkelä (1990, 53) claims, that the *"reader of the study must be able to follow the reasoning that the researcher has conducted, and he/she is provided the sufficient possibilities to agree or disagree with the researcher in his/her conclusions"*. Silverman (2000, 188) presents the themes of estimability and repeatability through the single concept of *reliability*, stating that it refers to the *"degree of consistency with which instances are assigned to the same category by different observers or by the same observer on different occasions"*. Silverman continues from here by stating that for the reliability to be calculated, the researcher must document thoroughly the methods that have been used in the analyzing work and research efforts.

In the research at hand it has been the honest aspiration of the researcher to thoroughly describe the systematics and rationale he has used to carry out the research; furthermore, the basic structure of the research has been kept on as simple and understandable level as possible. In this sense, one could expect that there should not be any inconvenience in this context that could lower the trustworthy or reliability of the research because of lack of estimability. Also the fact, that the general phenomenon put under research is apparently process-formed and therefore easily understandable, supports this claim.

When repeatability of qualitative analysis is concerned, the basic expectation is that same conclusions, that the researcher has done, should be possible to do also afterwards and by a different operator (Mäkelä 1990, 53). Thus, the analyzing and processing of

information should be conducted so that it stays as original as possible and is not simplified in such scales that it comes impossible to repeat the conclusions made (Mäkelä 1990, 53) - Silverman does the same thing by stating the possible problems which may occur when recorded interviews are transliterated and analyzed (2000, 187), and may thereby affect reliability. To prevent the trustworthiness being diminished by possible lack of repeatability, the description process was carried out most carefully, and quotations were used as much as possible when writing the case report. It must be admitted, that the interpretation of the quotations lowers the repeatability to some extent, but also this has been done with greatest care and there is a justified possibility to expect that the principal opinions, feelings and meanings behind the quotations have been preserved during the process.

6 FINDINGS

This chapter discusses the actual findings of the research. This is done by first describing and assessing the system itself through its qualifications and the benefits stemming from the use of it. After this, straight comparing and concluding efforts will be made to assess the model incorporated in the theoretical framework. This happens by considering every issue in the model one at the time, in such a manner that the perspectives from both countries (and both implementation processes, respectively), and both perspectives from the coordinators of the implementation and the trainers will be dealt with hand in hand. Thus, the views of all stakeholders interviewed and both regional implementation processes will be joined to find how much the single aspects presented in the model relate to the real life and which issues really have importance in ES implementation. This may sound rather complex, and it perhaps would have been like that if the opinions of the interviewees would have been very dissimilar; luckily this was not the case. All interviewees shared rather similar opinions and stands both about the system and the implementation of it - this makes it much easier to make the conclusions and present the findings. Obviously there were also differences to some extent, but mainly in certain issues and influence patterns only. These differences will be naturally presented and discussed thoroughly. After discussing the separate issues and their role in the implementation process at hand, the edited graphical representation of the overall model will be presented to highlight the findings of the performed case study. This will be followed by presenting the key things rising from the international context.

6.1 The system and its implementation elucidated

6.1.1 The system and its implementation

As already mentioned, the implemented computer system, considered from this point on simply as a “system”, is a one now being used by a large, multinational bank. Its main purpose is to be used as a fundamental aid and support in certain types of customer counselling situations, and it offers many types of benefits for the overall business, its users and clients. The system itself is of utmost importance, as it is a part of a whole new, strategic customer care and sales concept, developed to raise the level of service interaction and quality to a totally new level. The system is fully web-based and is run in a basic internet browser through the organizations intranet. It has a fully graphic user interface, which is designed so that it is possible to show the screen to the customer

being counselled at the time; however, it must be underlined that the system itself requires high expertise to be used and is strictly considered as any other system of the bank when it comes to confidentiality- or security issues. Thus, it is to be used only by qualified bank personnel, working on the certain banking sector.

The system has a truly international setting; it is used in all main regions of the international organization. The basic structure and logic is the same everywhere, even if there are some regional differences in legislation and local features. Moreover, although the system is now being used everywhere, the implementation was handled incrementally, so that it was utilized in a step-wise manner one national region at the time. The maintenance and upholding of the system is fully centralized in the international organization, even though the system uses older country-specific systems through various software interfaces.

The development of the system started in the year 2002, and it has been utilized during the years 2003–2005. Thus, it has been used for quite some time in every regional organization of the company. This study focuses on the implementation processes of Finland (autumn 2005–) and Sweden (spring 2004–) as separate projects.

6.1.2 The implemented tool as an ES - the benefits

The system can be considered as a textbook example of ES. Not only do the specifications and established tasks of the system correspond with the universal specification of ES; also the established benefits that the system can offer for business, correlate with the claimed universal benefits of ES presented in the chapter 2.1.2. In this chapter these benefits are discussed not only to scrutinize these benefits but also to in this way support the system's role as an ES.

Accuracy and reliability of decision making manifest because of the minimizing of human era in the process of giving counselling; the system not only offers the preliminary structure for the customer service situation and controls that legal matters are taken care of, more importantly it bases the decision making on information supplied by the most liable source in the organization; organizations own human experts. Additionally, as a system, the decision making process is automatic and also reduces the possibility of errors. *Timeliness of decision making* relates much with the facts presented with accuracy and reliability of decision making, as the expertise of organizations human experts is duplicated trough the system for every user of the system in a fast, secure and favourable manner. *Productive use of expert employees* is also supported by system, as also more inexperienced workers have the opportunity to give quality service with the system; furthermore, also the scarce expertise that the organization posses is put to work more effectively. *Documentation of decision making*

is also a very important task for the system, as new legislation requires also full documentation of the particular type of counselling. Obviously, this is also a factor that makes it easier to give quality service as earlier counselling sessions can be reviewed with customer.

