THE ROLE OF SYSTEM ADMINISTRATORS IN INFORMATION SYSTEMS SUCCESS

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Abstract

Limited research has been conducted on how system administrators actually can affect information systems (IS) after they have been implemented; hence, this study examines how system administrators can affect IS success in an implemented IS.

The study identified a system administrator’s affect on the three IS quality dimensions in the DeLone and McLean IS success model. The empirical findings were based on a single case study where the data was collected through interviews with the system administrator and the system assistants, but also through a questionnaire answered by the users of the IS.

The empirical findings suggested that the system administrator can affect IS success through the IS quality dimensions both directly and indirectly. The system administrator’s affect on IS success proved to be highly dependent on the external system vendor and the structure of the internal support unit.

Key words: system administrators; information systems success; The DeLone and McLean IS Success Model; information quality; system quality; service quality
1 INTRODUCTION

In recent years organizational spending on information technology (IT), such as information systems (IS), has continued to increase (Petter et al. 2008). There are many definitions of what IS are but on a general level IS could be explained as computer-based systems providing organizations with information support (Ives et al. 1980). IS provide organizations with reliable organizational data, but also enable the availability of data to a larger set of people within the organizations. This is very helpful when organizations try to map their problems (Sims 1992). Moreover, IS are used to ease the decision making process within organizations since IS reduce and filter the amount of organizational data and transform it into useful information that is more accessible (Senn 1978). Other reasons why IS are used among organizations are because IS have the ability to produce information that makes it possible to cut organizational cost, but IS also provide organizations with the ability to produce information that increase control and accountability (Elpez and Fink 2006).

Deciding on what IS to choose can be a rather complex process since it might have crucial effects on the costs on IS operations and IS support in the future. Studies have shown that almost 80 percent of the total costs related to IS arise after the IS have been implemented into the organizations (Pfleeger 2001). For organizations that utilize IS it has always been important to know what factors that might lead to better and successful IS (Bailey and Pearson 1983). Today’s increased levels of investments but also the high failure rates reported on some IS has led to that the debate about IS success has intensified (Skok et al. 2001). Using traditional financial measures to assess IS success has proven to be insufficient because of the complex nature of IS; hence, researchers within this field shifted their focus towards the use of qualitative measures to assess IS success (Symons 1991; Rubin 2004). Researchers developed the concept of IS success and managed to categorize IS success measures from previous research into IS success dimensions (Sedera and Gable 2004).

IS will never reach their full potential and be successful, no matter the quality of the IS, as long as system administrators do not educate IS users sufficiently. Hence, system administrators’ role as systems designers as well as educators is of great importance for IS success (Schewe 1976). Haber et al. (2011) say that the role of the system administrator should be to create relationships and collaborations with IS users, the reasons for this is because IS can sometimes be difficult to use and there can also be different perceptions on
how they should be used. By establishing a relationship it is easier for users to communicate with the system administrators and it also allows system administrators to show users why IS are used in the first place (Haber et al. 2011). Extensive research has been conducted on what system administrators should do to create a successful IS utilization. However, limited research has been done on what system administrators actually can do after the system has been implemented (Santhanam et al. 2007).

1.1 PROBLEM

Due to the fact that organizations are investing more on IS and that most of the costs related to IS comes after the implementation, the debate regarding IS success has grown (Pfleeger 2001; Skok et al. 2001). System administrators have an important role in making IS use successful in organization (Schewe 1976; Haber et al. 2011), and despite this fact IS researchers has paid little attention to the role that system administrators have after the systems have been implemented (Santhanam et al. 2007).

Because of the important role system administrators have in order for organizations to utilize IS successfully and the limited research on system administrators role after the systems have been implemented; the aim of this thesis is through a case study identify system administrators’ affect on the IS success dimensions after the system has been implemented. Hence, the research question for this study is:

*How can system administrators affect IS success after the system has been implemented?*
2 LITERATURE REVIEW

2.1 INFORMATION SYSTEMS

According to Elpez and Fink (2006) information systems (IS) are an information technology (IT) tool that provides accurate, reliable, and timely information. This idea is supported by Senn (1978) who also states that IS are systems that concentrate and sorts out data and transform that data into information which is used in the decisions making process at different levels of the organization.

An entire IS consists of several subsystems categorized by functional or organizational limitations. For example, there can be a special subsystem for inventory control or one for market forecast (Ives et al. 1980). Senn (1978) describes how information from the IS can be provided at request or at fixed time intervals for example in monthly or quarterly reports.

2.2 IS EVALUATION

In recent years organizations have gained interest in the evaluation of IS because of their uncertainty to the actual value of these investments (Lubbe and Remenyi 1999; Remenyi and Sherwood-Smith 1999; Skok et al. 2001). This increased interest in evaluating IS investments is also due to the increased levels of investments organizations make on IS (Fitzgerald 1998).

Because there are different stakeholders of IS there are also several definitions of what IS success is. For users of the IS, success might be that the IS improves job performance while from a managers point of view reduced risk might be a better measure (Briggs et al. 2003). The first methods used to evaluate IS mainly focused on the financial perspective where efficiency-oriented quantifiable measures were utilized and intangible qualitative effectiveness-oriented measures were ignored (Hamilton and Chervany 1981:a; Hamilton and Chervany 1981:b). However, traditional financial measures are not enough to measure the success of IS and the reason for this is because of its complex, interdependent, and multi-dimensional nature (Martinsons et al. 1998; Ballantine and Stray 1999; Cronk and Fitzgerald 1999; Petter et al. 2008). The failure of finding positive correlation with financial measures to evaluate IS led to a shift to a focus on qualitative measures such as user satisfaction (Symons 1991).

Since IS success can be assessed at different levels it has been hard to establish an overall measure for IS success that is totally clear and well defined (Wu and Wang 2006). Furthermore, the lack of consensus between studies of IS success as well as the different
scopes and approaches of researchers has made it hard to compare research findings and establishing a research tradition (Heo and Han 2003). In 1992 IS researchers DeLone and McLean had a breakthrough proposing a model of IS success (DeLone and McLean 1992).

The model has its foundations in the work of Shannon and Weaver from 1949 and Mason from 1978. What DeLone and McLean presented was a systematic combination of individual measures from previous research and an attempt to show off the interdependent process relationship of six IS success dimensions (Sedera and Gable 2004). Two of the main contributions of the DeLone and McLean model was according to Seddon and Kiew (1996) that the model provided a classification scheme for IS success measures used in prior literature, and secondly it suggested interdependencies between the different success dimensions.

Since the DeLone and McLean IS success model was presented in 1992 it has been referred to in over 1000 articles in refereed journals (Petter and McLean 2009). Today it is one of the most commonly cited models of IS success (Al-adaileh 2009). There are several advantages with using the DeLone and McLean IS Success Model. First of all the model can be used to measure the success of a whole IS but it can also be used to measure the success of one single subsystem (DeLone and McLean 2003). Furthermore the model has been used to assess IS success in both public and private sector (e.g. Almutairi and Subramanian 2005; Elpez and Fink 2006). The DeLone and McLean IS Success model will be presented in detail in the next subchapter.

2.2.1 The DeLone and McLean IS Success Model

When the DeLone and McLean IS Success Model first was published in 1992 it was an attempt to try to collect the results of previous studies investigating the dimensions behind IS success. This new model would provide researchers with the possibility to compare research findings in a new way. By grouping established IS success components into six different success dimensions DeLone and McLean managed to organize previous research of IS success into an IS success model (Figure 2.1). The six different dimensions they managed to distinguish were system quality, information quality, use, user satisfaction, individual impact, and organizational impact. What they found was that the success dimensions did not only affect IS success but that they are also interrelated (DeLone and McLean 1992).
In 2003 DeLone and McLean published an article reflecting over the research that had been made since they published their IS success model in 1992. Based on a review of research that had been made during these years to test, use, and edit the original model DeLone and McLean found strong support for the causal structure of their original model. However, they also presented a revised version of the model with a couple of alterations (Figure 2.2). Service quality was added to information quality and system quality as a third quality dimension of IS success. Apart from adding service quality net benefits took the place of both individual and organizational impact (DeLone and McLean 2003).

The revised model (Figure 2.2) contains three quality dimensions: information quality, system quality, and service quality. These three quality dimensions separately and jointly affect use and user satisfaction. Use and user satisfaction are closely interrelated where use in a process sense must precede user satisfaction but in a causal sense positive experience of use will create user satisfaction. Enhanced user satisfaction will in turn increase intention to use and ultimately use. Use and user satisfaction will create the net benefits of the IS and these in turn will to some extent have influence on subsequent use and user satisfaction (DeLone and McLean 2003; Petter et al. 2008).

One of the main shortcomings of the DeLone and McLean model is that it does not present any appropriate measures for each one of the success dimensions (Wu and Wang 2006). Instead DeLone and McLean state that all measures should be based on the objectives and context of the research being done, and to the extent that it is applicable measures tested and proven by other researchers should be used. The lack of established measures for the success dimensions can be seen as a result of the complex nature of IS (DeLone and McLean 1992). Apart from being seen as a shortcoming of the model it is also one of the main benefits
with it since the model can be applied to different context (Petter et al. 2008). However, an attempt should be made to reduce the number of measures to establish consistent appropriate measures of IS success to enhance the possibility to compare and validate findings (DeLone and McLean 1992; DeLone and McLean 2003). In the next section we will present the six success dimensions in more detail.

![Figure 2.2 Updated DeLone and McLean IS success model](Source: DeLone and McLean 2003, p.24)

2.2.2 Dimensions of IS Success

2.2.2.1 Information Quality

Information quality refers to the wanted characteristics of the information that the IS produce. When measuring end-user satisfaction information quality is often one of the key variables; hence, it is often seen as a component of user satisfaction rather than a unique construct (Petter et al. 2008). The quality of the information that the IS produce will determine users’ satisfaction of using the IS to solve their tasks, if the information that the system produce is very hard to understand or not accurate enough this might lead to frustration amongst users’ (Allwood 1998). Due to its importance information quality has been discussed a lot by IS researchers (Bharati and Berg 2005). Some of the most well established components of information quality according to Petter et al. (2008) are: accuracy, completeness, relevancy, timeliness, and format of the information.

Accuracy is an important part of information quality since it can be seen as the correctness of the information that the IS provide and how satisfied users are with the accuracy of the information. In the same way information completeness is important because
it shows how comprehensive the information that the system provides is (Bailey and Pearson 1983). Information relevancy is important to assess because it measures whether the information provided by the system is equal to the information that users needs or requires (Bailey and Pearson 1983; Rai et al. 2002). Timeliness reflects how updated users perceive the information provided by the system, if it is relevant or outdated (Bailey and Pearson 1983; Doll and Torkzadeh 1988). According to Bailey and Pearson (1983) format of output is an important part of information quality because it provides an insight about whether users think that the information provided by the IS is presented in a good and understandable way or not.

2.2.2.2 System Quality

System Quality can be explained as the overall performance of the IS (Bharati and Chaudhury 2004). DeLone and McLean (1992) explain system quality as the desired characteristics of the IS which purpose is to produce information that should be used by users and decision makers. According to Petter et al. (2008) important components of system quality is ease of use, ease of learning, and system flexibility.

Ease of use and ease of learning can be explained as to the degree that learning and using the system will be perceived as effortless by the user. This is an important part of system quality since effort can be seen as a limited resource that all people can chose to allocate in what way they like. Hence, IS that are perceived as effortless by users are more likely to be accepted by users (Davis 1989; Rivard et al. 1997). Furthermore, ease of use also enhance efficiency of users’ IS use (Doll and Torkzadeh 1988).

Flexibility is another important factor that several researchers have used as a component of system quality (e.g. Miller and Doyle 1987; Rivard et al. 1997; Bharati and Chaudhury 2004). The flexibility of the system refers to the possibilities to make changes or adjustments in the system in cases of new demands, conditions, or circumstances (Bailey and Pearson 1983; Wixom and Watson 2001).

2.2.2.3 Service Quality

Service Quality can be explained as the overall support that the IT department or service provider offer system users and is applicable whether the service is provided from an internal or an external support unit (DeLone and McLean 2003; Petter et al. 2008). According to Petter et al. (2008) responsiveness, assurance, reliability, and empathy are four of the main components of service quality.
Responsiveness is concerned with the support unit’s willingness to help users, if they provide fast service, and if they always take time for users no matter how busy they are (Jiang et al. 2002). Assurance reflects how users perceive the knowledge of the employees within the support unit, if they have sufficient knowledge to solve user’s problems. Reliability is essential because it indicates if users perceive the support unit as dependable, that is if they provide service when they say they will and if they do something if they promise to do so (Pitt et al. 1995; Jiang et al. 2002). Empathy is an important part of service quality because it reflects the support units concern for the users, if they provide individual attention and have understanding for users’ specific needs (Jiang et al. 2002).

