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Electronic Performance Support Systems

- Evaluating and Implementing IT Based Training in Organizations

Department of Technology Management and Economics
Management and Economics of Innovation
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2011
Master's Thesis E 2011:003

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Note 1: Due to a confidentiality contract signed by the authors and the studied company, the name of the company is excluded in this report. Instead the company will be denoted [COMPANY]. This will have no effect on the quality or comprehensibleness of this report.

Note 2: A dictionary is provided in the appendix where the most common abbreviations are outlined. Even though theses abbreviations are explained the first time they are presented, this is done to make it easier for the reader while reading through the report.

Abstract

Many organizations are challenged with upgrades in their Enterprise Resource Planning (ERP) systems and to cope with continuous change. Some organizations therefore seek to invest in Information Technology based training that can reduce cost and speed of training and learning.

This study analyses and evaluates investments in Electronic Performance Support Systems (EPSS) that can help organizations to cope with continuous change. The study has been conducted with a case study design at [COMPANY], where Customer Support is facing an upcoming upgrade of their ERP system SAP in February 2011. Currently, [COMPANY] utilizes user-guides to train their employees to cope with SAP upgrades but find this method too costly and time consuming. Thus, they requested recommendations for how they should invest in IT based training tools, called EPSS.

There exist an amount of EPSS on the market of which the researchers have chosen to evaluate four. The first one is traditional word based user-guides and the three others are EPSS that are integrated with the ERP or other applications. These three systems are called SAP Productivity Pak (SPP), SupportPoint and Tata Interactive Systems and vary greatly in functionality and layout.

The study consists of three research questions that are structurally linear but have been studied in an iterative manner throughout the process.

- Research question 1 - Feature Selection
- Research question 2 - Product Evaluation
- Research question 3 - Product Implementation

Feature Selection identifies what features in EPSS that are most valuable for the overall performance of the system. Product Evaluation evaluates and compares the relative performance of the EPSS based on the identified features. Finally, Product Implementation identifies risks with implementing the EPSS, but also gives recommendations on how these risks could be handled.

The three research questions have been answered by using triangulation of research methods where demonstrations, own trials, observations and interviews have been used to gather the desired information of each EPSS.

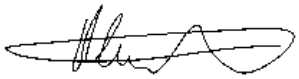
The long-term recommendation is that [COMPANY] should invest in SupportPoint since this EPSS outperforms all the others. However, a short-term recommendation to start using SPP is given as well. This is since, even though SPP is not implemented yet, [COMPANY] already owns an enterprise license of this EPSS. This short-term solution is motivated by the short time that is left until the next upgrade of SAP, together with the long time that is related to brining in a new product and supplier, such as SupportPoint. The implementation recommendations given for any of these EPSS are much similar and are mainly related to organizational issues rather than product specific issues.

Acknowledgement

First of all we would like to thank our supervisor Magnus Holmén at Chalmers University of Technology. He took on the challenge to supervise us even though we at the time were living in two different cities in Australia, Sydney and Gold Coast, a long way from Gothenburg. Holmén has been a valuable resource for us and provided input in critical phases of our study. Secondly, we want to thank our supervisor at [COMPANY] in Melbourne, Andrea Richards. Richards has given us all her support even in the toughest of times. The long distance supervising has been characterized by VoIP meetings that sometimes caused frustration as the technology refused to cooperate. Without Richards patience and commitment, this project would have been much harder to finalize. Another valuable individual has been Andrew Selkirk at [COMPANY] in Stockholm whose engagement has helped us during late evenings filled with technical problems. We are also grateful for all employees at [COMPANY] that participated in observations and interviews. Lastly, we want to thank Panviva and Tata Interactive Systems that provided us with information about their products.

As a final comment we want to stress that we are pleased that the work with this report went so smoothly due to the long-distance between Holmén, Richards and not at least ourselves.

Gothenburg, January 2011



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1 Introduction

This report investigates how organizations can use information technology (IT) based training to train their employees instead of using traditional training methods, such as lectures and workshops. A case study has been performed where four specific IT based training products have been evaluated on performance. Managerial implementation aspects have also been considered.

1.1 Background

Customers get increased power in today's global and dynamic business environment, which cause companies to continuously improve all aspects of their business to remain competitive (Bessant & Caffyn 1997). A popular approach to improve the organization's business functions in order to meet the tough customer demands is to integrate the information for all business functions into an Enterprise Resource Planning (ERP) system (Kraemmerand et al 2003; Davenport 1998). However, it is not enough to implement such a system but also to cope with the continuous change and technology improvements. Software providers constantly improve their ERP systems, incrementally or radically, by adding new functionalities and correcting software errors, which generates new ERP system versions available to the marketplace (Kraemmerand et al 2003).

Constant upgrades of the ERP systems can be seen as a never-ending process of organizational learning and change (Eriksen et al 1999) that requires training of the employees (Kraemmerand et al 2003). Training of employees takes time and is costly which some organizations attempt to decrease by utilizing IT to make the training process shorter and more effective (Liu 2003; Binney 2001). Organizations use IT solutions dedicated to train their employees in utilizing their current ERP systems. These IT solutions are derived from the concept of Knowledge Management Systems (KMS) that manage knowledge and intellectual capital (Debowski 2006). EPSS is a kind of KMS, which are developed to minimize the need for physical lectures, workshops and supervision that often are costly, time consuming and difficult to organize.

1.2 Feature Selection

Research has shown that training does not necessary lead to learning (Debowski 2006). Users have different approaches to learning (Noe & Winkler 2009) and the interaction between the user and the computer differ among individuals (Dix et al 2004). These issues might be related to the user-friendliness of EPSS, as well as other features, which is highly important to enable and ensure individual learning.

1.3 Evaluation of IT Investments

Even though an increasing number of companies are investing in IT since the mid 1990's (McAfee & Brynjolfsson 2008) there seems to exist difficulties in the evaluation process. Organizations are spending as much as 50 percent of their capital on IT investments (Renkema & Bergenhout 1997) but too often realizes the *productivity paradox*. Brynjolfsson (1993) refer to this as when the capital spent in an IT investment does not generate significant improvements of the productivity. In addition, it is rarely the companies with the highest amount of IT spending that shows the best financial results (Carr 2003).

The problem of unsuccessful IT investments is therefore believed to lay in the lack of an appropriate IT investment model. Even though there are many different models for IT evaluations accessible an agreement on a best practice has, so far, not been reached. This can be explained by that managers

tend to look for short-term financial benefits that enable quick results (Irani et al 2002). In contrary, long-term investments are often avoided by decision makers in which costs and future benefits are difficult to quantify (Borenstein & Betencourt 2005; Reinkema & Bergenhout 1996). There is therefore a need to construct an IT evaluation model that can make a just evaluation of the intangible benefits of an EPSS. In addition to the previously mentioned features of user-friendliness and the time and cost to train the employees, it is necessary to theoretically and empirically investigate what other features of the investment that is important in order to evaluate the performance of different tools.

1.4 Implementation of EPSS

When an appropriate IT investment evaluation model is created two other issues must be addressed. First, the apparent risks need to be identified and quantified as well as developing a strategy to mitigate them. Second, related to all kind of improvements within companies is the issue of organizational change. To enable successful and sustainable change there is not only a need for knowing what should be done, but also how to implement and manage it (Rubenowitz 2004).

To summarize, an investment in EPSS can be divided into selection of important features of the product, evaluation of the product and implementation of the product. In this study these issues are examined through a qualitative case study at [COMPANY]. The department Customer Support at [COMPANY] is facing a decision of investing in IT based training to improve learning in an upcoming upgrade of their ERP system.

1.5 Purpose

The purpose of this study is to evaluate and implement investments in EPSS that can help organizations to cope with continuous change.

The study is divided into three research questions to structure the results.

Research question 1 – Feature Selection

What features are important in comparing and evaluating EPSS?

Research question 2 – Product Evaluation

How could these chosen features be evaluated in order to make an investment decision?

Research question 3 – Product Implementation

What risks are relevant when implementing EPSS and how should these be handled?

The outcome of the study is used to give recommendations on how the decision makers at [COMPANY] should invest in, and implement EPSS for Customer Support and additional business units to cope with ERP system upgrades and continuous change.

2 Literature Review

In this chapter the theoretical framework is outlined that provides the reader with necessary information for forthcoming parts of the report.

The primary problem with this study lies in how organization can cope with continuous change in business processes. In this report, continuous change is in focus and is outlined in the purpose as well. To clarify for the reader, continuous change for a company does not only include upgrades in the ERP system, as is central in this case study, but also all other process changes and updates that occur on a daily basis. It might be small changes in a procedure or it might be an explicitly new process that employees have to learn. To handle the training for all these changes, an EPSS is proposed as an alternative way for the more traditional training methods.

The problem can be broken down into four areas for investigation; organizational change, training of employees, important features of IT based training and evaluation of different EPSS, see Figure 1. First of all, organizational change needs managerial support to realize approval from the employees instead of resistance. Second, continuous change generates a need to train the employees, which is costly and time consuming. EPSS can enable increased training efficiency but to ensure learning there is a need to consider individual learning approaches and what features that are perceived as user-friendly, which leads to the third area of investigation. Finally, a model to evaluate the risks of the implementation of EPSS is needed. Theoretical material of these four areas is presented below.

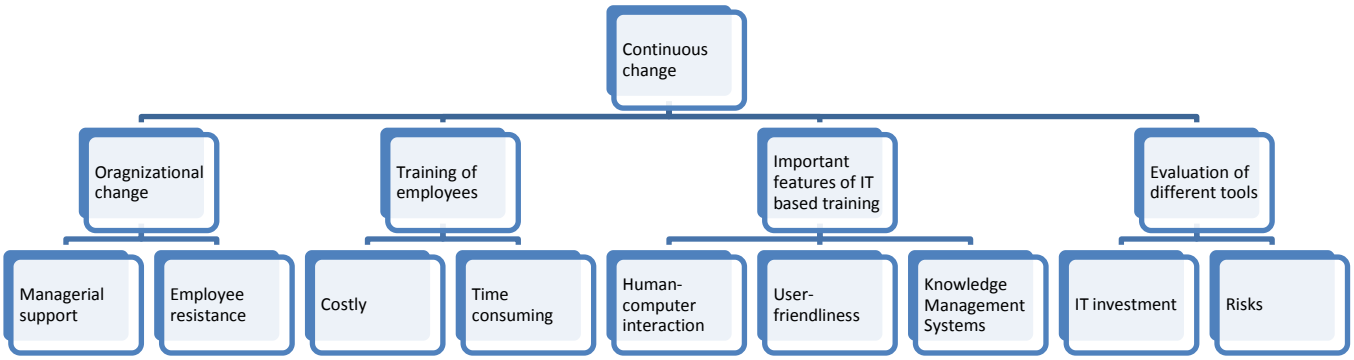


Figure 1 - Framework of Literature Review

2.1 Organizational Change

There will continuously be changes and upgrades of ERP systems, which are released to organizations in form of new versions of the system by ERP providers, such as SAP (Kraemmerand et al 2003). Any attempt to improve the organization will go along with organizational change. To make this change successful and sustainable there is not only a need for knowing what should be done, but also how to implement and manage the change. In addition, systematic methodology and strategy have shown to

be important factors to approach organizational change (Rubenowitz 2004). After the implementation is realized it is also vital to prevent the organization from falling back into previous practices by being prepared for the change and by having the willingness and right attitude to carry it through (Lejefors et al 2008).

Both managers and employees possess important roles in organizational change. Lack of managerial support is found to be one of the most important factors of user resistance (Kim & Kankanhalli 2009). Rubenowitz (2004) also emphasizes this in line with the need for managers to transmit an authentic belief in the success of the change to their employees. To achieve a successful implementation, the change must be accepted by the employees (Rubenowitz 2004). Employees tend to be resistant towards changes when they perceive threats evolving from that change (Lapointe & Rivard 2005). Such threats can be uncertainty of what will happen with the employees' responsibilities and procedures (Rubenowitz 2004). The object and subject of resistance in this case is the implementation of new IT respectively individual users or groups in the organization. Resistance of a system can occur when prior use of similar technology was perceived as a failure or when the user recognizes inequity between the prior and the new system. (Lapointe & Rivard 2005) The latter is explained by Kim and Kankanhalli (2009) as switching costs that they found as one of the most determine factors of user resistance. That is, if the cost exceeds the benefits of changing technology resistance is likely to arise since the perceived value of the change is lower than the status quo. Furthermore, Kim and Kankanhalli (2009) conclude that the opinion of colleagues is important for the user's perception and belief in the new system.

According to Lapointe and Rivard (2005), users can resist in many different ways. The first and mildest level of resistance is to show little engagement in the system and modest motivation to utilize it. The second level includes excuses not to utilize the system and willingness to cause conscious hold-ups. The third level contains active resistance by trying to convince others to resist and build advocacy groups against the IT implementation. The last form of resistance is aggressive and includes making threats, refuse to use the system or attempt to sabotage it. Marakas and Hornik (1996) stress that not all resistance should be seen as a barrier to remove. Employees occasionally communicate frustration or displeasure with a system that contains severe lacking of performance or user friendliness that needs to be looked into (Lapointe & Rivard 2005).

Managers that possess an understanding of employee resistance is believed to have an advantage in carrying the organizational change through since the implementation strategy is likely to be carefully prepared (Lapointe & Rivard 2005). Such management will mediate the benefits of the change to the employees as well as involving and motivating them to contribute in the implementation, which will increase the chances of acceptance and willingness to utilize the system (Rubenowitz 2004; Lapointe & Rivard 2005).

This section has described why it is inevitable to understand what should be done to minimize employee resistance when the organizational environment is changed. This is a vital managerial factor for reaching a successful implementation of new software. Along with organizational change, training of employees is also evident to ensure that they learn how to utilize the new implementation (Liu 2003), which next section addresses.

2.2 Training and Learning in Organizations

Debowski (2006, p. 245) defines training as *"the ways people develop job-related competencies under the guidance of an expert"* while Noe and Winkler (2009, p. 3) interpret training as *"a planned effort by an organization to facilitate employees' learning of job-related competencies"*. The latter definition does not constrain the activity to be supervised by a coach. On the other hand, a learning development tool can be regarded as an expert in form of an IT system, which makes both definitions valid in this study. Debowski (2006) further discusses that training is often related to practical tasks by using some kind of application to achieve learning. Learning is the outcome of training sessions, experiments, activities and reflections when the skills, knowledge or abilities of an individual has improved which lead to new insights, knowledge or competences (Debowski 2006). However, Debowski (2006, p. 245) states that *"training does not necessarily guarantee learning"*, which is why employees need to receive feedback to ensure that their skills have improved.

Several researchers argue that training is necessary when there is a performance gap between the organizational results and the organizational goals, or between the current state and the desired state (Noe & Winkler 2009; Patching 1999). By defining the performance gap one also discover the necessary learning aims to fill the gap (Patching 1999). Debowski (2006) states that individuals' approaches to learning vary greatly and Noe and Winkler (2009) add that each position in the organization is connected to a specific role. Thus, each role demands for specific performance of knowledge, skills and behaviors that must be considered when setting up training programs that fits the individual.

2.2.1 Individual Learning

According to Noe and Winkler (2009) four conditions must be fulfilled for learning to occur; i) Opportunities for trainees to practice and receive feedback, ii) Meaningful training content, iii) Any prerequisites must be apparent and iv) Allowance to learn through observation and experience. Debowski (2006) adds that for learning to occur, individuals need relevant, valuable and legitimate learning experiences, which all could be applied in their daily work.

According to Debowski (2006), motivation to learn depend on the individual's; previous experiences of training and learning, confidence in his or hers abilities to learn, willingness to commit to learning, control over time of learning and career aspiration. She further adds that the trainee also needs possibilities to reflect, make own choices and analyze the learning process.

2.2.2 Organizational learning

Senge (1990) discusses the concept of organizational learning as a strategy that learning organizations use to facilitate learning of its employees to continuously improve the organization. He argues that such an organization has five main features; system thinking, personal mastery, mental models, shared vision and team learning. Raybould (1995) has created a model; see Figure 2, that in five stages explain how organizational learning occurs. In the first stage is the organization's knowledge base collected and supported with an interface that is present for all employees, also known as KMS that is described further in 2.3.2 Knowledge Management System. The second stage allows the employees to get on-the-job training by using the system. By utilizing the system, each individual usually learns from receiving feedback in response to their actions and individual learning occurs in the third stage. In the fourth stage, the individual generate new knowledge by developing new techniques, methods and procedures different from the original ones. For organizational

learning to occur, this new knowledge must be integrated with the organization's knowledge base in the first stage that will diffuse the new knowledge. This process of learning and generate new knowledge may be simplified by utilizing EPSS, which will be discussed further in 2.3.3.

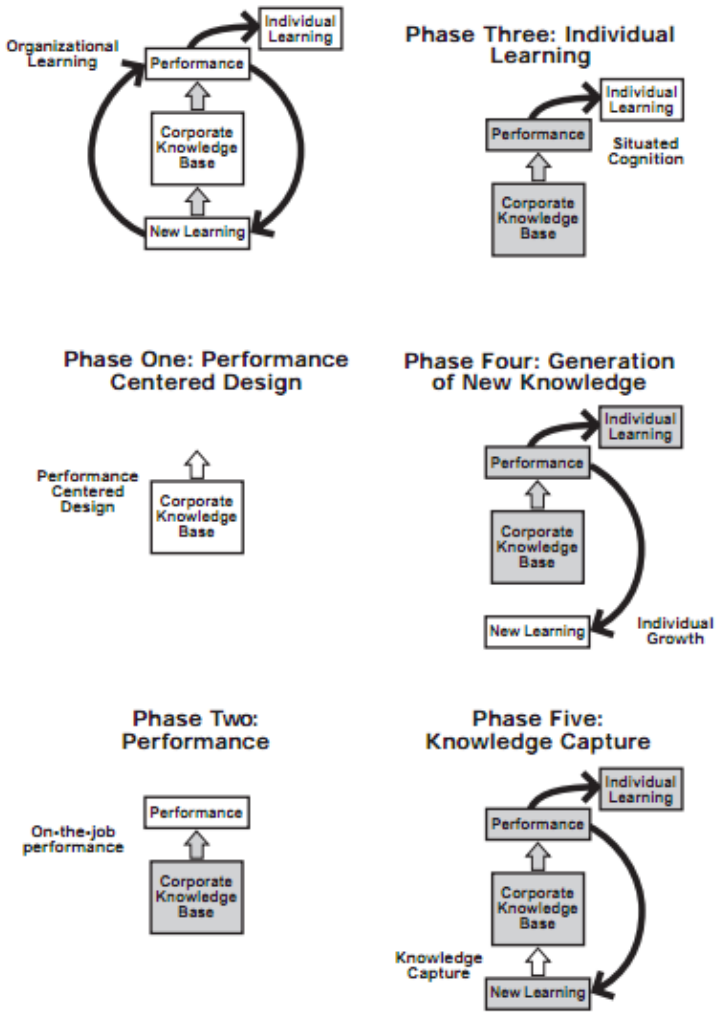


Figure 2 - The Organizational Performance/Learning Cycle (Raybould 1995)

There are two learning strategies within organizations; single loop learning and double loop learning (Argyris 1992). The prior strategy aims to incrementally improve procedures, which is important when the organization realizes that they have fallen behind competitors. The latter pushes the organization to strive for innovative and creative changes, which also is a significant capability for a learning organization. Single loop learning can also be explained by *know-what* and *know-how* knowledge while double loop learning is more of a *know-why* skill (Argyris & Schön 1978). Know-what can be explained as mastering a skill through training, know-how as how to manage the skill effectively through book learning and know-why as a deeper understanding of actions' cause and effect (Quinn et al 1998). The fourth stage of generating new knowledge in Raybould's (1995) model of organizational performance therefore demand individual double loop learning to occur. Consequently, organizations that use single loop learning will not realize organizational learning.

Next section presents the different traditional training methods that are commonly used in organizations for individual learning, such as induction of employees, off-the-job training, on-the-job training and self-directed learning.

2.2.3 Traditional Training Methods

Induction of employees is the initial training method that occurs during the first weeks of new employment or changed position in an organization. The purpose is to train the individual in the most critical tasks to enable the employee to perform his or hers tasks without coaching. (Debowski 2006) Off-the-job training is often conducted away from the original work environment and involves case studies, lectures, role-playing and simulations (Harris 1998). Simulations are constructed real-life situations in practice where employees can try different actions outside their normal job settings, which will provide feedback to enable evaluation of each action (Noe & Winkler 2009). On-the-job training is similar to initial training but is not only applied on new employees. It is used in order to improve employees' skills and competence by the assistance or guidance of a more experienced college or expert. (Debowski 2006) The trainee observes the expert performing tasks before trying to imitate the actions performed (Noe & Winkler 2009). The cost of on-the-job training can be high if it is a commonly used training method because of the extra personal that is needed to demonstrate tasks and guide the employees (Debowski 2006). In contrary, employees can be asked to take responsibility for their own training in self-directed learning. They are facilitated with training material and can choose when, how long and how often to conduct it. To ensure that the training is completed trainers control the training process and can also develop specific training programs to employees depending on their self-directed learning results. (Noe & Winkler 2009)

This section has defined training and what factors that needs to be considered when setting up training program to enable learning of all employees. Traditional training methods are important to understand the performance of IT based training methods, such as EPPS.

2.3 The Use of IT for Training Purposes

According to de Gues (1997) and Friedman (2002) organizations learn through employees' experiences and actions where the employees can be seen as agents for organizational learning. Training of these agents takes time and is costly (Liu 2003). Some organizations tries to lower time and cost of training by utilizing IT, such as EPSS, to allow sharing and transferring of knowledge instead of creating it from scratch, which result in a more effective and efficient learning process (Senge 1990).

Binney (2001) state that IT based training improves training and learning in organizations because it enhances knowledge among the employees. Hesket et al (1997) argue that by investing in technical support systems organizations do not only facilitate training practices and better performances of the employees but also increases their self-confidence and perception of their ability to assist their customers that doubles employees' job-satisfaction. The increased employee satisfaction, loyalty and productivity enlarge the external service value in form of customer satisfaction and retention. This result in repeated purchase that increases revenue growth and profitability, see the *Service-Profit Chain* illustrated in Figure 3. This concept is especially important for business units such as Customer Support since these have direct contact with the customers (Heskett et al 2008).

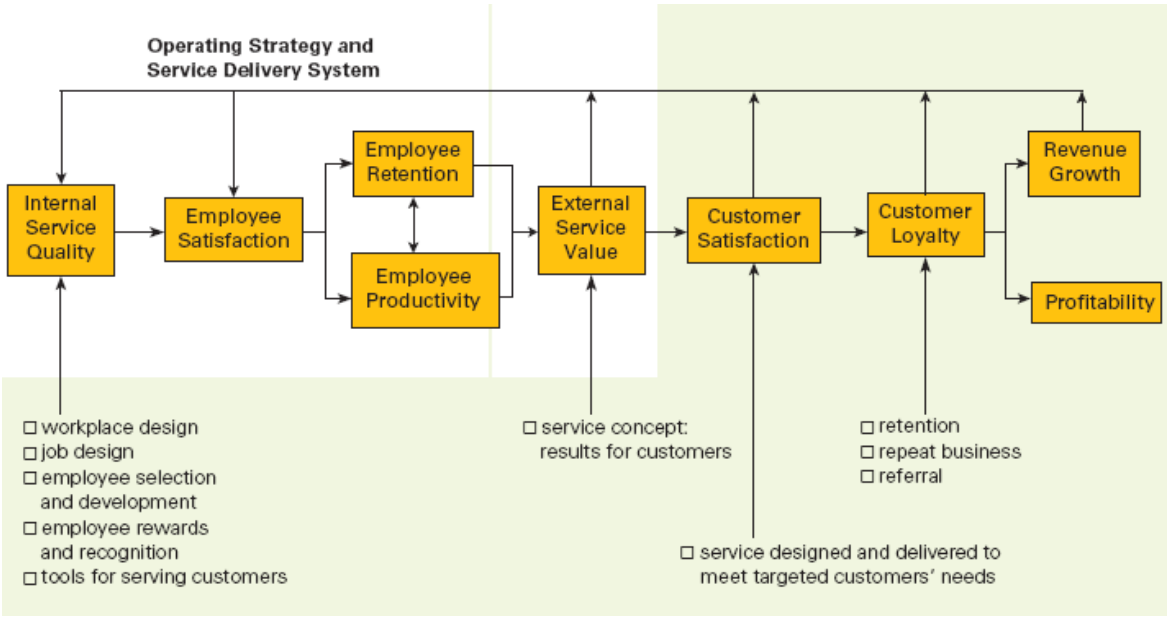


Figure 3 - The Service-Profit Chain (Heskett et al 2008)

Research has shown that employees put value on IT that simplify their work and specific job-related training that enable individual development (Heskett et al 2008). Allwood (1997) adds that software users perceive user friendliness of computerized support differently, which is to be investigated further in next section together with the interaction between the user and the computer.

2.3.1 Human Computer Interaction and User-Friendliness

A user is defined as an individual that utilizes technology in order to perform procedures and tasks (Dix et al 2004). The learning time of IT based training will depend on the efficiency of the software, the cognitive skills of the individuals and how useful the individuals perceive the software to be (Liu 2003). To set up training programs and ensure that learning occurs, there is therefore evident to understand the concepts of human-computer interaction and user-friendliness.

Liu (2003) states that both IT and humans play evident roles in knowledge management. IT store, distribute and retrieve information but humans need to interpret, create and apply that information for enabling knowledge transformation and learning. User-friendliness is defined by four components;

- Efficiency – how well the individual has used the resources in relation to how well the individual has reached the preciseness and completeness of the procedure (ISO 1998).
- Ability to learn – how easy and natural the individual is able to learn to utilize the tool (Holmberg 2004).
- Satisfactory – how appealing and pleasant the tool is perceived by the individual including the absence of discomfort (ISO 1998).
- Attitude – consist of the individual's general impression of the tool (Holmberg 2004).

