

# Organizational Effects of Using SaaS Systems in SMEs



## Master Thesis

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by

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## Abstract

"The cloud" has been a hot subject the last couple of years, and has been considered especially attractive to SMEs due to making it possible for whole information systems to be fully managed by the vendor. This can unburden the customer organization regarding for example large investment costs, hardware and software maintenance, while also adding flexibility and scalability.

There are three types of service models: infrastructure, platform and software, which dictate what the customer and vendor manages. In *Software-as-a-Service (SaaS)*, which is the focus of this study, a third part manages both the applications and hardware and the users access these resources through the Internet. However, with the usage of SaaS comes several issues for companies to handle and make use of, for example security and mobility.

This master thesis' aim is to present organizational effects of SaaS usage in SME user companies, by studying customer organizations post implementation. A qualitative comparative study was conducted where we held semi-structured interviews with SME users mainly at their own offices. In total six interviews were conducted at five different companies. At least two years usage experience was a criteria we set to ensure we could retrieve enough data from the companies.

To fulfill the aim of the study we set out to find common issues affecting SMEs using SaaS systems. Through a pre-study, including literature studies and customer interviews, we determined which of the common issues that could be considered most relevant. Factors taken into consideration was how SaaS specific an issue was and how relevant it is in the post implementation phase, and how much data we were able to retrieve regarding an issue through the interviews. The relevant issues were: price model, vendor relation, frequent updates, mobility and integration. Further, five hypotheses were derived, one for each relevant issue regarding the organizational effects of SaaS usage.

An analytical model was constructed mainly based on DeLone and McLean's (1992; 2003) original and updated Information System Success Model. The model helped in deriving organizational effects of usage from the different relevant issues. By using the analytical model with interview and literature study material we came up with the findings of this report, as described below.

The possible price models enables companies to be more flexible with their IT portfolio. Also, it was concluded that the costs of SaaS are based upon usage, which could make it harder to estimate, especially if the usage varies. But it can also be a strength enabling customers to scale their usage as needed.

In general, the vendor relation between a customer and vendor was not too complex, however with one exception. Our main discovery was that certain factors of SaaS usage affect the degree of experienced vendor lock-in differently. These include the nature of the pricing model, contract binding times and data ownership rights. Further, the level of trust and lock-in level could also affect the customer intention to change system.

Frequent updates, which are managed by the vendor, reduce time and effort in regards to maintenance performed by customers. However, sometimes the updates could also cause problems when the customer had own configurations.

The mobility offered by SaaS systems extends organizations ability to work. This includes increased geographical freedom for mainly employees of an organization.

We found that integration is much more of a general issue for information systems. But in SaaS connection of services are possible and can thus enable further value than each service can on its own. However, integration also causes increased lock-in and system management.

## Sammanfattning

Molnet har varit ett hett ämne de senaste åren, och har ansetts vara särskilt attraktivt för SME:s då det möjliggör att hela informationssystem sköts av systemleverantören. Detta avlastar kundorganisationer från stora investeringskostnader och underhåll av hårdvara och mjukvara, genom att samtidigt öka både skalbarheten och flexibiliteten.

Det finns tre typer av tjänstetyper: *infrastructure*, *platform* och *software*, vilka avgör vad som leverantören och kunden hanterar. I *Software-as-a-Service (SaaS)*, som är i fokus för denna studie, så hanteras både applikationer och hårdvara av tredje part och användare kan få åtkomst till dessa genom internet. Med SaaS tillkommer dock även vissa svårigheter som företag måste hantera, exempelvis gällande säkerhet och mobilitet.

Syftet med examensarbetet var att presentera de organisatoriska effekterna av SaaS-användning för SMEs genom att studera kundorganisationer i postimplementations-fasen. En kvalitativ, jämförande studie genomfördes där vi höll semi-strukturerade intervjuer med SME:s främst på deras egna kontor. Totalt sex stycken intervjuer genomfördes på fem olika företag. Vi krävde åtminstone två års användningserfarenhet för att säkerställa åtkomst till tillräcklig data.

För att uppnå syftet med arbetet så började vi med att hitta vanligt förekommande svårigheter ("common issues") som påverkar SME-användare. Genom en förstudie som innefattade intervjuer, litterära studier och användarintervjuer så kunde vi fastställa vilka av dessa problemområden som var mest relevanta. Faktorer vi tog hänsyn till var hur SaaS-specifikt och relevanta svårigheterna var i postimplementations-fasen, samt hur mycket data vi kunde få ut av våra fallföretag genom intervjuer. De relevanta svårigheterna ("relevant issues") var: prismodellen, relationen till systemleverantör, frekventa uppdateringar, mobilitet och integration. Dessutom tog vi fram fem hypoteser gällande de organisatoriska effekterna av SaaS-användning baserad på svårigheterna.

En analytisk modell skapades huvudsakligen baserad på DeLone och McLeans (1992; 2003) ursprungliga och uppdaterade "Information System Success Model". Denna modell underlättade att ta fram organisatoriska effekter av användning för de olika relevanta svårigheterna. Genom användningen av den analytiska modellen tillsammans med intervjuer och litteratur så kom vi fram till resultatet av studien, beskrivet nedan.

De möjliga prismodellerna möjliggör för företag att vara mer flexibla med deras IT-portföljer. Dessutom fastställdes det att när kostnaderna för SaaS baseras på användningen kan vara svårt att uppskatta totalkostnaden, särskilt när användningen varierar. Detta kan dock samtidigt vara en styrka då det möjliggör skalbarhet efter behov.

Kundrelationen mellan en kund och systemleverantör var inte alltför komplicerad, dock med ett undantag. Vår huvudsakliga upptäckt var att vissa faktorer i SaaS-användning påverkar den upplevda graden av inlåsningseffekter till systemleverantören. Dessa inkluderar prismodellens utformning, bindningstider och äganderättigheter till sin data. Dessutom kunde förtroendet och inlåsningsgraden också påverka kunders avsikt att byta system.

Frekventa uppdateringar som hanteras av systemleverantören, minskar både tid och ansträngning för kunden gällande underhåll. Däremot kunde uppdateringarna ibland orsaka problem när kunden hade egna konfigurationer.

Mobiliteten som möjliggörs av SaaS-system utökar organisationers arbetsmöjligheter. Detta inkluderar större geografisk frihet för de anställda i en organisation.