Apart from these components Li (1997) argues that assessment of service quality should also include improvement of user’s system knowledge which includes two components. The first component is users understanding of the system relating to the degree of system comprehension amongst the users. The second component is the degree of training provided to users which reflects the amount of training that user’s receive in order to increase their knowledge about the IS (Bailey and Pearson 1983; Ives et al. 1983; Li 1997). According to Magal (1991) these two components are important because system understanding and training makes users less dependent on the support unit which gives them greater user satisfaction.

2.2.2.4 Use
IS use has been established as one of the most used measures to assess IS success. Use is a fairly complex dimension since there are so many aspects of it and it can be measured from several perspectives (DeLone and McLean 1992; DeLone and McLean 2003). According to Seddon (1997) use can be described as the effort that will be consumed to use the IS and present frequency of use, number of use, or use vs. non-use as the best way to assess IS use. However, according to DeLone and McLean (1992) using actual use as a way to assess IS success is only relevant when use is voluntary. With these thoughts in mind Rai et al. (2002) proposed that the best way to assess use is through the evaluation of the utilization of the IS, that is to measure to which degree users are dependent on the IS to execute their work.

2.2.2.5 User Satisfaction
User satisfaction has traditionally been seen as a measure for IS success and can be described as the summary of a person’s attitudes or feelings towards several factors affecting that specific situation (Bailey and Person 1983; Raymond 1990). In the DeLone and McLean model user satisfaction refer to the users response to the use of the IS (DeLone and McLean
User satisfaction has previously been measured indirectly through system quality and information quality (Rai et al. 2002). Baroudi and Orlikowski (1988) early developed the idea that a single measure could be used to assess user satisfaction if it is an overall indication of user satisfaction one was after. This was exactly what Rai et al. (2002) did, trying to find a global measure of user satisfaction simply by measuring how people rated their overall satisfaction with the system.

2.2.2.6 Net Benefits
Net benefits took the place of individual and organizational impact as the impacts of IS moved beyond the immediate users. The change from impact to net benefits was due to the fact that impact can be seen as either positive or negative, while net benefits allow researchers to find both positive and negative consequences of using the system not limiting the results to whether the system is good or bad. The choice of what benefits that should be measured should depend on the purpose of the system being evaluated. Furthermore, benefits for who is also a question that needs to be considered while evaluating an IS (DeLone and McLean 2003). Torkzadeh and Doll (1999) classified the possible benefits of using IS into four different categories: productivity, innovation, management control, and customer satisfaction.

Since the purpose of our thesis is to see how system administrators can affect IS success after the system has been implemented we do not have an intention to measure the overall success of the IS in question. Hence, the net benefits of the system will not be assessed and our focus will instead be on the other five success dimensions. We will now move on and take a look at one of the stakeholders of the IS namely the system administrator.

2.3 SYSTEM ADMINISTRATORS
System administrators perform many tasks in their working role (Kahn 1983; Haber et al. 2011). According to Haber et al. (2011) it is observed that system administrators’ tasks consist of handling the security, managing, designing and operating the IT systems. Kahn (1983) and Benander et al. (2000) claim that the tasks the system administrators are performing in their working role is influenced by the type of data resource administration the organization has. Kahn (1983) says that the system administrators either work with data administration or database administration.

Data administration consists of setting up the general framework for how the data resources within the organization should be handled, and how these data resources should be used in practice. In contrast database administration is more technical oriented mainly
focusing on the design of the IT system but also providing users with technical support (Kahn 1983). Benander et al. (2000) claim that system administrators normally are limited to work with database administration such as operational IT systems or warehouse IT systems. In operational IT systems the task of the system administrators is to create a more standardized version of the current IT system, while in warehouse IT systems the system administrators’ job is to adapt the IT system to the specific information needs of the organization (Benander et al. 2000).

2.3.1 System administrators and IS
As written above, the role of system administrators is influenced by the type of data resource administration the organization has (Kahn 1983; Benander et al. 2000). System administrators within operational databases need to be fast with the service support on the IT/IS if the organizational operations are supposed to run efficiently. System administrators within data warehouses on the other hand are required to have good abilities in communicating the potentials with the IT/IS because in that way they will decrease the risk that misinterpretation about the IT/IS occur. System administrators within warehouse databases are also required to have broad organizational knowledge because then they can easier adapt the IT/IS to the organizational situations (Benander et al. 2000). Furthermore organizational knowledge amongst system administrators will enhance the relevancy and accuracy of the information that the IS provide (Lynch 1984).

According to McLean et al. (1993) the system administrators must possess more than just organizational knowledge if the IS should provide accurate information. They also need to take the responsibility for educating the IS users with sufficient technical skills to improve their understanding of the IS (McLean et al. 1993). Schewe (1976) also highlights the importance of educating users saying that it is hard for an IS to be used efficiently if the system administrators do not start to communicate with IS users and educate IS users sufficiently. The reason for this is that most IS users have concerns about their technical skills in operating IS (Schewe 1976). The system administrators role in educating users is also emphasized by Burgess (2011) who says that system administrators of today should focus less on developing the IT/IS further to make them less complex, instead they should focus on explaining the existing IT/IS more logically for the users. In contrast Robey (1979) and Haber et al. (2011) say that system administrators should strive to make the IS easier to use, because if this is done conflicts about the IS are avoided.
Lear (2011) states that it is important that system administrators follow through on their commitments to users to avoid possible conflicts and make users more satisfied. Haber et al. (2011) say that the most important role for system administrators today is to create relationship and to collaborate with IT/IS users since the design of the different IT/IS have become rather complex. If the system administrators manage these things well the possibility to form a common understanding regarding the IS role within the organization increases. Through the increased level of common understanding towards the IT/IS the system administrators and IT/IS users can exchange knowledge about the IT/IS and thereby improve them (Haber et al. 2011).

2.4 SUMMARY - SYSTEM ADMINISTRATORS AFFECT ON IS SUCCESS

System administrators must have organizational knowledge to be able to adapt the IS in accordance with the organizational needs so the IS provide users with complete, relevant, and accurate information (Lynch 1984; McLean et al. 1993; Benander et al. 2000). Furthermore, the information provided by the IS needs to be updated and presented in a way that users can easily understand (Bailey and Pearson 1983; Doll and Torkzadeh 1988). According to Petter et al. (2008) accuracy, completeness, relevance, timeliness, and format of the information is important components of information quality to achieve IS success.

Proposition 1: System administrators can affect IS success through information quality if they are able to affect the accuracy, completeness, relevancy, timeliness, or format of the information (Figure 2.3).

It is the system administrators’ role to manage, design, and operate the IS. Hence, system administrators have an important role in making the IS user friendly (Haber et al. 2011). System user-friendliness through ease of use, ease of learning, and system flexibility is how IS success can be achieved through system quality (DeLone and McLean 2008).

Proposition 2: System administrators can affect IS success through system quality if they are able to affect the ease of use, ease of learning, or flexibility of the IS (Figure 2.3).

System administrators have an important role in educating users so the IS will be used efficiently, this will also provide users with a better understanding of the system (Schewe 1976; McLean et al. 1993; Burgess 2011). Furthermore, system administrators need to
provide users with fast service support on the IS if the organizational operations are supposed to run efficiently (Benander et al. 2000). It is also important that system administrators have sufficient knowledge to help users and that they understand users needs. That system administrators follow through on commitments is crucial, by keeping promises made to users system administrators avoid possible conflicts and keep users satisfied (Lear 2011). According to Petter et al. (2008) service quality can be assessed by measuring the responsiveness, assurance, reliability, and empathy of the IS support staff. Additionally, Li (1997) argues that the assessment of service quality also should include users understanding of the system and the degree of training provided to users.

**Proposition 3: System administrators can affect IS success through service quality if they are able to provide users with understanding, training, reliability, responsiveness, assurance, or empathy (Figure 2.3).**

![Figure 2.3 Components of IS success](image_url)
3 METHOD

The aim of this thesis is to identify system administrators’ affect on the IS success dimensions after the system has been implemented. Due to the lack of research on this phenomenon we decided to use a single case study (Saunders et al. 2009). Research within the IS field has moved away from issues about the technical aspects of the IS and moved towards a focus on managerial and organizational effects of the IS (Benbasat et al. 1987; Myers 1997). Hence, it has been suggested that case studies are useful when conducting IS research about personnel’s linkage to IS success and failure since case studies combine different types of data which gives the researcher both objective and subjective insight of how these terms are perceived among the personnel. Furthermore, using case studies also provide the possibility to combine qualitative and quantitative data (Benbasat et al. 1987) which is important in IS research in order to gain both statistical data about the relation between the individuals and the IS but also to gain data about how the individuals apprehend their relation to the IS. The combined data is valuable since it provides researchers with extensive insight of the situation; thus, enabling a more detailed analysis of the situation (Kaplan and Duchon 1988).

3.1 THE OBJECT SELECTION

The object we chose to study was a smaller unit that is a part of a big public organization with the main responsibility for healthcare in their region. Through a contact we gained knowledge about the unit and its IS which led to that we contacted the manager of the unit and asked for permission to use the unit in our study. We found this unit interesting to study since they have a well established IS that has been used since 2008; hence, people in the unit are familiar with the IS. The unit’s familiarity with the IS reduced the risk for possible deviations in the findings which otherwise could have occurred if the IS would have been implemented recently. Another reason why we found this unit interesting to study was because there is a system administrator hired in the unit that has the main responsibility for the IS and has been working in the unit since the IS was put in practice four years ago. Moreover the unit has two system assistants that work as a link between the system administrator and the unit’s users. The reason why we chose to only look at this unit was because we believed that we could provide new insight into how system administrators’ can affect the IS success dimensions after the system has been implemented, which could be useful for future research.
The chosen system administrator had been working within the unit for five years. This meant that the system administrator had good knowledge about the unit’s IS and therefore was able to give us a detailed view of the work with the IS. We believed that by also including the two system assistants we could better map how the responsibilities between the system assistants and the system administrator were divided in relation to the unit’s IS users. Additionally, the unit’s IS users were included because they were the only ones that could provide us with an understanding of which components of the IS quality dimensions that were successful and which were not. This provided us with a greater opportunity to map what affect the system administrator had on the IS quality dimensions. We chose to include all of the unit’s 60 IS users in our research since we wanted to gain as many opinions as possible.

3.2 DATA COLLECTION

Our data was collected through three interviews, with the system administrator and the two system assistants, and through a questionnaire that was distributed to the users of the units IS, hereafter referred to as System X. We gained 42 answers on the questionnaire which gave us a response rate of 70 percent which is good since 30 percent is a reasonable response rate when questionnaires are distributed to the respondents through organizations’ intranet (Saunders et al. 2009).

3.2.1 Interviews

The aim of the interviews was to get a better understanding of the IS but most importantly to gain knowledge of how the system administrator could affect the different components of the three quality dimensions presented by DeLone and McLean. The reason why we did not ask the system administrator and the system assistants about use and user satisfaction is because these dimensions can only be perceived by the users (DeLone and McLean 2003). According to Yin (2009) interviews can be seen as one of the most important sources of information in a case study. We chose to do semi-structured face-to-face interviews with both the system administrator and the two system assistants. Semi-structured interviews are described by Saunders et al. (2009) as interviews where the researcher has a list of questions to be covered. However, it is seen as non-standardized allowing the researcher to add our leave out questions if necessary and it also provide the researcher with the possibility to restructure the order of the questions to keep the flow in the interview (Saunders et al. 2009). Using a semi-structured interview provided us with the possibility to ask follow-up questions in order to clarify
answers from the interviewees, but also to rearrange the order of the questions when necessary.

The interview questions for the interview with the system administrator were divided into three different parts (Appendix A). The first part of the interview focused on the IS and the basic construct of it in order for us to get a better understanding of the system and its actual purpose. The second part of the interview focused on the general role of the system administrator. The third part of the interview consisted of questions that were directly related to the quality dimensions in the DeLone and McLean model in order to find out what possibilities the system administrator had to affect these. After collecting the answers of the questionnaire we did a follow-up interview with the system administrator. This second interview aimed at getting the system administrator’s opinion about the results but most importantly to get a clearer view of which quality components the system administrator could affect.

In the interview with the two system assistants our main focus was to capture how they as main support providers for the users interacted and communicated with the users and how their collaboration with the system administrator was. We chose to do one interview with both of the system assistants together because they worked very close and because they were responsible for the support provided to users in different sectors. We believed that by interviewing them at the same time it would be easier to distinguish differences between the support work at the different sectors. In order to avoid inhibited responses from the system assistants as a consequence of interviewing them at the same time (Saunders et al. 2009), we mostly focused on questions regarding the division of labor between the system assistants’ and the system administrator, and how the system assistants interacted with the users. The interview with the two system assistants was divided into three separate parts (Appendix B). The first part focused on the system assistants and their main functions. The purpose of the second part was to get a better understanding of the relationship between the system assistants and the system administrator, and the third part of the interview focused on the system assistants’ relationship with the users.