2.3.2 Knowledge Management Systems

The use of KMS can increase organizational knowledge and learning of employees (Debowski 2006) since it supports the creation and transfer of knowledge in organizations (Alavi & Leidner 2001). According to Debowski (2006, p. 141), KMS provides *"each user with a channel to acquire, document,*

transfer, create and apply knowledge to meet the organization's knowledge priorities". The creation and sharing of knowledge provides the organization with increased organizational knowledge and enhanced possibilities to continuously improve their performance, which leads the company to achieve competitive advantage (Nonaka 1994). However, Tiwana (2000) adds that it is not enough to implement a KMS in order to reach these organizational benefits. It is important to apply and utilize it throughout the whole organization to recognize successful knowledge sharing and transferring.

The use of a KMS is according to Liu's research (2003) strongly correlated to individual learning, in terms of reduction of duplicate work, shortening the time of task solving and improved uncovering of problems. The quality of the information in the KMS affects how individuals perceive and use the system. The most important features of a good quality system are its effectiveness and the appropriate level of detail of information in the system. (Liu 2003) Other features that would increase users' perception of the KMS were found in Liu's research (2003);

I. Relevant search function
II. Enabling system integration
III. Currency, relevancy and accuracy of information
IV. Information transmission and collaboration possibility
V. Organizational endorsement and encouragement to use KMS
VI. Increased cognitive and behavioral changes
VII. Improved individual job-performance
VIII. Learning and training improve KMS utilization

2.3.3 Electronic Performance Support System

A common definition of EPSS is outlined by Raybould (1995, p. 11):

"An EPSS is the electronic infrastructure that captures, stores and distributes individual and corporate knowledge assets throughout an organization to enable individuals to achieve required levels of performance in the fastest possible time and with a minimum of support from other people."

Raybould (1995) argues that an EPSS is integrated to existing software that makes it a system. Traditional word based user guides can therefore not be seen as EPSS but rather Electronic Performance Support Tool. For simplification and minimizing the risk of confusion, user guides is in this study be classified under the term EPSS. Desmarais et al (1997) describe EPSS as a support system in learning and performing certain tasks with benefits such as;

- *enhanced productivity* – employees receive support instantly on-the-job and have the opportunity to constantly improve their performances
- *reduced training cost* – the initial training can be reduced and new employees learn the rest self directly by on-the-job training
- *increased worker autonomy* – employees can acquire new knowledge by utilizing the broad knowledge base whenever she chooses

- *increased quality due to uniform work practices* – increases accuracy and consistency of tasks that reduces the variation of errors
- *knowledge capitalization* – facilitates organizational learning by allowing knowledge creation and capture

In traditional training method terms, EPSS combines on-the-job training with self-directed learning in order to increase productivity and mitigate the cost of human experts that educate the employees. Some forms of off-the-job training are also possible to utilize in EPSS, mainly in form of electronic simulations that can be played by the employee whenever she wishes.

Desmarais et al (1997) investigated the EPSS success factor by estimating the cost and benefits of the system. The investigation shows a factor 17 between the break-even points of the optimistic and the pessimistic scenarios; see Table 1. The authors conclude that this evidence of uncertainty might frighten decision makers to invest in the new technology, especially because of the trend of failure in IT investments. The concept of IT investment is further investigated in the following section in order to conclude how a just evaluation of EPSS can be done.

		Scenario		
		Best-case	**Expected**	**Worst-case**
	Development cost			
a1	(1) Software: number inspection	$ 2,511	$ 4,860	$ 5,994
a2	(2) Software: hierarchical menu	$ 14,229	$ 27,540	$ 33,966
a3	(3) Software: combined (a1 + 2a)	$ 16,740	$ 32,400	$ 39,960
b	Pedagogical content	$ 4.810	$ 11,470	$ 18,130
c1	*Total cost: a1 + b*	*$ 7,321*	*$ 16,330*	*$ 24,124*
c2	*Total cost: a2 + b*	*$ 19,039*	*$ 39,010*	*$ 52,098*
c3	*Total cost: a3 + b*	*$ 21,550*	*$ 43,870*	*$ 58,090*
	Annual benefits			
d	Training time reduction	50%	35%	20%
e	Training days devoted to experiment's task set	1,5	1,5	1,5
f	Cost per participant	$ 500	$ 500	$ 500
g	Annual number of participants	60	60	60
h	Annual benefits stemming from training time reduction (d x e x f x g)	$ 22,500	$ 15,750	$ 9,000
	Other annual costs (maintenance and capital investment cost)			
i1	10% of c1	$ 732	$ 1,633	$ 2,412
i2	10% of c2	$ 1,904	$ 3,901	$ 5,210
i3	10% of c3	$ 2,155	$ 4,387	$ 5,809
m1	*Net annual benefits (h – 11)*	*$ 21,789*	*$ 14,117*	*$ 6,588*
m2	*Net annual benefits (h – 12)*	*$ 20,596*	*$ 11,849*	*$ 3,790*
m3	*Net annual benefits (h – 13)*	*$ 20,345*	*$ 11,363*	*$ 3,191*
n1	Break-even point (years), number inspection technique only (c1/m1)*	0.3y	1.2y	3.7y
n2	Break-even point (years), hierarchical menu technique only (c2/m2)*	0.9y	3.3y	13.7y
n3	Break-even point (years), both techniques combined (c3/m3)*	1.1y	3.9y	18.2y

* The values in rows n1 and n2 assume the reduction in training time is the same regardless of whether any of the two techniques is used or if they are combined.

Table 2 - Cost-Benefit Analysis (Desmarais et al 1997)

2.4 IT Investments

Borenstein and Betencourt (2005) state that investments in IT cover about half of America's total expenses with permanent equipment. This is consistent with Reinkema and Bergenhout (1996) that state that 50 percent of the capital expenditure of large organizations is related to IT.

According to Hinton and Kaye (1996) the most popular reason for investing in IT is related to cost reductions. In a survey made by Lin et al (2005) cost reductions together with process efficiency and strategic competitive advantage were mentioned as the most important reasons for investing in IT. Hence, there tend to be reasons on all levels of the business that motivate IT investments.

Irani et al (2002) state that the adoption of new technology is one of the most lengthy, expensive and complex tasks that a firm can undertake. It is related to large upfront costs and involves high uncertainty which motivates why the justification and evaluation of IT investments are important tasks (Lin, Pervan & McDermid 2005).

2.4.1 IT Investment Justification and Evaluation

IT investments are often referred to as one of the major enablers of business change (Irani, Sharif, Love & Kahraman 2002). Lin et al (2005) further highlight that investment in IT is one of the key factors determining the success or failure of organizations. In practice however, IT investments have shown less improvements in business productivity and efficiency. Furthermore, IS or IT managers are finding it harder and harder to justify investments in IT due to the immense pressure of measuring the contribution of IT to business performance.

Reinkema and Bergenhout (1996) bring up the fact that long-term benefits with IT solutions are difficult to measure as one of the biggest problems with IT investments. Lin, Pervan and McDermid (2005) also discuss the multi-dimensional characteristics of investing in IT and states that the greatest benefit of IT investments are strategic alignments and those are often missed when decision makers tend to look at short-term financial decision measurements such as payback time and net present value (NPV). Borenstein and Betencourt (2005) further mean that decision makers often tend to look for tangible measurements as they evaluate investments. This is since it is hard to justify investments with intangible factors where costs and benefits cannot be derived. Apostolopoulos and Pramataris (1997) mention that the full impact of an innovative process may require more than two years to emerge. Even after this, the impact in terms of financial measures may be hard to determine.

Irani et al (2002) brings up four issues that have made IT investment appraisals a difficult task. First, as mentioned by most authors, IT investments involve mainly qualitative benefits, which are hard to quantify. Second, there is a lack of good methodologies and tools for evaluating these kinds of investments. Third, it is hard to evaluate the performance of the whole system due to the complex mix of quantitative and qualitative measures. Finally, internal managerial skills have been lacking in order to implement, monitor and control the IT investment.

Due to the mentioned problems in evaluating IT investments, managers have been forced to either i) refuse projects that could have had a positive long-term effect on the company, ii) invest in projects as an act of faith which often turned out to be unprofitable or iii) use creative accounting to pass the budgetary process (Irani, Sharif, Love & Kahraman 2002).

Even though decision makers traditionally make decisions based on tangible measures, it is often the intangible factors that determines a business success in IT investments (Borenstein & Betencourt 2005). Tangible benefits are often related to expenditures and cost savings that can be measured in the short-term. However, the strategic benefits are often intangible which makes IT investment evaluation a complex process.

The problem that arises is that the evaluation process is often skipped as it comes to IT investments (Lin, Pervan & McDermid 2005). This is argued to have led to overinvestment in IT and inefficient projects that has shown unsatisfying returns on investment. Brynjolfsson (1993) introduces the productivity paradox, which relates to companies that invest significant amounts of money in IT that show no or less significant improvements in productivity.

Lin et al (2005) discusses the problem with disappointing returns on investments in IT solutions by the role of IT as enabler or realizer of benefits. IT is actually just an enabler of process changes and benefits while many companies make the mistake of seeing IT as benefit realization. This is in line with Dewett and Jones (2001) that highlight the importance of strategy and IT investment alignment. IT affects strategy and strategy affects IT investment decisions. If companies believe that they will increase business performance only by investing in IT solutions, they will most probably be disappointed.

Lin et al (2005) mean that even though IT investment evaluation is important, it is not sufficient to ensure that identified benefits are delivered. Furthermore, Lin et al (2005) refers to a survey made by Norris (1996) who showed that the number one cause of IT investment failure was vague statement of benefits of the IT investment which lead to uncertain allocation of responsibilities of delivering the benefits.

Ward et al (1996) discuss the same issue in that companies tend to focus on identifying the benefits in order to justify the investment. However, companies put less effort into realizing these benefits. Lin et al (2005) discuss several reasons why companies fail to realize the benefits and monitor and control the IT investment once it is implemented. First, it is difficult to assess benefits after a project has been implemented as benefits are often experienced later. Second, many organizations have poor IS or IT adoption practices. Third, IT investment monitoring and benefits realization are not necessary as the project was implemented according to plan. Fourth, as already discussed, intangible benefits are given less attention in investment decisions due to the complexity of measuring these. Finally, it is costly to undertake the post-implementation review of benefits.

To summarize, there are two major challenges for companies that are looking to invest in new IT. First, the evaluation and justification process that leads to a decision to invest. Second, the benefit realization process that deals with ensuring that the company capitalize on the benefits that the IT enables. Lin et al (2005) found that most companies do neither have a formal IT investment evaluation process nor a formal IT investment benefit realization process. This study is focused on evaluating, hence enabling answering the second research question. Furthermore, the third research question underlying this study is concerned with benefit realization part of IT investments since it focuses on identifying risks and gives implementation recommendations for the chosen IT investment.

2.4.2 Evaluation and Justification in Practice

According to a survey made by Lin et al (2005) the most common methodologies for evaluating IT investments are still NPV and cost and benefit analysis (CBA). This is consistent with the previously discussed issue that managers tend to choose what projects to undertake based on short-term tangible measures that can be directly translated into financial numbers. Even though these companies state that they have a methodology for evaluating investments, it is conflicting with the view of Borenstein and Betencourt (2005) who state that the long-term strategic goals should be the main focus of the firm when investing in IT.

Steen et al (2003) discusses how traditional financial measures have caused problems in companies by encouraging short-term thinking. When conducting a gap analysis, the focus is to find out the level of performance today and compare it to where the company desires to be in the future. A problem with financial measures is that they tend to neglect the variety of perceptions of a performance. Financial measures also tend to be incomplete in that they do not reflect the path to get from today's performance and the desirable. Trying to outline the financial impact of a multi-dimensional investment might also lead to something referred to as *paralysis of analysis* (Ross, Westerfield and Jordan 2008). This means that the decision making process becomes so complex that a decision is never made. For example, analyzing the financial impact of a strategic investment might need to consider a multiple of factors and relationships that will end up with a large number of potential outcomes. In this case, making a decision on a qualitative basis could both be easier to manage and provide a higher decision quality.

A more qualitative measure mentioned by Lin et al (2005) that are referred by companies as methodologies for evaluating IT investments are requests for proposals (RFP). Usually these documents are released as an invitation for suppliers in where the company states what requirements of benefits they are looking for in an investment. The RFP is a way of structuring the purchasing process and to early outline the objectives of the investment.

Pure financial measurements, as well as outsourcing of projects on a contractual basis such as RFP, are referred to as informal evaluation methodologies by Lin et al (2005). These financial measurements lack in measuring how IT adds value to the organization while the RFP should not at all be compared to a formal investment evaluation process.

2.4.3 Methodologies for Evaluation

Earl and Hopwood (1981) discuss the problem with imperfect information in relation to decision-making. Figure 4 illustrates the decision-making situation in terms of clarity of objectives and cause-effect relationships. Under perfect information a decision could be made by computation, hence a computer could in a matter of seconds determine whether or not a company should invest in a certain IT solution. However, in a world characterized by change, intangible measures and uncertain cause-effect relationships, decision-making must take into consideration other measures as well, others than those quantifiable.

		Uncertainty in objectives	
		Clear objectives	Ambiguous objectives
Uncertainty in cause-effect relationships	Good predictive models	Decision by computation Answer machine	Decision by compromise Dialogue machine
	Poor predictive models	Decision by judgement Learning machine	Decision by inspiration Idea machine

Figure 4 - Decision Model (Earl & Hopwood 1981)

Reinkema and Bergenhout (1996) argue that there are a large number of methodologies for evaluating IT investments but that most of them have been developed in isolation from each other without building on the body of knowledge that is already incorporated in the available methods.

Table 2 describes measures of implications of an IT investment according to Renkema and Bergenhout (1996). The traditional financial approach for evaluation is usually expressed in terms of profitability or return. The non-financial approach that takes into consideration the long-term intangible nature of the investment can be expressed in terms of contributions. The overall consequence consists of both financial and non-financial measures and represents the overall net value that an IT investment adds to the firm.

Consequences		Positive	Negative
Financial and non-financial	Value	Benefits	Sacrifices
Financial	Profitability (profits or losses)	Yieldings	Costs
	Return	Earnings	Expenditures
Non-financial	Contribution	Positive contribution	Negative contribution

Table 2 - Consequences of IT Investments (Reinkema and Bergenhout 1996)

Apostolopoulos and Pramataris (1997) study IT investment evaluation in the telecommunication industry with a mixed approach, where they first conduct a classic financial evaluation followed by a technical benefit evaluation. The financial evaluation should consider all costs and benefits related to the investments such as upfront costs, running costs and cost savings. The technical evaluation is similar to the financial evaluation since it is quantitative.

In addition to conducting the financial and technical evaluation Apostolopoulos and Pramataris (1997) suggest that the intangible benefits should be considered. The article provides no guidance in how this evaluation could be done but suggests that the intangible gains accruing from an IT

investment could be placed into three categories; i) increase in productivity, ii) business activity enhancement and iii) business risk reduction.

In their study, Reinkema and Bergenhout (1996) give an extensive list of different tools and methodologies that have been developed in order to evaluate IT investments. The authors then try to synthesize these methods and collect them in four kinds of approaches for evaluating an IT investment; the financial approach, the multi-criteria approach, the ratio approach and the portfolio approach.

The financial approach is expressed in several kinds of methodologies such as calculating NPV, internal rate of return (IRR), CBA or payback period of the investment. The financial approach is the most commonly used in companies today since it is the easiest to apply given that all benefits and sacrifices of an investment can be quantified. This is also where the financial approach lacks, especially in evaluating IT investments, since the nature of the investments most often are intangible.

The multi-criteria approach is the second family of evaluation methodologies and expands the scope to involve non-financial measures into the evaluation. This makes the comparison and evaluation between different alternatives harder to conduct on an equal basis but is also a necessary condition when evaluating IT investments. Some characteristics of IT investments cannot be expressed in monetary terms and the non-financial benefits therefore need to be evaluated on a qualitative basis. Renkema and Bergenhout (1996) give several examples of multi-criteria models but the basic approach tends to be the same. First, a certain number of goals and decision criteria are developed. Second, every criterion is given a weight that represents the relative importance of the criteria in the evaluation. Third, the investment is scored according to the chosen criteria. Finally, the score and weight are multiplied for each of the criteria and the sum of these products represents the expected performance of the investment.

The ratio approach simply involves expressing the performance of an investment in terms of ratios. These ratios do not need to be based on financial numbers since they can be expressed in terms of number of employees or some output measures (Renkema and Bergenhout 1996). However, these ratios are often based on some sort of quantifiable measures. Common examples of ratios used to evaluate investments are IT expenditures against total turnover, and yielding related to an IT investment against total profit.

The fourth approach is called the portfolio approach in where the investment is plotted against several criteria. A famous example is the Boston Consulting Group Matrix where a product is plotted in matrix based on its growth rate and market share (Renkema and Bergenhout 1996).

Renkema and Bergenhout (1996) state that a big problem with the current available methods is the lack of validation. Since a lot of evaluation methodologies are available, few of them has been widely accepted and adopted as a business standard. The complexity and time-consuming nature of utilizing these methodologies might be one reason why neither of them has reached a broader audience.

However, one famous methodology for evaluating an investment is the Balanced Scorecard, developed by Kaplan and Norton (1992). According to Lin et al (2005), the Balanced Scorecard is a formal IT investment evaluation methodology since it is a structured way of measuring, not only the

financial aspects of the investment, but also the takes into consideration the long-term non-financial measurements.

The Balanced Scorecard was developed in order to address the issues previously mentioned about financial measures. Qualitative measures were added as well as quantitative but non-financial measures. It may so be that the goal in the final end of an organization is profitability, but by considering multiple factors the company can not only measure the financial result, but also the path that leads them there (Steen, Kihlstrand & Mårtensson 2003).

To summarize, most authors suggest a model in which multiple criteria can be measured and evaluated. The focus on financial measures has historically been popular due to its clarity and ease of use. However, the real value of an IT investment lies in the intangible benefits. This report focuses on finding the performance of different IT solutions and thus, financial aspects do not play a significant role in evaluating IT investments. Therefore, the multi-criteria approach, as presented by Renkema and Bergenhout (1996), is used since the main approach is to find important features for [COMPANY] and thereafter evaluate them.

2.5 Risk

The goal of this section is not to provide a numerical model for calculating risk in relation to IT investments. Due to the qualitative approach of evaluating IT investments that is taken in this study, the risk analysis has a qualitative nature.

2.5.1Justification of Risk

A research report released by Rodger and Petch (1999) states that that the concept of risk has been apparent for a long time but has shown limited use in practice by organizations. This is explained in that companies look at projects and investments in terms of expected outcome. However, risk is related to that the expected outcome of a project is just the expected outcome. All real assets involve some sort of uncertainty and risk (Bodie, Kane & Marcus 2008). In the field of investments there is always a risk-return trade-off. The expected outcome of an investment is almost always different from the realized outcome since the future is uncertain.

Bodie et al (2008) discuss that investors would prefer the investment with the highest expected return if all else were held equal. However, the no free lunch rule states that there is impossible to get anything for nothing. This implies that not everything can be held equal since if it was, all investments would have exactly the same return.

In financial theory, the risk-free rate represents the return that an investor can achieve without taking any risk. To invest in a security issued by the U.S. government is most often a good representation of the risk-free rate, so is putting your money in a bank account. However, any investor that search for excess returns, in other words returns above the risk-free rate, needs to absorb some risk (Ross, Westerfield &Jordan 2008). This is one of the most fundamental ideas in capital market theory and investment decision-making.

Bodie et al (2008) justifies the presence of risk in any investment that aims to give excess returns by the concept of arbitrage opportunities. An arbitrage opportunity arises when an investor can earn a risk less profit without making a net investment. If an arbitrage opportunity would arise, investors would take an infinitely large position until the arbitrage opportunity is ruled out. Financial market

theory therefore assumes that arbitrage opportunities do not exist, and if they do they are eliminated immediately since investors will capitalize upon the opportunity.

The risk-return trade-off implies that if an investor search for investments with excess returns, the investor also needs to take risks. That is the true nature of investments since it allows investors to bear risk in search for profit (Bodie, Kane and Marcus 2008).

The same kind of reasoning could be applied to any IT investment. If there were any opportunity to invest in IT that would give a company a risk-free profit, all companies would invest until there was no competitive advantage in owning the software anymore. Since IT investments aim to give a strategic competitive advantage, as stated by Lin et al (2005), IT investments should also contain some sort of risks.

Renkema and Bergenhout (1996) identify risk measurement and evaluation to be an important part in IT investment evaluations. In addition to financial and non-financial measures they highlight that some available investment evaluation methodologies involve risk measures while some do not.

The IT investment in this study involves a high level of uncertainty and risk. Since the evaluation criteria will be based on both qualitative and quantitative measures, there will be a need to identify risk measures that are both qualitative and quantitative as well.

2.5.2 Uncertainty and Risk

In relation to risk management there are two basic concepts that one should distinguish between, namely *uncertainty* and *risk*. Knight (1921) discusses in his famous book *Risk, Uncertainty and Profit* what is really the distinction between risk and uncertainty. Knight's theory states that uncertainty is when both the outcome and probabilities of different outcomes are unknown. On the other hand, risk relates to a situation where the outcome is unknown but the probabilities are known. Hardaker (1997) refers to Knight's theory of risk and uncertainty in an example. If a person is not sure what weather there will be tomorrow there is uncertainty. On the other hand, if the person is going on a picnic and knows that there might start raining there is risk. Therefore, uncertainty is a value-free statement while risk is implying an alternative consequence. This leads to a common view of taking risk as the exposure to a chance of injury or loss (Hardaker 1997; Ward & Chapman 2003). However, uncertainty and risk are concepts that are usually used interchangeably in practice (Rodger & Petch 1999).

2.5.3 The Concept of Risk

Ward and Chapman (2003) identify and discuss several definitions of risk in order to pinpoint the true meaning of the concept. One common interpretation according to Ward and Chapman (2003) of the term risk is found in the Oxford Dictionary:

Risk – an exposure to chance of injury or loss.

This view of risk states that risk is necessarily a bad thing that investors want to avoid. The fact that risk most often is perceived as a bad thing is related to the fact that the human being by nature is risk averse (Bodie, Kane & Marcus 2009). This means that people in general prefer investments with a lower level of risk before an investment with a higher level of risk. In the traditional quantitative approach of assessing risk this behavior might seem irrational. For example, the risk of a stock is often represented by the standard deviation while the expected outcome is represented by the

mean. By just considering the standard deviation and the mean there should be an equal chance that a stock will go up or go down. The concept of risk aversion however suggests that an investor will neglect the upper side of risk and only see the negative lower side. Ward and Chapman (2003) state that this is a major problem with how managers approach risk since it is only concerned with what might go wrong. Another definition of risk, as presented by Ward and Chapman (2003) is:

Risk—an uncertain event or condition that, if it occurs, has a positive or negative effect on a project objective.

This way of defining risk considers both the upsides and the downsides but has another problem. This is the focus on risk as deriving from a single event or condition. Instead it is suggested that risk management should be extended to involve any uncertainty that could be managed which gives rise to the concept of uncertainty management (Ward & Chapman 2003).

2.6 Measures of Risk

In this report the focus is on qualitative risk. However, the authors find it useful to discuss the difference and meaning of both quantitative and qualitative risk measures.

2.6.1 Quantitative Risk

The traditional risk analysis theory in investments has evolved in capital market theory. Boehm (1989) presents the general idea of risk that a company is exposed to by Formula 1.

$$RE = Prob(UO) * Loss(UO)$$

Formula 1 – Risk Exposure

The risk exposure (RE) is measured by multiplying the probability of an unsatisfactory outcome (UO) and the loss from such an outcome. For example, if a company estimates a 10 percent risk that a certain event will take place and the loss of this event is f $1 million, the company has a risk exposure of $0,1 million to that event.

2.6.2 Qualitative Risk

The losses that are related to the risk are not always monetary losses such as those implied by the financial risk analysis model. The qualitative approach of assessing risks related to projects differs from the traditional quantitative approach. Instead of focusing on financial returns, the qualitative approach seeks to identify threats and vulnerabilities of a project without seeking precise values of the implications of risk. Instead risk is described in terms of variables such as “low”, “medium” and “high” since no exact monetary values can be derived (Bennet & Kailay 1992).

For example, loss in company goodwill is extremely hard to quantify. The loss of consumer confidence is also something that is hard to quantify before the event (Bennet & Kailay 1992).

In this study, the qualitative approach is used, in which negative potential outcomes of an IT investment implementation are identified. In order to prevent these negative outcomes to take place, the study further takes *risk management* into consideration.

2.6.3 Risk Management

Risk management refers to activities aimed at reducing the effects of risk. Harwood et al (1999) states that the focus must only be on risk that matters and that there might be a trade-off between changes in risk, expected returns and entrepreneurial freedom among others. Harwood et al (1999) refers to that risk can have different natures such as losing money or damaging human health. This means that an activity to reduce one kind of risk may increase another kind of risk.

In this study, risk management is based on a qualitative analysis of how [COMPANY] could act to prevent the identified risks. This is outlined in the chapter 7 Recommendations.

3 Problem formulation

This section is divided into five parts. First, the background of the case study is presented. The second part discusses the shift towards IT based training. The Electronic Performance Support Systems (EPSS) that are to be evaluated in this report are also presented in this part. The three final parts outline the researchers approach to solve the problems corresponding to the research questions; what features to select for comparison, how the products can be evaluated and what to consider when implementing the product.

3.1 Case Study Background

[COMPANY]'s department Customer Support is upgrading their ERP system that handle Customer Service Request, SAP Customer Request Management (CRM) 5.0 to the new available version SAP CRM 7.0 in February 2011. The new version involves changes in layout, functions and features that require training of the department's 6000 employees around the world. Currently, [COMPANY] uses a combination of Face to Face, Live Centra sessions, Recorded Centra sessions, static work based learning, user-guides and work instructions for training of its employees. [COMPANY] has learned from previous system upgrades that this process is costly and time-consuming. The company spent over six months to train its employees during the previous upgrade to SAP CRM 5.0. In the daily work, user-guides are currently the main source for training and support.