6.1.3 Implementation of the system as a strategic change process

As it was indicated in the previous subchapter, it is justified to describe the system as an ES. The implementation process, where the system was put to use also corresponds much with the specifications involved in the description of change process; according to the specified strategy, the existing techniques and course of action were considerably altered by implementing a system that handles many of those tasks earlier provided by a human worker. This lead to many changes in the basic tasks and job description of the people working by the customer interface. Furthermore, also some existing systems concerning internal information flow were altered and lightened, as the implemented ES could be used as a more powerful vehicle for transferring the information supplied by the experts to the field operators.

Moreover, this was the actual purpose of the system. As it was said in the chapter 6.1.1, the system is a central part of the strategic development process concerning services development, customer care and importantly, new legislation requirements. The banking service area the system is used in is going to have major influence especially in the nearby future, and these actions taken have an inevitable importance when this transition is being handled.

6.2 Implementation process of the system

The implementation process of the system correlated to quite high extent with established aspects on change implementation; clear connections could be found in contexts of general change specifications like change curve varieties and phases & stages of change.

6.2.1 Anatomy of change - the change curve

In the context of varieties of change, the system's implementation process was a mixture of discontinuous and "bumpy" incremental change, thus the change curve ended up looking precisely like the one presented in theoretical framework. The fact

that the organizational phenomenon was a single project, system implementation process, obviously promotes that the change has happened in a single, discontinuing manner, in both regions. Together with the other implementation activities, the users were noticed that the new system is now operational and it should be used from now on.

> *…it was the overall message; this strategic, good tool would now be used with every customer within this context…*
>
> *…we said that there is this new law, and you have to use this tool, it's a good tool…*
>
> (implementation leader, Sweden)

However, there have been, and will be periodical upgrades in the system that will manifest as light changes also in the near future. Also existing plans to make the system less region (country) -oriented, to develop it to comply with new legislation, and other upgrades will produce new, although rather minor chance in every region, precisely as it was stated in the theoretical framework.

> *…you should still have couple, 2–3 releases in each country every year…*
> (system leader)
>
> *…there already have been several new versions of the system with slight changes…*
>
> *…at this point it is important to be able to create continuing developments and upgrades…*
>
> (implementation leader, Finland)

6.2.2 Phases of change process in the FPT implementation

Because of the large and dispersed field organization and the great distance between change management and end-users, it was rather hard to form satisfactory outlook about how the discussed change process had respectively raised the effects of denial, defence, discarding, adapting and internalizing, thus the coping cycle. In any case, the persons who had the experience on training of the system had noticed these phases among part of the users. Still in the present situation, users have highly differing stands towards the system.

> *Among some users, there may be comments like "I should use it but still don't know how, it is so difficult to use, why does it suggest those like of things…*
>
> (Trainer, Finland)
>
> *…then there is this group who doesn't have the same interests, and if they use the system they don't quite get it and rely too much on it; and they can go "Oo, what just happened, what's this…"*

(Trainer, Sweden)

Yes, I have heard comments like this is so tricky and this makes it more difficult to give advice…

(Trainer, Finland)

It roughly seems that the dispersed attitudes of the end-users have located them in different phases of the coping cycle; many have moved even to the internalizing phase, whilst some may still be in the defence or discarding phase. This view was shared in both countries, and by both implementers and field trainers of the system; everyone interviewed claimed that although there are many who like to use the system and understand its benefits, there are also many who do not use the system. Although many factors seemed to affect this, culture, personal abilities and technical reliability were seen as the main issues affecting this overall phenomenon. These will be discussed more thoroughly in the chapter 6.3.

6.2.3 The stages of strategic change in the system's implementation process

The implementation process of the system was handled as a fully independent project in both countries; there were distinguished plans and schedules for implementation activities, also handled by committed, separate persons. Thus, the implementation was not carried out only as a necessary evil, continuum for the development phase but as a fully separate entity.

Yes, it was a separate project…when we have an implementation process going I can give my views but, its - other people's responsibility.

(system leader)

When the change processes behind the implementation of the system are scrutinized into the five phases of diagnosis, planning, implementation, control and learning, these can all be found from the projects, however not in a very orderly or profound fashion. It is relatively easy to draw a conclusion that the implementation processes suffered from the common phenomenon of putting most of the weight in the pure implementation stage - this can be seen for an example through the goals set in both implementation projects.

Although there were clear goals set for the implementation, these were only very general in nature, and related much to the arranging of the training methods involved.

There weren't any official goals set but the starting point was that every one giving guidance in personal wealth management should be able to use the thing.

(implementation leader, Finland)

> *The goal was that all the advisers should be educated before the 1/July, and you should be able to use the tool...but we didn't have any goals about how many should be done.*
> (implementation leader, Sweden)

The *implementation* stage itself occurred in a rather interesting, polarized manner exclusively trough training and education; the organizations being responsible for the implementation processes dealt with the whole implementation process mostly as a utilization of internal training methods. If so, this is highly understandable as the training was also the best way to achieve better after-development user involvement. It was logically seen in the implementing organizations that training efforts were also the most convenient way to get the contact with the users and get them involved, to get them actually to use the system and see how good it is. The training activities as user involvement are discussed more in depth in the following chapter.

The stages of *control* and *learning* followed the implementation stage - part of this was planned, partly these stages manifested naturally because the using figures of the system did not seem to be what they should have been. Control systems were utilized afterwards; in Finland this took about a year, in Sweden a little less. Until now, in Sweden there have been two satisfaction surveys among the users, in Finand a one. These aspects are also discussed more in depth in the next chapter.