Vi kom fram till att integration är mer en generell svårighet för informationssystem. Däremot i SaaS så är det möjligt att ansluta olika SaaS-tjänster, vilket kan skapa större mervärde än vad varje tjänst var för sig kan skapa. Däremot kan integration också orsaka ökade inlåsningseffekter och ökat behov av systemunderhåll.

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## Glossary

<b>Term</b>	<b>Meaning</b>
API	Application Programming Interface
ERP	Enterprise Resource Planning
IaaS	Infrastructure as a Service
iPaaS	Integration Platform as a Service
IS	Information System
ISS	Information System Success (Model)
PaaS	Platform as a Service
SaaS	Software as a Service
SME	Small- and Medium-sized Enterprises

# 1 Introduction

*The introduction chapter will begin with the background of the chosen study, which will then lead to the purpose of the study. Following the purpose three research questions are presented that will be answered in the study to fulfill the purpose of the study. After that is the study's limitations described and finally the disposition of the report is presented.*

## 1.1 Background

When it comes to technological discussions today one of the recent topics is the one about cloud computing, a technological breakthrough that enables companies to outsource everything concerning their enterprise systems, from IT-infrastructure to the actual applications.

Outsourcing hardware or data to the cloud instead of hosting it yourself can be compared to taking the bus instead of driving your own car. By taking the bus you are using a travel service, and you do not have to worry about driving or serving a vehicle. However, this comes at the cost of flexibility and comfort since you have to for example follow a bus timetable and travel with other passengers. If you instead travel by your own car you have greater flexibility, however you have to do the driving yourself and take the car to the mechanic when it breaks. In comparison, the bus passengers can focus their attention on other things than the actual driving of the vehicle, thus save time. The bus passengers would also not have to bear the risk in case of service interruption (e.g. the bus breaks) but could even expect the bus company to find a replacement vehicle. In a similar way that taking the bus instead of the car turns transport into a service, cloud computing can turn many of a company's IT functions into a service provided by an external party. This naturally enables new opportunities but it also presents other challenges and aspects that need to be considered.

Properties that are similar to the example of taking the bus instead of the car, and using the cloud instead of your own hosted systems, includes: giving away control (Johansson & Ruivo, 2013), "transferring the cost of ownership and maintenance to the service providers" (Lewandowski et al., 2013, p. 2) and time saved in regards to certain activities that come with no ownership such as for the cloud updates (Peng & Gala, 2014).

One especially interesting aspect of cloud computing is the service model *Software-as-a-Service (SaaS)*. SaaS can simply be described as letting an external party host and manage your whole information system, including hardware, data and software. Out of the different types of cloud computing service models, SaaS is the one that puts most responsibilities in the hands of the provider. Thus, it can be argued that this is the most extreme form of cloud computing. This is why we find this aspect of cloud especially interesting, because it is the cloud service that in many regards differs most from systems that are owned and managed locally by a customer (on-premises systems).

The cloud industry as a whole is growing rapidly. In 2014 IDC predicted that by 2018 in total 27.8% of the enterprise application market will be SaaS-based, which is a revenue growth of 125% compared to 2013. This equals to a compound annual growth rate of 17.6% for the SaaS market, while the same growth rate for on-premises system market is estimated to be only 3.1% (Columbus, 2014).

Observing the individual consumer's situation could easily recognize the impact of SaaS. The usage of streaming services such as Spotify and Netflix have changed the way many people consume entertainment. Music and video consumption have thus progressed towards a subscription based price model. Dropbox have made it easier for individual users to access data independent on geographic location as long as there is an Internet connection.

The cloud is a relatively new area that first started emerging, as we know it today, by the end of the 90's with customer relationship management (CRM) systems such as Salesforce (Salesforce, 2015). When visiting top vendor web sites the word "cloud" is sometimes used in a way that would imply it as a benefit in itself. When looking at top buzzwords, cloud computing is often mentioned (Global Language Monitor, 2015). Marston et al. (2010, p. 176) even claims "the evolution of cloud computing over the past few years is potentially one of the major advances in the history of computing".

One group that is especially interested in choosing SaaS based enterprise systems over on-premises ones are SMEs. In a study by Aberdeen Group (Castellina, 2012) it is shown through an empirical study based on their "2012 ERP Benchmark survey" that smaller corporations (under 50M USD annual revenue) tend to favor SaaS ERP solutions to a much higher degree than larger corporations. 26 percent of the small organizations in the study used SaaS ERP solutions, in contrast to 4 to 5 percent of the larger organizations.

According to Seethamraju (2014) SMEs tend to be skeptical about ERP system implementation in general. This skepticism regarding implementing large-scale systems stems from the difficulty in justifying the time and money needed for such an investment (Seethamraju, 2014). This could explain the popularity of SaaS systems among SMEs, since according to Venkatachalam et al. (2013, p. 3) SMEs are "projected to be the main beneficiaries of SaaS due to its utility pricing model with no or limited upfront capital investments". Salleh et al. (2012, p. 9) argues in similar terms that cloud-based enterprise systems "appears as an attractive option to SME in solving the problems of high investments in IT infrastructures and IT resources". Further, Krcmar et al. (2014) also state that due to the difficulty of hosting their own data center for a SME, a public cloud solution is practical (Krcmar et al., 2014). Public cloud can simply be described as that the cloud infrastructure can be used by the general public, in contrast to for example a private cloud that is used exclusively by one organization (Mell & Grance, 2011)

When we were reviewing the literature of SaaS for enterprise systems, most of the articles we found describe the benefits and possible drawbacks of selecting SaaS solutions. Actual post-implementation information regarding how it actually is to use SaaS systems were scarce. Even the sources we have described that highlights the popularity and benefits of SaaS for SMEs tend to have a more selection phase focus. Walther et al. (2015) confirm that research has mainly focused on circumstances when SaaS is being introduced, and not so much on the later phases of the software lifecycle. This is especially surprising according to Walther et al. (2015) since there are a number of factors that differ in the post-implementation phase with SaaS system compared to on-premises ones. For example the subscription-based price model and the risk that customers choose to cancel the service at an early stage. This has actually been a problem for some of the SaaS vendors, which customers choose to walk away from the service (Marston et al., 2011).