For the upcoming upgrade to SAP CRM 7.0, [COMPANY] is looking for new ways to train its employees. The company wants to know if it is possible to reduce the time of training to one month and simultaneously reach the same level of individual learning, which directly decreases the related training costs. In addition to the cost and time reduction objective, [COMPANY] has experienced problems with keeping its employees up-to-date with on-going changes in processes and procedures of their work tasks. The managers at [COMPANY] therefore see an opportunity to invest and implement EPSS that guides the individual through the SAP CRM 7.0 in order to increase the effectiveness and efficiency in both initial training and on-the-job training.

In February 2008, the management of [COMPANY]'s Supply group in Gävle, Sweden started a SAP Productivity Pak (SPP) pilot project as they realized a need for IT based training in relation to an ERP system upgrade from SAP to *One!*. The main objective during the SPP pilot was to find a tool that could organize the creation and structure of user-guides, hence time and cost reduction was the main focus but with less focus on individual learning and long-term benefits. An unlimited number of employees are allowed to utilize the software, SPP, since an enterprise license was purchased from SAP, see section 3.2.2. So far SPP has not been utilized to a larger extent and the success of the implementation has been questioned. If the implementation has failed it is still not known if it is due to the product itself or if [COMPANY] has failed in its internal processes to adopt the product.

The fact that [COMPANY] already possesses a number of SPP licenses suggests that there exists justification for investigation of the benefits and drawbacks of SPP. [COMPANY] also possess the alternative to utilize the traditional user-guides that are cheap and easily available. These two EPSS is therefore accessible to the researchers and a thorough investigation of them can be made. In contrary, SupportPoint and Tata's interactive Systems are not possessed by [COMPANY] and the empirical investigation of these EPSS can be somewhat constrained.

3.2 Towards IT Based Training

There exists a number of EPSS on the market that could minimize time of training and training costs, as well as enabling employees to be updated of continuous changes. To clarify for the reader, no extensive study of the whole market for EPSS has been done. Instead, a number of four EPSS was chosen in cooperation with [COMPANY] to build a basis for the actual study. The four EPSS presented below are the ones investigated further in this report.

3.2.1 Traditional User-guides

One of the most simple and least costly EPSS is the traditional user-guides. The user-guides are usually written in word-processing programs, such as Microsoft Word and Power Point, which provide step-by-step guidance of different processes and procedures. To enable changes and updates of the user-guides, they are often stored on the company's intranet rather than on each computer's hard drive.

3.2.2 SAP Productivity Pak

SPP is a learning development tool developed by the work training solutions provider RWD that has already been purchased by [COMPANY] and therefore is given further investigation. The tool was originally named uPerform by RWD but the product was then licensed to the company SAP who changed the name of the tool to enable brand recognition. SPP offers simulations that show the user exactly how a task should be performed. In addition, SPP provides traditional user-guides in a side window next to the main application to avoid tabbing between the application and the word-processing program that is apparent when utilizing user-guides.

3.2.3 SupportPoint

Panviva is a company that provides learning and process guidance through their Business Process Guidance Systems (BPGS) called SupportPoint. Basically, SupportPoint is an innovative interactive learning development tool that visually guides the user to perform the right tasks by providing accurate information. [COMPANY] has had discussions with Panviva regarding SupportPoint and the software is considered as one of the EPSS to investigate.

3.2.4 Tata's Interactive Solutions

Tata Interactive Solutions do not provide a standardized solution but customize their solutions to fit each customer. Tata Interactive Solutions is a part of this investigation in order to investigate if a customized solution could be the most appropriate choice of EPSS.

3.3 Feature Selection

Customer Support stated three initial requirements of their EPSS' need; (1) the cost of the product, (2) the speed from evaluation to implementation of the product and (3) the ability to keep the employees up-to-date with continuous changes in business processes.

[COMPANY] is interested in knowing if there are other features that are even more important to ensure and enable employee learning, which is investigated and presented in the case study. In addition, [COMPANY] wishes to subsequently apply the EPSS, not only to Customer Support, but to other business units' training programs as well. This idea is based on the desire of maximized return of investment, which is why it is important to thoroughly investigate the benefits and drawbacks of potential features of EPSS.

3.4 Product Evaluation

When the features of the product have been investigated and the features that are found to be most important have been selected, the second phase of the research is started. During this phase the four EPSS are compared and evaluated in order to identify the most valuable product. The problem is intensified because of the different objectives between the users and decision makers. The users tend to value intangible benefits, such as user friendliness, more than decision makers that tend to solely look to the financial data of the investment. The authors of this study are aiming to find a model that allows evaluation of intangible benefits. Current financial evaluation models lack in this, since there is an issue to quantify intangible benefits and thereby evaluate the true long-term value of each product.

The study could basically be done in two ways. First, identify all the features that are important, quantify the cost savings for each feature and finally add the license and maintenance cost for each EPSS to create a financial valuation like the NPV or IRR approach. This approach has not been chosen in this study and there are three reasons underlying that decision.

First, as discussed by Desmarias et al (1997) the cost savings of an EPSS is hard to tailor and must take into account a broad number of factors and interrelations between factors as well. This can lead to paralysis of analysis which implies such a high level of complexity in decision making that a decision is never reached (Ross, Westerfield and Jordan 2008). The features that are evaluated in the EPSS in this study further have long-term characteristics which require several assumptions to be made. For example, how long will the EPSS be in use and how many percent of the work force will utilize the EPSS? These types of assumptions are nothing else than guesses at this point and therefore they have a big impact of the financial analysis. Desmarias et al (1997) highlighted that the payback period for an EPSS could differ with a factor of 17 between an optimistic and pessimistic decision maker.

Second, the financial data available in the studied industry, and especially within the studied corporation, is target of confidentiality. It was indicated that [COMPANY] could have more than 50 % discounts on list prices from their vendors while the only thing that was available for this study was list prices.

Finally, the nature of this study is different than a pure break-even analysis of a single investment. If the focus is to decide if it is profitable to invest in a specific EPSS, a financial evaluation is probably the preferable approach. In this study, we look to evaluate several different EPSS in order to choose and recommend the usage of one of them. The choice has been to focus on the relative performance of the EPSS as a main approach, while the relative financial data is used as a second screening.

3.5 Product Implementation

The outcome of the second research question provides [COMPANY] with a recommendation of what EPSS that performs the best in regards to intangible benefits. Beyond this recommendation, [COMPANY] desires guidelines for how to successfully implement the product. This request demands a risk analysis of the implementation of the product that results in recommendations of how to handle the risks.

4 Methodology

This chapter presents the research strategy, design, process and methods. Furthermore, the most important quality criteria of the study as a whole are discussed.

All research has several characteristics that define the methodology for collecting and analyzing data (Bryman & Bell 2007). This chapter is structured into subchapters that cover the dimensions summarized in Table 3. Every subchapter first presents theory and concepts related to each dimension and this is followed by the approach chosen for this study. The research process and the research methods used in each stage of the process are more thoroughly examined since they aim to describe the underlying work in more detail.

Dimension	Approach for this Study
Research Strategy	Qualitative Approach
Research Design	Case study, Comparative Design and Quasi-Experimental Design
Research Process	Literature Study --> Empirical data collection--> Analyzing the Systems --> Generation of Recommendations --> Conclusions and Discussion
Research Methods	Interviews, Observations, Literature study, Documentations, Trials

Table 3 – Research dimensions for this study

The research strategy, design, process and methods are related to the approach that have been used in order to collect and analyze data in order to generate results that answers the purpose of this study. The issues related to validity are more concerned with how the results can be generalized. This is especially important to bring up since this research report has a qualitative research strategy based on a case study in which general conclusions cannot be statistically verified.

4.1 Research Strategy

Research methodology often distinguishes between quantitative and qualitative research strategies. Svenning (2003) discusses that quantitative and qualitative research strategies do not differ in the level of scientific acceptability but that they differ in terms of what aspects of reality they want to describe. The quantitative strategy is often based upon numerical measurements where the researcher has developed predefined measurements that she applies to the object (Seymour 1992). If quantitative research answers what happens, the qualitative research instead helps explaining why something happens. A qualitative research strategy may therefore give deeper understanding of the problem but it may not lead to the same possibilities of generalizing the results as a quantitative research strategy can give (Björklund & Paulsson 2007).

Since quantitative research often is analyzed by using mathematical and statistical models and tools it often requires a larger sample in order to draw relevant conclusions. If the sample is smaller a qualitative process is preferred (Denscombe 2009). Another distinction between quantitative and qualitative research is that quantitative methods most often is performed with hard measures such as money and time. Qualitative research is often preferred when there are softer aspects involved as well that are hard to quantify such as customer satisfaction and user-friendliness.

The qualitative aspect dominates during the data collection and analysis process of this study. This is since the research focuses on giving an understanding of how the studied EPSS can improve and

speed up training at [COMPANY]. However, in order to generate recommendations to [COMPANY]'s management it is useful trying to quantify the result in order to back up our investment proposal. This will be done by evaluating specific features that are identified throughout the report.

4.2 Research Questions

This study is built upon three research questions, which were presented in the introduction of this report. These three questions can practically be seen as three phases of research, namely Feature Selection, Product Evaluation and Product Implementation.

Research question 1 – Feature Selection

What features are important in comparing and evaluating EPSS?

Research question 2 – Product Evaluation

How could these chosen features be evaluated in order to make an investment decision?

Research question 3 – Product Implementation

What risks are relevant when implementing EPSS and how should these be handled?

The first phase in the process of analyzing and evaluating investments in EPSS is named Feature Selection and is aimed to answer research question 1. The aim is to find five to ten features of the EPSS that was especially valuable to [COMPANY]. Any EPSS of course has many more features than this, but not all of them would be seen as critical for [COMPANY] and a limited number of features also would make the further analysis more manageable. In the end, nine features were differentiated to build the framework to answer research question 2. The answer to this question can be seen as the Product Evaluation phase, where the nine features were evaluated for each EPSS within an investment evaluation model. The outcome was a recommendation of which EPSS that performed best according to the chosen features. The final research question is concerned with the risks involved with the implementation of the chosen EPSS and how to handle these. This phase is referred to as Product Implementation.

4.2.1 Relation Between Research Questions

Important to mention is the dependency between the first two research questions that are examined throughout the report. Research question 1, Feature Selection, is answered in the end of the report, after analyzing the empirical findings with help from the literature. However, in order to collect empirical data for research question 2, Product evaluation, the outcome of research question 1 is needed. Therefore, the methodology used is divided into two parts. First, feature selection is evaluated through a literature study, an empirical data collection and finally an analysis. Second, the selected features are used to do the second part of the empirical study, in other words collecting data about the relative performance of the EPSS in every feature. This is the nature of an abductive research process where conclusions are a drawn by synthesizing both empirical and literative findings (Wallén 1996). Research question 3, Product Implementation, is answered based on the findings from the SPP pilot project that became clearer during the iterative empirical study and literature findings.

To summarize, research question 1 and 2 cannot be studied independently. The empirical study to answer research question 2 cannot be started until research question 1 has been answered. This affects the linearity of this study since all empirical material is covered in Chapter 5 and all analytical material is covered in Chapter 6. The reader should therefore be aware of that the sequence of the practical study, which has been an abductive process between literature, empirical studies and analysis, is not in line with the sequence of the documented report, which follows a more formal structure.

4.3 Research Design

The choice of research design is the creation of a framework for collecting and analyzing data. In choosing a research design the researcher makes different priorities in terms of describing connections between variables, generalizing the result, understanding behavior and having a temporal appreciation of social phenomena (Bryman & Bell 2007).

It has already been stated in the literature review that the study of evaluating IT investments should have more focus on long-term intangible aspects. This also motivates the use of a qualitative research strategy, which should be reflected in the research design as well. Furthermore, the research process involves several different steps, which is outlined in the following subchapter, which implies that different research methods are used. This also makes the choice of one single research design more difficult. Bryman and Bell (2007) distinguish between five different categories of research designs; experimental or quasi-experimental design, cross-sectional design, longitudinal design, case study design and comparative design. This study is based on a combination of three research designs; quasi-experimental design, case study design and comparative design. These research designs are presented below, see Table 4, together with an explanation of how they are used in this study.

Research Design	Examples of Questions Asked	Stage in Research Process	Level of Abstraction
Case Study Design	What is the background of the project?	Overall	High
	What features are important in a potential investment?		
	What EPSS are available and considered for the investment?		
Comparative Design	How does each EPSS perform individually and in relation to each other?	Analyzing the alternatives	Medium
Quasi-Experimental Design	How is training and learning affected if the traditional learning method is changed to an alternative method?	Collecting empirical data from two of the EPSS	Low

Table 4 – Research Design Outline

First, we consider the case study design, which characterizes the whole study. A case study design focuses on providing in-depth analysis of one, or a few, features within a single unit. Such design is, unlike a true experimental design, an investigation of a normal setting where the situation is not artificially generated to fit the aims of the research. The case study design is chosen since it entails specific and in depth analysis of the use of EPSS at [COMPANY]. The drawback of using a case study design is that it is often difficult to generalize the results (Denscombe 2007).

Second, the comparative research design implies studying two or more contrasting cases with more or less using the same methods (Bryman & Bell 2007). In this study, the performance and strategic value of four EPSS are evaluated and compared which is suitable to be a comparative research design. The studied EPSS are evaluated on the features identified in research question 1. One issue that violates the validity of this study is that the accessibility of the four EPSS differs. User-guides are already incorporated and used within the company as a whole, while SPP is incorporated but with constrained utilization. The fact that SPP and user-guides are already purchased by [COMPANY] allows a more detailed and fair investigation of their capabilities. One important research method that is used to evaluate these two EPSS is the quasi-experimental observations that are explained soon. The two additional EPSS, SupportPoint and Tata Interactive Solutions, are not yet purchased by [COMPANY] and are studied and evaluated by using limited sources. Thus, to test the software in the same manner as the user-guides and SPP is therefore not possible.

Finally, a quasi-experimental design is used during the specific phase of data collection where two different EPSS are tested against each other. A quasi-experimental research design is based on an experimental approach, in which an experimental group tests what happens if a specific factor is changed which is compared to a control group that holds all factors unmodified. However, it is unlikely that the two groups are identical in experience, knowledge and learning which makes the quasi-experimental approach more compelling. In this study, an important part is to compare how users of traditional methods are performing compared to an alternative method. The experiment is conducted by first letting two users solve three different tasks with the support of user-guides. After this, two other users are told to solve the same tasks with the help of SPP. The observation aims to study the pattern of reasoning and common problems while utilizing the tools.

The quasi-experimental design is a more realistic approach than the pure experimental design since the researchers cannot control all conditions and observe events as they occur naturally (Denscombe 2007). The quasi-experimental approach therefore lacks in internal validity but the ecological validity is strong since there are not artificial interventions in the social life (Bryman & Bell 2007). Due to these factors, a quasi-experimental approach is considered to be more suitable for this study rather than a more controlled experimental design. This is since it cannot be controlled to what degree the users that are participating in the observations have the same background, experience and skills from user-guides or solving certain tasks.

4.4 Research Process and Research Methods

The underlying research for this study, as well as the structure of the research report itself, passes through several stages that involve different kinds of objectives and research methods to fulfill the overall purpose of the report. In this part the research process, with all major stages, is explained together with the chosen research methods. Table 5 summarizes the research process and the different stages are explained in detail.

Stage	**1. Literature Study**	**2. Empirical data collection**	**3. Analyzing the EPSS**	**4. Generation of Recommendations**	**5. Conslusions and Discussion**
Objectives	i) Provide an understanding for the role of IT based training within organizations.	i) Understand the background for the project	i) **Feature Selection** Find the most important features for evaluation.	i) Structure and concretize outcomes from analysis	i) Give general conclusions
	ii) Provide an understanding of IT investments, important features and methods for evaluating them.	iii) **Feature Selection** Find out important features for IT investment evaluation according to empirical findings.	ii) **Product Evaluation** Find out what solution is best according to the chosen features.		ii) Give suggestions for further studies
	iii) Create an appropriate model to evaluate the investment	iii) **Product Evaluation** Learn about functionalities and performance of the EPSS	ii) **Product Implementation** Find out what risks are involved with the investment and how they could be handled		
Research Methods	Literature study	Interviews, observations, documentation, trials, demonstrations	Applying theoretical models on empirical findings	Structuring outcome from analyzis	Applying findings from the qualitative study to general problems found in the literature study.
Outcome	i) A framework for analyzing and studying IT investments and IT based training.	ii) A comprehensive understanding and documentation of each of the studied EPSS performance in relation to the identified features	i) Find out how well each of the EPSS performs.	i) Provide a concrete list of recommendations	i) One part that discusses the generalizability of the study.
			ii) What risks need to be considered and how could they be handled		ii) One part that brings up issues for further research

Table 5 – Research Process

The research methods describe techniques for how to collect the data (Denscombe 2007). The research methods used in this study are interviews, observations, trials, literature studies and documentation.

In most of the research process stages the data has been collected by the use of more than one research method. This technique, referred to as *Triangulation* in the literature, is useful in order to seek validity of the results (Denscombe 2007). Triangulation is the process when research is conducted by using several sources of information or research methods. It is the practice of viewing things from different perspectives. The term stems from the fact that there is a greater chance to find out the exact location of a point if it is viewed from at least two more positions. Basically, triangulation aims to give the researcher a better understanding of the problem as she views it from different positions.

Triangulation is used since interviews, observations and documentations are used in order to find an as accurate view of the empirical problem as possible. Furthermore, the EPSS is also utilized in order to get an understanding of its benefits and drawbacks.

4.4.1 Literature Study

The literature study has several purposes. First, it provides important theories and concepts related to IT based training and its role within organizations. This is important since it helps understanding the situation that [COMPANY] is in. Second, the literature gives guidance on important features that decision makers should consider when investing in an EPSS. Third, theories and models of IT investment evaluation provide a basis for answering the second research question. Finally, theories about organizational learning and risk analysis of implementing IT investments is used to answer the third research question.

The identified areas in the literature that are examined in this report are summarized in Table 6.

Issue or Area identified in Reality	Subject to be studied in the Literature
Update of IT platform	Theory of Organizational Change
Leading to	
Need for training of employees	Training and Learning within Organizations.
Leading to	
Experience suggest an alternative method for training – EPSS are proposed	Theory about IT based training and learning development within organizations, such as Knowledge Management Systems and EPSS.
Leading to	
A need for IT investment	Theory about IT investments.
Leading to	
Different EPSS are considered and they need to be evaluated. One EPSS is already incorporated but the implementation and current use of it has been disappointing	Theory about IT investment evaluation and risks related to such an investment.

Leading to	
SPP has already been implemented within the organization but has not shown significant results. What does [COMPANY] need to consider succeeding with an implementation?	Theory about organizational learning and risks with implementation.

Table 6 – Literature Review Scope

The springboard for this study is the update of SAP CRM that [COMPANY] is facing. Theories of organizational change are important in this face to examine the possible issues that comes with new work environments. This ultimately leads to a need to train employees which is examined in the literature by studying training and learning within organizations. This situation leads us further into examining how training can be conducted. [COMPANY] has experience from conducting initial training by workshops and educations which is very time consuming and costly. The same is true about on-the-job training that is currently supported by user-guides. This has proven to be an inefficient and costly way of conducting training. This justifies why [COMPANY] is looking into alternative methods for training in EPSS. Therefore, theories of IT based training are interesting to study further. This part also provides a basis for selecting features that are important in evaluating an EPSS. Finally, this leads into the decision making process of evaluating and choosing an IT solution. This is investigated in literature by examining theories of evaluating IT investment and risk management in implementing it.

4.4.2 Empirical Data Collection

The empirical study is structured by the research questions where the first part is dedicated to identify what features [COMPANY] is valuing in an EPSS. This is also complemented with other important features that are found while investigating the EPSS.

The second part involves collecting information about the performance of all the EPSS in relation to each feature that has been chosen. This part of the empirical data collection is based on the features that are concluded to be the most important in the first part of the analysis, where both theoretical and empirical findings are considered.

Due to the variation in availability of the different EPSS, the data collection process has not been identical. This is illustrated in Table 7. User-guides have been evaluated through trials, observations and interviews. SPP has been evaluated and tested through demonstrations, trials, observations and interviews. SupportPoint has been evaluated based on demonstrations and interviews. Tata Interactive's solutions have solely been evaluated based on demonstrations.

	Demonstration	Trial	Interviews	Observations
User-guides		X	X	X
SAP Productivity Pak	X	X	X	X
SupportPoint	X		X	
Tata Interactive	X			

Table 7 – Research Methods

Both parts of the empirical data collection have interrelated processes. This means that research methods are not always explicitly conducted to examine research question 1 without affecting research question 2 and finally also research question 3. For example, the observations were initially setup to examine the efficiency of SPP in relation to user-guides but also led to some important input for answering research question 1.

The interviews that have been conducted are summarized in Table 8 and the questions that were used can be found in Appendix B and C. All interviews are semi-structured interviews with people that have experience or specific knowledge about one or more of the four studied EPSS.

Interviews

Respondent	Function/Title	Company	Outcome
Responent A1	Manager of Training	[COMPANY]	Functioned as a springboard of the project in providing background information and scope of the investigation. Participated in observations while conducting tasks with user-guide assistance.
Respondent A2	Competence Controller	[COMPANY]	Providing information about [COMPANY]'s use of user-guides. Structure of content and coverage. Participated in observations while conducting tasks with user-guide assistance.
Respondent B1	Employeer at Customer Support	[COMPANY]	Giving input of the usage and perception of user-guides among the employees at [COMPANY]. Participated in observations while conducting tasks with SPP assistance.
Respondent B2	Employeer at Customer Support	[COMPANY]	Giving input of the usage and perception of user-guides among the employees at [COMPANY]. Participated in observations while conducting tasks with SPP assistance.
Respondent C	IBM consultant for [COMPANY]Support	IBM Sweden	Giving Support of how to utilize SPP and what functions are in the EPSS.
Respondent D	IBM consultant for [COMPANY]Support	IBM India	Giving Support of how to utilize SPP and what functions are in the EPSS.

Respondent E	SPP Administrator at Supply Group	[COMPANY]	Create and publish SPP documents
Respondent F	Technical Expert	Tata Interactive Solutions	Giving demonstration and information about the functionalities of Tata Interactive Solutions.
Respondent G	System Developer	Tata Interactive Solutions	Giving demonstration and information about the functionalities of Tata Interactive Solutions.
Respondent H	Salesman	Tata Interactive Solutions	Giving demonstration and information about the functionalities of Tata Interactive Solutions.
Respondent F	Sales man	Panviva	Giving demonstration and information about the functionalities of SupportPoint.
Respondent G	Sales man	Panviva	Giving demonstration and information about the functionalities of SupportPoint.
Respondent H	Sales man	Panviva	Giving demonstration and information about the functionalities of SupportPoint.
Respondent I	IT Manager	NAB – Panviva's customer and utilizer of SupportPoint	Giving feedback and information about the usage of SupportPoint from a customer's point of view.
Respondent J	IT Manager	Fosters - Panviva's customer and utilizer of SupportPoint	Giving feedback and information about the usage of SupportPoint from a customer's point of view.

Table 8 – Summary of Interviews

The documentation that has been used consists of internal documents within [COMPANY] such as process descriptions, user-guides and reports. In addition to this, work instructions for SPP, presentations, descriptions and sales material for SupportPoint and Tata Interactive Solutions.

The observations were initially conducted to outline the potential of SPP in relation to user-guides since both these two EPSS are owned by [COMPANY] and could be examined in practice. A specific observation method was used; Think Aloud Protocol (TAP), which was used to emphasize the qualitative aspects of the tests, see Appendix D. Because of this choice of method, the observations could be conducted with only four employees at [COMPANY], which were the only accessible and appropriate users of SPP and user-guides that the researchers could find. The employees were observed while utilizing either SPP or user-guides to solve some specific tasks within SAP CRM and were urged to think aloud, and tell everything that came to their minds, during the observation. All four employees had experience from handling user-guides but the tasks that they were asked to

perform were new to them. Two of the observed participants, A1 and A2, were assigned to perform the tasks by using the traditional learning method with assistance from user-guides. The other two, B1 and B2, were assigned to perform the tasks with assistance by SPP.

Finally, some trials in SPP were made by the researchers in order to get skills and knowledge in utilizing the EPSS. Unfortunately, the same amount of hands-on experience could not be gained from SupportPoint or Tata Interactive Solutions since there are significant costs involved to gaining access to a licensed version.

4.4.3 Analyzing the EPSS

The analysis is, just as the literature review and the empirical study, divided after the two research questions. Research question 1 that identifies the most significant features of the IT investment is used as a framework for structuring the aggregated performance of each of the EPSS. One IT investment model based on findings in the literature is used in research question 2 in order to investigate which of the EPSS that is most beneficial for [COMPANY].

The cost of the EPSS is not a part of the selected features but instead considered after the comparison of the intangible features of the EPSS has been made. This was concluded during the abductive process of selecting features since cost always is important in the end but is hard to immediately compare to other features that are harder to quantify. For example, a high level of user-friendliness in a product can be difficult to compare to a lower price on a second product. Furthermore, the evaluation focuses on the performance of the different EPSS in terms of the selected features. The cost of the EPSS is not really a performance measure but rather a second decision-making criterion.

Research question 3 implies that a risk analysis of the proposed investment is done in order to provide valuable input for how the selected EPSS should be implemented and issues that [COMPANY] needs to consider in regards to the implementation.

4.4.4 Generation of Recommendations

The outcome of the analysis provides a basis for the last parts of the study, giving specific recommendations on how [COMPANY] should act in this situation. The recommendations consist of concrete and company specific suggestions on how to invest and implement an EPSS.