6.3 Managerial issues

After presenting the structure of the implementation process, it is now possible to scrutinize more thoroughly the distinct aspects of the full concept. This is done through the familiar setting, managerial issues presented already in the chapters above. First the issues having structural and organizational nature are being considered, after this the people issues are scrutinized.

6.3.1 Structural and organizational issues

Management structures and coordination were seen, together with the *culture*, as the most important things affecting the overall success of the implementation. All interviewees had very similar opinions about the issue, and saw that the organizational structures defining how the implementation could be managed could have been much more supportive for the implementation. Practically this means that the implementing organizations together with the people doing the actual transferring job, the trainers, did not have that kind of support from the line management of the areas and branches that

they would have needed. There should have been better dialogue with the middle management of branch offices, which had major role as the managers of the actual users of the system. This is because of the implementing organizations places and functions in the organization; these organizations are offering the sales support activities for the certain business area, thus serving the branches. As the implementers did not have the direct authority nor the help of those with the authority, it was much harder to get the message through. Although retail organization as an intermediary supported the idea of the system and recognized the situation according to the higher strategic guidelines, the fact that there have been intermediaries - located within rather long distances in the organization - involved has made the successful implementation harder to achieve.

> *Of course this is a very difficult process, this implementation process, because you have the line management that you have to anchor of course in everything you do, advisors, line management must of course support what you are doing.*
> (system leader)
> *It has been a tough implementation…and…we haven't had the management with us in the branches, the employees with us…*
> (implementation leader, Sweden)
> *…sure we have promoted the system so that it is involved in communications, and we produce controlling material and so on. But obviously we don't have any authority to give orders from here* (the implementing organization) - *it is it* (line organization of the retail organization) *who gives the orders.*
> *In principle they* (retail organization) *seemed to be taking a positive attitude towards this. But that how strongly they actually promoted the idea that the system is really used - that was not really on the desired level. But they are now taking much more positive stands.*
> (implementation leader, Finland)

All trainers shared the same view that the system leader and implementation leaders had - one trainer summed the situation most effectively when asked about general feelings towards the IT change projects in general:

> *Well, what I have especially in my mind, when you have these new systems, the most important things are the training, that you really teach people to use it, but most important is, particularly in this area, the work that the closest manager does… and it would also be important to train the close supervisors when new tools are implemented so that they could take them for their gangs… this has a great meaning.*
> (trainer, Finland)

Job redesign was involved also in this ES implementation process, but not as a direct issue happening because of the ES. As described earlier, the ES at hand was a part of larger service concept renewal process; this procedure included many alterations in the daily work of the users involved, and the system and the changes stemming from it were a planned part of this. In this way it can be seen, that tasks were redesigned to correspond with the changes created by the system. However, it is also difficult to see how much this factor affected the success of the implementation.

Technical reliability had a strong influence on the implementation process, sadly a negative one. Both countries suffered from some technical inconveniences in the early periods the implementation, and this led to some rather negative stands towards the system among some users. Not only did these malfunctions affect negatively the overall feelings toward the system, but they actually also offered for some users the vehicle to reason their other negative stands.

> *The system was incomplete when it was put to work. It should have been tested more so that it really would have worked…*
> (implementation leader, Sweden)
> *There were problems in the test versions, but when we had this production version, it was OK… but then, when there were first upgrades, they caused some problems. And after that, after almost every upgrade, there has been something.*
> *Sure these problems had influence on some users. I once saw a printout that should have been given to customer - it had a one factor presented there 30 times, when it should have been there only once. I understand that some advisors may decide after this that they won't use this kind of apparatus.*
> (implementation leader, Finland)
> *But you might say that... testing is perhaps underestimated and it's a very important part of the developing process…so you could say that we are too quick to launch, but at the same time you are trading with the time to market - how long development time do you really want. Actually we need to be even more quicker, I think. In the development and testing, and launching.*
> (system leader)

It must be underlined, that any of the technical malfunctions had a nature of crucial or catastrophic problem. In practice, there were some inconveniences that stemmed from wrong calculations or bugs, or system crashes that took from one hour to two or three days. This is highly understandable, given that the system is technologically a rather complex and even pathfinder-like solution. However, this represents rather logically the problems so often experienced with ESs. It is also important to notice how

the culture for technology affects also this factor; depending on the organizations readiness for the new and innovative technology; there may be great differences on how technical malfunctions and problems can tolerated without letting them affect the overall stand towards the new system. Moreover, practically all problems stemmed from the international structure of the system; this issue will be dealt with also in the chapter 6.4.

Controlling and monitoring systems played just as great role in the implementation as the literacy suggested. Like already mentioned, there were not actual utilizable systems existing in the beginning of the implementation - the demand for these was noticed afterwards and so the systems and the ways to use them were developed. This had a highly positive impact on the using rates, as it was possible to follow even user-based activity. Interviewees were highly unanimous also with this subject, although others valued it more than others.