The nature of the questions in a semi-structured interview makes it appropriate to use audio-recorder and note taking to capture a full record of the interview (Saunders et al. 2009). Yin (2009) claims that in comparison to other methods audio-recording provides the most accurate rendition of an interview. We chose to use an audio-recorder during the interviews to
be able to be more active during the interviews; we also made notes when we felt it was necessary.

3.2.2 Questionnaire
The aim of the questionnaire was to capture the users’ perceptions of the five success dimensions (excluding net benefits). Each one of the success dimensions was measured by one or several components that have been used in previous research. According to Saunders et al. (2009) adopting or adapting questions used by other researchers makes it possible to compare results but most importantly it provides reliability.

The questionnaire together with a cover letter was distributed to the users by email through the managers of each sector. The reason why we could not distribute the questionnaire to the users ourselves was because there was no available list of users. To collect this information would have been too time consuming given the time we had, hence we choose to let the sector managers distribute the questionnaire. The questionnaire was tested before it was sent out to make sure that the respondent would be able to understand and answer the questions. First we discussed the questionnaire with the system administrator and made some adjustments and then it was tested on two persons working in the organization with knowledge about the system.

The questionnaire consisted of 15 questions (Appendix C) and after each question respondents were given a chance to add comments. We chose to formulate questions 2-15 into statements asking the respondents to give their answer on a five-point Likert scale. Likert scales are often used to capture respondent’s opinion towards a statement or series of statements (Saunders et al. 2009). The five-point rating scale ranged from strongly disagrees to strongly agree. In question 1 Likert scale was not used, instead other answers were available as will be explained below.

The questionnaire started with a question related to IS use based on the study by Rai et al. (2002). The users were asked to respond to the question are you dependent on System X in order to execute your work. In this question users could only answer yes or no which gave us an opportunity to find out whether the use was voluntary or not.

The assessment of information quality was made through the use of the five components proposed by Bharati and Chaudhury (2004) namely; information accuracy, completeness, timeliness, format, and relevancy. Several researchers have used these five components to
To assess information quality (e.g. Bailey and Pearson 1983; Doll and Torkzadeh 1988; Rai et al. 2002; Al-adailhe 2009). To measure information quality we used the following statements:

- **Accuracy** - *The information in System X is accurate*
- **Completeness** - *System X provide sufficient information*
- **Timeliness** - *The information in System X is up-to-date*
- **Format** - *The information in System X is presented in a clear way*
- **Relevancy** - *System X provide me with the information that I need to do my job*

To evaluate the **system quality** we used two components used by Rivard et al. (1997) namely ease of use and ease of learning. Using ease of use and ease of learning to assess system quality has been argued by several researchers (e.g. Doll and Torkzadeh 1988; Seddon 1997; Bharati and Chaudhury 2004; Petter et al. 2008). Since system flexibility is an attribute of the system rather then something that users can assess we did not include any question related to this component in the questionnaire. To measure system quality we used the following statements:

- **Ease of use** – *System X is easy to use*
- **Ease of learning** – *System X is easy to learn*

To measure **service quality** we chose to combine measures from two separate studies. We selected two components suggested by Li (1997) namely users understanding of the system and training provided to users. These components have also been used by other researchers to assess service quality (e.g. Bailey and Pearson 1983; Ives et al. 1983; Magal 1991). We also selected four measures from the study by Pitt et al. (1995) related to reliability, responsiveness, assurance, and empathy. Using these measures has been supported by several researchers (e.g. Parasuraman et al. 1988; Van Dyke et al. 1997; Jiang et al. 2002). In the original study Pitt et al. (1995) used several question to each category; however, because the questionnaire would have been too extensive otherwise we chose to include only one question from each category. To measure service quality we used the following statements:

- **Understanding** - *I have sufficient understanding about System X*
- **Training** - *I have gained enough training on how to operate System X*
- **Reliability** – *If the Service Support promises to do something by a certain time they will*
- **Responsiveness** - *The Service Support provide prompt service*
- **Assurance** - *The Service Support has adequate knowledge to help me if I experience any problems with System X*
- **Empathy** – *The Service Support understands my needs*
To assess user satisfaction we used the question proposed by Rai et al. (2002). Users were asked to respond to whether they agreed with the following statement *I am generally satisfied with System X*.

3.2.3 Data analysis
After the interviews had been conducted we transcribed the recorded data since we did not want to miss out on anything of the reasoning in the interviews, the transcriptions can be found in Appendix D-F. To make it easier for the reader the references to the interviews were coded, the first and second interview with the system administrators is referred to as SAd1 and SAd2, and the interview with the system assistants is referred to as SAs. After the interviews were transcribed we looked for expressions, statements, etc. and categorized this information in accordance to the different components of the three quality dimensions showed in Figure 2.3.

Since the questionnaire was already categorized into the different components in the different quality dimensions we did not have to categorize it afterwards. We chose to calculate the mean for each component and also one overall mean for each of the three quality dimensions. Since we used a five-point Likert scale 3 is the midpoint meaning that mean values under 3 indicate a negative perception of the component and mean values over 3 indicate a positive perception. The reason why we used these measures was because we just wanted the users´ perception about the system and we believed that these measures gave us enough indications of the users’ perceptions.

3.3 Ethical Considerations
We chose to treat the unit, respondents, and interviewees anonymously since this was the wish of the unit’s manager. The reason for why the unit wanted to be treated anonymously was that the IS the unit utilize has unique design characteristics that are property protected by the system vendor. So if we for example asked the system administrator about the affect they had on improving the system quality we might have gained information about some design characteristics of the IS and therefore we agreed with the unit that all information that we got should be treated anonymously.
4 EMPIRICAL FINDINGS

The results are based on the three interviews with the system administrator and the two system assistants, and the results of the questionnaire answered by the users of System X. Users’ comments in the questionnaire can be found in Appendix G and the underlying results leading to the classification of the components in tables 4.1-4.4 can be found in Appendix H.

4.1 THE SYSTEM

The unit’s IS, referred to as System X, was implemented in the fall of 2008. The system is utilized for administering information about products in storage activities, order placements, purchases and technical maintenance activities. It also provides the unit with statistics and forecasts which is important in the decision making (SAd1).

An external system vendor is the owner of the system and they are also responsible for making all the adjustments in System X. The system administrator has no possibilities to change anything within the system. If the unit want anything added to the system the system administrator has to write a specification of what they want and then the system vendor provide them with an offer of what it would cost to get this adjustment or wait and see if the desired adjustment is included in the next release provided by the system vendor for free. The system is used by the majority of Swedish county councils and since they all use the same version of the system changes in the system affects all of them. Hence, many opinions need to be considered before changes are done which makes the rate of change in the system very slow (SAd1; SAd2).

4.2 THE SUPPORT UNIT

The unit’s IS users are supported by an internal support unit that consists of the system administrator and the two system assistants. The support unit provides support to users; perform system maintenance, troubleshooting, and availability analysis. While the system assistants have the main responsibility for the direct contact with users supporting them with minor problems like creating product numbers or replacing forgotten or expired passwords, the system administrator is responsible for the technical issues. According to the system assistants all of the members of the support unit are responsible for the support of System X, and they try to help each other out as much as they can within the support unit (SAs).
When users encounter problems they contact the support unit by email or phone. All of the members in the support unit have a personal email and phone number where users can contact them. There is also a service phone that is always staffed and a function mailbox that users can email, where all of the members of the support unit have the possibility to answer them in order to provide users with immediate support (SAs).

4.3 THE SYSTEM ADMINISTRATOR
The system administrator has been working in the support unit since 2007 and is employed as both system administrator and logistician but sees the role as system administrator as its primary function. The system administrator was one of the members of the project group when the system was implemented in 2008. The role of the system administrator back then was to gain an understanding about the system before the implementation and prepare users for how they should use the system (SAd1).

The main function of the system administrator is to pursue the contact with the system vendor since there are constantly new adjustments the unit wants to get implemented. The system administrator is also the one who is responsible for error reports to the system vendor if there is something wrong with the system or if there are any problems that they need to discuss. The system administrator claims that its most important function is to have contact with users, trying to get an understanding of the problems that they might have in their daily work and then discuss these issues with the system vendor. When the system vendor publishes new releases of the system it is the system administrator’s job to prepare users for the new applications in the system (SAd1).

4.4 INFORMATION QUALITY
Much of the information in System X is built around the unit’s products and therefore new product numbers must be created daily in System X to meet the demand of users (SAd1; SAs). However, some of the respondents perceive that the creation of new product numbers is sometimes a bit deficient. The information content of the products cannot be permanently changed since this information is downloaded from a central database (SAd1). Some respondents perceive this as a problem since the information regarding the products is not always correct within System X. The system administrator tries to prevent this by contacting the external information vendors that are responsible for uploading the information to the central database and ask them to upload the correct information. After that the system
administrator can run a manual update on System X so the information regarding the content of the product becomes correct (SAd1).

One of the respondents commented that some information should be more accessible, for example if you accidently place an order on a product that has expired. If users try to place an order on an expiring product an error message appears on the screen, however these error codes are rather confusing since the same error code has a wide variety of meanings. The system administrator can do an availability analysis on orders that have been placed in the system in order to detect such faults. After detecting the faults the system administrator email the user that has placed the order to help them correct the mistake by providing them with instructions on how to do it, and hopefully they learn something so it does not happen again (SAd2).

Daily updates are made from several databases to keep the information in the system up to date; the system administrator is responsible to make sure that these are done. Amongst other things the system administrator runs a daily update of the national registrations so that addresses and information about clients is accurate (SAd1).

The format of the information that System X provide is not something that the system administrator can affect directly. The only way that format can be changed is by contacting the system vendor and ask for an adjustment (SAd1). Some of the respondents are rather negative towards the format since many of them think that they need to open several windows in order to find the information they need and that there is generally too much irrelevant information. One way that the system administrator can make sure that users have access to the relevant information is by providing or withdrawing system access. This is a way to make sure that users have access to the information they need in order to do their job (SAd1).

Even though the respondents have commented on some flaws with the information in System X they are overall positive towards the information quality within System X. With the exception of format users were positive towards all of the components of information quality (Table 4.1).

<table>
<thead>
<tr>
<th>Component</th>
<th>Users opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>Positive</td>
</tr>
<tr>
<td>Completeness</td>
<td>Positive</td>
</tr>
<tr>
<td>Timeliness</td>
<td>Positive</td>
</tr>
<tr>
<td>Format</td>
<td>Negative</td>
</tr>
<tr>
<td>Relevancy</td>
<td>Positive</td>
</tr>
<tr>
<td>Information Quality</td>
<td>Positive</td>
</tr>
</tbody>
</table>
4.5 SYSTEM QUALITY

Some respondents perceive that System X is a bit hard to use since they have to click on many windows and tabs before they can reach the information they are searching for. The system administrator cannot do something about this since they have no possibility to make any adjustments to System X. The system administrator explains that System X is a web-based system which is why it includes that many clicks (SAd2). The support unit has created an action list that highlights the issues and problems that the users have with System X. From that action list the system administrator and the management group discusses how the design of System X can be changed and improved in order to make the users’ daily operations and System X more integrated (SAd1).

The system administrator has suggested that the system administrator should spend more time out in the organization visiting users more often to get a better understanding of how users work. The reason for that is that the system administrator thinks that this would provide an opportunity to see what the users’ daily work look like and also what kind of demands this puts on the system. It is very important that the users are very specific about what they want so that the system administrator can transform these wishes into something that the system vendor can comprehend and offer a solution to. The adjustments that the system vendor offers is something that the unit pays for; however, in this situation the system administrator has an important role in discussing with the system vendor trying to convince them that these adjustments should be provided for free because it is necessary adjustments that needs to be done (SAd1).

The respondents commented that the system is not difficult to use as long as it is tasks or functions they use often, but when it comes to doing things they do not do very often it gets difficult to understand. Overall the respondents are negative towards the system quality of System X and they are negative towards both ease of use and ease of learning (Table 4.2). However, the system administrator comments that the users should put some effort in adapting their way of working to how System X works since the system administrator believe that there does not exist any IS that can be totally designed in line with all of the users individual needs (SAd1).