4.4.5 Result Discussion and Further Studies

The conclusions of this study are focused on generalized outcomes of the work and its implications on previous findings and theories. These conclusions focus on problems on a higher level than the company specific recommendations given previously. Furthermore, further studies are discussed, focusing on related areas that were not covered in this study.

4.5 Quality Criteria

In order to assess the quality of a study there are certain quality criteria that should be discussed. The two most important measures of research quality are discussed in this section, namely validity and reliability.

4.5.1 Validity

Validity is a concept that measures the truthfulness of research and exists in many different forms (Bryman & Bell 2007). The three most fundamental forms of validity that is discussed in this report are construct, internal and external validity.

4.5.1.1 Construct Validity

The term construct validity means that a study actually measures what it aims to measure (Bryman & Bell 2007). First of all, it can be discussed whether the EPSS features that were identified, and later used in order to evaluate the products, measured the actual performance of each system. Since performance is a concept, in other words a variable characteristic of an object of study, it does not have a direct measure. Indicators, such as user-friendliness, are instead used in this study to represent the performance. Construct validity is therefore negatively affected by this lack of a direct measure for performance of the EPSS.

Secondly, the researchers did not have previous experience from the participant observation technique TAP, something that may have affected the construct validity negatively. This is since the researchers were not professionally trained in how to setup and record a TAP observation. However, the researchers performed a few tests before the observations and allowed the observants to practice the method to think aloud in fiction problem solving questions to increase the construct validity. Triangulation has been used in order to identify different features that are important to consider which further strengthens the construct validity.

4.5.1.2 Internal Validity

Internal validity infers that the right people with the right competence are interviewed and that causal relations exist between the measured variables (Svenning 2003; Bryman & Bell 2007). In this study, the internal validity is considered to be high since many different sources and methods have been evaluated and used to analyze the problem. However, the internal validity could be affected because of the fact that the accessibility of some of the EPSS has been limited. Overall, the internal validity is considered to be medium to high.

4.5.1.3 External Validity

External validity means that the research can be applied in a broader perspective in order to generalize the conclusions. In order to reach a high level of external validity it is important to have good quality of the empirical information (Svenning 2003). Bryman and Bell (2007) add that by insuring thick description of the object and concept of the study and quantifying the data in statistical models increases the external validity and generalizability. In terms of external validity, there has been a restriction of number of EPSS to evaluate in this study. Therefore, it should not be interpreted that the EPSS with highest score on total performance is the best product on the market since not all such systems have been evaluated in this study.

Furthermore, the external validity of what features are important and their relative weights in an evaluation model is restricted. Instead, the general conclusions are drawn on the methodology of evaluating investments in EPSS and what risks are related to such an investment. These conclusions have higher external validity since many companies, within the industry and across industries as well, are facing the same issues.

4.5.2 Reliability

Reliability refers to the level of accuracy of the study. A reliable study has to be repeatable. That is, it has to generate the same result independent from who has conducted the research (Björklund & Paulsson 2007). In cases of qualitative research reliability can be quite complex though since the data collection takes place during interaction between people. Christensen et al (2001) therefore state that measuring reliability sometimes is irrelevant in evaluating the value of a qualitative study.

In this case study, most evaluations have been done on a qualitative basis by the two authors. This leads to subjectivity in these evaluations. There are three parts of this study where the subjective bias has significant impact. First of all, during the Feature Selection phase the choice and formulation of different features were done by the authors and confirmed with the training manager at [COMPANY]. However, if someone else would have done the same work, there is a big chance that this person would come up with different features and different formulations of them. Secondly, the dedication of weights for each feature was also done by the two researchers, with some feedback from the manager at [COMPANY]. Thirdly, the performance evaluation for each feature has the same exposure for subjectivity as do the dedication of weights.

To get a more reliable result the evaluations could for example have been done by sending out questionnaires to a large number of employees where they could communicate their view on dedication of weights. The problem by doing this is that a lot of information and experience that the researchers have gained throughout the process is also needed to understand the features and their impact on the EPSS. For example, most end-user respondents would not understand why speed of implementation and central documentation storage would be important at all, since they would almost only be concerned by the user-friendliness. For the evaluation of each feature, the authors see no relevant alternative way to go ahead since the evaluation is based on knowledge and experience from all four systems.

5 Empirical Results

This chapter presents the empirical findings of this study. It starts with a short background of the data collection process, a summary of the identified important features, followed by a description of the data collection process for each of the studied EPSS.

Customer Support at [COMPANY] has previously been working with mentor led training sessions for initial training and user-guides for on-the-job training and performance support. However, [COMPANY] is now looking into using a more interactive and dynamic EPSS to be able to shorten time to training and make on-the-job training more efficient.

This empirical chapter is structured in two main parts that covers data collection to enable feature selection, as well as data collection to enable product evaluation. The third research question is answered in the next two chapters where risks during implementation, as well as recommendations on how to handle these risks, are brought up.

5.1 Important Features for Performance Evaluation of EPSS

During the data collection process it was important to gain a broad understanding of the four different solutions in order to find benefits and drawbacks of each of them. To be able to structure the empirical findings in the following sections it is found needful to present the most important features that finally were chosen for evaluation and comparison. The features have been identified and chosen both prior, during and after the empirical data collection in an abductive process, which also have been backed up by theoretical material. Table 9 presents the origins of the identified important features. The selection of these features are described and justified in section 6.1 Feature Selection.

	Feature	Identified
1	User-friendliness	During trials and observations
2	Simulation Possibilities	During observations
3	Central Document Storage	During data collection
4	Process Overview	During interviews
5	Communication of Changes	Initially requested by [COMPANY]
6	Speed of Implementation	Initially requested by [COMPANY]
7	Context Sensitivity	During data collection
8	Feedback	During interviews
9	Flexibility	During data collection

Table 9 – Identified features and their origins

Initially, *Speed of Implementation* and *Cost* were requested features by [COMPANY]. However, the cost of EPSS is not a part of the selected features but instead considered after the comparison of the intangible features of each EPSS has been made. This was decided during the abductive data collection process and is motivated in Chapter 4 – Methodology.

As discussed previously, the continuous change of processes and procedures also brought up a desire for *Communication of Changes* via the system in an early phase of the study. This would mean that as soon as any change in the ERP system is registered, or if any other change is made in a business process, the EPSS should be informed of this and communicate it to the user.

During the data collection, other features were found important. *User-friendliness* was first recognized during trials in SPP and the user-guides. Even though the respondents were somewhat familiar with the user guides, user-friendliness showed to be a vital factor for efficiency and even more important for the unfamiliar SPP.

The fact that SPP provided *Simulation Possibilities* made it possible for the respondents to try this feature, which all saw value in because of the ease to imitate the simulation in order to learn how to complete a task. The request for *Central Documentation Storage* was found desirable because of [COMPANY]'s policy to keep all organizational documents in the same database.

Roles and responsibilities were also discussed during the data collection and how a training tool could be programmed to identify a specific user. This feature, called *Context Sensitivity*, lets each employee find her responsibilities and information connected to her role through the EPSS. Furthermore, it also identifies where in the process the user is in order to provide more accurate information.

During the interviews with the administrators, a request for the possibility to give and receive *Feedback* on content improvement was discovered. Finally, [COMPANY] would like the opportunity to utilize EPSS in a wide range of applications and business units. Therefore, the *Flexibility* of the training tool has been considered. The term flexibility is seen as the future efforts in terms of time and cost to prepare the training tool to be used for an application other than SAP CRM.

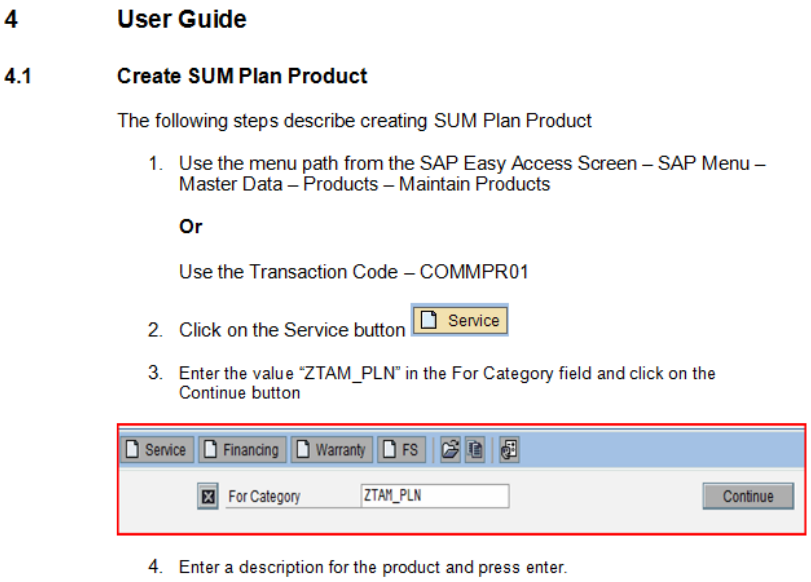
All features have been discussed and justified with [COMPANY] as important for evaluation, even though they were not required from the beginning.

5.2 Data Collection of User Guides

[COMPANY] is currently looking for a better alternative than utilizing user guides for on-the-job training but the user-guides are still considered as an alternative for training and are therefore justified to be a part of the study.

5.2.1 Trial

[COMPANY] has traditionally used user-guides for on-the-job training, see Figure 5. The user-guides basically consist of a word document where screenshots, annotations and informative text aim to guide the employee. The user-guides are available on [COMPANY]'s central document management area Eridoc. A deeper technical specification of how the user-guides within [COMPANY] work is not needed.



4 User Guide

4.1 Create SUM Plan Product

The following steps describe creating SUM Plan Product

1. Use the menu path from the SAP Easy Access Screen – SAP Menu – Master Data – Products – Maintain Products

   Or

   Use the Transaction Code – COMMPR01

2. Click on the Service button [Service]

3. Enter the value "ZTAM_PLN" in the For Category field and click on the Continue button

4. Enter a description for the product and press enter.

Figure 5 – Screenshot of User-Guide

5.2.2 Observations

The observations that were conducted with employees using user-guides were aimed to study the difference between utilizing traditional methods, in terms of user-guides, and a potential future method, in terms of SPP. The description and results from the observations are found under section 5.3.3.

5.2.3 Performance

The results from the conducted trial and performed observations revealed information about the performance of the user guides that are outlined below.

5.2.3.1 User-Friendliness

The lack of user-friendliness in utilizing user-guides is one of the main reasons why [COMPANY] is looking into alternative solutions. One of main identified problems that were identified refers to tabbing and switching windows while working in the software and going back to the user guides. This clearly disrupted the workflow and gave rise to irritation and confusion among the participants in the observations. Another problem was the need for scrolling up and down in the user guide since the documentation for each task often consisted of several pages. A third problem was how to access the user guides since there is no direct link within SAP CRM to access it. Instead the employees have to go through Eridoc and find the user guide and search the document to find the specific task.

5.2.3.2 Simulation Possibilities

Obviously, the nature of the user guides, in other words simple word documents, does not provide any simulation possibilities that can be used during the initial phase of training.

5.2.3.3 Central Document storage

One benefit of using user guides is that all documents can be stored centrally and be available to everyone with access to the company's database. Since it is only based upon Microsoft Word documents, and no additional software, everyone can download the content.

5.2.3.4 Process Overview

The user guides, as they are formulated today, give some sort of process guidance since there are parts in the documents that describe when a certain task should be done. However, the user-friendliness once again is not optimal since the information has to be search for and the amount of text within the document sometimes makes it difficult to find what the user is looking for. In addition, individuals behave differently when searching for information. While someone prefers to look at pictures or annotations, another one prefers looking for text that explains the prescribed procedure.

5.2.3.5 Communication of Changes

The user-guides are currently updated as soon as a change is done in a task or a system. The changes are then communicated to concerned employees through emails once every quarter. The changes are collected manually and to send out emails every time something changes is considered to costly and time consuming. However, [COMPANY] has found drawbacks with the quarterly reports since there might take several months before users are informed about changes.

5.2.3.6 Speed of Implementation

The initial time for setting up user-guides is negligible since the structure is only based on word documents. The implementation is instead related to the time of putting all the content into the documents. This is obviously a manual task and is done by one full time employee.

More critical is the time of training, hence initial training, which is done the traditional way, in other words with mentor led training sessions. This does not fulfill the requirement of reducing initial training time from six months to one month.

5.2.3.7 Context Sensitivity

Since the Word documents have no integration with the software environment, in other words SAP CRM, there is also no context sensitivity of the user-guides. This basically means that the word documents provide the same information no matter who is utilizing them or where in the process the employee is working.

5.2.3.8 Feedback

The process of giving feedback to the documented material seems to be less than optimal from an ease-of-use perspective. There are possibilities to take contact with the administrator if the user considers something to be unclear or inadequate. It is not identified how often this is done and the process rather than the actual use of it, should be considered.

5.2.3.9 Flexibility

The word documents can be applied for every application and every unit within [COMPANY]. If a good template of how to document a task or a process is given there are no larger difficulties in diversifying the methodology into other applications and departments. This has also been the traditional way of documenting training material within [COMPANY].

5.3 Data collection of SPP

The data collection process of SPP started with a demonstration of the software, followed by trials, observations and interviews.

5.3.1 Demonstration

The demonstration of SPP was conducted in two phases; initially and complementary demonstration.

The initial demonstration[1] was conducted in Melbourne during the first week of the study. At this time, the researchers possessed some background information about Customer Support's issue and little knowledge of SPP. The demonstration was virtually conducted via Sharepoint with two of IBM's technical specialists of SPP[2]; respondent C and D.

SPP enabled administrators to record tasks within SAP CRM 5.0 from which employees can obtain learning content, mainly as simulations and work instructions. The simulations are mostly used for initial training and exist of four different degrees of difficulty. The lowest level of simulation is the *demonstration* that consists of a virtual replay of the recorded task. They are accessible to the employees at any time where they can observe them repeatedly to get a hold of the process in general and to try to memorize the steps of it. The second level is the traditional *simulation* in which the employee is asked to perform the tasks by herself. The simulation does not approve action performed in another way than what was initially recorded by the administrator and makes the employee aware of what she should do to make the correct action. The two final levels of simulations consist of different degree of self-directed learning. What makes them different is the degree of assistance provided depending on the level of knowledge of the employee.

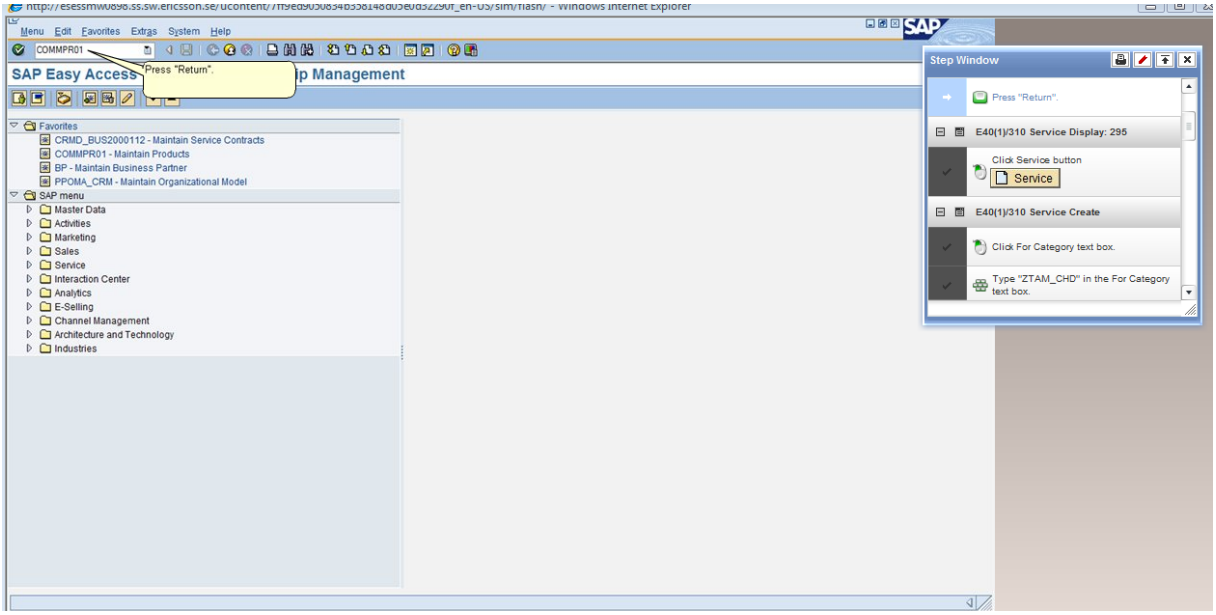
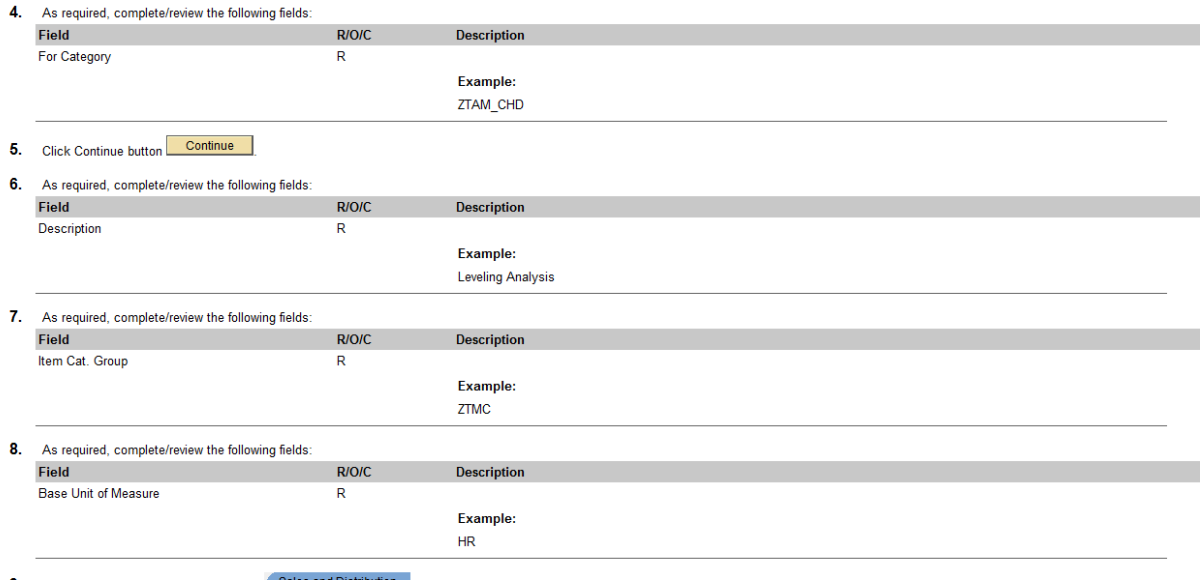


Figure 6 – Screenshot of the SAP window with a minor assisting SPP window

The work instructions are mostly useful for on-the-job training and consist of step-by-step instructions, very much similar to the user-guides. The work instructions include screenshots, see Figure 6 and 7, of the current SAP CRM 5.0 view with additional description of how to perform each step but they do not provide annotations of any kind.

[1] 2010/07/01

[2] IBM is [COMPANY]'s IT vendor and will be involved in a possibly implementation of SPP



4. As required, complete/review the following fields:

Field	R/O/C	Description
For Category	R	
		Example:
		ZTAM_CHD

5. Click Continue button [Continue]

6. As required, complete/review the following fields:

Field	R/O/C	Description
Description	R	
		Example:
		Leveling Analysis

7. As required, complete/review the following fields:

Field	R/O/C	Description
Item Cat. Group	R	
		Example:
		ZTMC

8. As required, complete/review the following fields:

Field	R/O/C	Description
Base Unit of Measure	R	
		Example:
		HR

Figure 7 – Screenshot of SPP work instructions

The complementary demonstration[3] was conducted with respondent C during the researchers' second field trip to Melbourne, which consisted of several demonstrations. These demonstrations were conducted for two reasons. The first one aimed to gain deeper knowledge in how to publish created material on the SPP webpage and other technical issues that needed to be solved before enabling performance of SPP observations. The second reason was to get a deeper understanding in the EPSS for further evaluation. The demonstrations showed that the employees could, whenever they need assistance, click on the "[COMPANY] help-bottom" in the SAP CRM menu to access SPP. This opens up a new window where all tasks that are relevant to what the employee was seeking assistance for are presented. Here, the employee can choose which recording that seems most relevant and click on it to proceed to the related learning content. The demonstration also revealed that the work instructions are possible to *stay-on-top* on the SMS window. This simplifies navigating between SMS and SPP since no tabbing between documents is needed.

5.3.2 Trial

In addition to the demonstrations, the researchers compiled their own trial in SPP to investigate the EPSS's benefits and drawbacks in order to minimize possible biased opinions from IBM.

During the trials two major issues related to user-friendliness were identified. First, if the work instructions consist of several steps there is a need to scroll down in the SPP window. This tended to be disruptive and sometimes hard to handle, especially when working on a laptop. Second, the position of the SPP window sometimes was such that it covered important informative parts of the window in the main application.

5.3.3 Observations

The new upgrade of SMS, SAP CRM 7.0, is not available until February 2011, which means that the observations would need to be compiled with use of the old version, SAP CRM 5.0. Therefore, it was necessary to identify an area where tasks where not yet performed in SAP CRM 5.0. With recommendations from Customer Support, the area *Task Management* was selected. With assistance

[3] 2010/08/09-13

from traditional user-guides, which had not been properly tested yet, the researchers recorded SPP content in order to observe employees performing tasks by the use of user-guides as well as by SPP. However, the employees that handle Task Management are located in Hungary, Europe. Instead, three administrators and one authorizer of SAP CRM 5.0 located in Melbourne, Australia, were chosen to perform Task Management tasks under observation. All four employees also had experience from handling user-guides.

Two of them, group A, had had sufficient more training with SAP CRM 5.0 than the other two and they had a little insight in the Task Management process. With this background they were assigned to perform the tasks by using the traditional learning method with assistance from user-guides. The other two, group B, were assigned to perform the tasks with assistance by SPP.

The employees work with the user-guides everyday and they state that they find, almost every time, what they are looking for. One respondent mentioned that it is often time consuming and exhausting to find the right information by using trial and error based on gut feeling and experience. The others seem to agree since they sometimes have to try to find the information elsewhere by asking colleagues, search the intranet or the internal document storage. The employees state that the information in the user-guides is almost always accurate but sometimes there could be parts missing, especially the administrators' user-guides.

5.3.3.2 Method

Before the interviews the participants were introduced to the goal, aims and desired outcomes of the study. They were also introduced to the Think Aloud Protocol (TAP) method, see Appendix D. In addition, group B got a brief explanation of the Task Management process and were shown an SPP simulation of the first task. In order for the participants to become familiar with the TAP method together with the user guides or SPP respectively, the first task was used as a practice task for both groups. The TAP observations were complemented with interviews, see Appendix B.

5.3.3.3 Result

As the observations were performed on a very limited number of participants, the study took a qualitative approach. Instead of focusing on time to perform a certain task, which has a lot of influence and bias from individuals, the researchers looked for workflow restrictions, patterns and common mistakes in utilizing the tools.

Workflow Restrictions

Time to complete each task was dependent on how well the employee was able to navigate with the user guides respectively with the SPP. Working with the user guides required tabbing between applications while SPP demanded movement of SPP's *stay on top*-window, which hidden information in the SAP CRM 5.0. This confused group B but they stated that they would probably quickly learn how to handle the issue. Group A on the other hand, seemed annoyed by the tabbing between the applications and group B, who also were used to this, preferred working with the SPP.

Pattern

Group A could not find all information in the user-guides but eventually they reasoned to the accurate commando. This was often because they had to scroll in the user-guides which lead to missed steps. The respondents behaved quite differently, where respondent A1 rather looked at the

pictures instead of reading and respondent A2 rather read the text before looking at the pictures. In places where the text was insufficient it was more difficult for respondent A2 to know what to do and when pictures or annotations were missing respondent A1 had more problems. The first respondent of group A comment on the absence of annotation and highlighters in the user-guides which would have made it more user-friendly and easier to understand what to do. She also used short commandoes like *copy* and *paste* frequently, which explains her shorter amount of time task performance. Both employees in group A seemed to think that switching screen all the time was *"painful"* and *"the biggest problem with user guides"*.

Group B missed instructions sometimes due to the need for scrolling in SPP. After trying to find steps that they could not find, they went back to the instructions and found out that they had missed a step. Respondent B2 used short commandoes like *copy*, *paste* and transaction codes in order to speed up the process. One time this lead to a problem since the SAP CRM 5.0 remembers the last tab position under a certain commando, which meant that the screen did not look the way that SPP was suggesting. Respondent B2 found the right tab at last but instead of it being a shortcut it was time consuming. Both employees stated that the stay-on-top window was in the way for the performance in SAP CRM 5.0 and that they had problem to work around that. Sometimes they tried to move it, but not enough, or it was in the way for next step, which is why they both minimized it sometimes to be able to see and work with the whole SAP CRM 5.0 screen. As stated before, this would not be a problem according to IBM but since [COMPANY] is in the start-up phase, all functions have not yet been successfully met.

Common mistakes

From time to time group A did not find the right commando because the user-guides did not tell them to scroll down in the SAP CRM 5.0. To be able to go further they had to rely on their experience and their gut-feeling where to proceed. Scrolling seemed also to be a problem in the user-guides where it was easy to miss a step and hard to find where in the process the user was located in. The user guides lacked sometimes in consistency in two ways. First, it sometimes stated 'click continue' or 'press enter' and sometimes it did not. Second, the picture and text that correlated to the same step were sometimes above and another time below the text which seemed to confuse the employees. The fact that the screenshots were shallow appeared to impact negatively on the employees since it was difficult to determine where it originated.