> *Before the implementation the idea about the monitoring system was neglected… same time, the follow up is still very important. One idea could be that some part of the development team could be dedicated to only this function.*
> (system leader)
> *We didn't have the monitoring included in the system in the development phase… then it was actually noticed that still somehow the system kept records about the user statistics - and from there were able to have the information.*
> *There are also other important reasons, but monitoring systems are a one of them, having positive effect.*
> (implementation leader, Finland)
> *We need this benchmarking* (where the monitoring system is used)*, it's very important. I wish we would have had it from the very beginning.*
> (implementation leader, Sweden)
> *It's highly valuable information as we can then know what the situation is. And get people motivated as it is then possible to ask personally about the using behaviour.*
> (trainer, Finland)
> *Yes, it's a good tool for managing, you can see the personal figures and go and see how much this person uses and then ask about it if there is something strange.*
> (trainer, Finland)
> *It's very good. Now that we can use the statistics… I think that we should benchmark even more.*
> (trainer, Sweden)

Rewarding systems were not involved in the implementation project, at least not in a "hard", compensative way. Because of the qualities of the organization at hand, it would have been very difficult to organize direct rewarding system just in the system's perspective, neither were there possibilities to monitor the activities so that some kind of rewarding would have been possible. Whether this affected the implementation, it is hard to see. During the later times, however, the using numbers of the system have been included in other activities tracking systems in both Finland and Sweden.

6.3.2 People issues

Internal culture had a huge impact in both countries. Most of the interviewees brought up this factor already in the early parts of interviews, and stated that the most difficult thing affecting the implementation process was the culture which had traditionally emphasized other sector of banking activities (named here X), while neglecting the part that the system was implemented for (Z). Thus, the users and their supervisors were unfamiliar with the whole context, and therefore were not able to express high level of change responsiveness. In this sense it must be claimed that it was not the technical change that created most of the cultural difficulties in the implementation process, but a much more "everyday" change stemming from the larger operational change process, including the ES at hand.

> *Its about the will and habits to do things in bank… We have had this sales culture concentring on X, not Z, and moreover, the way to do sales has been different. There has been a big transition in taking the new view which concentrates on customer needs instead of just product qualities.*
> (trainer, Finland)
>
> *There are two groups having the different stand towards the system. There are these who are familiar with this (Z) business, and then those who are more experienced with X - this group has other interests and is more difficult to approach.*
> (trainer, Sweden)
>
> *The most important thing is that we have a X culture. And the management doesn't see and understand the Z market, those needs, the customers need for Z support…this makes it much more difficult.*
> (implementation leader, Sweden)
>
> *It has been in our culture that the things, which have had special importance, have been mainly X oriented… so there is this powerful history in the background…*
> (implementation leader, Finland)

> *Yes, the culture is one thing; how it is brought up by the managers, and how important the Z area is… so it can be a number of things.*
> (system leader)

Although it was the broader organizational change at hand which seemed to affect through the culture factor, it is interesting and even rewarding to see how the culture seemed to have the suggested impact precisely with those related factors presented in the model, thus the dynamics were in the real life much alike as in the theory. Culture had a clear effect on management structures and how it was possible to manage the occurring change, and it also affected the communications involved. Moreover, it could be said that culture also influenced the way it was possible to do job redesign, as culture had such a great impact on the stand and abilities that some users had towards the system. These abilities and opinions then again resulted as the person-related capacities of handle the system and its features.

Intra-organizational communication was possible to arrange through the existing routes and structures, and was seen as a necessary core factor in the implementation. In spite of its dispersed structure, the organization involved has a good tradition in communications coordination; this manifested also in the implementation project at hand as many channels were used simultaneously, and communication efforts were started well before the actual utilization processes started. The general methods used were phone conferences and intranet, but the most important method to handle also the communication were the people responsible for the training methods, working directly with the area organizations and branch offices. These specialists have the task to promote and develop the business area involved, and also the training and supporting of the use of the new system was given to them. This group of people, also interviewed for this study, had a great responsibility and positive effect for the whole implementation process as they had the direct contact to the people working in the customer interface. Their role will be discussed naturally also in the context of the *training* factor.

> *They were extremely important for the implementation, they are the real implementers.*
> (system leader)
> *That* (to use the trainers) *was the only way. Because you have to be local.*
> (implementation leader, Sweden)
> *The network of trainers was extremely important. If we would have that we would have been able to take the message to the areas much more effectively.*
> (implementation leader, Finland)

The importance of trainer network was as highly appreciated in both regions; how ever, there was a clear difference in how these resources could be utilized in Finland

and Sweden. Swedish organization had had this network of specialists for many years and it was possible to use these highly focused specialists from the very beginning of the implementation. In Finland this crucial network was created actually few months after the discussed system was put to work - it took naturally some time to get the new processes and tasks up and running, so also took some time that they could be effectively used in communication and training of the system.

The message that could be used when communicating the implementation to the users was a little different in the local organizations. In Sweden there was a new local legislation appearing during the summer 2004, which required certain new actions in the banking area involved. The features of the system complied with the requirements of this new legislation, and it was therefore possible to communicate the system as an utterly mandatory application, required by both own strategic guidelines and external legislation. In Finland there was at the time no such a strict legislation concerning the same business area, and it was therefore possible to underline only the corporation's own strategy and practice as the reasons to use the system. However, the system will be as important and mandatory in all regions after the new EU law applied during the autumn 2007. Thus, although there was the new legislation requiring the using of the system going to be applied in both countries, there was not such a hurry in Finland as in Sweden where the own local law was very much at the hand at the time of the implementation.

User involvement was a recognized and naturally handled factor in both regions; in Sweden, where the system was developed and implemented before Finland, a special reference group was used to offer insights and ideas for the system. The reference group is still used when new versions are designed. In Finland, where system was developed from the international platform already used in Swedish version, a group of experienced advisors and specialists also assembled before the implementation process. The reference group offered good information, and helped also in the testing of the system. The international structure of the system placed some limitations, though, which also restricted the amount of how much the ideas could be utilized in Finland. This will also be discussed more thoroughly in the subchapter 6.5.2.2.