It simply seems like there are both benefits and possible drawbacks to SMEs using SaaS based information systems. These kinds of situations trigger our interest how it actually is for a company to use SaaS. Further, SMEs have been early adopters and thus there should be many companies out there with experience of using these systems. Also the SaaS trend seems to keep on growing as well. The surprise is that the post-implementation phase has not been a very researched area for SaaS, which even further trigger our interest on how the usage of SaaS information systems really looks like. Especially in the form of public cloud due to the difficulty of SMEs hosting their own private cloud. So we simply want to see what happens after a company has selected and implemented a SaaS system and used it for a while, to see if the cloud can live up to its hype. Perhaps there are SMEs who still have not reached for the clouds that also would like to find out: how is it actually to work with SaaS systems?

## 1.2 Purpose

As described in the background the selection phase has been the main focus of SaaS system research to date. However, we are more interested in finding out how it actually is to use SaaS systems from a customer perspective. Since SMEs have been argued to be the early adopters, and also that some authors (Venkatachalam et al., 2013; Salleh et al., 2012) claim that SMEs can benefit especially from SaaS usage, we would like to find out how companies (customers of SaaS) actually are affected by mature SaaS usage. This leads us to the purpose of our research.

*The purpose of this master thesis is to find organizational effects of using SaaS systems in SMEs, by studying customer organizations post implementation.*

## 1.3 Research Questions

To make it easier to answer the purpose of the study we have formulated three research questions. The first question will aim to discover what issues that actually affect the SaaS usage. The second question will determine which of these issues to focus on. The answer to the third question aim to fulfill the purpose of the report.

1. What common issues affect organizations in their usage of SaaS systems?
2. Which of the common issues are most relevant in the post implementation phase?
3. How does the relevant issues affect the customer organizations?

## 1.4 Limitations

In this study we focus on usage of public SaaS systems, since out of the different cloud service types, public SaaS usage will differ most in comparison to on-premises systems. The other service models are more similar to on-premises systems, thus the differences would be less and thus also the discovered organizational effects.

This thesis is written from a business perspective and not a technical perspective. Thus, there are no deeper technical discussions regarding cloud systems. The purpose is to study organizational effects of SaaS usage, and therefore deeper technical aspects are outside the scope of the study.

The choice to study SMEs were influenced by studied literature (e.g. Seethamraju, 2015) that suggest usage of SaaS systems could have a stronger impact on SMEs than on larger companies.

A comparative study is used to be able to retrieve information from different companies and different systems. However, there are similarities regarding mainly the type of companies studied. All companies are technical and develop systems. Further, all case companies are located primarily in the Stockholm region of Sweden. The study is not limited to a specific type of information system, but per definition of a system we are not studying something that could be considered a tool, like for example mail clients. Consequences of these limitations are that our generalizations will mostly apply to these types of SMEs and systems, and some of our discovered effects might not be prominent in larger organizations.

We want all the case companies to be experienced SaaS system users. This is due to the assumption that more organizational effects appear in an organization as time passes, and we want to be able to discover as many organizational effects as possible. Thus, all case companies included have been using at least one SaaS system for at least two years.

We limit the study to how *processes* are affected by SaaS usage, thus excluding *results* of SaaS system usage. The changed processes can contribute to certain results, but it is difficult to prove that the results only stem from the changed process. In other words, it is difficult to prove that a certain

financial outcome is the result of only the specific SaaS system usage, since other factors can contribute to the same discovered outcome as well.

## 1.5 Disposition

This report is divided into seven major chapters, which are described below.

1. **Introduction.** The first chapter presents the background and foundation of our study. The foundation includes the study's purpose, research questions and the limitations.
2. **Method.** The second chapter presents and discusses how we have proceeded in the study and our interpretivist point of view. The chapter includes research method, research approach, critique of quality, used research techniques and how we performed our interviews. It also describes the process of selecting which of all the "common issues" in SaaS usage considered being of special interest ("relevant issues"). The actual selection of the relevant issues is described in *5. Empirical Research*.
3. **Frame of Reference.** The third chapter contains the results of the literature review. In this chapter all the common issues discovered in literature are presented, and the five most relevant issues are further elaborated. As already mentioned, the process of selecting these five relevant issues from the common issues is described in *5. Empirical Research*. However, since the frame of references should only include relevant references the findings are still structured according to these five relevant issues. Further, the chapter includes cloud definitions and theory used to build our research model.
4. **Our Adaption of the IS Success Model and Hypotheses.** The fourth chapter discusses how we constructed our research model, still based upon the five relevant issues selected. We also present our hypotheses and illustrate how the hypotheses will be answered through the research model.
5. **Empirical Research.** The fifth chapter presents the findings from the case companies, and how we derived the relevant issues from the common issues discovered through the literature study.
6. **Analysis.** In the sixth chapter we analyze the empirical findings regarding each of the relevant issues of the report, with the use of our research model and frame of references. Further, the hypothesis are analyzed and answered.
7. **Conclusion.** The final chapter summarizes our findings and discusses potential further research areas.

## 2 Method

*In this chapter the method of the study is described. First we describe the research method, then the research approach, and after that our selected epistemology is presented. After that we present our critique of quality framework. Finally we present the techniques used to collect our material.*

### 2.1 Research Method

This study is a qualitative comparative study with a deductive approach. The qualitative research strategy was chosen due to organizational effects being considered hard to quantify, and also that we are interested in *finding out* eventual organizational effects as well as assessing if any described in literature actually materialize in the post-implementation phase. Earlier research in the subject of cloud or SaaS have applied a qualitative research strategy, for example some of the articles included in the frame of reference for this report: Lewandowski et al. (2013), Marston et al. (2010) and Johansson and Ruivo (2013).