Group B also seemed to have consistency problems, which lead to confusion. For example, this depended on how the recording was recorded, the SPP tell the user to 'click continue' while the user might already had pressed enter. In addition, the SPP sometimes tells the user to scroll down in the SAP CRM 5.0 and sometimes not which lead to that the user tried to find the right commando at the wrong location. Scrolling in the SPP document was also a problem since steps were missed and it was difficult to locate where in the process the user was if the user got lost. Finally, the absence of annotations or highlighting in the SPP made it difficult for the users to find the accurate buttons even though the SPP provides sound screenshots.

5.3.4 Interviews

The interview with respondent E, an administrator of SPP at the Supply group, revealed important information about the implementation and the degree of utilization of the IT based learning tool. The respondent did not work in the Supply group when the tool was introduced but had got the

information that SPP had been implemented based on decision from managers that have left the company. The respondent approximates the amount of administrators to ten to twelve but is not able to estimate the amount of users. However, she states that the tool is barley used by the employees and that it takes a long time and continual usage to learn how to utilize SPP. The reason for this seems to lie in the constrained amount of recordings that exist and the employees' lack of habit to use the support. The employees either use the traditional user guides that still exist or more likely ask someone else. Respondent E reports that she does the recording now and then because of directive from the management but since it does not happen regularly she is not confident in utilizing SPP. Also, updating the recordings is described as complicated and rarely possible to complete. The respondent has to redo the whole recording to be able to change the instructions. Thus, it takes her time and effort to complete the recordings, which she knows that few colleges are going to utilize anyway.

Because of the mentioned information, the respondent's general impression of SPP was worse than previously expected. In addition, the respondent stresses the lack of responsibility of the product. From the respondent's experience she cannot recommend a further implementation of SPP in the organization. She believes that SPP has a somewhat potential to be a more efficient EPSS that the traditional user guides depending on how the end-users perceive it. Furthermore, the respondent thinks that the employees would need training and support from the management to feel motivated to utilize the tool. Finally, the respondent mentions that a decision will shortly be made within the Supply group whether SPP should be kept as IT based training or not. Her impression is that it is more likely that they will go back to utilize the traditional user-guides.

5.3.5 Performance

From the empirical data collection of demonstration, own trial, observations and interviews following performance was found.

5.3.5.1 User-Friendliness

The way that SPP functions today implies some serious concerns regarding user-friendliness. In general, the on-the-job training functions of SPP face the similar problems as the user-guides do. Tabbing between screens and handling the position of the SPP window that appeared to be in the way for important information on the screen was considered as big issues during the observations. Furthermore, the structure of the content implies that the user needs to scroll in the SPP window, which disrupts the workflow and sometimes makes the user to overlook important information or steps in the procedure. However, the access to the help content is good since it is provided by a direct link within the software platform, in other words SAP CRM.

5.3.5.2 Simulation Possibilities

The simulation possibility is an advantage with SPP since it provides several modes of walking through a task by the use of the four different tutorial forms.

5.3.5.3 Central Document storage

Currently, the content that is put into SPP is stored on the web based client and cannot be stored centrally in Eridoc.

5.3.5.4 Process Overview

The nature of SPP is performance support, hence step-by-step guidance within the software platform. However, there seems to be limited availability of process guidance functions. It is considered as a disadvantage that the user cannot take a step back and get an overview of the whole process.

5.3.5.5 Communication of Changes

Communications of changes imply that the administrator either has to record the content all over again, or make all changes manually. However, one respondent that record SPP material stated that this was not always the case and hence, she had to start over to rerecord some content. The communication of changes is driven by the context sensitivity of SPP as well as email based communication to concerned users.

5.3.5.6 Speed of Implementation

Since the system is already purchased, the time to setup the system is related to finding a good template and structure of the content. Furthermore, the time to record and document all the content is a time-consuming process. However, when the employee who records content has learned to utilize SPP, the time to create content is considered to be shorter than the same process for user-guides. This is due to the recording function and logic of the SPP software.

In addition to this, the time of training seems to have higher potential than user-guides to be software-driven rather than mentor-driven. The simulation function provided is a main driver of decreasing the time to training.

5.3.5.7 Context Sensitivity

The new release of SPP provides context sensitivity both in terms of roles and process location. However, this has not been justified since [COMPANY] only has been authorized to utilize the old version of SPP so far. The performance of the context sensitivity can therefore not be correctly evaluated.

5.3.5.8 Feedback

The process of giving feedback currently works in a similar manner as with user-guides. The administrator of the content can be contacted directly but there is inadequate information of how much this has been utilized in the pilot project at Supply.

5.3.5.9 Flexibility

SPP can be used within other software platforms since it is only a matter of providing links from the software platform to the web-based SPP client. Additional work that might be necessary is to develop a new template in which the structure of the content is adapted to the new software platform.

5.4 Data Collection of SupportPoint

The Business Process Guidance System (BPGS) is a term coined by the company Panviva and refers to the underlying logic of Panviva's products. BPGS is a performance-enhancing tool that gives on-the-job support by guiding workers through their daily processes. It is developed to guide workers through processes on a daily basis. SupportPoint is the company's flagship and a product that has caught [COMPANY]'s interest. The BPGS has been commonly used in the financial sector where employees face a lot of complex procedures and policy issues. Panviva has developed SupportPoint to function as a GPS for work where the employee is guided through the process by telling the

system where she wants to go. In fact, SupportPoint is, just as the other studied tools, one example of an EPSS but seemingly much more focused on the process overview than both user-guides and SPP. The term BPGS instead of EPSS is considered to be a way for Panviva to differentiate their products from their competitors'.

5.4.1 Demonstration

The demonstration of SupportPoint, see Figure 8, was performed by one of Panviva's salesmen, respondent F. [COMPANY]'s prerequisites were discussed with additionally two respondents, G and H, who demonstrated how well SupportPoint could meet these needs. The demonstration also showed the width and depth of the EPSS that would generate additional value to the organization. In contrary to SPP, SupportPoint handles business processes and procedures and not only step-by-step instructions.

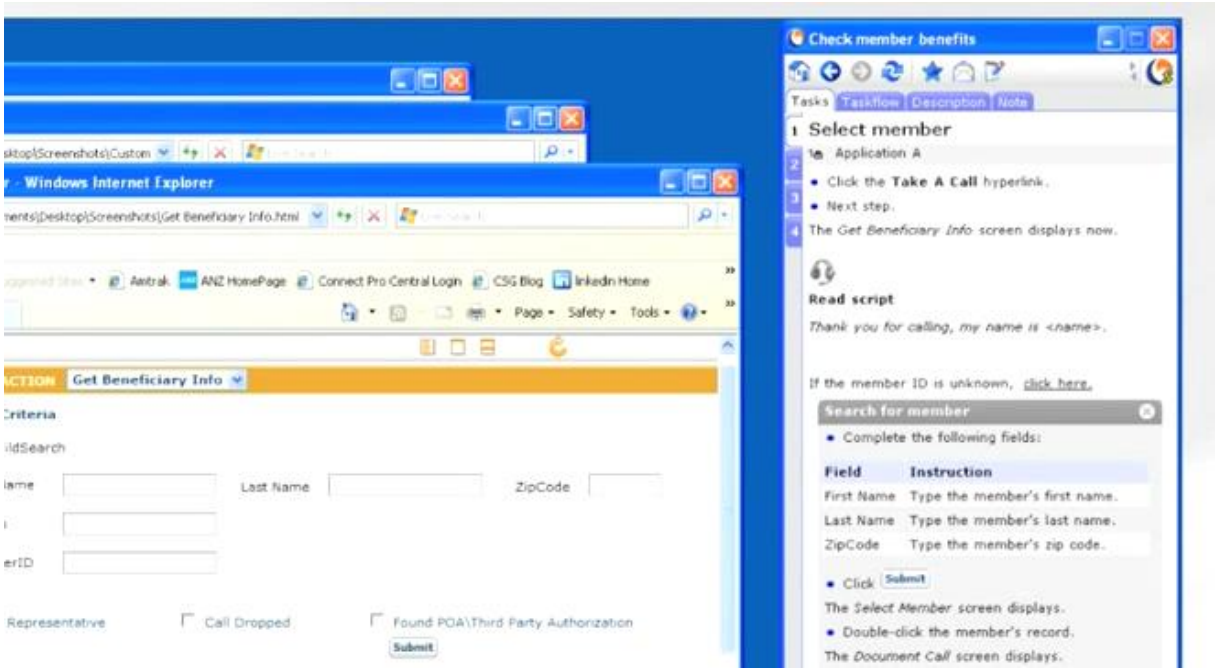


Figure 8 – Screenshot of SupportPoint

5.4.2 Interviews

Two interviews were conducted with two users of SupportPoint; respondent I from Foster's Group (Foster's) and respondent J from National Australian Bank (NAB). Both companies have utilized SupportPoint for four years or more and their IT investment criteria showed to be similar to [COMPANY]'s currently prerequisites of the EPSS features. Before investing in SupportPoint, Foster's utilized traditional hard-copy user-guides as well as an online help system that could not provide context sensitivity assistance or stay-on-top window functions, which is similar to [COMPANY]'s issues with traditional word based user-guides.

Both Foster's and NAB evaluated several similar EPSS but finally selected SupportPoint because of following features; stay-on-top window that eliminate tabbing between applications, ease of publish content and connect context help as well as the return on investment of the system. In addition, the design of SupportPoint was mentioned as a determinant factor by allowing both beginners and experienced employees to utilize the system since it permits different degrees of complexity. Other benefits that NAB and Foster's mentioned were that SupportPoint; provides detailed procedural

step-by-step guidance, keeps the processes and employees up-to-date, ensures consistency and accuracy, clarifies responsibilities and roles by context sensitivity, is quick and easy, provides constantly support from Panviva as well as gives a high level of customer satisfaction.

Foster's and NAB discussed the following features of SupportPoint that are addressed below; simulation possibility, documentation storage, process versus step-by-step, communication of changes, feedback, context sensitivity and flexibility.

Simulations for training and learning do not exist within SupportPoint but both respondents state that it is easy to integrate simulations from another application to the system.

Foster's utilize the dedicated Panviva server, since it was not possible to store documentation on their own server. NAB, on the other hand, implemented its own server because of bank security issues regarding infrastructure.

The respondents emphasize the ease to shift from process overview to detail information within SupportPoint. In addition, it is possible to reference to policy documents from the intranet which increase the total understanding of the business. Furthermore, changes in the processes are directly communicated to all employees.

End-users are able to send feedback on how to improve processes and procedures to administrators but both respondents mentioned that there is a need to encourage employees to do this since the motivation to do so is not always current.

Foster's utilizes the context sensitivity feature, which allows them to group employees into different groups and regions. They have organized it in such way that all employees still can see all content in SupportPoint but the use of applications are restricted to those who are authorized to utilize them. NAB is not yet utilizing this feature but state that they will probably do so when they have allocated enough resources to implement it.

Foster's and NAB have connected SupportPoint to several IT systems and applications in order to maximize the benefits of the EPSS. They both indicate that SupportPoint is very flexible to use over different platforms and groups of people.

In terms of efficiency, NAB divulged that the *time-to-competency*[4] was reduced by 50 percent when implementing SupportPoint. NAB further mentioned that the time to perform certain procedures on-the-job has not necessarily decreased but the consistency and accuracy have improved greatly. Consistent and accurate information was not a main driver for [COMPANY] when initiating this project. However, [COMPANY] has raised a concern about this as well as it was brought up. Consistent and accurate information is key to proide excellent customer service, which is eased by having an EPSS.

Foster's stated that their employees find it easier to get assistance on-the-job, navigate in the EPSS as well as get up to speed at work. In addition, the interviews discovered that it is easy to keep the system and its employees up-to-date because everything is available to everyone as soon as the content is published on the server.

[4] The time it takes until a new employee can perform its job without assistance

A few drawbacks with SupportPoint were mentioned. One respondent stated an administrative problem correlated to linking documents but Panviva is currently working on this for the next release. The other respondent mentioned a license issue that demanded downloading the client based system to each computer, which was problematic in their business environment.

Both respondents state that the utilization rate of SupportPoint varies within the organization. Administrators usually utilize it more than end-users because the need for updating processes and procedures constantly occur. The end-user is able to choose when to utilize SupportPoint depending on hers or his knowledge, or perceived knowledge, to solve certain processes and procedures.

The interviews reveal that the installation of SupportPoint took only a day whereas the implementation of content took more time. The amount and quality of the information in SupportPoint depends on the organizations' access of resources and degree of complexity of the processes and procedures to create and publish content on the server. In almost all circumstances when employees ask each other for advice, there is no content on these processes or procedures in SupportPoint. One respondent mentions that they are still creating and publishing content after four years of utilization of the tool and explicates that they have very complex processes in their organization. In addition, they rarely utilize the traditional user-guides since these are not state-of-the-art anymore.

5.4.3 Performance

The aggregated performance of SupportPoint is based on the conducted demonstrations and two interviews. The overall perceived performance is outlined below.

5.4.3.1 User-friendliness

As it comes to training tool location it is fixed as a side window to the application that the employee is working in. The window always stays on top in order to avoid tabbing and switching between the application and the training tool. Panviva has focused on ensuring that SupportPoint never is in the way of the actual application while still staying on top.

"Always on top, never in the way"

It is also possible to hide or move to the other side by clicking a button. This feature enables the employee to avoid disruptions in the workflow while working in SupportPoint.

No programming skills are needed in order to handle SupportPoint, neither for the administrator or process owner, nor for the end-user. The system uses an interface that builds upon logical actions such as clicking the screen and writing a note. It is also easy for the administrator to upload pictures or diagrams wherever you are in the process and the end user could easily create her own notes as well by clicking and writing.

5.4.3.2 Simulation Possibilities

SupportPoint does not provide any simulation tool where you can record and publish material. The reason for this is that Panviva focuses on on-the-job support and process guidance rather than off-the-job training and step-by-step guidance. However, training material in terms of simulations is still used by Panviva's clients and is easily integrated through a link in SupportPoint.

5.4.3.3 Documentation Storage

SupportPoint stores all the documentation within the application itself since that enables a smooth workflow. According to Panviva, a central storage of SupportPoint documentation in their client's database would not be efficient even though it is an objective for some companies. This issue is a collision of interests between stakeholders since central storage would inhibit optimal usage of EPSS and decrease efficiency when the employee has to enter the database to access training material. Panviva and SupportPoint focuses on efficient on-the-job support and therefore stores documentation within the application.

5.4.3.4 Process Overview

Panvivas BPGS solutions are built upon the idea of a GPS at work. Instead of having to plan your route or stop while you are working to jump between different maps and documents, SupportPoint is designed as a GPS where you tell it that you want to go from point A to point B. In this sense SupportPoint is highly process focused so that the employee gets the overview of what to do in order to reach the destination.

5.4.3.5 Communication of Changes

For every process there is a start page in SupportPoint where the most recent changes in the process are posted. This looks and functions like a billboard and the user could also choose to subscribe to certain processes the she uses to a larger extent in order to get every update emailed to herself.

5.4.3.6 Speed of Implementation

Panviva normally needs one to two days for setting up SupportPoint for its clients once a purchasing decision has been made. The time for implementation is then mostly dependent upon the customer in terms of how much content the client already has, how much it wishes to put in as well as the quality of the material. Panviva is not able to provide any specific time frame for this process since it varies too much.

From Panviva's experience a normal training time per end-user would be 10-20 minutes in order to understand and use SupportPoint. The time for training supervisors would be included in the implementation process where the setup and content input is processed.

5.4.3.7 Context Sensitivity

SupportPoint is built upon context sensitivity since it knows both who the user is and where in the process the user is. Roles can be setup in various ways, such as geographical areas, business unit or functions, but Panviva's experience is that too detailed breakdowns of roles can disrupt workflows and efficiencies while utilizing the EPSS.

5.4.3.8 Feedback

One important feature of SupportPoint is that the user cannot only make her own notes for a specific process but also send it to the administrator as suggestion for improvement. This process is constructed so that the user easily can utilize it without having to fill in a form or search for contact information. SupportPoint knows where in the process the user is and who is administrating the specific process so the feedback process is eased. Furthermore, SupportPoint also provides a function that allows the user to make individual notes directly in the public content so that it is only visible to that user. This might be a reminder to oneself of whom to talk to or other individual tips and tricks that is not suitable for all users.

5.4.3.9 Flexibility

SupportPoint is constructed so that it can be used for any application. This lies in the nature of being a BPGS to focus on guiding the employee in the process without getting into application specific details.

5.5 Data collection of Tata Interactive Solutions

5.5.1 Demonstration

As it comes to Tata Interactive's solutions there are two major differences that need to be considered. First, Tata has no standard tool that they promote and sell. Instead all their solutions are customized and built upon a customer demand analysis, which is done together with the customer in an early stage, see Figure 9. Secondly, Tata distinguishes between two different kinds of EPSS in that they fulfill two different purposes. The first type of EPSS that Tata demonstrated was based in on-the-job training while the second EPSS was more focused on initial training with off-the-job characteristics. Because of the lack of a specific tool to refer to, Tata's demonstrated capabilities are considered in the following summary.

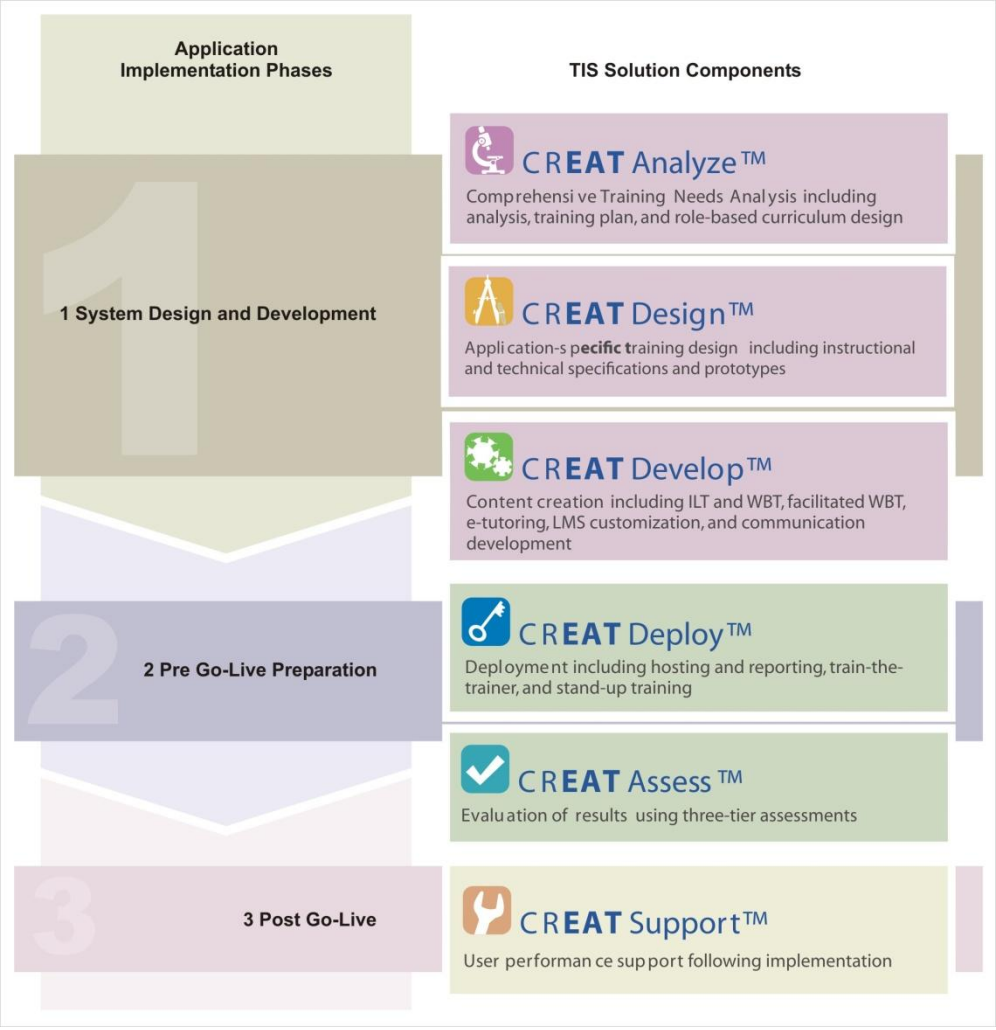


Figure 9 – Tata's Approach of EPSS

5.5.2 Performance

The lack of opportunity to interview some of Tata's customers resulted in a less substantial empirical data collection. Because of that the performance of their EPSS is only based on the demonstration.

5.5.2.1 User-Friendliness

Tata demonstrated one EPSS that actually was interactive with the user within the platform. Tata's solution involved popup windows that told the user where to click in a similar way that was shown in SPP's off-the job simulations. This example showed upon deep integration possibilities that increase the user-friendliness within that application.

5.5.2.2 Simulation Possibilities

Simulations was a part of the off-the-job EPSS that was presented and functioned in a similar way as SPP. Captivate, a simulation tool provided by Adobe, was used to do the capturing and the simulations could be done in an interactive manner.

5.5.2.3 Central Documentation Storage

According to Tata, all recorded material and content could be stored locally on Eridoc if [COMPANY] wished to.

5.5.2.4 Process Overview

Since Tata creates customized solutions, a BPGS similar to SupportPoint would be possible. What was shown during the demonstration was however more focused on step-by-step guidance in the software rather than process guidance.

5.5.2.5 Communication of Changes

Process changes would be able to be communicated immediately to all users. This is solved upon the customer's request and the system and process for doing this is always customized.

5.5.2.6 Speed of Implementation

This part differs more from the other peers since Tata's solutions are customized. The first step would involve a demand analysis, which would take approximately one month. This is to outline exactly what [COMPANY] is looking for in terms of functions, platforms, content and number of roles and users.

To put in all the content and construct the system would usually take 12-16 weeks according to Tata but this would also depend a lot upon the amount of content and number of roles and users.

5.5.2.7 Context Sensitivity

Context sensitivity was made possible for all Tata's solutions and was usually tailored to the process of logging on to the system. As the employee sign in with her identification and password a message is sent to the database, which give her access and authority to all her applications, and this is also linked to the training tool that Tata develops.

5.5.2.8 Feedback

Tata's EPSS can provide direct links that makes it easy for the user to send feedback to the administrator.

5.5.2.9 Flexibility

Tata's solution is developed for a specific platform that requires a new setup together with the company every time a new platform is launched.

6. Analysis

This chapter provides the analysis based on the literature and empirical findings. First, the theoretical and empirical findings are used for feature selection, which aims to answer research question 1. The second part uses the IT investment evaluation and risk analysis methodologies presented in the literature review to evaluate EPSS and aims to answer research question 2. The last section analyzes the failure of the SPP pilot project implementation to identify the reasons for the disappointing outcome, which can provide valuable input for the implementation of the EPSS. In addition, a number of risk management activities are suggested that are tailored to the identified risks with the investment. Both aims to answer research question 3.

6.1 Feature Selection

This part of the analysis aims to answer research question 1:

What features are important in comparing and evaluating EPSS?

This question is analyzed and answered with a basis in the literature review together with the findings in the feature selection section in the empirical data collection. Table 10 presents the empirical and literature findings and the following subsections explain and motivate why each feature was considered important for evaluation.

	Feature	Empirical findings	Literature Findings
1	User-friendliness	During trials and observations	Heskett et al (2008); Allwood (1997); ISO (1998); Holmberg (2004); Liu (2003)
2	Process Overview	During interviews	Debowski (2006)
3	Speed of Implementation	Initially requested by [COMPANY]	Tiwana (2000)
4	Flexibility	During data collection	Liu (2003)
5	Feedback	During interviews	Noe & Winkler (2009); Liu (2003)
6	Communication of Changes	Initially requested by [COMPANY]	Noe & Winkler (2009); Liu (2003)
7	Simulation Possibilities	During observations	Noe & Winkler (2009); Liu (2003)
8	Context Sensitivity	During data collection	Noe & Winkler (2009)
9	Central Document Storage	During data collection	-

Table 10 – Identified features and their origins

It is important to notice that all these identified features have been considered important for [COMPANY] to some, but not to an equal, degree. In the previously data collection sections performance in each area is considered for each of the studied EPSS without consideration to their relative importance. This is instead further analyzed and evaluated later in the report.

6.1.1 User-Friendliness

According to Allwood (1997) individuals have different perceptions on user-friendliness of software, which can be explained through the concepts that ISO (1998) and Holmberg (2004) presented; efficiency, ability to learn, satisfactory, attitude towards the software. Instead of measuring user-friendliness by these, highly subjective concepts, the performance evaluation of EPSS is based on Heskett et al's (2008) ideas to recognize to what degree the software simplifies the general employees work, gives them specific job-related training that improves their individual job-performance.

6.1.2 Process Overview

This feature is related to how well EPSS provides a process overview in order to guide the employee and was one of the initial requested features from [COMPANY]. This feature could be compared to simulation possibility, which is more related to give a detailed step-by-step guidance in how a task should be performed. One of Debowski's (2006) factors for learning to occur is the possibility for the individual to reflect, make own choices and analyze the learning process, which all are feasible through the process overview.

6.1.3 Speed of Implementation

Speed of implementation is a main concern since Customer Support's aim is to decrease the implementation time from six months to one month. It is important that the employees quickly are able to apply and utilize the EPSS in order to realize organizational benefits as stated by Tiwana (2000). [COMPANY] has assigned one full time employee for enabling the implementation but will assign additional resources if this is required. The speed of implementation is also dependent on how quickly the vendor can setup the EPSS.

6.1.4 Flexibility

Initially, the EPSS is used with SAP CRM at [COMPANY]. There are many other applications in Customer Support such as web-based applications among others that the EPSS could be useful for as well. Furthermore, in order to be considered a long-term investment, it is according to Liu (2003) important to investigate the EPSS's ability to provide system integration.