<table>
<thead>
<tr>
<th>Table 4.2 Users perception of system quality</th>
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</thead>
<tbody>
<tr>
<td><strong>Component</strong></td>
</tr>
<tr>
<td>Ease of use</td>
</tr>
<tr>
<td>Ease of learning</td>
</tr>
<tr>
<td>System Quality</td>
</tr>
</tbody>
</table>
4.6 SERVICE QUALITY

When it comes to educating users on how to use System X education should be provided to users out at the different sections in the unit; however, according to the system administrator the education provided to users is almost non-existent (SAd1; SAd2). Together with an IT-pedagogue the system administrator has developed instruction manuals on how to use and navigate in System X which are available through the intranet (SAd1). Some respondents think that these instruction manuals are outdated at the moment. Therefore, the system administrator believes that the system administrator and the IT-pedagogue need to review the instruction manuals more often since System X has a couple of new releases every year and in these new releases new functions can appear which makes the old instructions outdated. The system administrator also thinks that users have a responsibility to alert the support unit if they detect that a manual is outdated (SAd2).

Some respondents have a problem to understand the whole process in System X. The system administrator believes that this lack of understanding is because users work under time pressure and therefore mostly focus on their own tasks. The effect of this is that the users do not have the time to really understand how they influence the process flow for the rest of the organization. It is suggested by the system administrator that users should be provided with education about the flow in System X so they fully grasp the whole process of the system which would provide them with a better understanding about the system (SAd2).

Some respondents think that changes and improvements of System X are slow and one of the respondents commented that he/she always gets told that adjustments are costly and that several interests have to be taken into consideration before any adjustments can be made. The system administrator explains that adjustments of the system are highly dependent on the system vendor and on what kind of issues it is, this is something the system administrator believes that the users need to be better informed about. As the system administrator puts it “Their [the users] knowledge is only poor because we fail to inform them” (SAd2). The system assistants think that users are not aware of which limitations the support unit has when it comes to fixing issues within the system (SAs). The respondents commented that the support unit possess good knowledge and is really helpful however, a couple of respondents stated that they are unfamiliar with the system administrator.

The system assistants do not feel that they handle complex issues, instead they believe that when users experience more complex issues they contact the system administrator
directly without consulting the system assistants first (SAs). This idea is supported by the system administrator who states that “[...] sometimes they [the users prefer to contact me directly because they know that I can fix things rather quickly [...]” (SAd1).

Even though the support unit is rather dependent on the system vendor the users are generally positive about the service provided. Users have rated all of the components of service quality as positive, resulting in a positive overall score for system quality (Table 4.3).

4.7 USE AND USER SATISFACTION

When asked how dependent users where on the system 41 of the 42 respondents answered that they are dependent on System X in order to execute their work while only one of the respondents claimed that they are not (Appendix H).

User satisfaction amongst users was assessed by one overall question asking users about their overall satisfaction with the IS. The users of System X rated their user satisfaction as negative (Table 4.4).

<table>
<thead>
<tr>
<th>Table 4.3 Users perception of service quality</th>
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</thead>
<tbody>
<tr>
<td><strong>Component</strong></td>
</tr>
<tr>
<td>Understanding</td>
</tr>
<tr>
<td>Training</td>
</tr>
<tr>
<td>Reliability</td>
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<tr>
<td>Responsiveness</td>
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<td>Assurance</td>
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<tr>
<td>Empathy</td>
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<tr>
<td><strong>Service Quality</strong></td>
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<table>
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<tr>
<th>Table 4.4 Users satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Component</strong></td>
</tr>
<tr>
<td>User satisfaction</td>
</tr>
</tbody>
</table>
5 ANALYSIS

5.1 INFORMATION QUALITY

Our first proposition was that system administrators can affect IS success through information quality if they are able to affect the accuracy, completeness, relevancy, timeliness, or format of the information.

We found that the system administrator had the ability to affect accuracy through the availability analysis where faults on the orders placed in the system are detected. The effect of the system administrator’s actions is that faults are detected earlier and corrections can be made so that orders are delivered faster and clients can get their products quicker. Considering that customer satisfaction has been established as one of the most important net benefits of using IS (e.g. Torkzadeh and Doll 1999) it could be argued that the system administrator through the affect on accuracy also enhance the net benefits of using the system from a customer point of view. However, the involvement by the system administrator in correcting the IS users mistakes could possibly harm the users satisfaction since users feel controlled by the system administrator or they might get the feeling that the system administrator sees them as incompetent not being able to do their job properly. This is in line with Magal’s (1991) thoughts that if users are less dependent on the support unit they will have greater user satisfaction. Another possible effect might be that users expect the system administrator to correct eventual mistakes and therefore do not put in the effort to avoid making the same mistakes again which could potentially have a negative effect on the accuracy of the information.

The completeness of the information is something that the system administrator can affect by adding product numbers; although, the system assistants are mainly responsible for this. By adding product numbers the support unit makes sure that the users have all products available in order to perform their job. The completeness of the information is important in order for users to provide clients with the products they need, if they are not accessible in the system no orders can be placed until the support unit has added the product since this is not something that users can do themselves. This makes users very dependent on the support unit which might have a negative impact on user satisfaction.

The case shows that the system administrator can affect information relevancy by providing or withdrawing users’ system access so users have access to the right information in
accordance to their job description. However, some users perceived that the system contains a lot of irrelevant information which could be an effect of that System X is used for several different activities and therefore needs to contain a large amount of information. Hence, it could be argued that successful relevancy is more than just creating information access for the users in accordance to their job description; successful relevancy is about creating personalized information to every single user, otherwise the users will not perceive the information as relevant which will have a negative impact on user satisfaction. This idea does not support Bailey and Pearson (1983) and Rai et al. (2002) definition of successful relevancy, they claimed that successful relevancy is achieved when the information is in line with the general needs or requirements of the users.

In contrast to previous research (e.g. Lynch 1984; McLean et al. 1993; Benander et al. 2000) our findings show that the system administrator does not have to possess organizational knowledge in order to improve the accuracy, completeness, and relevancy of the information that the system produce. Instead these improvements are based on the system administrator’s system knowledge, and the organizational knowledge needed to improve the components is embedded in the system. This could be an indication that systems that are provided by an external system vendor are already adopted to organizational needs to the extent that the system administrator only need to possess system knowledge to affect the accuracy, completeness, and relevancy of the information the system provides. To develop IS internally within an organization demand organizational knowledge amongst system administrators in order to build a system that meets the organizational needs. Hence, it would be fair to argue that the knowledge system administrators need to possess to be able to affect the accuracy, completeness, and relevancy of the information the system provide, is highly dependent on what kind of system it is.

The case shows that the system administrator can affect the timeliness of the information by running daily updates of the system. By doing these updates the system administrator ensures that the information in the system is always updated. However, the system administrator cannot ensure that the updated information is accurate since it is downloaded from a central database. This means that the timeliness of the information is almost irrelevant if the information in the updates have deficient accuracy, since inaccurate information is of no use to the users which in turn have a negative impact on user satisfaction.

The findings show that the system administrator is not able to affect the format of the information. Furthermore, the questionnaire showed that the users were negative towards the
format of the information that System X provides. This could lead to a conflict between the users and the system administrator, where users might blame poor performance caused by ambiguous information on the system administrator since users perceive that the system administrator is responsible for the format of the information in the system. This case indicates that the format of the information is an important component for the system administrator to affect in order to create satisfaction amongst users. This supports the idea, previously presented by researchers, that the information in IS need to be presented in a way that makes it easy for users to understand (e.g. Bailey and Pearson 1983; Doll and Torkzadeh 1988).

5.2 SYSTEM QUALITY

Our second proposition was that system administrators can affect IS success through system quality if they are able to affect the ease of use, ease of learning, or flexibility of the IS.

The findings show that the system is flexible and can be adapted to changing needs; however, the system administrator can only affect the adjustments of the system indirectly through the contact with the system vendor. Due to the lack of possibility to make any adjustments to the system the system administrator also has limited possibilities to affect the ease of use and ease of learning of the system. The underlying conditions to bring about changes in the system make the change process very slow. If users feel that changes are slow the risk is that they feel that it does not pay off to make complaints or put forward new ideas for alterations to the system. According to Haber et al. (2011) it is important that the system administrator and the IS users create a common understanding of the system so they can exchange knowledge and thereby improve the IS. Hence, if users stop providing the system administrator with insight there will be no exchange of knowledge. This will make it hard for the system administrator to bring forth suitable adjustments to the system vendor that meets users’ needs and improves the conditions for IS use amongst users.

Apart from effecting use and user satisfaction the three quality dimensions are also interdependent; hence, also affecting each other (e.g. DeLone and McLean 2003) this means that there could be other ways for the system administrator to affect system quality. In this case it is not about raising perceived system quality but rather trying to soften down the negative aspects of the system. It has been suggested that system administrators today should strive to make IS easier to use to avoid conflicts with users (e.g. Haber et al. 2011). Others have claimed that system administrators should focus less on developing the IS and instead
put their effort on educating and explaining the existing system for users (e.g. Burgess 2011). In an IS like System X where adjustments to the system are restricted to an external system vendor the system administrator has very limited possibilities to affect users perceived ease of use and ease of learning. Furthermore, the organization gets very dependent on the system vendor. By enhancing users’ system knowledge and understanding regarding the existing version of the system the system administrators could lessen the organizations dependency on the system vendor. This is even more important when the range of suitable systems is very limited since organizations become even more dependent on the system vendors. Through training and providing users with understanding the system administrator could increase users’ ease of use and ease of learning despite their limited possibilities to affect system quality.

5.3 SERVICE QUALITY

Our third proposition was that System administrators can affect IS success through service quality if they are able to provide users with understanding, training, reliability, responsiveness, assurance, or empathy.

The case shows that the system administrator can affect users training and understanding by providing them with computer based instruction manuals on how to use System X. However, a possible negative effect of that users are provided with training and understanding only through these manuals could be that users only learn and understand tasks they perform frequently because nobody provides them with an overall picture on how the system should be used. The case reveals that some users actually have difficulties performing tasks they do not do very often. This indicates that the system administrator probably have to be more involved in educating users helping them to get a better understanding of the system as a whole. This is in line with Schewe (1976), McLean et al. (1993) and Burgess (2011) who state that system administrators are important in the training process of users in order to create a better understanding of the system amongst the users.

The system administrator can affect the reliability of the support service by helping the system assistants to provide users with support. However, in this case the system administrator rarely has immediate contact with users regarding support issues. Hence, the system administrator is only able to affect the reliability if the system administrator is both aware of users’ expectations and what they have been promised by the system assistants when the system administrator takes over support issues from the system assistants. This means that
the system administrator faces several commitments that have to be considered in order to avoid dissatisfaction amongst users, which supports Lear’s (2011) arguments regarding system administrators’ important role in following through on commitments. However, in this case the condition for successful reliability is dependent on the communication between the system administrator and the system assistants.

The case shows that the system administrator can affect responsiveness since the system administrator together with the system assistants sometimes help users to fix smaller issues in System X. However, because of the limitations to make alteration in the system the key issue in this organization is that users must be aware of the support unit’s limitations so they have reasonable expectations on the support unit’s responsiveness. The effect of these limitations is that the responsiveness of the support unit is sometimes dependent on the system vendor which might lead to that users perceive the responsiveness as very irregular depending on what kind of issues they have. Therefore the system administrator and the support unit can only create successful responsiveness if users are aware of the limitations of the system and have reasonable expectations.

The system administrator can affect assurance since the system administrator possesses lots of system knowledge. However, since the system assistants are the ones that have most contact with the users it might lead to that the system administrator’s knowledge is not recognized. The findings from the questionnaire revealed that some of the users had never been in contact with the system administrator. This could imply that if the system administrator would try to strengthen the assurance towards users it could possibly undermine the knowledge of the system assistants since users might prefer to talk directly to the system administrator. Since the system assistants are the ones who take care of the daily routines it is better that the focus is on strengthening their assurance towards the users.

The findings show that the system administrator can affect empathy by spending more time out in the organization interacting with the users in their working environment to get a better understanding of the users’ needs. However, some users claimed that they did not even know who the system administrator was. Consequently, it could be argued that these users needs have probably not been taken into consideration by the system administrator. The system has been used since 2008 and the system administrator’s time spent out in the organization interacting with users has up until now has been rather limited.

The case also shows that one of the main functions of the system administrator is to recognize users’ needs and then discuss these issues with the system vendor. This means that
the system administrator in this case is more or less obliged to collaborate with the users in order to improve the system, which supports Haber et al. (2011) idea that system administrators should exchange knowledge with users in order to improve the IS.

5.4 THE INTERRELATEDNESS OF THE QUALITY DIMENSIONS

The three quality dimensions information quality, system quality, and service quality both independently and jointly affect use and user satisfaction since they are interrelated (DeLone and McLean 2003; Petter et al. 2008). As we have seen the system administrator can affect information quality, system quality and service quality in different ways and this affect might also improve use and user satisfaction in some situations. However, the effect of a positive impact on one quality dimensions might be overweighed by a negative perception on one of the other quality dimensions.