> *Well, we tested the overall concept… …very early in the Norway we did a focus grouping in the retail customers to find out the focus groups, so we did an overall testing about the concept. And that was a right thing to do for the holistic view.*
>
> *Then we used advisors to test the test versions - we also tested out the sketches, before we actually made the thing.*
>
> (system leader)
>
> *We had the group of the own organization thinking that out, and then we had this group of advisors that assembled few times.*

> *But as there were the international frames, it was rather controlled, how much we were able to do with the reference group either.*
> (implementation leader, Finland)

The users were initially engaged in using and trying the system mainly through training. This will be dealt with in the next section. Post-utilization user satisfaction surveys were orchestrated in both countries; there have been two large-scale internal surveys in Sweden and a one in Finland. Also the graphical user interface has been tested by an external consultant.

Training, the last factor presented, could be seen as much a broad and important factor as the culture and management structures, significantly in the implementation process described. In the end it seems that many other tasks actually manifested through the training efforts, namely the tasks of *user involvement* and *communication*. As already described above, the implementation project was mainly seen as a project of training and communication. Moreover, great part of the communications were handled through training - this is a very natural way as training is the most crucial and weightiest single action to be taken in a project and organization like the one at hand.

The specialist/trainers had a huge responsibility and task in the training of the system, like already proposed in the section where *communications* were described. It seems that this was a good way to go local with the system. Also other training methods, like phone conferences and intranet were used also in the training. Although the importance of training was sawn as the most important way to get the system implemented, there was a chronic lack of resources, at least in Finland where the specialist network was not operational when the implementation started.

The engaging training was used a lot; the suggestion in the model, which states that the main task of training efforts is not to just train, but also to get the users by the system in the first place, was highly emphasized by the implementers. This view proved to be effective, as there were many positive messages stemming from the midst of the users well after the initial implementation process; for many it took a long time to perceive and understand the benefits and strategic meaning of the system. This was something that could be achieved only through the using of the system itself. In the implementation process, the engaging training was achieved in situations where users had personal training, or by giving them the opportunity to try out the test version of the user interface.

> *We perceived the situation so that the implementation would be dealt with the test version for the most part, thus the users would get access to this test version which they could use to practice; with the help of the telephone training so that there would be this separate phone conference…*
> (implementation leader, Finland)

The engaging training was supported by building the so called *test clients* feature in the user interface; even today, it is possible to choose from three different types of model customers in the opening screen of the system, which allow the user to try or test the system with different kinds of virtual customer situations. However, the benefits offered by this element were partly undermined by the technical problems experienced with the test version, and the resource problems which gave fewer possibilities to arrange personal training, especially in Finland. Nevertheless, as an overall method, training had much more thorough relationship with *user involvement* than predicted in the theoretical framework; this actually ads a one more inter-issue effect in to the overall model, the one that training has towards user involvement.

The resource problems mentioned above occurred mostly because of the lack of the operational specialist/trainer network already discussed in the section of *communication*. The implementation process of the Finnish trainer network, handled at the same time as the system utilization, gave fewer possibilities to arrange more thorough and profound training.

> *So I think that it was the beginning of the year 2006 when we looked for these models for operating… you could say that we learned how to do this work and got our network to work.*
> *…I feel that most of the energy went to get this sales thing going on…*
> (trainer, Finland when asked about training)

Obviously the training also included the traditional methods in both countries, including telephone conferences and written media, including screenshots. It could be claimed, that self studying was more than possible with the material provided but the users simply had not always enough time or substance at their hand to educate themselves.

6.4 Modified representation of the dynamics behind the overall issue

To continue with the analogue set already in the theoretical framework, the graphical representation given in the subchapter 3.2 is presented again here with modifications, stemming from the findings of the case study performed (Figure 8).