6.1.5 Feedback

Noe and Winkler's (2009) first condition for learning to occur is that the employees need to get the opportunity to train and receive feedback. Liu (2003) further states that a KMS should involve an information transmission and collaboration possibility, which can be provided by a feedback function. A feedback function enables the employees to improve content that is put into the EPSS, which allows the organization to capture knowledge and realize organizational learning. The employees need to be able to send feedback to the administrators who could correct the information that they find information. Feedback functions can take many forms, such as e-mails to the administrators, wikis weekly meetings or 'press a button'.

6.1.6 Communication of Changes

Changes in how processes or tasks are performed will always occur and is therefore considered important with a good function or mechanism that keeps users up to date with the latest changes.

Based on Liu's (2003) third feature for a user friendly KMS, a process which is edited or changed needs to be able to track to uphold currency, relevancy and accuracy in the system. Noe & Winkler's (2009) second and third condition for learning to occur; meaningful training content and apparent prerequisites also prove for a need to providing up-to-date information in the EPSS.

[COMPANY] has also discovered that their employees tend to use the knowledge they gain during initial training periods, while new functions and updates of the processes is not efficiently taught. Due to this, it is important to investigate how well the EPSS can assist employees in complete on-the-job training.

6.1.7 Simulation Possibilities

Simulation possibilities were tested in the observations of user-guides and SPP, which all respondents found valuable and therefore was this feature requested by [COMPANY]. Simulations also fulfill Noe & Winkler's (2009) fourth condition for learning to occur; allowing learning through observation and experience. The simulations allow the user to receive feedback of his or hers actions, which Liu (2003) states lead to improved individual job-performance. Thus, the possibility of simulations is an important factor for evaluating EPSS.

6.1.8 Context Sensitivity

According to Noe & Winkler (2009) each role in an organization demands for successful performance of competencies that needs to be relevant and accurate, which can be offered by a context sensitivity function. As an employee works within the software environment and support is needed, it is considered useful to know what authorities and roles she has. Furthermore, it is also helpful if the EPSS knows where in the process the employee is to simplify mediation of information concerning the process.

6.1.9 Central Document Storage

[COMPANY]'s policy is to have a central storage area for documentation. For [COMPANY] this is called Eridoc and is built upon the content management platform Documentum. During discussion with decision makers at [COMPANY] this has shown to be an important issue since if the content that is used in the EPSS cannot be directly stored in Eridoc, it may conflict with internal policies. In contrary, no literature material has been found to support the choice of this feature but since it has showed to be important to [COMPANY], the feature remains in the evaluation of the systems.

6.2 Product Evaluation

This part of the analysis aims to answer research question 2:

How could these chosen features be evaluated in order to make an investment decision?

It is important to note that the result of investing in any EPSS is not only dependent on the features of the software and their respective performance, but also on the organizational structure around the investment. This mainly includes managing responsibilities for the software which, if not in place, can make the outcome of the investment disappointing as have been seen in the SPP pilot project.

Therefore, this phase of the study considers the evaluation of the product-related features while the research question 3, Product Implementation, discusses risks and important considerations for

[COMPANY] in implementing the software. Before research question 2 is answered, the evaluation model that has been used is presented.

6.2.1 Proposed Model to Evaluate IT Investments

To evaluate the IT investment the following multi-criteria approach, as discussed by Reinkema and Bergenhout (1996), is used. In research question 1, nine features were found important for evaluating the investment. These nine features are dedicated a weight, in percentages, and each of the EPSS is marked on each feature with a performance score, also in percentages. Table 11 shows this model.

Feature	Weight	Performance	Score
F1	w1	p1	w1*p1
F2	w2	p2	w2*p2
F3	w3	p3	w3*p3
F4	w4	p4	w4*p4
F5	w5	p5	w5*p5
F6	w6	p6	w6*p6
F7	w7	p7	w7*p7
F8	w8	p8	w8*p8
F9	w9	p9	w9*p9

Table 11 – Model to Evaluate the Performance Score

The total score of the system is then calculated as the sum of all the products of weights and performance scores, see Formula 2.

$$Total\ Score = \sum_{i=1}^{10} w_i * p_i$$

Formula 2 - Calculated Total Score

The total score of the system is thereafter suggested to be the overall performance of the system and the system with the highest score should be recommended as the best investment for [COMPANY].

6.2.1.1 Dedication of Weights

With nine identified features for evaluation it would be convenient to say that each of these features has a weight of approximately 11.11 percentages. However, since not each of the features is considered as equally important for [COMPANY] it is important to make a qualitative estimation of their relative significance. Table 12 summarizes how the weights have been distributed over the nine features and the motivation of the dedication is provided below.

Feature	Weight
1. User-Friendliness	15 %
2. Process Overview	15 %
3. Speed of Implementation	15 %
4. Flexibility	15 %
5. Feedback	10 %
6. Communication of Changes	10 %
7. Simulation Possibilities	8 %
8. Context Sensitivity	7 %
9. Central Document Storage	5 %
Total weight	100 %

Table 12 - Dedication of Weights

Some features have been given higher weights than others because of qualitative aspects. User-friendliness, Process Overview, Speed of Implementation and Flexibility are features that are rated as more significant features than the others in EPSS. The user-friendliness and interface related issues will have impact in both the short and long-term since it determines how efficiently the software can be used, as well as how well it will be received and diffused in the organization. Issues related to user-friendliness were also some of the main concerns during the empirical data collection phase. The ability of the system to provide process guidance was given by [COMPANY] in the empirical phase of the project and its usefulness for training has been confirmed since it gives not only initial training but also long-term on-the-job support. The speed of implementation is obviously important since this was one of the initial features and main motivation for [COMPANY] to invest in IT based training. The speed of implementation is also a reflection of the administrative workload and user-friendliness in the long-term since administrating is a continuous process. Furthermore, flexibility is important since the EPSS should be seen as a long-term investment, something that can be used for several platforms and department within [COMPANY].

Feedback is also considered important because it stimulates the use of the system and improves its content. If feedback cannot be given in an efficient manner, the quality of the content will not be improved and the risk that users will perceive the tool as inaccurate arises. Possibility to give feedback is however something that cannot only be tied to the performance of the EPSS but also to how [COMPANY] structures these channels. Even though the chosen system will not have the most efficient built in feedback channels, [COMPANY] should consider providing this in another way, for example through standardized forms that are fast and easy to fill in.

The process of giving the user information about updates and changes in the system is regarded as important. Even though process changes can be communicated via emails it is still seen as preferable

if it can be integrated into the system. Simulation possibility is still considered important since it was identified as a good tool to use during initial training. In the long-term though, it is regarded as limited in its usefulness since it is less of a process guidance tool.

Context sensitivity is also an important feature but has been regarded as limited in its use. Roles and responsibilities should be treated carefully so it does not constrain the employees from accessing information that would make them feel less important or threatened. Finally, central document storage was stated as important in the beginning of the project due to policy considerations. However, this might be a matter of trade-off since central storage in Eridoc can decrease speed and efficiency compared to having it stored in the software client. Furthermore, it seems to be business standard to keep the content stored in the client. The possibility to store documentation in Eridoc is nevertheless considered since the decision makers can view it as important.

6.2.2 Evaluation of EPSS

The two researchers have conducted the evaluation of EPSS individually and the average score has been calculated. Not very surprisingly, the two researchers had analogous perspective of how the different systems performed in each category.

6.2.2.1 User-Guides

The performance of user-guides is summarized in Figure 10 and discussed further below.

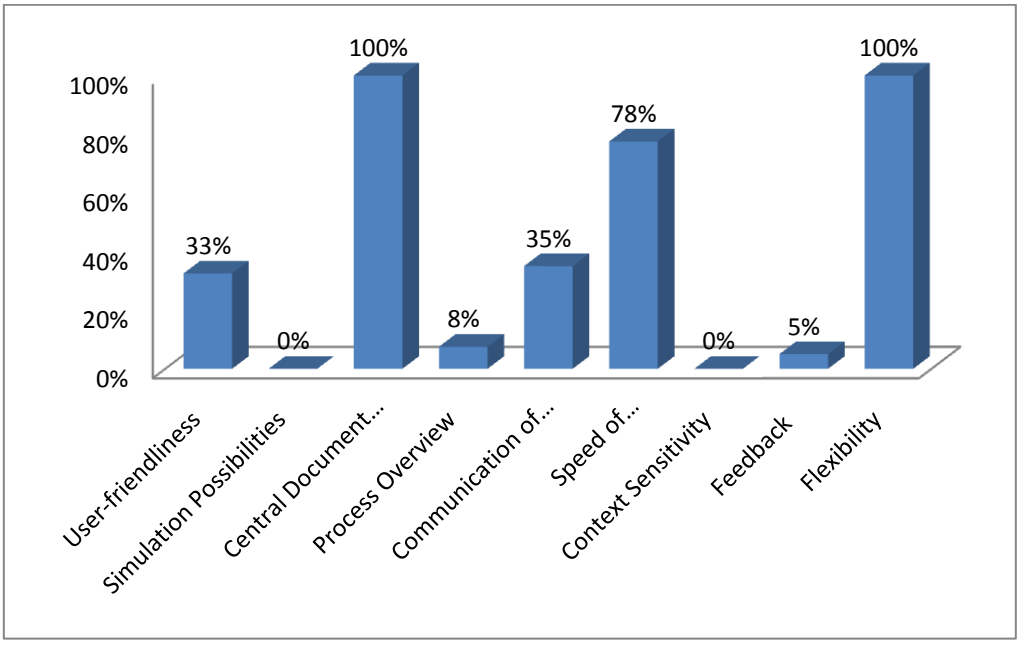


Figure 10 – Performance of user-guides

The user-friendliness of user-guides tended to be a big issue during the empirical observations and was also a main reason why [COMPANY] was looking into an alternative solution in the first place. Simulations for initial training are obviously not provided at all in user-guides. Some major advantages with using user-guides is that it is possible to store all documentation in the centralized database Eridoc, the speed of implementation and the flexibility of this training system. Microsoft Office is the only software that is needed and something that is already incorporated in the business. Furthermore, there is no setup needed since the routine for administrating is already in place. However, there have been questionable whether the administrating standards should be revised or

developed further. It is also a flexible way of conducting training since all departments use Microsoft Words on a day-to-day basis and no significant initial setup is required.

User-guides provided poor results in a number of features. The process overview, which has been developed in EPSS to provide on-the-job training is obviously something that traditional user-guides lack. User-guides can give a written description with screenshots and annotations that explains the process but the usefulness of this has proven to be limited since higher amount of text most often give people incentives to look for help elsewhere. Furthermore, the lack of context sensitivity makes the user-friendliness and the process overview function even worse off since a high degree of scrolling and searching in the documents occurs.

The process of giving feedback is another important issue with user-guides. It was estimated that around 5-10 percentages of all discovered mistakes and defects were reported to the administrator of the user-guides. The remaining flaws was not passed further since it is almost always much easier and more efficient for the employees to ask the neighbor than to go through user-guides and send e-mails to describe the lack of information. Furthermore, there are currently no standardized forms that can be filled in which also makes the process consume additional time and effort.

Finally, changes are currently communicated once every quarter since it is most convenient to do a consolidated update than communicating every small change individually by email. This is also a problem with user-guides since changes cannot be spotted immediately while working in the software.

The performance can then be weighted according to the chosen weights in order to calculate the weighted score. The result is shown in Table 13.

Evaluation of User-Guides			
Feature	**Weight**	**Performance**	**Score**
User-friendliness	**15%**	**32.50%**	**4.88%**
Process Overview	**15%**	**7.50%**	**1.13%**
Speed of Implementation	**15%**	**77.50%**	**11.63%**
Flexibility	**15%**	**100.00%**	**15.00%**
Feedback	**10%**	**5.00%**	**0.50%**
Communication of Changes	**10%**	**35.00%**	**3.50%**
Simulation Possibilities	**8%**	**0.00%**	**0.00%**
Context Sensitivity	**7%**	**0.00%**	**0.00%**
Central Document Storage	**5%**	**100.00%**	**5.00%**
		Weighted Score	**41.63%**

Table 13 – Evaluation of user-guides

Interesting here is that the speed of implementation and flexibility are determining the main part of the score. The simplicity of using user-guides is a convenient reason for sticking with this method of training. However, the user-friendliness, process overview, feedback and communication of changes are very limited in user-guides as well as simulation possibility and context sensitivity is not provided at all.

6.2.2.2 SPP

The performance of user-guides is summarized in Figure 11 and discussed further below.

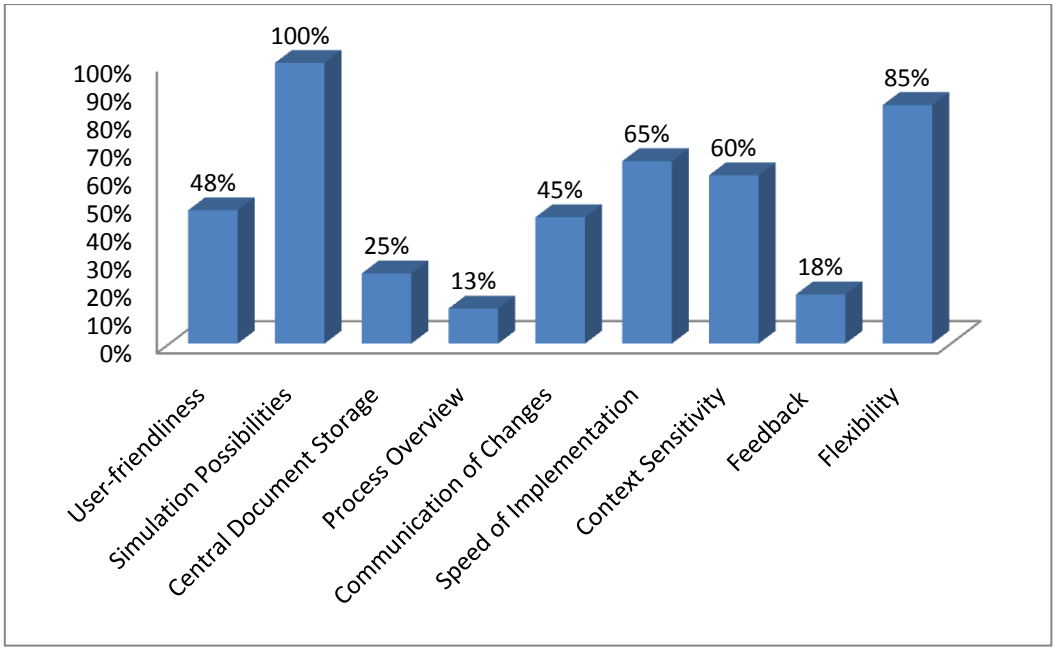


Figure 11 – Performance of SPP

First of all, there were some serious issues with the user-friendliness of SPP, mainly stemming from the same sources as those for user-guides. Managing the SPP window was extremely challenging for the participants during the observations and often led to tabbing instead of simultaneously working in SAP and SPP. Another problem was, just as with user-guides, the process of scrolling and searching for information. Simulation possibilities, on the other hand, were an appreciated feature with user-guides and worked out really well. The central document storage was not recommended and instead there was suggestion to put up linkages to the content in Eridoc while keeping the content in the SPP client.

In terms of process guidance, SPP showed poor functionalities in the tested version. The current version provides similar process guidance in terms of written work instructions. The structure of these instructions tends to be formalized through templates and since each procedure is structured in a separate document it is easier to find the right instructions than it is utilizing the traditional user-guides.

How the Supply group has handled updates in processes and tasks within SPP so far has not been made clear during the empirical research. No specific functions or news page is included in the client and it seems as traditional direct contact or e-mails, just as with user-guides, are used for communicating these changes. The same thing is true as it comes to feedback. No formal methods of

reporting inadequate content has been found and e-mails or direct contact seems to be the way to go.

The speed of implementation and the flexibility of platform create an advantage for investing in SPP. The implementation of SPP is forecasted to consume a similar amount of time as the implementation of the user-guides but additional setup time will be needed for the SPP implementation to create an appropriate template, dividing responsibilities and promoting the software internally.

SPP provides context sensitivity, both in terms of process positions and roles. The general experience of context sensitivity of roles is however very limited. The Supply group at [COMPANY] has chosen not to include this in the pilot project but in a sharp implementation this could be needed.

SPP has given the impression to work well with different systems since the structure and logic of the training tool do not seem to be platform dependent. However, setup will be needed every time a new platform is launched for SPP.

The results after weighting the performance are shown in Table 14.

Evaluation of SAP Productivity Pak			
Feature	**Weight**	**Performance**	**Score**
User-friendliness	**15%**	**47.50%**	**7.13%**
Process Overview	**15%**	**12.50%**	**1.88%**
Speed of Implementation	**15%**	**65.00%**	**9.75%**
Flexibility	**15%**	**85.00%**	**12.75%**
Feedback	**10%**	**17.50%**	**1.75%**
Communication of Changes	**10%**	**45.00%**	**4.50%**
Simulation Possibilities	**8%**	**100.00%**	**8.00%**
Context Sensitivity	**7%**	**60.00%**	**4.20%**
Central Document Storage	**5%**	**25.00%**	**1.25%**
		Weighted Score	**51.20%**

Table 14 – Evaluation of SPP

The weighted score is ten percentage points higher than the user-guides' that origins from differences in certain features. For example, less marks has been given to central document storage and speed of implementation for SPP while simulation possibilities and context sensitivity has been given higher marks. In general, SPP seems to be more widely useful than user-guides but it can still be questioned if the additional costs are worth this marginal improvement. From this evaluation, the SPP is considered as a more appropriate EPSS for [COMPANY] than the user-guides.

6.2.2.3 SupportPoint

The performance of SupportPoint is summarized in Figure 12 and discussed further below.

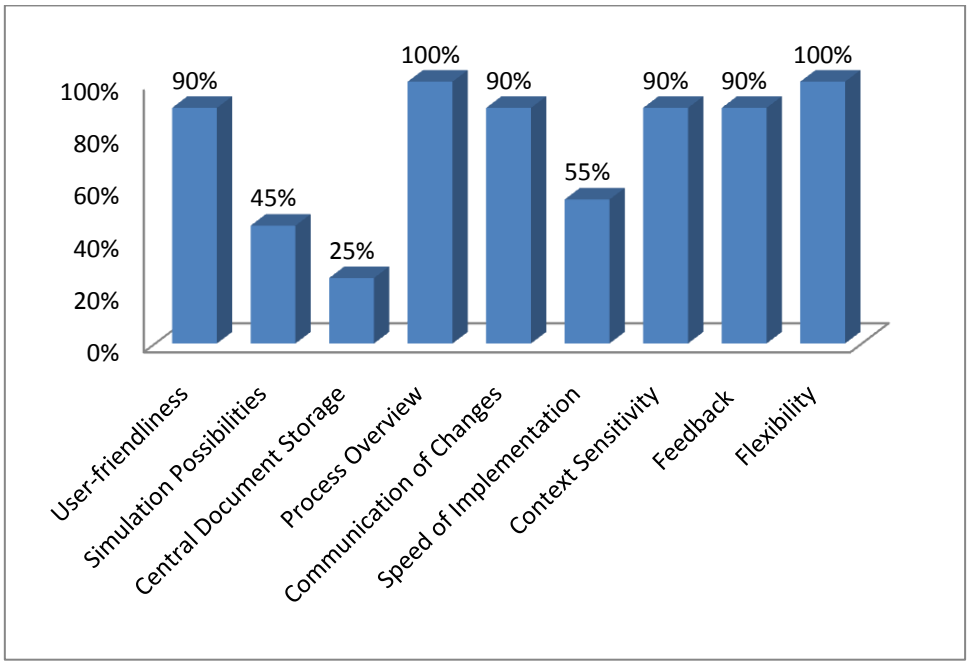


Figure 12 – Performance of SupportPoint

Most of the features of SupportPoint are evaluated to be beneficial for [COMPANY]. The flexibility and process overview are outstanding in the sense that it is possible to link SupportPoint on all kinds of applications and to easily follow the organizations' processes. The user-friendliness, the ability to communicate changes, the feedback and the context sensitivity are also regarded as top performance features. SupportPoint has obviously been developed with regard to the individual user's attitude, ability to learn and achievement of efficient and satisfactory results, which generates a high degree of user-friendliness. The ease to communicate changes and the way that the update directly reaches all users at the same time engenders administrators to keep the organizations' processes and procedures accurate at all times. The possibility for the end-users to provide feedback to the administrators is considered as an excellent feature to engage the employees in the improvement of the processes and procedures since the ease and speed of doing so are facilitated by SupportPoint. The context sensitivity has proved to enable employees to find information that is connected to their specific role, which makes it easier to find accurate information efficiently. The feature also allows administrators to be able to reach the employees that are affected by certain changes instead of always sending information to all employees, which can result in employees perceiving they are receiving spam and overlook information when it is actually relevant.

The speed of implementation, the possibility of simulation and the central document storage of SupportPoint were not given as high performance as the previous described. The actual installation of the EPSS will only take a day or two but the content creation and publication of it is dependent on [COMPANY]'s ability to provide resources to do so. In addition, interviews with Panviva's customers reveal that the time to implement and publish the content depends on the complexity of the organization's processes as well as how much content already is created. However, an implementation would be supported and guided by Panviva that would simplify the process. SupportPoint does not provide simulation possibility itself but it is easy to link created simulation

material from other software into SupportPoint, which has been done by several of Panviva's customers. The central document storage that [COMPANY] requests cannot be met by SupportPoint. Instead, they offer linkage from the SupportPoint server to Eridoc. Table 15 shows the total performance score of SupportPoint.

Evaluation of Panviva SupportPoint			
Feature	**Weight**	**Performance**	**Score**
User-friendliness	**15%**	**90.00%**	**13.50%**
Process Overview	**15%**	**100.00%**	**15.00%**
Speed of Implementation	**15%**	**55.00%**	**8.25%**
Flexibility	**15%**	**100.00%**	**15.00%**
Communication of Changes	**10%**	**90.00%**	**9.00%**
Feedback	**10%**	**90.00%**	**9.00%**
Simulation Possibilities	**8%**	**45.00%**	**3.60%**
Context Sensitivity	**7%**	**90.00%**	**6.30%**
Central Document Storage	**5%**	**25.00%**	**1.25%**
		Weighted Score	**80.90%**

Table 15 – Evaluation of SupportPoint

6.2.2.4 Tata Interactive Solutions

The performance of Tata Interactive Solutions is summarized in Figure 13 and discussed further below.

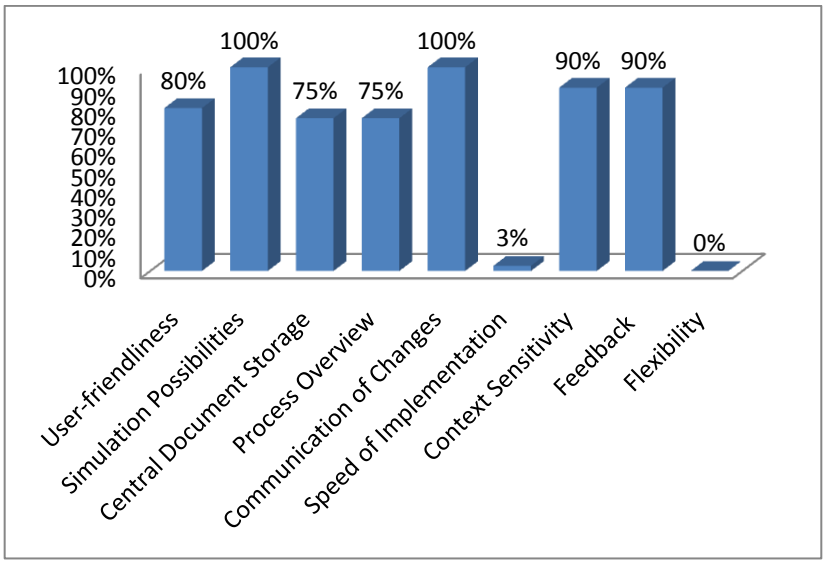


Figure 13 - Performance of Tata Interactive Solutions.

Evaluating Tata Interactive Solutions on a fair basis has been challenging since all their solutions are customized and no solution can be reused. Many features have got high measures of performance since Tata has shown and spoken of these capabilities. It must however be noticed that the features that has been shown has not been contained in a single solution. Tata has been distinguishing between performance support and process guidance solutions and the simulations have been shown within a performance support system that has been developed for a certain customer. This functionality is very similar to the one within SPP. At the same time, Tata has shown capabilities to give process guidance, not in the same impressive and extensive way as SupportPoint though, in another system as well. Tata further highlights that these kinds of systems are usually either developed as a performance support or a process guidance tool, seldom as both. Furthermore, Tata stated that context sensitivity for both roles and process location were included in most of their solutions and that functions for giving feedback, providing information about process changes and central documentation storage usually could be solved together with the customer. However, these three functions were never shown since it was not part of any solution that Tata could demonstrate. Due to all this, Tata's capabilities have been rated very high in several of these fields, which might or might not be fair since not all these features have been thoroughly demonstrated. However, it is over 20 percentage points lower marks than SupportPoint and only 10 percentage points respectively 20 percentage points higher evaluation than SPP and the user-guides, which both are possessed by [COMPANY]. Furthermore, the degree of flexibility of Tata's system is considered very poor since the company has to be consulted each time a new platform is to be introduced.

The results after weighting the performance are shown in Table 16.

Evaluation of Tata Interactive Solutions			
Feature	**Weight**	**Performance**	**Score**
User-friendliness	**15%**	**80.00%**	**12.00%**
Process Overview	**15%**	**75.00%**	**11.25%**
Speed of Implementation	**15%**	**2.50%**	**0.38%**
Flexibility	**15%**	**0.00%**	**0.00%**
Communication of Changes	**10%**	**90.00%**	**9.00%**
Feedback	**10%**	**90.00%**	**9.00%**
Simulation Possibilities	**8%**	**100.00%**	**8.00%**
Context Sensitivity	**7%**	**90.00%**	**6.30%**
Central Document Storage	**5%**	**75.00%**	**3.75%**
		Weighted Score	**59.68%**

Table 26 – Evaluation of Tata Interactive Solutions.