The use of System X can be seen as mandatory for users since 41 of 42 users are dependent on System X to execute their work; hence, use is not a valuable measure for the impact of the quality dimensions. The results of the questionnaire showed that users were dissatisfied with the use of the IS. This can be an effect of the fact that the system administrator has very limited possibilities to affect system quality. Looking at the overall scores of the three quality dimensions the users were positive to both information quality and service quality while users were negative towards system quality. This could be an indication that organizations cannot only focus on achieving high scores on one or two of the quality dimensions and think that users will be satisfied overall but that it is necessary to pay attention to all three quality dimensions. This could potentially lead to problems when one or two of the quality dimensions falls under the control of an external partner, in this case that the system quality is dependent on the external system vendor. Another possibility could be that the unit providing users with support is outsourced. This is something that needs to be taken into consideration when investing in an IS.
6 CONCLUSION

The aim of this thesis was to identify system administrators’ affect on the IS success dimensions after the system has been implemented and provide an answer to the research question *How can system administrators affect IS success after the system has been implemented?* Our answer is based on an analysis of empirical findings from a single case study where we identified the system administrator’s affect on the quality dimensions proposed by DeLone and McLean (2003). The results of our study presented the following answers:

First of all we can conclude that the system administrator can affect IS success through the quality dimensions in the implemented system both directly and indirectly. The reason for that is because IS success is highly dependent on the structure of the support unit and also the owner structure of the system, since this determines the system administrator’s possibilities and limitations. It is also important to remember that since it is the three quality dimensions that constitute the foundations for use and user satisfaction all of the dimensions require equal attention to achieve a successful IS.

Looking at the system administrator’s affect on the quality of the information two types of affects can be distinguished. The system administrator’s affect on relevancy and on format of the information affect the users’ use and user satisfaction with the IS. In contrast the system administrator’s affect on the accuracy, completeness, and timeliness of the information affect the service provided to clients. This mean that the system administrator can affect IS success through information quality by either enhancing users’ use or user satisfaction or by directly improving the outcomes of the use of the system.

The system administrator can only affect system quality if the system administrator manages to pursue a discussion with the external system vendor in order to create improvements in the system. This means that the affect the system administrator has on IS success through system quality is only indirect, which in best case improves use or user satisfaction.

The system administrator has not the main responsibility for the support provided to users except on major technical issues; therefore, the system administrator’s affect on IS success through service quality is very dependent on how the system assistants act towards the users. This means that the system administrator can only indirectly, by supporting the
system assistants in their support work, affect the outcome of the service quality and thereby create satisfaction amongst users.

6.1 IMPLICATIONS

The findings showed that the system administrator’s affect on IS success was mostly dependent on an external partner and the structure of the support unit. For example the system’s design could only be changed by the external system vendor and therefore the adaption of the system to organizational needs became slow. Moreover, the system administrator had to rely on how the system assistants acted towards the users in the support in order to achieve better outcomes of the service quality. The practical lesson that can be learned from these findings is that system administrators that work with IS under similar conditions can be inhibited by the dependency on external system vendors. These limitations impact the system administrator possibilities to affect the creation of user satisfaction but also to ease the use of the system. Furthermore, when the system administrator is not responsible for the main contact with the users of the implemented system the system administrator is only able to affect the outcome of the support when the system administrator communicate with the ones that are in charge of the contact with users, in this case the system assistants.

When it comes to the limited research that has been done on what system administrators actually can do after the system has been implemented to affect IS success our findings fill this gap by showing that the system administrator very rarely can do the things previous literature suggests that system administrator should be able to do. Instead our study showed that a system administrator that works with an already implemented IS has to deal with more partners than just the users of the IS in order to create satisfaction among them and thereby being able to affect IS success.

More research must be carried out to identify how system administrators can affect IS success on implemented IS and since this case showed that the system administrator’s affect on IS success was mostly dependent on an external partner it would be interesting to do a study on a system administrator that controls the IS internally. These findings could then be compared with our findings and provide insight into what similarities and differences there are in how system administrators can affect IS success on implemented IS that are either externally or internally controlled.

Furthermore, because of the importance of the structure of the support unit it would be interesting to distinguish how different structures of the support unit affect the system
administrators’ possibilities to affect IS success, since the support unit’s structure highly affects the system administrator’s relationship to IS users.

6.2 LIMITATIONS

One limitation with this study is that it cannot be definitely concluded if the system administrator’s affect on the quality dimensions actually affects the last component of the DeLone and McLean IS success model, net benefit. Hence, it is hard to determine if the system administrator’s affect fully leads to IS success or not. However, this study has provided insight into how a system administrator can affect the quality dimensions in IS success, and since net benefit are achieved via the quality dimensions this study provides valuable insight into how system administrators can affect IS success.

A second limitation with this study is that we have only looked at one system administrator and its work. This means that the result from this case study could be very case specific and limited to the conditions that this specific system administrator has. However, since there have been limited research on this topic this study provides valuable insight on system administrators role in an implemented IS and can be used as a valuable foundation for future research.
REFERENCES


APPENDIX

APPENDIX A – Interview schedule system administrator

The information system
When did you implement the system?
What is the purpose of the system?
How many users are there?
Are there different kinds of users?

The role of the system administrator
What does the structure of the support unit look like?
What is your role?
Which are your main tasks?
What do you consider to be your most important tasks as a system administrator?
Are there any tasks today that you feel that you should not have?
Where you involved when the system was implemented?

Information Quality
- What possibilities do you have to effect the information in System X?
- What possibilities do you have to effect how the information in System X is presented?

System Quality
- What possibilities do you have to modify System X to new requirements, conditions, or circumstances?
- Was user friendliness something that was considered during the procurement process?

Service Quality
- Users education:
  o When the system was first implemented who was responsible for educating users?
  o Who educates new employees?
  o Are you involved in the users’ education?
- Are there any regulations on how you should act when you get contacted by a user?
- Does the vendor perform any maintenance on System X?
Intervju schema system förvaltare

Informationssystemet
Hur länge har ni använt systemet?
Vad används systemet till?
Hur många användare finns det?
Finns det olika typer av användare?

Systemförvaltarens roll
Hur är Service Supporten uppbyggd?
Vilken är din roll?
Vilka är dina huvudsakliga uppgifter?
Vad anser du är dina viktigaste uppgifter som systemförvaltare?
Finns det några uppgifter som du har idag som du anser att du inte borde ha?
Var du med när systemet implementerades?

Informations kvalite
- Vad har ni för möjlighet att påverka informationen i System X?
- Vad har ni för möjlighet att påverka hur informationen i System X presenteras?

System kvalite
- Har ni möjlighet att modifiera System X vid nya krav, förutsättningar eller omständigheter
- Var användarvänligheten något som togs i akt då systemet köptes in?

Service kvalite
- Utbildning av anställda:
  o När systemet först implementerades vem skötte utbildningen av personalen?
  o Vem sköter utbildningen för nyanställda?
  o Är ni involverade i utbildning av användarna?
- Finns det några bestämmelser för hur man går till väga när användarna kontaktar er?
- Utför systemleverantören något underhåll på System X?
APPENDIX B – Interview schedule system assistants

The role of system assistants
Which are your main tasks?

System assistants relationship with the system administrator
What does your relationship with the system administrator look like?

System assistants relationship with users
Are there any particular rules on how you should proceed when users contact you?
What knowledge do you feel that the users have about what you can do/cant do with the system?
What do you think is the users perception of you and your work?
What do you think is the users overall opinion about the system?

Intervju schema system assistenter

System assistenterna roll
Vilka är era huvudsakliga uppgifter?

Förhållandet mellan system assistenterna och systemförvaltaren
Hur ser förhållandet ut mellan er och system förvaltaren?

Förhållandet mellan system assistenterna och användarna
Finns det något speciellt tillvägagångssätt hur ni skall gå till väga när användarna hör av sig till er?
Hur god uppfattning tror ni att användarna har om vad ni kan/inte kan göra med systemet?
Vad tror ni att användarna har för uppfattning om er och ert arbete?
Vad tror ni att användarna tycker om systemet generellt sett?
APPENDIX C – Questionnaire

1. Are you dependent on System X in order to execute your work?
   - Yes
   - No

2. The information in System X is accurate
   Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree
   1 2 3 4 5

3. System X provides sufficient information
   Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree
   1 2 3 4 5

4. The information in System X is up-to-date
   Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree
   1 2 3 4 5

5. The information in System X is presented in a clear way
   Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree
   1 2 3 4 5

6. System X provides me with the information that I need to do my job
   Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree
   1 2 3 4 5

7. System X is easy to use
   Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree
   1 2 3 4 5

8. System X is easy to learn
   Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree
   1 2 3 4 5

9. I have sufficient understanding about System X
   Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree
   1 2 3 4 5

10. I have gained enough training on how to operate System X
    Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree
    1 2 3 4 5
11. If the Service Support promises to do something by a certain time they will

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12. The Service Support provide prompt service

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13. The Service Support has adequate knowledge to help me if I experience any problems with System X

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14. The Service Support understands my needs

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15. I am generally satisfied with System X

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Enkät

1. Är du beroende av System X för att kunna utföra ditt arbete?
   - Ja
   - Nej

2. Informationen i System X är korrekt
   Instämmer inte alls   Instämmer inte   Varken eller/Ingen åsikt   Instämmer delvis   Instämmer helt
   1                        2                        3                        4                        5

3. Informationen i System X är tillräckligt omfattande
   Instämmer inte alls   Instämmer inte   Varken eller/Ingen åsikt   Instämmer delvis   Instämmer helt
   1                        2                        3                        4                        5

4. Informationen i System X är aktuell
   Instämmer inte alls   Instämmer inte   Varken eller/Ingen åsikt   Instämmer delvis   Instämmer helt
   1                        2                        3                        4                        5

5. Informationen i System X presenteras på ett tydligt sätt
   Instämmer inte alls   Instämmer inte   Varken eller/Ingen åsikt   Instämmer delvis   Instämmer helt
   1                        2                        3                        4                        5

6. System X innehåller den informationen jag behöver för att kunna utföra mitt arbete
   Instämmer inte alls   Instämmer inte   Varken eller/Ingen åsikt   Instämmer delvis   Instämmer helt
   1                        2                        3                        4                        5

7. System X är enkelt att använda
   Instämmer inte alls   Instämmer inte   Varken eller/Ingen åsikt   Instämmer delvis   Instämmer helt
   1                        2                        3                        4                        5

8. System X är enkelt att lära sig
   Instämmer inte alls   Instämmer inte   Varken eller/Ingen åsikt   Instämmer delvis   Instämmer helt
   1                        2                        3                        4                        5

9. Jag har en god förståelse för hur System X fungerar
   Instämmer inte alls   Instämmer inte   Varken eller/Ingen åsikt   Instämmer delvis   Instämmer helt
   1                        2                        3                        4                        5

10. Jag har fått tillräckligt med utbildning i hur System X fungerar
    Instämmer inte alls   Instämmer inte   Varken eller/Ingen åsikt   Instämmer delvis   Instämmer helt
     1                        2                        3                        4                        5

11. Om Service Supporten lovar att göra något inom en viss tid så gör de det
    Instämmer inte alls   Instämmer inte   Varken eller/Ingen åsikt   Instämmer delvis   Instämmer helt
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12. Service Supporten ger omedelbar service

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13. Service Supporten har tillräckligt med kunskap för att hjälpa mig om jag har problem med System X

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14. Service Supporten har förståelse för mina behov

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15. Generellt sett är jag nöjd med hur System X fungerar

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APPENDIX D – Interview system administrator 2012-03-21 (SAd1)

Andreas: So, we will start off with some background questions, for how long have you been using the system?
System administrator: Since September, September 1st 2008.
Andreas: Did you work here when…
System administrator: Yes I participated in the implementation and was a member of the project group so I had very early access to the trial version of the system not the real system but a trial version and everything is so much easier if you have all of your things in place to try it out so already at that point we were a little behind but with all the conversions and decision about how much that should be converted that was not on me but on the management team.
Andreas: Exactly what was your task in the project group, what was your focus so to say?
System administrator: I was supposed to get an understanding of how the system worked and then try to prepare the users and how they should think in the different views and how they should make order placements and so on.
Andreas: So you should understand the technical part.
System administrator: Yes.
Andreas: And then you should transmit this to the users.
System administrator: Yes yes exactly like that.
Sara: Did the system vendor make any adjustments for you?
System administrator: Yes yes. At that point in time, well the first regions in the public sector that used this system implemented it in December 2007 and that was the first release. And when we started to use the system that was the third release of the system. For each region implementing the system they had to make adjustments since we work in different ways. So we were early in implementing the system so many parts were not in place but that just how it was.
Sara: Did you make many additional adjustments.
System administrator: Yes some.
Andreas: And then a more general question, what do you use the system for?
System administrator: It is an operational system that is all storage, orders, purchase...what do we have more, activities which basically is technical maintenance and reparations that you register; yes it is essentially those four.
Andreas: How much is it used to making decisions?
System administrator: Well, we can see how much we have in stock and how it is distributed and based on that we make predictions and decisions. So the system itself does not make any decision but it is an invaluable foundation for decision making.
Andreas: How many users are there?
System administrator: For System X there are 60 users and Web-System X which is a simplified version of System X there are almost 400 users so I would say around 450 in total.
Andreas: What is the difference between these two?
System administrator: In Web-System X you cannot make any administrative work so if you have placed an order you cannot change it that has to be done in the main system.
Andreas: In System X?
System administrator: yes exactly that is the administration system.
Andreas: Are there different types of users?
System administrator: Yes, they have different job types. In System X we have technicians that use the system to do their activities, advisers that place orders, assistants that administrate activities, orders, and storage, and then we have the storage stuff.
Andreas: Do they register information or receive information?