Five different research designs were considered, which were experimental, cross-sectional, longitudinal, case study and comparative. The ambition was to be able to draw generalized conclusions from our study to reduce the risk of organizational effects being isolated to a certain system or a certain company. Therefore, the chosen research design was comparative design, since it involves studying several cases. Bryman and Bell (2011) give different examples of what a case can constitute: a single organization, location, person or event, further they also explain that a case can be “organizations, nations, people etc.” (Bryman and Bell, 2011, p. 63). In addition, they explain “[i]n business research this is a popular research design that usually takes two or more organizations as cases for comparison, but occasionally a number of people are used as cases.” (Bryman and Bell, 2011, p. 66). Yin (2009) further describes that a single individual can be seen as a case as well, however usually that also implies that the primary unit of analysis is that single individual. In our study we are studying the experiences of the interviewed individual, however we are also interested in the organizational effects so the unit of analysis is somewhat broader. Yin (2009, p. 29) also describes that a case “can be some event or entity other than a single individual”, including for example “decisions, programs, the implementation process, and organizational change”. So our research mainly focused on the experiences of a single employee in an organization. We also did research each company before accepting them and before conducting each interview. Whenever we refer to a “case company” in this report we are referring to the research, interview(s) and follow up communication in regards to the company. As we will elaborate on later, our first case company included a group of two people being interviewed. However, the additional information received from the second interview did not contribute much to our research due to the information being repetitive. Thus, from there on, we conducted one interview per company.

Bryman and Bell (2011, p. 63) also mention that comparative design “allow the researcher to compare and contrast the findings deriving from each of the cases. This in turn encourages researchers to consider what is unique and what is common across cases, and frequently promotes theoretical reflection on findings”, which fits our ambition well. Bryman and Bell (2011) also mention that a multiple-case study usually focus on “the cases and their unique contexts”, however if the focus is rather on general findings “with little regard for the unique contexts” then it is rather a cross-sectional design. Since we rather focused on the findings than context of the findings it can be argued that our study is more of a cross-sectional design. However cross-sectional design also includes quantitative data (Bryman & Bell, 2011), which our study does not include. So we simply have a comparative study with more focus on the findings than the unique cases’ contexts. Though, we do reflect upon the context, which will especially be further elaborated in *2.4 Critique of Quality*.

When a comparative design is applied to qualitative research, it takes the form of a multiple-case study. According to Bryman and Bell (2011, p. 63) it is easier to understand social phenomena if several cases or situations are compared. Many of the organizational effects we expect to find can be related to social phenomena, thus it fits our purpose. Further, Yin (2009, p. 62) suggest that having several cases “blunt criticism and scepticism” regarding findings.

Eisenhardt (1989) describes in her article different tactics for using several cases in studies, for example cross-case pattern searching. One of the benefits of looking for cross-case patterns is that it “forces investigators to look beyond initial impressions and see evidence thru multiple lenses” (Eisenhardt, 1989, p. 535). She also states that her methods are highly iterative and appropriate for new research areas. Since our topic of SaaS usage is a relatively new one, this fits us well. Eisenhardt (1989, p. 540) suggests a tactic for cross-case pattern searching, to select categories or dimensions to investigate and then look for similarities within and between the groups. The dimensions can be chosen freely by the researcher according to Eisenhardt (1989). This also fits us well since we focus on relevant issues of SaaS usage between the different case companies. Another benefit of searching for cross-case patterns is that when there are conflicting findings the researchers have to probe more to see if there is any underlying biases in the analysis or if the differences simply are random. Eisenhardt (1989, p. 541) further explains that this will “improve the likelihood of accurate and reliable theory, that is, a theory with a close fit with the data”. Even though Eisenhardt’s (1989) article discusses how to improve theory building, while our study is rather about testing theory, we aim to be able to draw generalized conclusions. Since a generated theory is meant to be general in some sense, and we aim to make some generalized conclusions, it is thus useful to learn from Eisenhardt’s (1989) tactics. So even though her article suggests a more inductive process, we still believe our deductive work can apply it.

There are also some criticism regarding using multiple case companies in a study. Dyer and Wilkins (1991, p. 613) criticize that Eisenhardt (1989) mixes hypothesis testing with theory generating research. However that is not a problem for us since we have a deductive approach anyway, so it is rather positive from our research position. Dyer and Wilkins (1991) also criticize that using several cases comes at the cost of losing rich details in the background of each case. However, in our research we are not aiming for rich background information of the companies, but we aim to more details regarding the organizational effects within the studied relevant issues.

Eisenhardt and Bourgeois (1988) conducted a multiple-case study with eight case companies and parts of their research have inspired us. For example, they selected eight cases and they state that they “stopped adding cases when our incremental learning diminished” (Eisenhardt & Bourgeois, 1988, p. 739). Including our pre-study we had five case companies, and Eisenhardt (1989) recommends at least four case companies, so we think we included enough case companies. The incremental learning decreased after the fourth case company in our case. The fifth case company presented some new insights, but that was since the interviewed subject had a position that differed from the positions of the subjects at the first four companies. Also, it is important to note that there are some similarities in the type of SMEs studied. For example, all of them were either developing software or hardware. So our generalized findings will apply to that group of SMEs. We do not exclude the possibility that more organizational effects would have been discovered with a larger sample. However, it could then be discussed whether newly discovered effects are common or relevant if they have not been found in the five case companies already studied. To be able to draw more generalized conclusions regarding SaaS usage in SMEs in general a larger sample would probably have been needed to cover the variety of SME SaaS users. Our studied group of SMEs has also been described in the limitations of the study.

Another reason why we did not include a sixth case company is that the fifth case company gave us the final information needed to get a good understanding of the topic of study. It was considered more important to be able to describe as much of those findings in the report as possible rather than to include a sixth case company. Also, many of the effects got repeated throughout the interviews so the patterns were already prominent. So, by including the pre-study companies also in the analysis, we have sufficient data. Eisenhardt and Bourgeois (1988) also conducted their interviews in teams of two people with one taking notes and the other one asking questions, which is the same working method we have adopted.

## 2.2 Research Approach

This report takes a deductive approach to examine whether the stated effects on organizations from implementing a SaaS solution actually do take effect in companies. In a deductive approach, according to Bryman and Bell (2011), one or more hypotheses are derived from the theory to be empirically tested. For that reason hypotheses have been described for the issues that were selected for further study after the pre-study. Bryman and Bell (2011, p. 11) further describe that these hypotheses need to be researchable and "...the social scientist needs to specify how data can be collected in relation to the concepts that make up the hypothesis" (Bryman and Bell, 2011, p. 11). Thus, we hereby state that our hypotheses can be answered by conducting semi-structured interviews with people who have experience in the usage of SaaS systems. See 5.2 *Study Findings* for further information on how data was gathered to answer the hypotheses.