As it comes to Tata, these ratings should be critically looked upon. The rating of certain features has been given kindly because of the belief that such a system could be put together by the company. Due to the customization of solutions it is not possible to have one peer from the company and its technical capabilities have to be considered instead. Still this alternative performs very poorly compared to the other solutions mostly depending on the lack of flexibility and the time of implementation.

6.2.2.5 Summary

Figure 14 below summarizes the weighted scores for each function and EPSS. This also illustrates the differences between how the tools scored in each category. There are some interesting conclusions that can be drawn here. First, SupportPoint performs superior in comparison to all other investigated EPSS. Second, SPP is evaluated as slightly better than the user-guides. Third, Tata scored low in comparison with SupportPoint even though they were very kindly marked on some functions that could not be fully confirmed. The lack of information and service provided by Tata, together with its approach of customizing solutions make this alternative even less attractive.

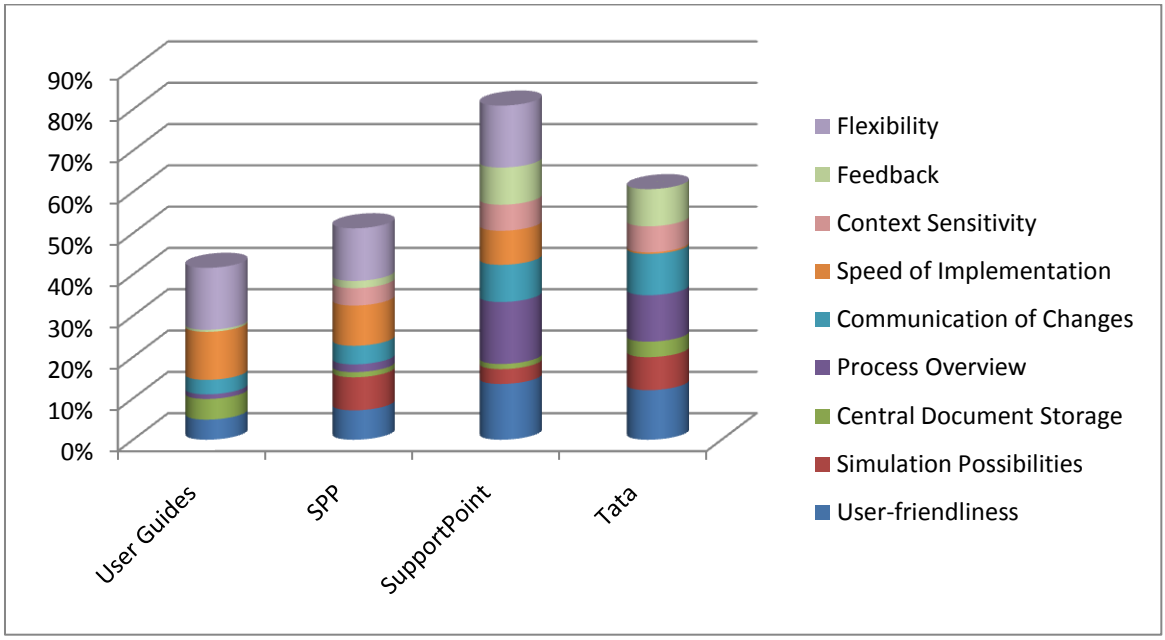


Figure 14 – Summary of performance for each EPSS.

The main conclusion is that SupportPoint is the most appropriate EPSS in relation to the identified factors and their importance to [COMPANY].

6.2.3 Financial Aspects and Screening

Considering the outstanding performance of SupportPoint it is the main candidate for a future investment. However, the financial aspects of SupportPoint should be discussed in relation to the other EPSS as well.

Tata performs poorly in some of the most vital features, flexibility and speed of implementation. Speed of implementation is one of the main business drivers for conducting this analysis since [COMPANY] only has a couple of months until the EPSS has to be ready for use. With a customized solution as Tata's, the EPSS will be built from scratch, which will both be costly and time consuming. However, this is only a problem in the short-term since it relates to the implementation only. For

[COMPANY] though this is a main concern at this point. Flexibility on the other hand has a much more significant impact in the long-term. A customized solution is extremely costly to update and maintain since [COMPANY] will have to incur all the costs. A customized solution has also been discussed within the organization as a tough thing to pass through, since a large organization as [COMPANY] is dependent on continuous support and flexibility in their software base.

Since Tata Interactive Solutions is performing worse than SupportPoint and also is more costly it is thereby excluded from further analysis. However, both user-guides and SPP is owned by [COMPANY] and could be seen as options from both cost and financial points of view.

Since all numbers are confidential from both [COMPANY], IBM and Panviva the estimated costs are based on list prices and a standard discounts for the size of the project. Table 17 summarizes the incremental costs for SPP, SupportPoint and user-guides. All costs are based on a percentage of the license cost of SPP, which has been given. The incremental costs are divided into three categories; License cost, Setup cost and Service cost. The license cost is the initial cost of buying the license to the EPSS for the selected number of users. The setup cost is the cost of setting up the EPSS to be ready for use. The service cost is the cost that the EPSS supplier charges [COMPANY] every year for provision of upgrades, maintenance and other services. The discounted lifetime service cost is seen as a 1:1 ratio to the license cost of the EPSS according to business standards.[5]

	SPP	SupportPoint	User-Guides
License Cost	100%	120%	0%
Setup Cost	6%	7,87%	0%
Discounted Lifetime Service Cost	100%	120%	0%

Table 17 - Relative Cost Approximation

The incremental costs are seen as the costs that are relevant for the decision. The cost and effort of administrating and creating content to put into the system is not seen as an incremental cost since that has to be done for all three EPSS. Therefore it is not a cost that should be considered in choosing between mutually exclusive projects (Ross, Westerfield & Jordan 2008).

As can be seen for user-guides there are no incremental cost for the license, since Microsoft Office is already incorporated. There is not any cost for setting up the EPSS or servicing it either. However, user-guides are what [COMPANY] already uses and the performance has proven to be disappointing.

More interesting is the comparison between SPP and SupportPoint. The incremental cost of the setup is seen as very similar with the only difference that SupportPoint would need some additional time and cost in terms of bringing in a new supplier. The license and service agreement is similar, where SupportPoint is 20 percentage points more expensive. Figure 15 summarizes the incremental costs for SPP and SupportPoint.

[5] Respondent F from Panviva, confirmed with Respondent C from IBM

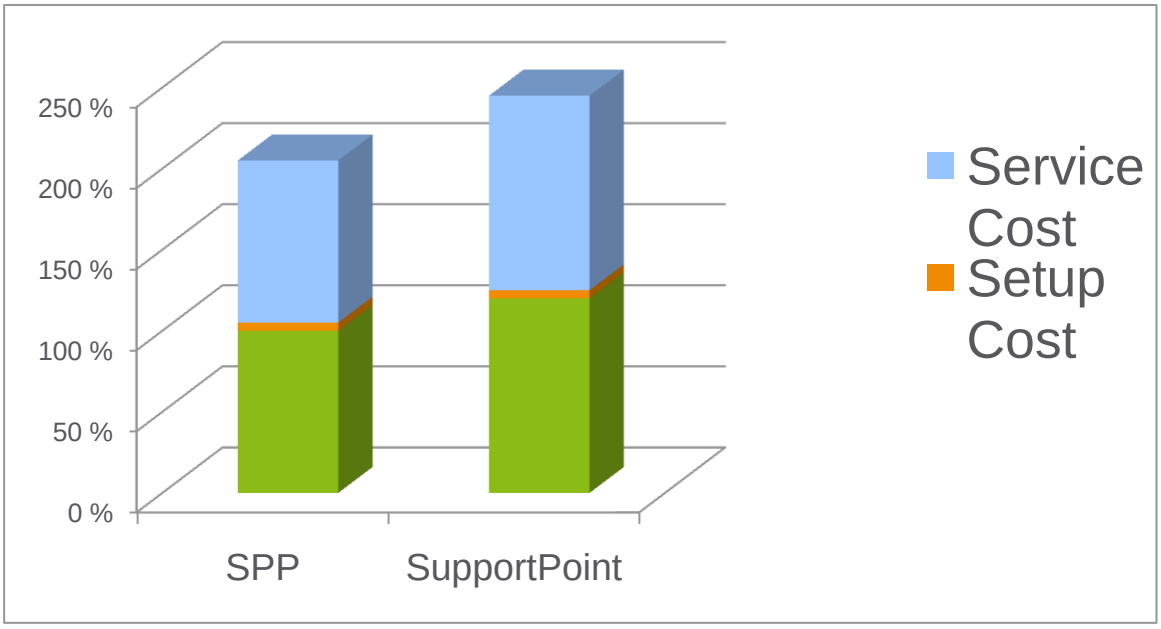


Figure 15 – Incremental Costs of SPP and SupportPoint

What is not taken into consideration in the above mentioned numbers and figures is that [COMPANY] has already purchased an enterprise license of SPP. This leads to that the license cost of SPP should be viewed as a sunk cost for [COMPANY] and, hence, not an incremental cost for the decision. An updated comparison is showed in Figure 16.

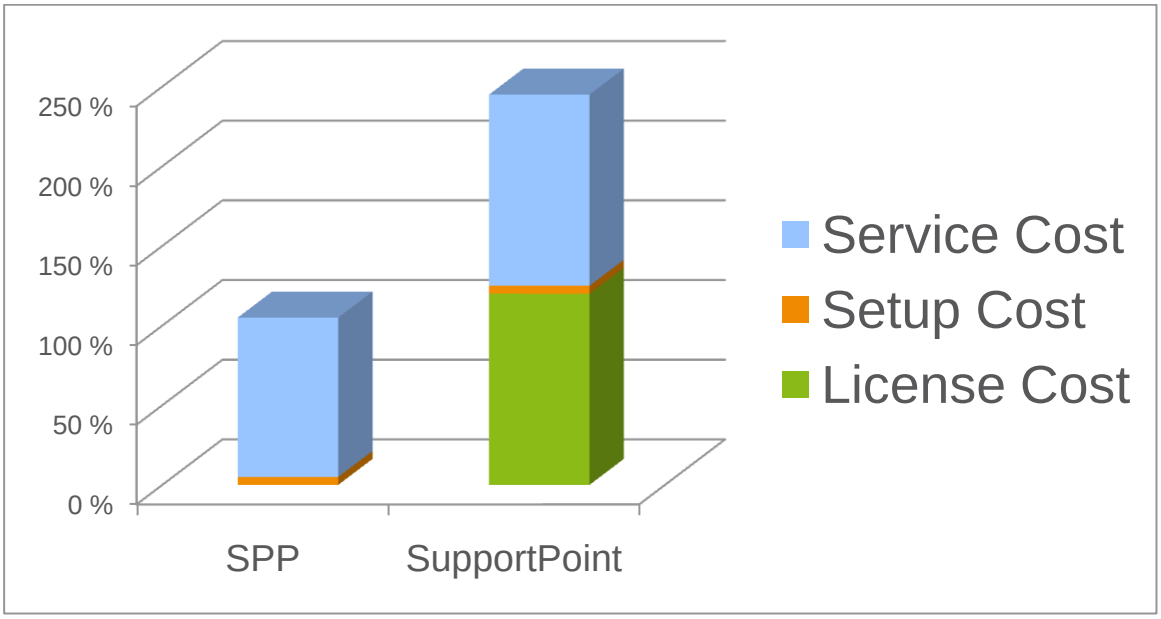


Figure 16 - Incremental Cost for SPP and SupportPoint with Respect to Up-Front Cost

The estimates given in this comparison is nothing else than estimates. The fact that SAP is a current supplier for [COMPANY] further implies that there are additional discounts involved with choosing SPP. What could be said about these rough numbers is that SPP is a much cheaper alternative, mainly due to the sunk costs of already owning an enterprise license. In terms of long-term performance SPP is only a slightly better option than user-guides though while SupportPoint outperforms all of the other EPSS. For the recommendation in this report, the performance is the basis while the financial

aspects are more of a decision to be made by [COMPANY]. This subsection has rather indicated the relative difference in financial terms. To analyze and answer research question 3 in the next section, SupportPoint is chosen as the EPSS for reference.

6.3 Product Implementation

This part of the analysis aims to answer research question 3:

What risks are relevant when implementing EPSS and how should these be handled?

The EPSS used to answer this research question is SupportPoint, which was concluded under research question 2. However, what is important to highlight is that the risks involved are very similar no matter what EPSS is chosen. The only difference is that some risks might be eliminated if [COMPANY] chooses to go with an existing product and supplier, such as user-guides and SPP.

6.3.1 Reasons for Failure in the Initial SPP Implementation

The empirical review reveals lack in SPP's specific features, such as the issue of communicating changes. The first section of this chapter excludes the performance of the EPSS and instead focuses on the reasons for failure of organizational change during the previous SPP pilot project.

As stated in internal documentations and reports at [COMPANY], the SPP pilot project managers of the Supply group had high expectations of the system and the proof-of-concept gave good indications of SPP's potential. SPP seemed to fulfill the requirements since the proof-of-concept was passed through according to the project report. The outcome however showed disappointing results. The two general problems can be divided into product features and organizational issues.

The previous research question evaluated the product features of the EPSS, and SPP has proven to underperform in several fields. This is an issue with product features for the current analysis and should not be assumed as a reason for failure during the SPP Pilot project, which had different product requirements. However, as [COMPANY] invested in SPP in 2009 the investment did not seem to have gone through a structured evaluation process. Even though the proof-of-concept was accepted, the functionalities of SPP did not seem to be good enough to stimulate the usage of the software and the arisen resistance in this case may be acceptable in order to prevent an implementation of a lower performing EPSS.

Without considering SPP's performance, three reasons for failure of the SPP implementation related to organizational issues have been identified. First, the low degree of utilization and the slow diffusion of SPP can be traced to Lapointe and Rivard's (2005) first level of resistance; the employees showed little interest and motivation to utilize SPP. Rubenowitz (2004) argues that this reaction is caused because employees perceive threats of undesirable changes in their responsibilities and procedures after the implementation of the EPSS. The low engagement of SPP can also have been triggered by the perceived general opinion in the Supply group, which Kim and Kankanhalli (2009) have identified as an important factor for the individual user's judgment of the EPSS.

Second, the fact that SPP is relatively similar to traditional user-guides, with exception from the simulation functionality, could have generated employee resistance. Lapoint & Rivard (2005) explains this as if the user had had previous negative associations with the user-guide it is likely that this can be projected on SPP.

The lack of responsibility, mediation and support from the management at [COMPANY] that was found in the empirical results is widely seen as a main drawback for successfully changing the organization (Kim and Kankanhalli 2009; Rubenowitz 2004; Lejefors et al 2008). The third reason for implementation failure is therefore believed to be the most significant reason.

First, there seemed to be a very vague distribution of responsibilities. This was discovered during the empirical data collection process since employees neither seemed to have enough information to talk about the product, nor knew who was responsible. Furthermore, this issue could be related to that some managers involved in the pilot project had left the company seemingly without transferring the knowledge to another person. The tacit knowledge of the pilot project and SPP was therefore lost leaving a fraction of knowledge by the few involved managers that still possessed their positions at [COMPANY]. If a genuine engagement would have existed, the ability to externalize the tacit knowledge could have been realized by initial training of other employees before the key individuals left the organization. The fact that the original implementation group was shattered lead to the second problem. The managers that still were in the organization poorly controlled and internally promoted the SPP implementation process. They did neither support the change nor transmitted belief in it towards its employees. The lack of support from the managers and the absence of mediated benefits to the employees have caused the users to adoption of the first and second level of resistance, which has disrupted the diffusion of the EPSS.

The evidence from the investment in SPP has resulted in low utility of the software and low knowledge transmission of the product. During the investment in SPP, [COMPANY] seems to have experienced the productivity paradox. Even though [COMPANY] spent a significant amount of money in the investment it has not shown any significant effect on productivity. It has lead to that the Supply group that currently utilizes SPP considers to go back to traditional learning methodologies in terms of user-guides. However, the implementation of SPP in Customer Support has not been affected by the Supply group's resistance towards SPP and can therefore be implemented in better way to mitigate employee resistance.

In contrary, it should be mentioned that resistance is not always a barrier that should be attempted to eliminate. The resistance that employees show can be a way to communicate the flaws of SPP (Marakas & Hornik 1996; Lapoint & Rivard 2005). If the performance of the tool is not good enough, then there is a need to act on that issue instead of aiming to reduce the resistance.

The following risk analysis is conducted in order to highlight issues that might constrain the implementation process of SupportPoint or other factors that may lead to project failure like the previous pilot project with SPP.

6.3.2 Risk Analysis

One major reason why it is both interesting, and important, to dig deeper into analyzing the risks with investing in SupportPoint is what happened during the previous pilot project at the Supply group in Sweden. The risk analysis consists of two parts; risk during and risks after the implementation.

6.3.2.1 Risks During Implementation

After the decision to purchase SupportPoint, the implementation process of the software can roughly be divided into five tasks, see Figure 17. First, the software needs to be prepared and structured by

the vendor. Second, all content needs to be created and published in the system. Third, an organization of responsibilities and support needs to be setup. This contains administration, promotion and training responsibilities as well as channels for feedback and changes. As this organization and infrastructure is created, the fourth step is to start rolling out the system. This is the introduction and promotion in the organization. The final step is the process of initial training, which is needed before the system is used in real work.

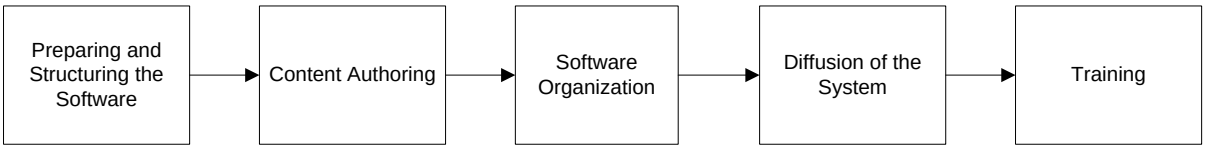


Figure 17 - Important Phases During the Implementation Process

Related to the implementation phases of SupportPoint, the following uncertainties have been identified.

Time to setup

One identified risk, which is related to one of [COMPANY]'s main concern of investing in EPSS, is the time to setup the product. The definition of setting up the system is the first part of the implementation process, including the time to install the software and the time to get the content in. Panviva has stated that the initial structuring of the system only takes one or two days, a process that could involve some variability but not such as it is interesting to investigate further. Instead it is the process of getting all the content into the system, which is critical for [COMPANY]. This process is dependent on two factors; the amount and the complexity of the content and the resources that [COMPANY] can set aside to work with this. The risk is that the process of getting all the content in will run over time.

Vague organizational structure

Disappointing project outcomes might be the result of a poor organizational infrastructure that was apparent during the pilot project in the Supply group. In order to prevent this it is important to utilize some kind of implementation strategy, in which managers clearly explains the benefits of the change to the employees as well as encourage them to be a part of the implementation by asking for preferences, opinions and ideas.

Diffusion

One risk is that the diffusion of the system will not be fulfilled. This was also evident during the pilot project in the Supply group and was probably related to the vague organizational structure as well. The main problem was that the system was not promoted internally in a satisfying way by lacking to mediate the benefits of the EPSS as well as not involving the employees in the implementation process.

Time of training

The administrators of the EPSS will get a thorough initial training in how to utilize the system and manage process updates, feedback and so on. Each end-user will get a short introduction of how to utilize the system.

After the training in how to use SupportPoint, the employees are ready to start utilizing the software in order to learn how to utilize SAP CRM 7.0. During the learning process, all employees are able to reflect by adding own notes wherever the individual choose. They can also choose what area and how often to train as well as they can analyze their learning process. To what degree the employees will do this is likely to be dependent on their motivation to learn, which is based on individual experiences and attitudes.

The four conditions for learning to occur, as outlined by Noe and Winkler (2009), are all possible to be met by SupportPoint:

i) The trainee has the opportunity to train whenever the trainee choose to do so and will be able to receive, in form of updates, and send feedback of content in processes and procedures.
ii) The trainee will be able to access meaningful training content for those processes and procedure as the administrators have published content for
iii) The trainee will have access to any prerequisites
iv) The trainee will be able to learn through observations and experience by utilizing the simulations respectively by utilizing knowledge and skills from SAP CRM 5.0 as well as conducting own trial in SAP CRM 7.0

As the software is setup, organized, promoted and diffused the employees need to be trained to fill the performance gap between the current state of changing EPSS and the desired state where the employees can train and learn through SupportPoint. The employees need to be trained until they learn which will take different amount of time for each user. However, the high degree of user-friendliness of SupportPoint will likely keep the time short and the range of variety narrow.

6.3.2.2 Risks after Implementation

After the software is successfully rolled out throughout the organization there are still uncertainties related to the investment. On a general level there are two important stages that need to be fulfilled for the investment to be successful, see Figure 18. First, it is important to ensure that the users are actually utilizing the software after being trained. Second, the productivity gains that were enabled through the purchase of an IT system need to be realized as well. This is related to the model of organizational learning that Raybould (1995) presented. The more organizations use double loop learning, the more they can capture individual knowledge that can be diffused further in the organization. This should be the investment's long-term goal since this enables the organization to continuous improvement.

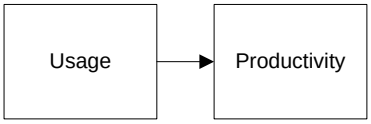


Figure 18 - Important Phases after Implementation

Low acceptance and usage

Even if the diffusion of SupportPoint works out well and users get their initial training, the usage of the software is still uncertain. This might be because of the gains from product functionalities are not satisfying or well communicated. This risk is considered to be one of the main reasons for the failure of the previous SPP pilot project.

Disappointing productivity gains

Even though the software is in use, the outcome in terms of productivity might show to be unsatisfying. This could be related to an overestimation of the capability and usefulness of the features in the tool.

6.3.2.4 Risk Management

With the previously mentioned risks in mind there are ways to minimize the impact of these by taking specific actions. Whatever decision [COMPANY] makes, to go for a an existing product with an existing vendor such as user-guides or SPP, or to go for a new EPSS from a new vendor such as Panviva Supportpoint or Tata Interactive Solutions, there are similar risks to be considered.

One risk analysis for each of the EPSS has therefore not been done since they first of all would become very similar, and second because all of the systems are not equally likely to be considered. SPP and SupportPoint are the two systems that have been concluded to be the two likely EPSS for [COMPANY] to use in the future. SPP still has to be considered for the upcoming upgrade of SAP CRM, which is discussed further in the next chapter, since time to implement is a crucial factor. Therefore SPP can be seen as a short-term solution to solve the specific issue with the upcoming upgrade of SAP CRM while SupportPoint is the long-term solution for [COMPANY]'s future training and process upgrades.

The general risks when implementing either of these two EPSS is considered to be almost the same, but with the difference that SupportPoint requires some additional considerations since Panviva is a new vendor and that SupportPoint is not yet incorporated. Conducting a pilot project or a prestudy of SupportPoint could possibly reveal the true usefulness of the EPSS to a fraction of the cost of buying the license. This enables [COMPANY] to manage the later risk of disappointing productivity gains since, if that shows to be the truth, the only financial burden is the cost of the pilot project.

Table 18 summarizes the discussed risks during the risk analysis together with the implementation recommendations, also called the risk management activities, which is further described in the next chapter.

	Risk	Probability	Impact	Implementation / Risk Management
During implementation	Time to setup and prepare system runs overdue.	High	Medium	Start with a specific set of documentation and employees. Implement the EPSS in phases.
	Vague Organizational Structure	Medium	Very High	Clear division of responsibilities by creating a centralized and dedicated team. Roll out regional responsibilities of the EPSS.
	Slow Diffusion	Medium	Very High	Stimulate and motivate the usage by having a dedicated team that promotes and follow up the usage. Develop key measures to show the result of the usage.
	Time to training runs overdue	High	High	Develop the skills internally instead of being to dependent on the supplier. Again, the organization structure is important to handle this risk.
After Implementation	Low acceptance and usage	Medium	Very High	Identify business drivers and develop key measures. Promote these internally through structured channels.
	Disappointing productivity gains	Low	Very High	Start small with a pilot project and measure the impact and improvements.

Table 18 – Summary of the Risk Analysis

Something to notice is that some of the risk management activities are important for several of the identified risks. For example, the organizational structure, such as a centralized team and regional responsibilities, is important throughout the process to handle several types of risk. Also, the importance to communicate improvements by developing key measures early on is critical to handle several of the identified risks later in the process. To summarize, even though risks might be evident in different steps of the implementation process, the action taken to prevent these might sometimes have to be taken earlier on. For a deeper explanation of the implementation recommendations, the reader is referred to the next chapter.

7 Recommendations

This chapter presents the recommendations given to [COMPANY] in how to choose and implement EPSS.

The first part of the recommendations explains the proposed choice of EPSS, with justification and challenges, see Table 19. The second part handles the implementation of the EPSS. Furthermore, the recommendations are divided into long-term and short-term recommendations. SupportPoint has been identified as the long-term solution and the best alternative overall. However, SPP is recommended in the short-term since it is already incorporated and the new update of SAP CRM is under time pressure. The evaluation showed that neither the user-guides nor Tata Interactive Solutions are considered to be a product for [COMPANY]. The performance of the two systems was too poor and an investment in the latter EPSS would result in high costs, both financially and time wise.