System administrator: Both, information is registered through order placement which generate either purchase or a packing slip.

Andreas: What does the structure of the support unit look like, what are the different functions and responsibilities?

System administrator: Well it is a support unit for System X so the daily work consist of providing support to users, system maintenance, troubleshooting, availability analysis, and then there are lots of routines that we have to do.

Andreas: What is an availability analysis?

System administrator: If there is something wrong on an order that have been placed for example if the article has expired or something like that we can check it out.

Andreas: If the users have any problems with the system do they call you or?

System administrator: They contact us either by email or call us, we have a function mailbox and then personal emails and then we have our phones.

Andreas: Is there somebody who has the main responsibility to help them out and solve their problems?

System administrator: Well the function box is monitored by system assistant 1 but that does not necessarily mean that system assistant 1 is the one that solves the problem she can hand it over to someone who can solve it.

Sara: But she is the one who have the most contact with users?

System administrator: Yes and a large part of the support function is to create product numbers and system assistant 1 is the one who does that.

Andreas: So the main task is to make updates?

System administrator: Yes you could say that, and I almost forgot to mention that we also do daily updates of the national registrations since our clients move around and change address so that is something that we have to do every day and routines like that.

Andreas: What is your role?

System administrator: I am employed as a system administrator and logistician but my main role is as system administrator and I take care of the negotiations with the system vendor since there still are adjustments that we want to be made and I am also the contact person towards the system vendor but everyone within this unit have the right to contact them to make error reports or just discuss problems with the system but usually it is me that call the vendor …but not always.

Andreas: So those are your main tasks?

System administrator: Yes exactly.

Andreas: In your role as a system administrator what do you see as your most important functions?

System administrator: Like I have said I think it is to have contact with users and understand their problems in their daily work and then discuss these problems with the system vendor.

Andreas: Is that included in the description of your position…

System administrator: Well no not that detailed but a system administrator is supposed to do this so of course it is a part of my job. Apart from that I have other tasks as well including finance and accounting.

Andreas: Are there any tasks you have today that you feel that you should not have?

System administrator: No, I mean what is service if somebody asks me to create a product number and I see that everyone else is busy then I do it myself.

Andreas: But you should not do it?

System administrator: No not really, but I would.

Andreas: So it depends on the situation?

System administrator: No, I mean you cannot pass around an email, good service is good service and we provide support for different sections and sometimes they prefer to contact me directly because they know that I can fix things rather quickly and if I feel that I have time to do it, I do it.

Andreas: What are your opportunities to affect the information in System X, like adding new articles?
System administrator: Well yes it is a part of our mission within the support unit to update new articles but we do not have the possibility to change the content within the articles because they are downloaded from a central database so if we want something to be changed we have to ask the information vendors and then we import that information into our system. If we do changes without them being done at the information vendors they will disappear the next time we make an update so you have to have a chain where the vendor changes first and then we can do the update.

Andreas: How good are the information vendors to make updates?
System administrator: In general I think they are good.

Andreas: You do not have any possibility to affect how the system is presented in System X?
System administrator: Very limited we can only provide users with higher system access which allows them to see more information, that is what we can but about the information overall there is not that much we can change, only what views they should be able to see in the system.

Sara: To make it easier?
System administrator: You can add personalized shortcuts for functions that you want easy accessible.

Andreas: Is that something that you can help them with?
System administrator: Everyone can do it.

Andreas: Do the users do this themselves or do you help them?
System administrator: Yes they do it themselves.

Andreas: Have there been times when users have contacted you?
System administrator: Yes it happened a couple of times when we implemented the system but not during the last couple of years.

Andreas: Do you have any possibilities to modify System X to new demands, conditions or circumstances?
System administrator: Yes we can but then it is an adjustment and then we have to pay for it.

Andreas: But you cannot do anything by yourself?
System administrator: No we cannot go in and change anything ourselves.

Andreas: When you bought the system was it fully operational?
System administrator: Yes and if there is something we want to add we have to contact the system vendor and provide them with a specification on what we want and then they provide us with an offer of how much it would cost and then we either accept or turn down the offer.

Andreas: Do the users have many requests about adjustments or additions they want?
System administrator: Yes we have a list of desired adjustments or the action list as we call it which is a list of adjustments that would improve the daily work and when the system vendor post new releases some of the things on our list is included and other things we have to pay for but then we get it much faster because we have a deal with the system vendor that if we want an adjustment that we pay for then we should get it within a specific time frame, but then we pay for it.

Andreas: And then you should learn these new functions and then teach the others?
System administrator: Yes I always take the first step and then we have the System X group meetings and in that group there are members from the different job types because I do not know how they do their work so we test the new functions to see how they work and we try to get better at letting the users try it out themselves because I might think that yes this is exactly what we wanted but that is not the users perception because maybe they wanted something else and I do not work with their daily activities I work with mine and it is up to me to take in that this is the information we want we want this view yes and then we get it but maybe it is not like they have expected it to be so you have to be really specific about what you want and then the users need to confirm it and say that yes this is what we want.

Andreas: You said something about a list.
System administrator: Yes, an action list.

Andreas: So the users have the possibility to express their opinions about potential problems?
System administrator: Yes they contact me and then I write it down and then we have a dialogue because they have to be very specific about what they want and I have to formulate that into something that the system vendor
can comprehend and then there are a lot of questions on the way even before we get an offer. But I mean that is the way it is, it is the system vendors system and they have the right to offer us adjustments, and make us pay for it and then it often because a discussion that this is nothing we want to pay for this should be provided for free because it is a necessary adjustment that needs to be done and sometimes it feels like they do not want to acknowledge that it is an adjustment that is required. And they are a private company and want to earn money so that is the way it works.

Andreas: How involved were the users in the procurement process of the new system?

System administrator: Extremely limited, it was more like we are going to change the system, this is the new system, and now you should learn how to use it.

Sara: Was user-friendliness something that was considered during the procurement process?

System administrator: User-friendly to the extent that we trust the system vendor and have tested the system and then there were a couple of other county councils that were using the system already.

Andreas: So you took some references from them.

System administrator: Yes we talked a little and they were very diplomatic stating that well there are still some flaws with the system and sure there were but the system was supposed to be implemented and so it was. So we had two days of training for each person at that point in time.

Andreas: For each person?

System administrator: Yes for those who participated so we tried to include users from each job type one from storage, one who puts orders, and one from activities.

Andreas: Did you also participate?

System administrator: I participated during the storage sessions since I mostly worked with the logistics at that time and it was hard to find time to participate at all sessions.

Andreas: So you were involved in their education?

System administrator: Yes.

Andreas: When the system was implemented who was responsible for educating the users?

System administrator: Me amongst others. At that time we used the managers for the different sectors and educated them into “super users” as we called them for different modules and they were responsible for that part of the system.

Sara: So the majority of the users were educated by?

System administrator: By the “Super users” and me and those who participated.

Andreas: Who is responsible for training new employees?

System administrator: When it comes to System X it is done out at the units, it is nothing that is done here.

Andreas: You do not have any responsibility?

System administrator: No nothing like that but we have set up local instructions that have been formulated by our IT pedagogue and they are very pedagogically designed with things like click here to come there and click there to validate this and things like that.

Andreas: Have you been involved in writing them?

System administrator: No, not writing them but I have been involved in the content but not how it should be structured or anything like that.

Andreas: But you have provided some insight?

System administrator: Yes yes yes I have shared my opinion about some parts.

Andreas: So you are responsible for the system in the whole region and also for educating users?
System administrator: For System X the users are educated out in the units but system assistant 2 and I are responsible for the education of Web-System X and we also make all instructions for that system which is a simplified version of System X that is also less advanced.

Andreas: Do you have any guidelines that you should follow when users contact you that you should provide them with help within a certain time frame or it depends on the situation?

System administrator: Well I think that you should get an answer within a day just telling them that we have received your email and we will come back to you with a solution to the problem since we cannot fix everything because it all depends on the system and it is not possible to make changes just because somebody feels that now I want my print outs here instead of there and I work in one city one day and the other day you are in another city and then you want your prints there but that is not possible if you do not change the settings but then you might forget to change it back and then the print outs will appear in the wrong printer and things like that and then all you can say is that this is how we can solve this for now and then they might say that well that do not work for me and then you have to talk to the system vendor and see if you can fix it.

Andreas: Do you have any rules that some problems have higher priority?

System administrator: Some problems reappear, there are things that are on the action list that we want to be fixed but if you call it problems or something else is only a question of definition.

Andreas: So some have higher priority?

System administrator: Yes well some problems have higher priority at one point and then next time there might be another problem that have high priority then maybe the first problem reappear and it is like that problems comes and goes.

Andreas: What is your role in these situations, to contact the system vendor?

System administrator: Yes and keep a dialogue with the users and tell them that this is not possible and then they throw tomatoes at you.

Andreas: Does the system vendor perform any maintenance on System X?

System administrator: What do you mean by maintenance?

Andreas: Well some kind of updates?

System administrator: Yes they provide us with new releases of the system with new functions.

Andreas: For free?

System administrator: Yes the update itself is free but we have to pay for the labor costs. But it is a part of our deal that they should present new releases and that we shall get access to these for free, except for the labor costs.

Andreas: Do they have to come here to do it?

System administrator: No, they only update the database and the system applications.

Andreas: What is your role when it comes to these updates?

System administrator: They are often done during the night so I only hope that it will work in the morning. My task is to prepare the users about what is going to happen and look through the release notes so I know what they are actually doing and see what is of particular importance for us and if they have included something that we have specifically asked for.

Sara: But the users are never disturbed by these updates.

System administrator: Not if we do it in the evenings, we have requested that all updates should be made after 17.00.

Andreas: Do you demand this?

System administrator: Yes I am the one who schedule the updates with the system vendor so we have a dialogue and then I say that it has to be done after working hours. In the beginning there were several problems with the system and then they released a new update where these problems were fixed and these were done during working hours but that has only happened a couple of times. But then we also have an IT department so sometimes when the disks are full they have to reboot the system but then you try to do it during the lunch and if it is very urgent you have to send out an email because when the system is rebooted the system stops working but that is very rare.

Andreas: But then you have noticed that something is going on?
System administrator: Yes I do as soon as the system starts to run slow or something is not right the users start to email and call me telling me that something is wrong or that something is not working and if several people contact me I just report it to the system vendor.

Andreas: What is your role in relation to the system vendor?

System administrator: Contact person for report of errors.

Andreas: Do you feel that you can make them work faster?

System administrator: As I see it, it is all about relationships and I think that my relationship with them is pretty good and I hope they feel that when I do contact them it is only about urgent matters and I try to stay objective.

Andreas: How much knowledge do you feel that you have when it comes to the integration of the system out in the organization? Are you often out meeting users to see how well it works?

System administrator: I have presented a suggestion that I should spend more time being out in the organization and see how they work because when we meet it is often at big meeting like the System X group meetings and then you have a technician but they are not doing what they normally are doing so I do not have an opportunity to observe anything there so it is a suggestion that a should go out and observe well maybe not observe but just come out and see what are the daily problems of our users. At our last System X group meeting I invited the CEO of the system vendor and their customer manager and I really think that it was a good experience because it is easy to sit and think why does nothing happen and then I try to explain that there are many county councils that use this system and I think that they get a better understanding of the situation.

Andreas: Do you think that the users are satisfied with the system?

System administrator: System X has a bad reputation since it was not totally adjusted to our needs when we implemented it and it is very easy to blame it on the system.

Sara: So you think that those who were working in the organization when System X was implemented were negative about the system even before it was implemented because of the bad reputation?