It could be argued that our research is not deductive, but rather inductive, due to a pre-study influencing which issues were chosen to further pursue in the "real" case study. However, Bryman and Bell (2011) mention that despite a deductive approach seems to be linear and follow a sequence of steps, this is not always the case. One reason for that is described as: "the relevance of a set of data for a theory may become apparent only *after* the data have been collected" (Bryman & Bell, 2011, p. 12). This reason fits our situation since the pre-study was necessary to determine what information could be retrieved from a customer in the post-implementation phase of SaaS system usage. The studied literature often took a perspective from "experts" and managers that describe different aspects of cloud systems, who were not necessarily end users themselves. Also, we did conduct substantial theoretical studies before planning the pre-study interviews, which is in accordance with a deductive process where theory precedes observations and findings (Bryman and Bell, 2011).

## 2.3 Selected Epistemology - Interpretivism versus Positivism

Selection of a study's epistemological standpoint is an important issue due to what will be regarded as knowledge. For social studies the two main epistemologies are positivism and interpretivism. The main difference is that positivism "advocates the application of the methods of the natural sciences to the study of social reality and beyond" (Bryman & Bell, 2011, p. 15), while interpretivism states that social sciences are different than natural sciences and therefore "requires a different logic of research procedure, one that reflects the distinctiveness of humans as against the natural order" (Bryman & Bell, 2011, p. 16). In interpretivism hermeneutics is important since it influenced its formulation. Hermeneutics is originally an approach to understand or interpret text primarily of theological nature. The central idea of hermeneutics is that "the analyst of a text must seek to bring out the meanings of a text from the perspective of its author" (Bryman & Bell, 2011, 563).

According to Klein and Myers (1999) interpretive research can be done in information system research if "it is assumed that our knowledge of reality is gained only through social constructions" (Klein & Myers, 1999, p. 69). Due to the nature of our study selecting an interpretive approach fit compared to a positivist approach. We collected data through semi-structured interviews with several studied

companies where we had to take the interviewees' perspectives and understanding into account. Also, we took into consideration the possibility that our own biases could influence the process. In our study there are several truths to consider and we as researchers needed to take them all into account and interpret them for ourselves, which is in accordance with an interpretive viewpoint. Lastly even though deductive research is often done with a positivist epistemology, they do not cause each other. (Bryman & Bell, 2011)

An important point is that interpretive research is dependent on "the underlying philosophical assumptions of the researcher" (Klein & Myers, 1999, p. 69) and is thus not synonymous for qualitative research.

### 2.3.1 The Principles of Interpretive Field Research (Klein & Myers, 1999)

Klein and Myers (1999) proposed seven principles "for the conduct and evaluation of interpretive field work in IS" (Klein & Myers, 1999, p. 68). Klein and Myers (1999) states that applying any of the principles are not mandatory for interpretive studies but that great consideration shall be taken for each of them, especially since they are to some extent interdependent. The seven principles are:

1. The Fundamental Principle of Hermeneutic Circle
2. The Principle of Contextualization
3. The Principle of Interaction Between the Researchers and the Subjects
4. The Principle of Abstraction and Generalization
5. The Principle of Dialogical Reasoning
6. The Principle of Multiple Interpretations
7. The Principle of Suspicion

The principles are explained below, and will be used where appropriate. In the following sub-chapter (2.4 *Critique of Quality*) we describe how we have fulfilled these principles.

#### Principle 1: The Fundamental Principle of Hermeneutic Circle

This principle is more of a meta-principle from which the other principles are expanded. The principle describes that to get a full understanding of a whole, one must understand its parts and interrelationships. But to understand each part and relationship the context of the whole must be applied. One must thus iterate between the whole and its parts and interrelationships to increase one's understand of the whole.

#### Principle 2: The Principle of Contextualization

As written by Klein and Myers (1999) "[t]he contextualization principle requires that the subject matter be set in its social and historical context so that the intended audience can see how the current situation under investigation emerged" (Klein & Myers, 1999, p.73). This requires the researchers to understand that their work is influenced by and becomes part of the organization's history, this has to be reflected in the research. It also has to be understood and reflected that people are producers of history. In short the principle is about putting the study and the topic in a larger context including both the organization and the society.

#### Principle 3: The Principle of Interaction Between the Researchers and the Subjects

Due to "data" being *produced* from the interaction between the subjects and the researchers this principle requires the researchers to be placed together with the subjects in a historical context. By this principle it is meant that the participants interpret and analyze as well, not only the researchers. This means that other parties that interact with them, such as researchers, vendors and consultants,

also influence participants. It also means that researchers are co-creators to the answers retrieved from subjects.

#### Principle 4: The Principle of Abstraction and Generalization

There are some debates regarding abstraction and generalization of interpretive research. Klein and Myers (1999) thus emphasizes that it is important for the researchers to explain how they arrived at their theoretical generalizations and abstractions. This should be done by relating details in the case studies to how they were experienced and collected by the researcher. This will ensure that the reader can understand how the generalizations were created.

Four types of generalizations that can be made are: the development of concepts, the generation of theory, the drawing of specific implications, and the contribution of rich insight. Interpretivists are not so interested in “falsifying” theories but rather wants to use theories as a “sensitizing device” to view the world in a certain way. So theories are important in interpretivist research but it is also used in a different way than in positivistic. (Klein & Myers, 1999)

It is thus our understanding that since interpretivists recognize that there can be multiple interpretations it is important to provide the reader with enough details of how the generalizations are made so the reader can decide if the generalizations are reasonable.

#### Principle 5: The Principle of Dialogical Reasoning

Klein and Myers (1999) wrote that the principle of dialogical reasoning "requires the researcher to confront his or her preconceptions (prejudices) that guided the original research design (i.e., the original lenses) with the data that emerge through the research process" (Klein & Myers, 1999, p. 76). Klein and Myers (1999) state that the "researchers should make the historical intellectual basis of the research (i.e., its fundamental philosophical assumptions) as transparent as possible to the reader and himself or herself" (Klein & Myers, 1999, p. 76). They also state that "[a]s a minimum, the researcher should identify what type of interpretivism s/he prefers, identify its philosophical roots, and relate the particular strengths and weaknesses of the preferred philosophical direction to the purpose of the work" (Klein & Myers, 1999, p. 76).