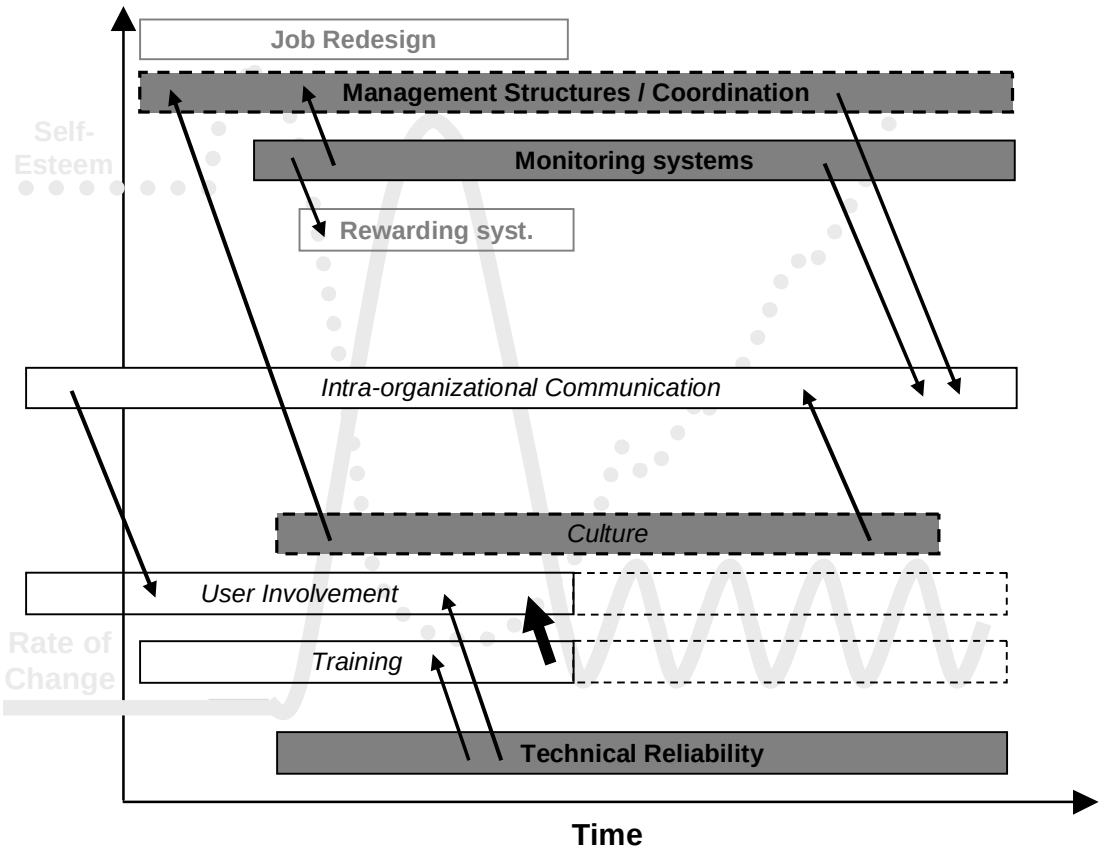

Figure 8 The modified representation of the Expert System Implementation Change model

As already presented above, case study supported the views and statements placed in the theoretical framework rather well - this also made the graphical representation not to suffer from heavy alterations. Thus, the findings did not place many requirements to change the representation; at least there were not so powerful contradicting statements which would have given opportunity to remarkably alter the depiction or its structure. As stated above, both curves representing the “rate of change” and “self-esteem” corresponded with the implementation process of the ES at hand. Moreover, also time periods that the single issues had most effect on implementation, and should therefore taken into account, corresponded with the ones provided in the theoretical framework. This was also case with effects that the separate issues have on other issues. One single new effect was found, though. This is the one that *training* had on *user involvement*.

Although findings did not give enough contradicting proof to remove any of the issues from the model, nor to find completely new ones, it was possible to highlight the importance of certain issues and lower the one of others. This act can be seen from the depiction; the issues heavily supported by the findings of case study are now presented

with grey boxes, as the issues which were not so highly emphasized have only grey figure. The issues having more important role are *management structures*, *technical reliability*, *controlling- and monitoring systems* and *internal culture*. The ones whose presence or absence was not seen as very important, *rewarding systems* and *job redesign*, have now only grey figure.

6.5 International context

As claimed in the chapter 4, ESs and transnational organizations have a rather strong relationship. This relationship manifests in both the benefits that the ES features can offer specially for the dispersed and geographically wide organization, as in the amplified change problematic that occur when the implementation is handled in international organization. This proved to be right also with the case system. The purpose of this chapter is to discuss the system's internationally important features and more importantly, the special managerial issues affecting particularly the international implementation process.

6.5.1 International qualifications and benefits of the systems

As already presented in the chapter 6.1.1, the system at hand has a pure international setting. This manifests not only through it's basic structure concerning technical structure or the way it is maintained and supported from a one centralized office, but also because of its role as an ES. With the system, it is possible to manage the knowledge and expertise offered by few instances in the widespread, international organization. Because of the standardized service concept using the same system in every region, it is also possible to develop and support the local activities more profoundly in the international, dispersed organization. In this environment, the system also works as a vehicle *per se* to offer more quality service for the customer. This is something that would require much more complex and expensive efforts if only non-technology methods would have been used.

It was already admitted, that international environment has the most evident affect on the development process of the system to be used - this was the case also with the case system. The international system framework that was to be used in every region put some strict limitations to the localization possibilities of the system, and affected greatly how much it was possible to involve users before the implementation; this will be discussed more in depth in the chapter 6.5.2.2. However, the design process has not, and

will not be discussed more thoroughly according to the limitations made in the very beginning of the research.

6.5.2 International environment affecting the managerial issues

As stated above, the effect of the international environment comes most evident through the certain managerial issues. Here these distinct factors are scrutinized from the viewpoint of the case implementation process.

6.5.2.1 Structural and organizational issues

Technical reliability had a special role as an overall issue in the case implementation project; the reasons for the technical problems undermining the implementation work in both countries had a very international nature as most often the problems jamming the whole system occurred in the interfaces that the international main system used to claim data from the regional databases. Thus, the *historical development* and the regional data centres, presented in the chapter 4.2, had their indirect effect on also the implementation process. According to the views of the interviewees, it could be claimed that by securing the stability of the interfaces between the older regional systems and the new international system, the other factors that technical reliability affected, *training*, *user involvement* and *communication*, would have been easier to handle. There were no actual platform or operating system problems stemming from the international environment, as the system was designed to be run in a basic web browser.

Management structures were handled so that the regional implementation processes were delivered as practically fully local projects; this was a natural decision to be made as the implementation was a continuum for the regional development project in every country. The need for locally formed implementation techniques was greatly emphasized and this was also sawn as an appropriate way to handle the situation. However, there could have been even more international co work during the implementation so that the conversation could have been used to at least exchange experiences and views about the implementation.

> *Well ideally, if you would have a dedicated international team… but… at the same time, to have a successful implementation you must also be very anchored to the local organization.*
> (system leader)

6.5.2.2 People factors

Culture did not have such a big effect from the international point of view; actually the regional organizations compared were culturally much more alike than the researcher supposed in the first place. The factors and stands stemming from organizational cultures in both regional organizations involved within the study were profoundly alike - this was very surprising given that the country organizations share quite different types of history. The stands towards both computerized work and the distinct banking area involved were very much alike according to the interviewees. Thus, within the limitations at hand it could not be claimed that national cultures would have had such a big influence in the international context even if they had a big impact on the local implementation processes. In the case at hand, one reason for this must be the many similarities that the national cultures of Finland and Sweden share. It would be most interesting to have the opportunity to scrutinize an implementation process orchestrated in an international organization, formed by regional organizations which are affected by much more differing national cultures than the ones included in the study at hand.