System administrator: Yes.

Andreas: Do you get any critique because users are dissatisfied with the system?

System administrator: No I do not think so I have even had users saying things like good job and I know you do the best you can but of course there are probably some users that sit and wonder why does nothing happen but like I have said we are dependent on the system vendor.

Sara: How much knowledge do you feel that the users have when it comes to what you can and cannot do when it comes to the system?

System administrator: Well I think that it varies because I feel like some people do understand while other does not. Some people think that I can just change things but I cannot. But one could always get better at testing the different routines and find shortcuts and things like that. But as it is today I feel that the system is very stable and if they just follow the instructions there should not be any problem that is my opinion. But of course we can never exclude that there could be bugs in the system because the system vendor is not that careful about testing things before they release it. Sometimes I get the impression that system vendors focus on the system that they offer private organizations because their activities are much simpler. Within public sector when goods are delivered to users we have to keep track of it we have to make depreciations while the user still have the goods because it is not sold but we do not have it but we still own it. In a private company you usually buy something and then you sell it but the difference for us is that we have to keep track of who have the goods, when did they get it and we are dependent on that kind of information.

Andreas: To which degree does the system facilitate the scrutiny that is so important within the public sector?

System administrator: Well let me put it like this if we purchase a product that we call number one and then we might have fifteen of those in storage if it is a common product. If we then want to give each product an individual label then it will be called product one but then we add a letter or something so it is called one b which makes it totally traceable.

Sara: The persons who handle the product are they also traceable?

System administrator: We can track everything. Who has handled it, who received it at the goods reception, which person has used it, who handled the return, who placed it in the storage, which person have done repair or activities on the product everything can be found so the system allows total traceability.

Sara: So the system is from the beginning intended to be used within the public sector?
System administrator: Yes and even more so towards the specific activities like the ones we have because there are so many products to keep track of and there are no other company on the Swedish market that can provide systems like this one.

Andreas: So you did not have that much choice?

System Administrator: No.

Andreas: Well I think that was all, thank you so much for your time.
APPENDIX E – Interview system assistants 2012-03-22 (SAs)

Andreas: Which are your main tasks?

Sara: I guess you have different ones so maybe we could start with you System assistant 1.

System assistant 1: My main tasks, well I have a mixture because I handle purchase for section 1 and section 2 and then I take care of the file maintenance for section 3. Then I take care of the system support and that could be anything and if you cannot do it yourself you try to find someone who can solve it, and then I monitor the support inbox that we have created.

Sara: You mean the function box?

System assistant 1: Yes exactly, and that is what I try to monitor the most since we started to use the function box with section 3, but soon section 1 and section 2 will also use it.

System assistant 2: Yes and I do file maintenance as well, mostly for section 1 and section 2 and most of the time me and system assistant 1 try to help each other out but system assistant 1 mostly deal with section 3 and I take care of section 1 and section 2.

Sara: So you have divided the tasks between you two?

System assistant 1 and 2: Yes.

System assistant 2: And then the support of course.

Sara: You are also involved in educating users about Web-System X?

System assistant 2: Yes that is what I spend most time with and then there is System X support but that is something we all do.

Andreas: So there is nobody that is particularly responsibility or it depends what problem it is and then you send it to the one that can solve it in the best possible way?

System assistant 2: Yes you do the best you can and then you try to ask around and we help each other out as much as we can within the unit otherwise we have to contact the system vendor and then there are new developments and adjustments done in the system, Web-System X in particular so then you try to contact the users and see if they have any desires and then you try to fix it the best you can.

Sara: When the users contact you do they do it by mail or do they call you or do they use the function box or do they prefer to contact you directly?

System assistant 2: I think that it is mostly emails and phone calls, but mostly emails.

System assistant 1: I think my users are so used to using the function box because since we started it I have tried to answer them from that.

Andreas: Have your users been more introduced to using the function box?

System assistant 1: Yes I have tried to do that because if I am not here well that is what I focus on but of course I answer if somebody sends me an email.

Sara: So you have tried to make them use the function box as much as possible?

System assistant 1: Yes, but then there are some phone calls as well.

System assistant 2: Yes there is, I think I get.

System assistant 1: Yes I think you have more phone calls than I do because section 3 do not call since we have the function box but people from section 1 call me since I take care of the purchase of that section.

Sara: So they know that you can do it?

System assistant 1: Yes they know that I do it.

Andreas: So when there are problems are there any particular problems that you priorities first?

System assistant 2: Yes if there is a system shutdown then that is priority one because then users can not do anything but otherwise for me I would say to add new product numbers into System X so the users can order these products so that is priority one, so they have something to order.

System assistant 1: Yes there are a lot of new product attachments and things like that.

Andreas: Do you often have to add product numbers, is that done daily?

System assistant 1: Yes
System assistant 2: Well yes when it comes to section 1, section 2 is not that often, but in section 1 there are a lot of products that are outside the range of products.

Andreas: What is your relation to the system administrator when it comes to the division of work and the support of the system?

System assistant 1: Well if there are shutdowns in the system we often contact the system administrator.

System assistant 2: Yes well it depends if he is here but we try to collaborate and help each other out as much as we can.

System assistant 1: The system administrator has more tasks revolving the IT.

System assistant 2: Yes the system administrator is the contact person towards the IT department so if there are any problems he contacts them and he understands it the best, better than anyone else of us.

System assistant 1: Everyone report errors in the system to the system administrator but sometimes you are supposed to update products or something and then you cannot do it then I report the error myself to the system vendor because there is not something that the system administrator can do about it because they have to update the database.

System assistant 2: That is something we can all do but also to the system administrator.

System assistant 1: If you have a problem you always ask somebody have you experienced this problem earlier before you report an error but we have some well known problems that recur.

Sara: You mean that there are some problems that reappear?

System assistant 1: Yes.

System assistant 2: When it crash.

Andreas: Is there some problem that recur, that you have to deal with?

System assistant 2: From the users?

Andreas: Yes exactly.

System assistant 1: You mean about failures in the system?

Andreas: No problems that the users want you to help them with.

System assistant 2: The most usual problem I think is that they forget their password or that it has expired or that they have done something wrong that we need to cancel in the system, often things like that.

Sara: Do you experience more problems of this kind than with the actual system?

System assistant 2: Well it happens but its more about the users as I see it.

System assistant 1: I think the system is pretty stable.

System assistant 2: There are often times when you feel like why is it like this, why can we not fix this ourselves.

System assistant 1: I was thinking more about the system.

System assistant 2: Yes we have had problems that the system has been running slow but I think that it was a while since it did.

System assistant 1: Yes.

Sara: When the system starts to run slow is that something you notice immediately that user´s try to contact you?

System assistant 2: Yes.

System assistant 1: I think when the system administrator tried to run the book-keeping then we immediately noticed that the capacity of the system went down and people started to call so after that he have been forced to do it during the night.

Andreas: When the users contact you do you have a policy or something about how you should act or that you should provide users help within a certain time period or it depends?

System assistant 1: No no we do not have any policy’s like that. Since we use the function box I think that you should get an answer at least the same day of not faster and I think we manage to do that at this moment but otherwise I think that if you email somebody I think you should get an answer at least within 24 hours.

Sara: Concerning the function box, do you feel that if you had not responded quickly they would have tried to contact you in other ways?
System assistant 1: Yes yes and if there is something very urgent they always call the service phone because there is always someone that answers.

Andreas: How good knowledge do you feel that the users have when it comes to what you can do and cannot do regarding the system?

Sara: Do you think that they know where your limitations are and when you have to contact the system vendor?

System assistant 2: No I do not think so.

System assistant 1: No I do not think they know.

System assistant 2: No I do not think they know what we can and cannot do and what we have to pass on. I do not think they know.

System assistant 1: But on the other hand I do not perceive that they come to me with any hard or advanced questions.

System assistant 2: Maybe the system administrator gets them.

System assistant 1: Yes I think so.

System assistant 2: And in that case I think they bring it up during the System X meetings and then they contact the system vendor.

Andreas: What do you think about the users perception of your job, do you think they are satisfied or not?

System assistant 1: I think they are satisfied.

System assistant 2: Yes I have never heard that anybody is dissatisfied but in the other hand they never tell you if they are satisfied, but you usually hear about it if people are dissatisfied but there is nothing that I have heard.

System assistant 1: Since we started using the function box I have gotten a lot of positive feedback that the users think that it is good and that they now know where to turn because earlier it was a bit unclear to whom you should turn to but now I have gained a lot of positive feedback.

Andreas: Is there anything else you would like to add?

System assistant 1 and 2: No.

System assistant 1: I think that was all.

Andreas: Thank you so much for your time.
APPENDIX F – Interview system administrator 2012-03-30 (SAd2)

Andreas: If we start with the information in the system looking at question three.

System administrator: System X provides sufficient information.

Andreas: Yes, you can see that they are positive.

System administrator: Yes I actually think that is surprising, they feel that it is hard to find the information they look for but when they do they think that it is sufficient. I think that is a conclusion one could draw.

Andreas: How do you think that you have impacted that the users perceive the information as sufficient.

System administrator: It like this that when we do adjustments to the system we have to make additions to the different views in the system. Wait, I can show you an example. If you have an order that have been placed during this week, previously you could not see from which storage facility it was sent from so we had do make an adjustment so we could access that information, so you have to capture what the users need.

Andreas: Is that something you can do?

System administrator: No that is not something I can do except to talk to the system vendor about it.

Andreas: So they do all the changes?

System administrator: Yes and my job is to capture users opinions, if the users feel that it is unclear at the moment because they do not know from which storage facility deliveries come from then it is my job to pressure the system vendor so we get what we need.

Andreas: So it is an adjustment?

System administrator: Yes it is an adjustment they have provided us with.

Andreas: That you had to pay for?

System administrator: This was in the beginning of the project; we had not been using the system for that long period of time so we did not have to pay for it. But there are other adjustments that have been done that we have paid for. If we look at an example we have a summary of returned products where you can find when these products have been received, you could not see that before. That is an example of one adjustment that we have paid for. Because it would be a problem for us if there are two identical products you do not know which one that have been returned. It is small adjustments like that, which needs to be done all the time.

Andreas: If we move on to question four, the users have commented about the file maintenance and that information disappeared when you switched systems.

System administrator: Yes and I agree with that. Information disappeared from the system because we did a conversion and what information that should be converted was selected so we did not transfer all the information although I do not have an example of it right now. But file maintenance I do not know I mean we chose some products that we should not use anymore that we did not transfer to System X and afterwards we have been forced to add some of these again but it was because we did not think that they would return and that is why it was decided that some of the products should be sorted out but I never took any decisions myself about this it was decided in the management group.

Andreas: But afterwards you have felt that there were articles missing?

System administrator: Yes.

Andreas: So then you had to add these again?

System administrator: Yes and then there was some problems to search for information about activities because the text was converted so there is not the same possibility to search for information as you could in the old system but I see this as a natural part of the development process you have to consider what you can gain and what you lose and I believe that the essential parts are still in place, and I have not heard any complaints from users for a while now.

Andreas: That information has disappeared?
System administrator: Yes and as I said it was a conversion so. We still have access to the old system through a data warehouse so all information is still accessible.

Andreas: So then you can find the information in the old system and then add it in System X?

System administrator: Well yes we can search for the information and then add it but right now we actually have one employee who is specialized in searching for information in data warehouses and we also have some lists available where you can find some of the information.

Andreas: But that is not your responsibility?

System administrator: Well in a way it is since I am always involved but the old system is shut down but of course we have the data warehouse where you can find some of the information but yes historical information about the articles that were not converted might have disappear but that is just how it is.

Andreas: Somebody also mentions the instruction manuals that we discussed last time we met, that they are inaccurate and not updated.

System administrator: This is something that I will talk to our IT-pedagogue about because it is his responsibility to try to keep them updated but I know that he sometimes have troubles to keep up because of his other duties but of course this is something that we are aware about.

Andreas: Does it happen that when new releases are updated that the instruction manuals only are applicable for the previous release?

System administrator: Yes well, we should review the instruction manuals because new releases could mean new features and such but I am very positive that others have commented that the manuals are good but I am aware of that we need to review them and look through them but at the moment no one has time for that but it should be done at least once or twice a year, just look them through and see what has happened.

Andreas: So you do that with the IT-pedagogue?

System administrator: No we have not but it feels like we should do it but I can also feel that the users have some responsibility to alert us if they feel like something is missing or is wrong because if we rewrite the manuals and then there is a new release then we have to get informed about this that now there is a new feature.

Andreas: and then we have a comment that the addresses are not right and you told us last time we met that you update that information from the national registration and you do that once a day, do you feel like this is something you are responsible for?