Prejudices and prejudgment are stated to be seen as a hindrance for positivist research, it obstructs the possibility for objectivity. But in hermeneutics "prejudice is a necessary starting point for our understanding" (Klein & Myers, 1999, p. 76), that researchers must be aware of their own historicity. The prejudice simply guides the field study process and sometimes the prejudices have to be adjusted (or disregarded) according to findings. This is seen as an important part of the process of understanding (Klein & Myers, 1999). Simply, it is about being aware of your own prejudices and be able to take some distance from them when needed.

#### Principle 6: The Principle of Multiple Interpretations

According to Klein and Myers (1999, p. 76) the principle of multiple interpretations “requires the researcher to examine the influences that the social context has upon the actions under study by seeking out and documenting multiple viewpoints along with the reasons for them”. This is simply about studying multiple viewpoints among the participants and understanding the influence of factors such as power, economics, and values. It differs from the previous principle in that it challenges the participants conflicting interpretations, not the researchers conflicting interpretations. Although the end result can still be that the researchers’ preconceptions are changed as well. This provides value to the research by “probing beneath the surface” according to Klein and Myers (1999, p. 77).

Sometimes conflicting interpretations does not exist, but if this is the case it is best to explain the reason for it.

### Principle 7: The Principle of Suspicion

The principle of suspicion is to encourage critical thinking through discovery of "false preconceptions". It is about understanding the social world surrounding the actors, which includes power structures, different interests and the limitation of resources for actors to meet the goals. This principle is according to Klein and Myers (1999) the least applied one due to disagreements regarding how much researchers can and should be critical, and therefore it is stated that it is okay for some researchers to not fully follow this principle (Klein and Myers, 1999). So the principle is simply about being critical and not blindly believing everything.

### 2.4 Critique of Quality

The framework for evaluating the quality of the study is presented in this sub-chapter, based on Lincoln and Guba's (1985) trustworthiness criteria and also drawing on "The Principles of Interpretive Field Research" by Klein and Myers (1999).

Bryman and Bell (2011, p. 41) state: "Three of the most prominent criteria for the evaluation of business and management research are reliability, replication, and validity". However, there is some controversy regarding the relevance of these concepts in qualitative research (Bryman & Bell, 2011, p 394).

Bryman and Bell (2011, p. 41) states that reliability and replication are suitable mostly for quantitative research. This can be put into contrast with this study which instead is qualitative. The third criteria validity is according to Bryman and Bell (2011, p. 42) in many ways the most important criteria, and it deals with conclusions drawn from research. There are also different types of validity: *measurement validity*, *internal validity*, *external validity* and *ecological validity*. However, also here there is some misfit when applying the different types of validity to qualitative research. Measurement validity for example carries "connotations of measurement" according to Bryman and Bell (2011, p. 394), which would imply quantitative methods.

As mentioned before, there is some controversy regarding the relevance of the concepts of reliability, replication and validity in qualitative research (Bryman & Bell, 2011, p 394). Besides questioning the relevance, some authors have also suggested that meanings should be changed to better fit the qualitative nature (Bryman & Bell, 2011, p. 394). There are a number of different positions, which differ in terms on how much they differ from the already described criteria. Bryman and Bell (2011) describes in total three alternatives to use in qualitative research, but also mentions that there are actually more alternatives than that. Rather than trying to discover every single criteria there is (which would pose the question: can we be sure that we really have covered all plausible alternative criteria there is?), we will instead choose mixtures between the three positions provided by Bryman and Bell (2011). The researchers in qualitative research who do not make too many modifications to the concepts of validity and reliability are according to Bryman and Bell (2011) classified as realists. Realism is similar to positivism regarding collection and analysis of data, and also both view that the reality and description of it is separate (Bryman & Bell, 2011, p. 17). Since this study rather takes an interpretivistic approach, instead of a positivistic, it is thus necessary to make modifications to the concepts of validity and reliability to not align us with realism. This need is even further enhanced considering that the traditional concepts of reliability, replication and partly validity are more suitable for quantitative research (Bryman & Bell, 2011), as was mentioned earlier. Today, most researchers

are positioned somewhere between realism and anti-realism, and some of the strategies are influenced by Lincoln and Guba, according to Bryman and Bell (2011).

For this reason, to better adapt the criteria of reliability and validity to our qualitative research and taking into consideration that we have taken an interpretivist stance, we expand the criteria with the contributions of Lincoln and Guba (1985) concerning *trustworthiness*. *Trustworthiness* suggested by Lincoln and Guba (1985) consists four criteria: credibility, transferability, dependability and confirmability. When describing the different criteria, we describe how we also fulfill the principles of interpretive research according by Klein and Myers (1999). In our experience, Lincoln and Guba (1985) provide a lot of useful practical techniques to increase the trustworthiness of our research. It is thus easy to also describe how each of Lincoln and Guba's (1985) criteria contributes to fulfilling the principles as described by Klein and Myers (1999). So below are the different trustworthiness criteria described.

#### 2.4.1 Credibility

*Credibility* is related to internal validity and is described by Bryman and Bell (2011, p. 43) as: "how believable are the findings?". *Credibility* consists of five techniques.

1. Activities increasing the probability that credible findings will be produced (Lincoln & Guba, 1985, p. 301).
2. Peer debriefing (Lincoln & Guba, 1985, p.308).
3. Negative case analysis (Lincoln & Guba, 1985, p. 309).
4. Referential adequacy (Lincoln & Guba, 1985, p. 313).
5. Member checks (Lincoln & Guba, 1985, p. 314).

##### 1) Activities increasing the probability that credible findings will be produced

The activities concerning the first technique are *prolonged engagement*, *persistent observation* and *triangulation* (Lincoln & Guba, 1985, p. 301).

Prolonged engagement is "the investment of sufficient time to achieve certain purposes: learning the 'culture', testing for misinformation introduced by distortions either of the self or of the respondents, and building trust" (Lincoln & Guba, 1985, p. 301). This is fulfilled in our study by having the support of an ERP vendor partner with vast experience of enterprise system implementation and support. By frequent contact with them during this study, a better insight into the culture surrounding the enterprise system industry is thereby gained. Also, new perspectives and their experience better help us analyze and understand our empirical data. However, we still keep a critical mind to what we learn in accordance with Klein and Myers (1999) seventh principle of suspicion.

The second activity is persistent observation that provides depth, while prolonged engagement provides "scope" (Lincoln & Guba, 1985, p. 304). Persistent observation has not been conducted since we only conducted interviews at a single visit or by a Skype call.