Intra-organizational communication was handled as a fully localized procedure in both regions, this way there were no actual straight forward communicational problems stemming from the international environment; moreover, fully local communication activities were sawn as an utmost important factor in the implementation process, given the large and dispersed organisation. However, the system was linked very firmly with the new service concept delivered. This concept stemmed from the strategy developed and communicated for the whole international organization, so there were also international themes involved in the communication.

User involvement was affected both before and during the implementation process by the international setting. When developing the system, the international framework restricted the possibilities to localize the system, thus also to fully involve the users in the design process. During the implementation, the *technical reliability* affected the process through user involvement, as described in the chapter above.

7 CONCLUSIONS

As it was subjectively claimed in the introduction, ESs are important and advantageous systems, which on the other hand are very difficult to implement. The traditional problems that are encountered when managing change process are evident, even amplified if the change is created in relation with an effective and emotionally powerful domain like ES. This view is supported by the case study executed, as the specific system and its tasks fully comply with the general specifications and benefits of ESs, while its implementers also faced various difficulties in the overall utilization process. Many of these inconveniences corresponded with the themes presented in the change management literacy - this made it possible to discuss also the specific issues having special role in the ES implementation process. By conducting the qualitative research it was possible to test and discuss both the ES implementation process's role as a change process, as also the managerial issues rising from the context. Moreover, it was very easy to evaluate the dynamics between the specific issues.

In the context of the case involved, it can be concluded that the natural structure of the ES implementation process follows rather logically the structure proposed in the theoretically formed model. When the theme of *self-esteem* is involved, it could also be claimed that the coping cycle, discussed broadly in the theoretical framework, also took the more complex shape formed in the theoretical framework. Thus, implementing of an ES does create change which occurs in two phases; first as a one larger episodic burst stemming from the initial utilization of the system, then as a "bumpy", smaller-scale change which is because of the inevitable updating and renewing procedures of the system. This then makes also the coping cycle of the organization at hand to have quite extraordinary shape, where self-esteem rises incrementally because of the "bumpy" second phase change. A completely new aspect raised by the case study was that among considerably large amount of users, there are also huge differences between the acceptance and using -levels of the systems. Thus, it can be claimed that at a specified moment after the initial implementation process, users tend still easily locate on varying positions in the coping cycle.

The managerial issues, having special role in the implementation process, were all found also from the case implementation studied - some of these proved to have more profound meaning than others. As presented, these issues altogether were:

- Established and supportive *management structures*
- Successfully handled *job redesign*
- Fully achieved *technical reliability*
- Operational and working *controlling- and monitoring systems*
- *Rewarding systems*
- Change-responsive *internal culture*

- Carefully planned and executed *intra-organizational communication*
- High level of *user involvement* achieved
- Profound and colourful *training* efforts

In the specific implementation project, discovered in the case study, the issues having the most profound effect on ES implementation were *management structures*, *technical reliability*, *controlling- and monitoring systems* and *internal culture*. Although all issues were incorporated in the context, *rewarding systems* and *job redesign* were not seen as such an inevitably important issue. Within certain issues, especially the issue of *management structures* was enriched with the views gained from the case study; in particular the utmost importance of the motivation and involving of close supervisors and managers controlling the daily work of the users of the system was found in the case study. Although the importance of *technical reliability* was already emphasized broadly in the theoretical framework, the case study deepened this hypothesis in a most powerful way.

As it can easily be seen from the Findings -chapter, the case study also brought up one more important issue, having clear effect on the implementation process through almost every one of the issues presented earlier. This would be the issue of *sufficient resources*. Almost every issue presented in the framework were understood and valued by the implementers, but in many situations there was a lack of time or personnel which then again undermined the possibilities to handle all the important issues.

When the international aspect was dealt with, a clear connection with the importance of the *structural and organizational* issues raised from the original model was found; these proved to be *management structures* and *technical reliability*. Almost surprisingly, the *people* issues were not effected so much by the international environment - in the case study at hand only *user involvement* experienced changes when the international aspect was brought along. *Internal culture* was not affected by varying national cultures within the case study at hand, which probably was because of the highly similar cultures of the two countries involved in the study. Moreover, the issues concerning internal culture were to the highest degree similar in both countries, which is actually even surprising, given the varying histories of the country organizations. This theme also leaves the researcher with the most lucrative ground for future research; it would probably prove very rewarding to discover the effect that more varying national cultures affecting the behaviour of regional organizations have towards the international implementation procedures. Thus, it would be feasible to use the existing study as a breeding ground to examine the overall theme within a more culturally heterogeneous organization.

On a very general level, it could be concluded that the inconveniences experienced with the case implementation had a rather structural nature. Thus, it could also be claimed that the *structural and organizational* issues seemed to have more powerful

effect. However, as the model proposes, these were also strongly linked to the “softer” side of the issues distinguished. Shortly put, it could perhaps be said that even if fully human related themes sure are important and should be reconsidered carefully in highly technical implementation processes, as claimed in the very beginning of the research, it is just as important for the organization to have its existing systems and operating models, including managerial structures, as well as sufficient resources, already there to utilize more human resource linked procedures, and this way be able to overcome the difficulties stemming from the problematic implementation process.