System administrator: Yes we have had some issues with these updates because the file cannot be downloaded so we have investigated how we could possibly control this but I mean it is very difficult to check up because these files contains such a large amount of information.

Andreas: So then you have to sit and…

System administrator: Yes and it is like searching for a needle in a haystack and well we have to trust that it works they have also mentioned that sometimes phone numbers are inaccurate but the problem is that that information is not available through the national registration and that is something we have argued about for a while.

Andreas: Do you work anything with the system vendors to solve this problem?

System administrator: Well the problems with the phone numbers I will never solve because we never get that information however there is a major deviation of the addresses are not correct but I have only heard about a couple of cases and then it has been regarding asylum-seekers that have been given a Swedish personal identity number and then you have to do file maintenance on that person in System X to be able to update that information but that is the only deviation I have heard about and that is more about file maintenance than anything else.

Andreas: Do you think that is the problem?
System administrator: Yes it could be like that, at the moment I like to believe that it works but that is until I have been proven otherwise but it is normally like this that as soon as one thing does not work then nothing works and this time it was asylum-seekers but that disperse amongst the users and then somebody asks why phone numbers have changed but they do not change. But we cannot exclude that there are problems with the file because technology sometimes causes trouble that happens.

Andreas: If we look at question five, if the information is presented in a clear way somebody have commented that they think that it sometimes is too much information, what do you think they mean by that?

System administrator: I think they refer to the file maintenance of products but also the fact that if you place an order of an product that has expired in those cases I agree that System X generate a couple of error messages if you order a product that should be administered in a certain way and if you do not learn to read the text, because it can mean two or three different things which means that you have to search for the information about the product and check what it is about but I admit that it should be clearer because at the moment you get the same message if the product has expired as if it has expired from the supplier which is to different things but you get the same error message.

Andreas: Do you do something to prevent this, do you need to make adjustments?

System administrator: Yes it is an adjustment that needs to be made so that different statuses generate different texts.

Andreas: Is that something you have talked to the system vendor about?

System administrator: Yes it is on our action list.

Andreas: On a more general level, are you surprised by the comments or have you heard it before?

System administrator: Yes I have heard it before and it is things that reappear but I do my availability analysis and when I do I try to inform users what adjustments they should do. I have one example it is an email that I sent the other day that I sent to someone saying that on this order you have registered a product number that has expired and then I ask her to choose another product instead and then she was really grateful and answered thank you so that is the kind of feedback I get.

Andreas: Did you send it to her?

System administrator: Yes I track it down and then I email her what adjustments that she needs to do and then I attach instructions of how she should do it and that is taking it one step further but hopefully she will know the next time it happens what she should do or I will have to send more emails like this one.

Andreas: So you run an error tracing and then you find that this could possibly be a problem and then you email the user?

System administrator: Yes.

Andreas: If we look at question seven if System X is easy to use somebody commented that there are a lot of clicks, what do you think about that?

System administrator: Well System X is a click system, jumpy, and I would like to argue that yes it demands a lot of clicks but no it does not you can control the whole system through keyboard shortcuts by only using the keys.

Andreas: Did the users gain knowledge about the keyboard shortcuts during their system training?

System administrator: No.

Andreas: Are there instruction manuals for that to?

System administrator: This is published on the intranet and it is also available up here in the header. Each time we have the System X meetings I nag about the keyboard shortcuts when they mention this question and it is actually really good and you can use it for a lot of things.

Andreas: Is it because of the design of the system that there are so many clicks?
System administrator: Yes well it is a web-based system just like internet explorer and you click there too but yes I agree that there are a lot of clicks but you have the keyboard shortcuts and believe that the critique comes from someone who worked when we used the forerunner of System X because that was a DOS version and the system was controlled by the keys so it was much easier to navigate but it was much slower because it suffered of time-lag but of course you did not have to do as many clicks as you have to do now.

Andreas: Questions seven and eight deal with how easy the system is to use and learn, what are your comments regarding the results is it what you expected?

System administrator: Yes well, it seems like they are a bit …

Andreas: Yes looking at question seven the majority are negative.

System administrator: Yes and many are neither nor but the majority are negative and I think it is because they have a problem to see the process flow which makes it harder to understand because in the next question they feel that they have sufficient understanding but they do not think that it is easy to use which is a bit contradictory but the results regarding the ease of use was pretty expected.

Andreas: Do you think that users rate it as easy to understand because they have good knowledge about their usual tasks but to grasp the whole system is what makes it hard?

System administrator: If you think about the flow in the organization then you could say that most people work around orders and then we have the finance department, management, and personnel and so on so I understand that it is hard to grasp the whole picture because it is a flow and you have to understand the flow and that it continues and education is what is needed for them to grasp the whole picture. So I think that they have great knowledge about their part of the process but not as much knowledge about how the things I do effect “over there” and I think that is the problem.

Andreas: Why do you think that they have problems to grasp the whole picture and what do you think can be done to prevent this?

System administrator: Well, everyone work under time pressure and I think they do what they should so they place their orders and when it is done they take care of the next one and I think they do not have the time to try to see the whole picture because I am sure that they are interested that shows in the number of respondents as well so this is something that we will learn from and try to start an education about the flow in System X and this should not be to detailed either that would just create confusion but just so they get a better understanding about the whole process of the system.

Andreas: and you will be the driving force in this project?

System administrator: Yes it feels like that since I have the most knowledge about the system.

Andreas: In these questions users have mostly commented that they want to be updated about the system and also they want to get a better general picture of the system.

System administrator: When it comes to training it is rather nonexistent at the moment when it comes to System X. In Web-System X me and system assistant 2 take care of educating users but that is a different system.

---Interrupted by system assistant 1---

Andreas: If we look at question eleven, if the Service Support promises to do something by a certain time they will somebody has commented that changes are slow in System X.

System administrator: As I have said before when it comes to changes we are dependent on the system vendor we cannot say that we want this and this and then they deliver it tomorrow they have to look into what the other county councils think and what they want so the rate of change is to some extent very slow. But again, you have to see it as a process they have their view and then they have to think about the other county councils because everyone work in different ways

Andreas: Is it because the lack of knowledge?
System administrator: Their knowledge is only poor because we fail to inform them but on the other hand are they really interested in learning this when they are occupied with their usual activities? So you have to look at the whole picture.

Andreas: How many of the county councils utilize System X today?

System administrator: The majority, I think there are only two or three that do not use System X.

Andreas: If we look at question fifteen, I am generally satisfied with System X, users seem rather positive. However there is another comment about missing functions that was included in the previous version of the system.

System administrator: I did not work with the old system for that long so I have hard to relate to what they can mean but of course there were things that you could do and information that you could assess in the old version that does not show in System X. I am very positive that somebody has commented that System X is much better than the old version because a lot of the users are very negative or that has been my perception so it is very nice to see that there are users that are satisfied with it.

Andreas: In question fifteen somebody mentioned that they feel that they have to adapt their way of working to the system instead of the other way around.

System administrator: And that is where we have different views because I feel that you have to adapt to the system but they feel that it should be the other way around and I understand that it is difficult to change your routines but if we would change to a new system today then we would have to change the way we work since we are used to work with System X and that way of thinking and if would have gotten a new system we would have to adapt to that way of thinking. No matter what you do no matter what system you use you always have to adapt your way of working to the system but that is my point of view but if there is a system out there that is fully individual-based I would like to see it.

Andreas: Is this a recurring discussion?

System administrator: Yes the users believe that System X should be completely adapted to the way we work and to the way we think and to how we do things instead of thinking that maybe we can do it like this instead you should be able to do everything at the same place but sure I fully understand because the system we used before System X was implemented in the mid 90’s and then we changed to System X in 2008 so it is almost 15 years or at least 12 years so one can imagine that people were used to it and now we got a new system with a new interface that you had to adapt to.

Andreas: After using System X for four years do you still consider it to be new?

System administrator: No I do not think so the way of thinking should be there by now but it might be that one is trapped in the old way of thinking but I mean after four years I think we start to get some history with traceability and you can look around and if you search for a while you will find that you have a good platform with history and statistics which give a more true and fair view but when it comes to statistics we have been forced to use information from the old system but at this point in time after four or three and a half years at least then you have a lot of information in place.

Andreas: Do you have any comments to the additional comments?

System administrator: Given some of the comments I feel like we really need to get better at promoting ourselves and show that we are the ones that support you.
APPENDIX G – Questionnaire comments

Comments on Information Quality:
Respondent 7: It can be very difficult to find all of the information you need despite advanced computer skills. Some information should be more accessible for example if you try to place an order on a product that has expired.

Respondent 8: Failures often depend on insufficient registration of product numbers.

Respondent 13: Too much irrelevant information.

Respondent 14: Phone numbers not updated.

Respondent 19: Hard question, there are some bugs in the system which make the information unreliable sometimes.

Respondent 20: Unfortunately you have to open many views to get hold on all of the information that you need in a specific case.

Respondent 21: There are several concepts that have similar meaning, although I cannot remember any examples right now…

Respondent 26: Product numbers are missing.

Respondent 28: Very complicated system where I have problems to navigate between different windows. Too many steps back and front to get the information you need so in that way too much irrelevant information.

Respondent 31: Deviations and “black holes” occur.

Respondent 38: File maintenance is not always correct!

Respondent 41: File maintenance is not correct!

Respondent 42: Information disappeared in the transition to System X; the file maintenance is sometimes poor.

Comments on System Quality:
Respondent 7: Well, the basics are not that hard. But as soon as you do something that you rarely do it does not feel intuitive. Of course that could be an effect of the massive amount of information that system X is supposed to handle, but it feels like there has to be a way to make it easier.

Respondent 8: It takes a long time to learn. If there are tasks that you rarely do you really have to think hard and sometimes even ask for help. When we started using System X we were limited to work with certain parts of the system because the managers said that it would be too difficult for one person to learn and use all features of the system – but I guess that there are not that many people who remember that they said that.

Respondent 9: Since you have to jump between windows and tabs to perform your work it is not very easy to use.

Respondent 20: Unfortunately you need good knowledge in how the system is structured in order to use it, I mostly work around order placements.

Respondent 21: Unfortunately you are sometimes unsure if you have verified want you wanted, the program is jumpy and you sometimes loose information.

Respondent 23: Too much to think about.

Respondent 24: Too many clicks.

Respondent 26: Too much clicking!
Respondent 40: It is hard to describe in words but on a general level the interface of System X is very disorderly there are many tabs and functions that demand new tabs for the same client. It is not a very logical system so you really have to learn the basics in order to gain an understanding.

Respondent 42: Not very logical.

Comments on Service Quality:
Respondent 7: According to my experience the support unit is very competent and helpful, but I have no direct contact with the system administrator.

Respondent 8: Education is something you get by using the system, but it would certainly become much safer and more effective if you knew all the “shortcuts”.

Respondent 11: When it comes to our Service Support (The support unit) they provide fast service.

Respondents 15: Well, I feel that adjustments take time.

Respondent 21: I am often told that it costs money to do adjustments and that many different interests’ needs to be taken under consideration.

Respondent 23: The support unit provides good service.

Respondent 24: The instruction manuals are good; however they are not always updated.

Respondent 29: Need more and deeper understanding to avoid straining the "next" instance for example purchase.

Respondent 30: Repetition would be good.

Respondent 31: The support unit is always fast, but I do not know anything about the system administrator. I feel that the changes in the System X are slow, but they might not promise more than that.

Respondent 32: Some of the instruction manuals are outdated.

Respondent 41: Do not know; have never been in contact with the system administrator.
APPENDIX H - Tables and figures of questionnaire answers

Users’ perception of Information Quality

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<tr>
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<th>RESPONDENTS</th>
<th>MEAN</th>
<th>STANDARD DEVIATION</th>
<th>OVERALL OPINION</th>
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<td>0.922</td>
<td>POSITIVE</td>
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</table>

Users’ perception of System Quality

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>RESPONDENTS</th>
<th>MEAN</th>
<th>STANDARD DEVIATION</th>
<th>OVERALL OPINION</th>
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<tbody>
<tr>
<td>Q7. Ease of use</td>
<td>42</td>
<td>2.60</td>
<td>1.001</td>
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<td>Q8. Ease of learning</td>
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<td>2.69</td>
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<td>TOTAL</td>
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Users perception of Service Quality

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<th>OVERALL OPINION</th>
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<tbody>
<tr>
<td>Q9. Understanding</td>
<td>40</td>
<td>3.40</td>
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<td>Q10. Training</td>
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<td>Q11. Reliability</td>
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<tr>
<td>Q14. Empathy</td>
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<tr>
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### Dependency of use

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### User satisfaction

<table>
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<th>MEAN</th>
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<th>OVERALL OPINION</th>
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<tbody>
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<td>Q15. User satisfaction</td>
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