	Short-Term – SPP	***Long-Term - SupportPoint***
Justification	Performs better than user guides	Strong references
	Context Sensitivity	By far the best performance of the studied tools
	Already Purchased	Focus on self learning
	Higher Speed of implementation	Impressing Process Guidance
	Simulation possibilities	Outstanding User-friendliness
	Flexibility	Update function
	More User-friendly than user guides	High Flexibility
		Context Sensitivity
		Easy and direct feedback function
Challenges	Inertia and Resistance	Higher cost associated with bringing in new supplier and product
	Previous implementation failed	Time to purchase is long
	Unsatisfying functionalities in the long-term	
	No satisfying feedback function	
	Unsatisfying process overview	
Implementation	1. Start with a specific set of documentation and employees	1. Start small with a pilot project / prestudy
	2. Implement in phases	2. Start with a specific set of documentation and employees
	3. Create a dedicated team of 3-5 employees	3. Implement in phases
	4. Develop the internal skills	4. Create a dedicated team of 3-5 employees
	5. Make sure to have someone responsible in each region	5. Develop the internal skills
	6. Identify business drivers and develop key measures	6. Make sure to have someone responsible in each region
		7. Identify business drivers and develop key measures

Table 19 – Recommendations to [COMPANY]

The recommendations are further explained and justified in the following sections.

7.1 Choosing EPSS

It will likely take [COMPANY] some time to agree on a decision regarding a long-term investment in an IT based learning development tool and after the decision is made the preparations and implementation of the tool need to be setup. Two recommendations are provided; one short-term solution that enable setup before the upgrade of SAP CRM starts in February 2011 and one long-term solution that is recommended to realize benefits within the whole organization in the future.

7.1.1 SPP – A Short-Term Solution

In the short-term SPP is suggested as a tool for IT based training. The short-term especially looks on the upcoming update of the SAP CRM system.

7.1.1.1 Justification

First of all, the short-term challenge is between user-guides and SPP. These two learning development tools have shown to lack in many areas such as user friendliness and process guidance. However, SPP has shown better performance overall when evaluating the selected features. The context sensitivity and the simulation possibilities of SPP are features that make it more attractive than user guides

The fact that SPP is already purchased implies a faster implementation than SupportPoint that makes the product more attractive in the short-term where [COMPANY] is looking for a fast implementation to handle the new upgrade of SAP CRM.

7.1.1.2 Challenges

Some major issues were outlined in the risk analysis and evident from the previous SPP pilot failure. Furthermore, SPP has shown some major limitations in terms of important features such as process guidance. Inertia and employer resistance is a big risk with SPP.

7.1.2 SupportPoint – A Long-Term Solution

7.1.2.1 Justification

SupportPoint has proven to be a solution that meets most of [COMPANY] needs. SupportPoint's features outperformed all other EPSS and have some outstanding features that characterize a long-term alternative. The logic of SupportPoint furthermore switches the focus from memorizing to understanding the process of solving a task, also referred to as double-loop learning in the literature (Argyris 1992), which is a reason why the product has excluded the simulation functionality in the software. However, simulations are still used by some users of SupportPoint and are recorded by additional tools such as Captivate and integrated in SupportPoint.

7.1.2.2 Challenges

Any new vendor that is brought into an organization's operations implies new relationships and additional costs, both product specific and administrative. The input of resources needed has to be valued in relation to the potential cost savings and strategic gains from implementing SupportPoint.

Since [COMPANY] has a strategic vision of narrowing down the number of suppliers, this is a dilemma. Not only will the training staff meet resistance from higher management when proposing a new vendor, but current IT consultants at IBM as well as employees at [COMPANY] responsible for existing solutions will try to lobby for these.

7.2 Implementation

It is not the authors' ambition to give a step-by-step instruction on how [COMPANY] should practically work to implement any of these solutions. Every investment decision at [COMPANY], just like at any other established and well developed organization, goes through a formal decision process that no one else than [COMPANY] experts know best. Instead, the authors aim to give some advice on what [COMPANY] might consider when implementing EPSS.

The implementation of the two proposed solutions will hypothetically involve similar steps except that the pilot study of SPP is not considered needed, since the EPSS is already incorporated and time to the actual upgrade of SAP CRM is short. Therefore, the first recommendation is only considered to be relevant in relation to the implementation of SupportPoint. In total seven important aspects related to the implementation of SupportPoint, and six related to the implementation SPP, have been identified and is explained below. These can be seen as a framework for enabling [COMPANY] to train their staff and manage the product in a good manner, see Figure 19.

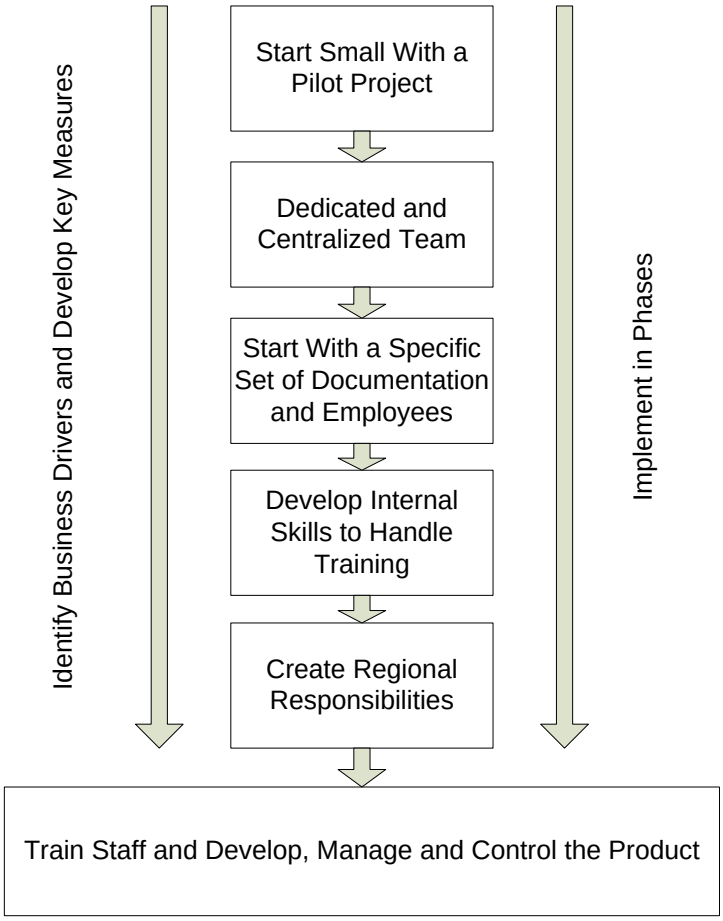


Figure 19 – Implementation of SupportPoint.

7.2.2.1 Start with a Pilot Project

[COMPANY] is recommended to start with a smaller prestudy or pilot project if choosing to go for SupportPoint. This is due to the large upfront cost of investing in new software and it further gives practical indications of the potential benefits of SupportPoint. This approach has been recommended by the supplier Panviva as well and also brings other benefits. First of all, the setup of the EPSS will be

done during the prestudy, something that has to be done no matter what approach [COMPANY] chooses for the implementation. Furthermore, the identification of business drivers will be done during a pilot project, which gives [COMPANY] the opportunity to evaluate how well SupportPoint can improve, for example, time to training. This pilot project is not considered needed for the short-term implementation of SPP since the product is already purchased. Instead, the next six steps are equally important for both SPP and SupportPoint.

7.2.2.2 Start with a specific set of documentation and employees

[COMPANY] is recommended to start small since aiming to get all content in and all employees involved may make an implementation time consuming and complex. Since one of the risks that concerns [COMPANY] is time to implement, this gets even more important.

7.2.2.3 Implement in phases

The implementation is recommended to be conducted in phases to be more easily managed and to ensure that the previous step is done accurately before moving on to the next. This recommendation is very much related and dependent on previous recommendations to give optimal results. First, the start has to be small and specific as outlined in the previous recommendation. Second, an implementation in phases will be faster if there is a clear structure with a responsible team and regional responsibilities. Key measures can then be used to ensure that the EPSS gives sufficient result before the next area of the implementation is started.

7.2.1.1 Create a dedicated team

What has been strongly recommended by suppliers and successful customers is the importance of having a small, centralized and dedicated team that is responsible for the product content and authoring. This team could be somewhere around three to five people depending on the amount of content, users and frequency of upgrades and changes. The importance of centralization is based on controlling the structure of the content in order to keep high quality of the system. Dedication and interest in the product is especially important among members in this team since these people ultimately are the promoters of the product and responsible for creating logic and structure to make the users enjoy the software.

7.2.1.2 Develop the skills internally

In general, there are two extreme approaches in how an organization could handle product specific competence. Either the company could hire consultants or rely on suppliers to handle all internal training and resolving system requests, or it could develop the skills internally.

Even though [COMPANY]'s employees, mainly referring to the dedicated team, will need a training period together with the supplier or the IT consultants at IBM, there is a belief that [COMPANY] will benefit from more independent management of the product. If the dedicated team were in place these people would be well suited as the experts within [COMPANY] to handle the internal training instead of outsourcing it.

7.2.1.3 Create regional responsibilities

[COMPANY] is a multinational corporation and therefore will have employees all over the world using training software like SPP. Since collecting feedback, as well as having people pushing for the product, is important to ensure high quality and success of the product, creating regional responsibilities is seen as a good way to go. This would for example be that every region in India,

North America or Asia Pacific et cetera, has one administrator who is responsible for collecting feedback from users within the region, schedule follow-up meetings and work as a channel between end-users and the dedicated team.

7.2.1.4 Identify business drivers and develop key measures

Something that could be seen as a key to success as it comes to stimulating the usage as well as convincing managers of potential and performance of a product is develop measurements and communicate them. This could for example be that the users of EPSS decrease time to solve a specific task with 30 percent or that [COMPANY] saves costs of training with 50 percent. The key measures are always different between organizations and it is therefore important for [COMPANY] to outline the business drivers in an early phase. This is usually done together with the supplier and appropriate practical ways to do these measurements are developed.

8. Conclusions and Further Studies

This chapter presents four conclusions and some suggestions for further studies.

8.1 Conclusions

This study has been characterized by some methodological challenges and limitations, which has affected the research process and the outcome. These aspects are discussed in the following sub-sections.

8.1.1 Contextualization to Identify Features

From a general point of view, the nine features found in this study may not be assumed as an appropriate basis for every company that wishes to pursue an investment in IT based training. These features have been identified using more general sources, such as literature in the field, but also very company specific sources, such as observations and interviews within [COMPANY]. Organizational culture, firm size and strategic objectives are factors that differ between companies, which could affect what features are important to consider. A good example of this can be found in this report in the purchase of SPP. When [COMPANY] first evaluated SPP, the Supply group needed a product that could help them structure and organize user-guides. The objective in this investment is very different from the current one, where [COMPANY] is focusing more on time and cost reductions in terms of training. Even though both SPP and SupportPoint can be considered as potential EPSS for [COMPANY], they fulfill somewhat different purposes. The formulated problem and future objectives therefore play a significant role in feature selection and evaluation of EPSS.

Instead, the methodology of finding out the company specific needs from an IT investment provides higher external validity. The first research question can be seen as a process of contextualization, in other words studying the situation, environment and circumstances for a specific company. Even though the chosen features differ from company to company, the multi-criteria approach is proposed as an easy way to understand and evaluate IT investments. It can take into consideration long-term and strategic measures that cannot be found in available financial techniques.

8.1.2 Evaluation Model

In this study we choose to use the multi-criteria model as a good way to evaluate the intangible benefits of an EPSS. However, it could be discussed if any other model could have been used instead. We exclude all the financial models since we are measuring benefits that are extremely difficult to quantify, especially in financial terms. Some of the other proposed models for evaluating IT investment, discussed in the literature review, could however be used for a future study. The ratio approach and the portfolio approach were not considered for this study since they were harder to apply to our research approach. The balanced scorecard technique however could have been a useful way of doing this study. The balanced scorecard approach also takes both tangible and intangible aspects into consideration and has a lot of similarities with the multi-criteria approach. However, since one methodology had to be chosen, the multi-criteria approach tended to be easier to apply to our study and also very easy to communicate to the stakeholders.

8.1.3 Dependent Research Questions

In an early phase, our research question 2 was seen as dependent on research question 1. The answer to research question 1 was needed to start exploring research question 2. This would have meant that our research would follow a linear process. However, early in the study we realized a methodological problem related to the first and second research question that was difficult to solve. The features that we were aiming to select were simultaneously evaluated for each EPSS, in other words we could not select what features to evaluate before we could evaluate the EPSS. Therefore, our research questions have been dependent on each other in an iterative process.

For example, user friendliness and flexibility are examples of features that were discovered as important for the overall EPSS performance during the empirical study. The conclusion is that an iterative approach of the research questions of selecting features to evaluate an investment must be done in correlation with the evaluation of the products unless perfect information of the different products already exists.

8.1.4 Treatment of Financial Aspects

As outlined by several authors in the field, the evaluation of any IT investment should not be done only on available financial data. IT investments are strategic decisions that should be evaluated using a model different from the classic net present value and internal rate of return methodologies. Desmarais et al (1997) illustrate the difficulty to estimate the cost and benefits of EPSS that leaves large uncertainty to decision makers. It is also difficult to estimate how long the product will be used, how much time each individual respectively the organization as a whole save by utilizing the product and how much value the organizational learning generates. Intangible benefits are too difficult to quantify to be able to make a just comparison with the EPSS costs. In this study we have therefore rejected the financial aspects in the multi-criteria model and instead focused on evaluating intangible features, such as product user-friendliness and system flexibility. The cost of the system has been taken into consideration after the multi-criteria model has been used.

Another interesting aspect, and also something that can be used as criticism towards using the multi-criteria approach, is the lack of measures of financial impact related to each feature. Consider user-friendliness, one might approximate that an increasing level of user-friendliness can save the users 10 percent of their time and therefore decrease costs of employees with 10 percent.

If the company has close to perfect and accurate information about these costs and the mutual dependency between each feature it can be argued that the multi-criteria approach can be transformed into a pure financial model and the net present value technique would be appropriate.

Aiming to achieve a pure financial evaluation with IT investments could also lead to what Ross et al (2008) refer to as paralysis of analysis. It is costly and time consuming to gather all the information about long-term impacts of each feature and how every single feature relate to the others, which leads to a situation where the decision process gets too complicated to ever get anything good out of it.

Furthermore, if the purpose of this study had been different a financial approach would have been more useful. If the object was to decide if a specific investment was financially viable or not, then costs and savings from the investment would be necessary to tailor. However, in this study we have been given a practical oriented task to give a recommendation on what EPSS [COMPANY] should

invest in based on a comparison between different solutions. The focus has therefore naturally been the performance of the EPSS as a basis for the recommendation.

8.1.5 Utility of EPSS

The benefits of utilizing EPSS can be to facilitate individual learning of how and what to do in a software environment, which is called single-loop learning. EPSS can further enable employees to understand why they do what they do and also transfer individual knowledge to the organizational knowledge base. In other words, EPSS can enable organizational learning by utilizing double loop learning. In addition, the more developed the EPSS is, the wider can the knowledge base be extended and the EPSS can also be utilized in order to learn business processes.

Interesting to reflect upon is whether the era of traditional training methods is over and EPSS is the future approach for learning. Some users in the empirical study definitely seem to think so but small organizations do not yet have the resources to invest in such a system and large organizations tend to move slow towards uncertain IT investment where the benefits and costs are difficult to quantify.

8.2 Further Studies

In addition to the previous reflections over this study, some areas for further studies have been identified.

8.2.1 A Quantitative Research Approach

This study has been focusing mainly on qualitative aspects in all research aspects. Another possible way to do the same type of research would be to use a quantitative data analysis approach. This would also require the data collection to generate quantitative data, which would imply somewhat different research methods. How could research question 1, 2 and 3 be answered with a quantitative approach? What research design, research methods would be suitable?

An advantage of a quantitative approach would be a higher level of external validity if enough instances were studied. However, such a study would require more time and resources to conduct and might lose the same kind of insights and knowledge of circumstances that a case study can cover. For example, the history and experience [COMPANY] has with SPP gave a lot of insights that were reflected in the analysis and results. How would this knowledge be found with quantitative measures?

8.2.2 Organizational Factors

One area that was not specifically investigated in this study is the dynamics of stakeholder relationships and their impact on IT investment decisions. We have developed a model to evaluate IT investments in training within a specific company and used that to give recommendations how to act in a certain situation. At a glance it can seem easy to just implement these recommendations and hope that they will lead to success. In the real world though, there are institutional forces and structures that affects decision processes in a way that can be hard to measure.

Bargaining power of different stakeholders might also have a significant impact on the decision process. As was discovered during the study at [COMPANY], IT consultants at IBM generally had a certain field or product type that they were pushing for since it helped them getting more jobs. Going for a new vendor, such as SupportPoint, will not only incur additional administrative costs but also

meet response from different stakeholders. Current suppliers will generally not be happy and current IT consultants and employees will also have preferences that will impact the decision process.

Company culture and history might also be an aspect that affects the outcome of IT investment decision processes. Compare a company that is identified as very innovative and has a history of change and adapting to new environments to a company with well-defined structures within a slow-changing industry. How will this affect the IT investment decision?

8.2.3 Double Loop Learning versus Single Loop Learning

A concept that came up during the study, and that we believe could be studied in more detail in relation to EPSS, is double loop learning. It was shown that some EPSS were better than others in providing an understanding of the process and why the employee is doing a certain task. Enabling double loop learning was not stated as a specific feature after Feature Selection but rather incorporated in to the feature called Process Overview. An interesting discussion is whether there are two main philosophies dividing the providers of EPSS where one camp is focusing on the process overview and double loop learning while the other camp is focusing more on the traditional step-by-step guidance and single loop learning. There could possibly be a demand for both types of systems where companies like [COMPANY], involved with high technology products and complex processes, would benefit most from having the double loop learning based system. On the other hand, there are work structures within companies where the task is very simple, or extremely important that it is done in exactly the same manner each time, and in those cases a single loop system might be more time and cost efficient to utilize.

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Appendix A – Dictionary

BPGS – Business Process Guidance System

CRM – Customer Request Management

EPSS – Electronic Performance Support System

ERP – Enterprise Resource Planning

GPS – Global Positioning System

IS – Information System

KMS – Knowledge Management System

NAB – National Australian Bank

Off-the-job training - Training conducted aside from work such as simulations, lectures, case studies and work shops.

On-the-job training - Training conducted during work such as process guidance, user-guides and work instructions

PST – Performance Support Tool

RWD – The name of the company that developed the EPSS uPerform. uPerfrom was licensed to SAP and renamed SPP.

SAP – An organization that is leading in developing ERP

SMS – Service Management System

SPP – SAP Productivity Pak

TAP – Think Aloud Protocol, a qualitative observation method

Appendix B - Interview with Foster and NAB

This interview template is meant to be utilized when interviewing respondents that have at least some experience from working with SupportPoint. What the researcher wants to get out of the interview include:

- Efficiency
- Benefits and drawbacks of the system
- Most common problem/issues
- Perception of the system compared to other tools (if the respondent has any experience)
- Why/Why not SupportPoint is preferred to traditional learning methods.
- Feature specific questions

Introductionary Questions

In this phase we want to get to know more about the person's experience in utilizing SupportPoint.

1. When did you start using SupportPoint?
2. Why did you choose to purchase/use Panviva's Supportpoint?
3. Did you look at other applications as well? What was the determining factor?
4. Please describe briefly how you work with SupportPoint (i.e. how many users are there within the company, what departments are using it, which applications are integrated etc.)
5. What learning methods did you use prior to SupportPoint?
6. What gap did SupportPoint fill?
7. How often do you work in SupportPoint?
8. What is your general impression of the software?

Efficiency

Here we want to find out how efficient people think it is to use the software in terms of time to perform a certain task and find critical information.

9. Do you need additional help when using SupportPoint (asking colleagues, reading user-manuals, trial and error etc)?
10. Have you reduced the time solving a task when using SupportPoint compared to using other methods (e.g. asking colleagues, reading user-manuals, trial and error etc)? Approximately how much time in percentages?
11. Does the software help you in providing additional information that you did not learn in initial training sessions? That is, does SupportPoint keep you updated on process changes?

Benefits and Drawbacks

In this part we want to investigate if there are any features or functionalities that the respondent appreciates and if there are any that is missing.

12. What are the main benefits that you enjoyed while working with SupportPoint in terms of features and functionalities?
13. What are the main drawbacks with the system in terms of features and functionalities?

Problems and issues

In this phase we want to know if there are any issues related to the usages of the software (i.e. user-friendliness of the system). This area differs from the previous since it does not focus on the existence or non-existence of features, but rather of issues in utilizing features

14. Are there any specific issues with the software that makes it hard to utilize efficiently?

Comparison

Our intention in this phase is to get input for comparison of our studied systems, if the respondent has this experience.

15. Could you compare SupportPoint to other tools that are out there? Other software tools? Other methods for learning?

16. Would you prefer SupportPoint before choosing another software or traditional learning methods?

Please elaborate in terms of time efficiency, keeping you updated on changes and flexibility.

Feature specific questions

In this section we want to find out more about specific features and issues that we are interested in learning more about.

Simulation possibilities

Do you work with simulation in terms of training? Is this integrated into SupportPoint? What software do you use for this purpose?

Document Storage

Where do you store all the content that is put into SupportPoint? Is it stored in the software or centrally in the organizational database? If stored SupportPoint, has that caused conflicts related to internal document policy?

Process versus Step-by-Step Guidance

Would you consider SupportPoint to give you a broader guidance of the process rather than guiding you step by step in the application? If so, is that something that you would wish to have?

Updates in the system

How does SupportPoint inform you about process changes?

Feedback

Is it easy to give feedback on the content, change content or make own notes in thee content? Is that utilized to a larger extent?

Speed of implementation

How long time did it take you from the decision to purchase SupportPoint, until the system was setup and ready to use? How long time of training was needed to get started?

Context sensitivity

How does SupportPoint recognize the user's role and authorities? Does it recognize where in the process the user is in order to give more accurate guidance?

Flexibility

How flexible is SupportPoint with different applications? Is it very coupled to certain environments or is it much more general?

Appendix C - Interview Questions SPP

This interview template is meant to be utilized when interviewing respondents that have at least some experience from working with SPP. What the researcher wants to get out of the interview include:

- Software tool efficiency
- Benefits and drawbacks of the system
- Most common problem/issues
- Potential of the system (for Customer Support and a broader level as well)
- Perception of the system compared to other tools (if the respondent has any experience)
- Why/Why not SPP is preferred to traditional learning methods.

Warming-up questions

In this phase we want to get to know more about the person's experience in utilizing SPP.

1. When did you start utilizing SPP?
2. Why did you start utilizing SPP?
3. What did SPP replace? E.g. user guides.
4. What are you utilizing SPP for?
5. How often do you utilize SPP?
6. What is your general impression of SPP?

Software Tool Efficiency

Here we want to find out how efficient people think it is to use the software in terms of time to perform a certain task and find critical information.

7. Do you need additional help when utilizing SPP (asking colleagues, reading user-manuals, trial and error etc)?
8. Have you reduced the time solving a task when using SPP compared to using other methods? Approximately how much time?
9. Does the software help you in providing additional information that you did not learn in initial training sessions? That is, does SPP keep you updated on process changes?

Benefits and Drawbacks

In this part we want to investigate if there are any features or functionalities that the respondent appreciates and if there are any that she misses.

10. What are the main benefits that you enjoyed while working with SPP?
11. What are the main drawbacks with the system?

Problems and issues

In this phase we want to know if there are any issues related to the usages of the software. This area differs from the previous since it does not focus on the existence or non-existence of features, but rather of issues in utilizing features

12. Are there any specific issues with the software that makes it hard to utilize efficiently?

Potential

In this part we want to find out how the user would perceive SPP's potential to be used in [COMPANY] in general, and for Customer Support in particular.

13. Do you see SPP as a good system for working with customer support? For other software utilization at [COMPANY] in general?

Comparison

Our intention in this phase is to get input for comparison of our studied systems, if the respondent has this experience.

14. Could you compare SPP to other tools that are out there? Other software tools? Other methods for learning?

15. In the areas where SPP does not deliver, does any other system so? Does it pay to buy the software for these limited functions?

16. Would you prefer SPP before choosing another software or traditional learning methods?

    Please elaborate in terms of time efficiency, keeping you updated on changes and flexibility.

Requirements of Features

In this section we want to find out more about specific issues that we previously have experienced with SPP together with the requirements that [COMPANY] puts on the system.

Features

17. What do you do if you have an idea of how to improve a task or process in the SPP? How do you provide feedback?
18. Are you accessing specific tasks related to your role at [COMPANY] or do you work anonymously?

Appendix D – TAP Template

Observations

Hi and thank you for coming! We are Henrik and Mikaela, the Swedish students who perform our Master's Thesis here at [COMPANY]. We study Industrial Engineering and Management at Chalmers University of Technology in Gothenburg. We are both doing our final year of our degree here in Australia on exchange studies and have been working together with Andrea Richards on our Master's Thesis here at [COMPANY]. We are investigating different learning development tools for more efficient and effective training in regarding to the upgrading of SAP CRM 7.0 in January. We suppose you are aware of that?

One of the learning development tools is called RWD uPerform, or SPP. Two of you will be using traditional user guides and two of you will use SPP. We will outline ten tasks for you in *Task Management* that we will engage you to perform as quickly and accurate as possible. We will observe your performance in order to conclude whether this tool is appropriate for Customer Support, and possibly other business units within [COMPANY].

We are using a special method of observing called think aloud protocol. This means that we prompt you to think aloud during the whole observation. This will provide us with more information of your performance and give us an understanding of the user guides' and SPP's usefulness.

For those who are performing the task with assistance from SPP we will carry out some training sessions to familiarizing you with the tool before the observation starts. In addition, all observers will practice in think aloud protocol so that you are comfortable with the method. You will for example be asked to solve a mathematical problem.

Tell the user that:

- You are testing the instructions, not the user, and that any difficulties are your fault, not theirs
- They can stop the task at any time if they become uncomfortable
- They may ask questions at any point in the process, but you may not answer them
- You will not tell them when they have completed the task; they must determine this on their own

Start the real observation in SAP CRM 5.0 – if necessary prompt the user with 'please keep talking'

Training Session in SPP

SPP is a software training tool that is intended to be used together with SAP's new platform release 7.0. What SPP does is that it helps the user of certain software to find the right action to take with a given task by guiding and provide information.