The purpose of this study was to explain and represent the dimensions and dynamics of change processes, occurring with and because of ES implementation and explain how change management procedures can contribute to the handling of the this often so difficult task. Because of the many limitations, it cannot be honestly claimed that the outcome of the research could be used as a road map to a successful implementation everywhere, any time. However, it can be claimed that on a certain scale enough has been done to explain and analyze the overall context; as there are many important things presented and evaluated, one can now gain better understanding on the problematic issue with the help of the overall model provided.

Expert systems and the benefits they can offer are something very important for a company which tries to survive in the modern, changing world, and right on this very moment there are countless organizations going through major changes because of an ES implementation project. Although it may be tempting at some point for many to start questioning all the benefits of Expert Systems, compared to the painful implementation process, one must understand that ES implementation projects are not the only thing producing difficult change management situations. In addition, if the organization learns how to deal with change as a by-product of Expert System implementation process, it may possess something much more important than just the benefits that the now (hopefully) working and also used Expert System can offer.

8 SUMMARY

Expert systems are sophisticated and distinguished computer programs, which have the capability to mimic human thinking- and reasoning processes by using more complex logics and information provided by human experts. Because of this, these programs can offer more sophisticated decisions and conclusions as an output. Expert systems have many benefits for the utilizing organization; however, because of the strong linkage with the processes and tasks earlier handled by human experts, these same benefits and system's powerful effect on daily work may produce a situation, where it can be surprisingly difficult to implement an expert system in such a manner that it would also be used effectively. Expert systems offer extra benefits particularly for international organizations, but on the other hand also the possible difficulties may polarize and deepen if the utilizing organization has a multinational nature.

Change management can be used to understand and handle the tricky implementation process, thus it offers tools to both explain the reasons behind the organizations behaviour during the implementation, as to manage the implementation itself. In the theoretical framework of the study it is claimed, that special attention should be paid on things like the periodically varying magnitude of change occurring because of the different phases of the implementation, as on the varying quantity of *self-esteem* of the people in the organization. Change management offers various ways for managing the change process; when combined with the specific requirements set by expert systems, it is possible to form a completeness of managerial issues having the most concrete effect on the success of the implementation. When the expert system at hand is being implemented in an international environment, certain issues tend to gain special role.

Thus, the purpose of the study was *to examine how ES implementation project can and also should be managed as a change process in an international organization*. This goal was divided into two subcategories; 1) *to define ES implementation process as a change process and*; 2*) to find, present, analyze and discuss the critical issues having special role in managing the ES implementation process in an international organization*.

To test the propositions, views and models offered in the theoretical framework of the research, a case study was performed. The case at hand, implementation process of an international expert system used by a transnational banking organization, offered a most suitable opportunity to gain an empirical proof. Qualitative interviews as a data gathering method manifested in discussions which were had with people being involved with the implementation in two different country organizations.

The outcome of the qualitative research supported the views presented in the theoretical framework satisfactorily and made some of the issues presented to stand out with greater importance. The research also brought up one more important theme not

underlined enough in the theoretical framework; this was sufficient resources. As usually in a change situation, enough time and effort should be on the disposal of the implementers, if the desired outcome is a satisfactory expert system implementation project.

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APPENDIX 1 THE INTERVIEW QUESTIONS FOR THE SPECIALIST TRAINERS

1. Own work history during the implementation of the financial planning tool

2. The system in general
    -own experiences and feelings
    -external opinions

3. How was the implementation communicated? Was the tool only “tool” or compulsory method?
    -in time?
    -thoroughly enough?
    -in a right way?
        -were the altered working habits discussed?
    -the organizational differences between regions?

4. How the feedback was gathered and handled?

5. Training activities
    - thoroughly enough?
    - with appropriate methods?

6. Monitoring system and how it was used?

7. How the implementation process succeeded
    -time line; what particular parts were left in mind?
    -own ideas about the implementation?

8. After the implementation project
    - Internal “After sales” activities

9. Finally
    -what should have been done differently?
    -learning experiences?

10. Questions for the interviewer, free word

APPENDIX 2 THE INTERVIEW QUESTIONS FOR THE IMPLEMENTATION LEADERS

1. Own work history and role in relation to the system and the implementation

2. (Development and) implementation time line

3. How the implementation process succeeded (in Sweden)

4. The elements of the implementation

- (The role of the users (/people that could give the user's contribution to the system, reference group) in the development process [international aspects])
- The plan for implementation, was the implementation handled as an independent project?
- Organizational conditions for the implementation
- Communications (internal - if existing, also external) in the implementation process
- Training activities
- Monitoring systems
- Internal "After sales" activities

5. How the task of the implementation was handed to other countries in the context of elements?

6. After the implementation project; how the situation has changed, how in the future?

7. Finally; what are the key things in mind when the implementation process is being discussed afterwards?

- What should have been done differently

8. Learning experiences

9. Questions for the interviewer, free word

APPENDIX 3 THE INTERVIEW QUESTIONS FOR THE SYSTEM LEADER

1. Own work history and role in relation to the system and the implementation

2. Development and implementation time line

3. How the implementation process succeeded (in Sweden)

4. The elements of the implementation

- The role of the users (/people that could give the user's contribution to the system, reference group) in the development process [international aspects]
- The plan for implementation, was the implementation handled as an independent project?
- Organizational conditions for the implementation
- Communications (internal - if existing, also external) in the implementation process
- Training activities
- Monitoring systems
- Internal "After sales" activities

5. How the task of the implementation was handed to other countries in the context of elements?

6. After the implementation project; how the situation has changed, how in the future?

7. Finally; what are the key things in mind when the implementation process is being discussed afterwards?

8. Learning experiences

9. Questions for the interviewer, free word