The third activity is triangulation, which according to Denzin (1978) is having different methods, sources, investigators and theories. This is achieved in this study by doing a comparative study involving several case companies, and that the study is conducted by two persons. At the first case company we interviewed we held two different interviews, but at the following case companies we held one interview per company. The reason for this was simple: having two interviews did not give us much extra insight so we simply stuck to one interview per company instead.

## 2) Peer debriefing

Peer debriefing is “a process of exposing oneself to a disinterested peer in a manner paralleling an analytic session and for the purpose of exploring aspects of the inquiry that might otherwise remain only implicit with the inquirer’s mind” (Lincoln and Guba, 1985, p. 294). This will expose biases and clarify interpretations (Lincoln and Guba, 1985). This criterion is partly fulfilled by the opposition process included in this study.

By also involving a vendor partner into the analysis of our empirical material, possible biases and influences of the participant’s vendors can be discovered, in line with Klein and Myers (1999) third principle regarding the interaction between researchers and the subjects. Since none of our case companies use the same vendor system as the vendor partner we cooperate with, it is reasonable to believe that we will receive a critical analysis from the vendor partner we cooperate with. This should thus reduce possible bias from the vendor partner we cooperate with as well as contribute in discovering possible bias that has affected our subjects. It is also easier for us to identify system or vendor specific effects. We also believe that this working method helps us to better identify different interests, which is in accordance to the seventh principle of suspicion according to Klein and Myers (1999).

Also, a presentation was conducted at the same ERP vendor partner where the crucial findings and analysis were presented. Participating in that presentation was experienced staff with expert knowledge, and we urged the audience to speak their mind if they disagreed with anything. Due to limited time for the presentation only the crucial findings could be presented, and no negative criticism was raised by any participant. The discussions following the presentation were more about the potential of SaaS itself and how it changes the industry for vendors and vendor partners. However, the presentation still gave some value to the thesis since no major findings were disaffirmed, and thus provided us with confidence in that our empirical findings are valid and credible.

## 3) Negative case analysis

Negative case analysis is about revising the hypothesis during the study. Lincoln and Guba (1985, p. 309) describe the process like this: “The object of the game is continuously to refine a hypothesis until it *accounts for all known cases without exception*”. The strength of this approach is to reduce the number of exceptions to zero to increase the credibility of a study (Lincoln & Guba, 1985, p. 312). However, Lincoln and Guba (1985, p. 312) also states that zero exceptions might be too difficult to achieve and that the overall goal instead should be to lower the exceptions. In our study, it was our ambition to provide conclusions with as few exceptions as possible to contribute to greater validity in accordance with this technique. Negative case analysis also contribute in fulfilling Klein and Myers’ (1999) sixth principle of multiple interpretations, since to reduce the number of exceptions in our research, factors that generate those exceptions must be regarded. Factors that can be considered include conflicting interpretations among our participants. In a similar way, also the third principle of interaction between the researchers and subjects must be considered. That is, if we have misunderstood anything that causes the exceptions. So simply speaking, negative case analysis according to Lincoln and Guba (1985) applied to our data forced us to consider how multiple interpretations could cause the exceptions in the analysis.

Revisions of the hypothesis have mainly involved making the hypotheses more concrete so we can reject or accept them with certainty. However, in the case of the hypothesis for vendor relation (*H2: The use of SaaS systems involves a complex relation to the vendor*) we had some conflicting data regarding if the vendor relation is complex in SaaS usage. However, there was only one exception and

that exception likely occurred due to the interviewee being a technical director and not a normal end user. The number of systems in that case company, as well as his job role as managing the systems within the company made him more aware of the complexities. Thus, his experiences were not suitable in regards to that hypothesis.

#### 4) Referential adequacy

Referential adequacy includes recording interviews and then provides the material for other researchers. This provides a basis for reliability since other researchers can verify the reliability of the material by reaching similar conclusions. It also provides validity since the conclusions can be tested. Drawbacks include giving up data and possible criticism regarding how representing the data actually is (Lincoln & Guba, 1985). As is described in 6.5.3 *Interviews* the interviews were transcribed and analyzed. However, this material will not be published due to vast amount of pages and anonymization. The interviewee guide with questions however is given in *Appendix A*. We mainly chose to present data that could be grouped into the issues of focus in this study. Especially findings that could indicate any kind of effect, advantage or disadvantage in regards to any of the relevant issues were included in the empirical research of this report.

The reason for anonymization was that we wanted to ensure that all our subjects could speak freely about their experiences. Also, we wanted to conduct the analysis freely as well, without risking upsetting any interviewees or vendors for any reason if sensitive details would be included. However, as already mentioned, we still have allowed all our subjects to check the correctness of our findings. Further, we sent the finished report to everyone involved.

#### 5) Member checks

Member checks are explained by Lincoln and Guba (1985, p. 314) like this: "[t]he member check, whereby data, analytic categories, interpretations, and conclusions are tested with members of those stakeholder groups from whom the data were originally collected, is the most crucial technique for establishing credibility". The basic idea is simply to let the subjects under study confirm the collected material and analysis, and it can be done both formally and informally. Another kind of member check can be to test the insights gained from one group with another group. The purpose of member checks is among other: correct errors and stimulate additional insights from the respondents by the process of repeating the material to them. In this study, summaries of the insights from the interviews were sent back to the respondents for confirmation. Also, crucial findings were checked with other respondents to see if they could confirm it in their own case or rather oppose it. The purpose of this process was to get their reactions and interpret those. Also, crucial findings were checked at the ERP vendor partner we cooperate with during this study, to get their perspective regarding the material and analysis correctness. (Lincoln & Guba, 1985)

This is also recognition of that the participants of our study also analyze and interpret data, which is in accordance to Klein and Myers (1999) third principle of interaction between the researchers and the subjects. As mentioned, we have summarized our findings from an interview to the most important facts and then have let the participants check that data. In this way they have been able to confirm and also add extra data. Since the participants were told our purpose we were in this way utilizing their ability to analyze as well according to the principle mentioned.

#### 2.4.2 Transferability

*Transferability* is related to *external validity* and deals with similarities between two contexts, called *fittingness* (Lincoln & Guba, 1985, p. 124). This fittingness, also called level of congruence, needs to be congruent enough between two contexts for reasonable generalizations. According to Lincoln and

Guba (1985) it can be expected by a researcher to provide enough information for others to make assessment regarding the transferability. This is called *thick description* by Lincoln and Guba (1985, p. 125), which implies all the information needed to know to understand the findings. *External validity* is said to be impossible from a naturalistic viewpoint taken in their book, since hypotheses can only be said to be working in the context and specific time they were found, and if the hypotheses hold in other contexts it is said to be an “empirical issue”. In this study as much information as possible was provided for each case company, taking into consideration that providing too much detail would make it possible to identify specific companies, which would contradict the aim of anonymizing such data in the report. Also, only details considered relevant were provided, though while we are aware that the assessment of relevance in itself is dependent upon our judgment. However, in the end, that could be an issue in any qualitative research. When any uncertainty during the process arose regarding the relevance of details and if these details should be mentioned, then we still mentioned those details, to reduce possible bias effects.

Contributing with details regarding case studies and how we interpret the material is also in line with Klein and Myers’ (1999) fourth principle of abstraction and generalization. In particular two of the generalizations suggested by Klein and Myers (1999) are extra interesting in our research: the drawing of specific implications and the contribution of rich insight. Since our purpose is about finding organizational effects of SaaS usage for SMEs, it is desirable to be able to make generalizations. That is the reason we have strived to choose case companies with different SaaS systems to reduce the risk that discovered effects are related to a specific system or system type. We thus want to draw specific implications that are as general as possible. According to this principle that can be done by being very clear with how we arrive at our generalizations. The contribution of rich insight is another way to arrive at generalizations according to Klein and Myers (1999), similar to what Lincoln and Guba (1985) describes as *thick description* as we described above. Thus, by describing our collected study details and how we experience these details we make our research more generalizable according to Klein and Myers (1999) and also more transferable (if the reader agrees with the reasoning) according to Lincoln and Guba (1985).

### 2.4.3 Dependability

Dependability is related to reliability (Lincoln & Guba, 1985), but includes a broader range of factors according to Lincoln and Guba (1985). To assess dependability a few steps needs to be taken. The first deals with “appropriateness of inquire decisions and methodological shifts” (Lincoln & Guba, 1985, p. 324). This includes questioning inquirer’s own bias to see that early closure was not reached, that data and different areas have been explored and that there has been no influence by outside sponsors or similar. It thus aims to limit premature judgment and influences. Biases have been covered before, and investigating different areas and angles have also been described in regards to *peer reviewing* and *member checks*. However, possible negative outside influence have not yet been covered. During this study some of the case company names have been discovered by “case company” descriptions at the websites of vendors or partners. It is thus a small chance that the vendor or partner has selected companies that are especially satisfied customers, which could influence the results of this research. However, all SaaS systems used by each company are assessed, with a focus on the post-implementation phase, which starts after the implementation is done. So a successful implementation does not necessarily imply a problem-free post-implementation phase. Also, most of the case companies use several SaaS solutions, whose vendors or partners might not have named them as a “case company” at their websites. And lastly, due to the multi-tenant nature of SaaS systems possible negative effects (e.g. system failure) should strike all customers equally, which makes it difficult for the vendor to select particular customers who have a more positive experience.

Being aware of possible vendor influence in selection of case companies is in accordance with Klein and Myers (1999) seventh principle of suspicion, since we are aware that there could be other interests affecting our selection of case companies. As mentioned earlier we also were cooperating with an ERP vendor partner and involving them when necessary to help the research progress. However, in our opinion they never tried to steer our report or work in any direction. Instead, they took more of a supportive role. The purpose of the study was our own choice, even though we did discuss alternatives with the vendor. They said it was part of their policy to support university students whenever they can. We have always tried to keep a critical mindset to information and interpretations resulting from discussions of the vendor partner as well, in accordance to seventh principle of suspicion by Klein and Myers (1999).

#### 2.4.4 Confirmability

Lincoln and Guba (1985) mention a few techniques for establishing confirmability. One of those is the audit trail, which is residues of recordings in the research. Six “Halpern audit trails” are mentioned in regards to this technique. However, Lincoln and Guba (1985, p. 319) state that it is unlikely that material can be produced to cover all those trails. The audit trails simply deal with keeping recordings and notes as proof. All such material has been saved but is not shared due to anonymization reasons. In general, all data collected and analyzed is stored digitally, which is easy to do. Considering that Lincoln and Guba published their book in 1985 that might not have been the case then, which would explain why they go into such details about these audit trails. There are other techniques included into the confirmability, which are “the audit process”, “formal agreement”, “determination of trustworthiness” and “closure” (Lincoln & Guba, 1985, p.318-325). Applying these techniques is considered to not add any more value to this methodology, and thus are excluded. For example, Lincoln and Guba (1985, p. 328) chose only to mention the “audit trail” in their brief table summary of the techniques, which could imply that it is the most important technique for confirmability.

Saving as much raw data as possible also makes it easier to add details in the report when needed, or revisit the data to be able to recall how the data collection was experienced. As mentioned before, to be able to explain how data was experienced is important according to Klein's and Myer's (1999) fourth principle of abstraction and generalization.

The transcribed data has been especially useful during the process. Whenever doubt has arisen regarding anything the transcribed documents have been accessed where it was easy to search for the specific parts of interview necessary to clarify the matter at hand. An example of when the transcriptions have helped is during our discussions regarding the selection of relevant issues since we then realized how vendor relation was an issue worth studying further. Then we had to go back to the transcriptions to find what the previous case companies had said about their vendor relations. Making the transcriptions helped in that we got to re-live the interview and got a chance to further understand what the interviewee had said. But the transcriptions also gave us artifacts to check when discussions about what a certain interviewee actually had said or which interviewee had made a certain statement.

#### 2.4.5 Revisiting the Principles of Interpretive Field Research (Klein & Myers, 1999)

When describing the four trustworthiness criteria we also described how using these criteria were related to Klein and Myers (1999) hermeneutic principles. However, two of the principles were never mentioned: the second principle of contextualization and the fifth principle of dialogical reasoning.

The second principle of contextualization is more about understanding how our work affects the organizations we interview. It could be that when we interview individuals regarding their company's SaaS usage that our questions and their own reflections affect their *future* usage. If the usage is

affected then it is likely that the organizational effects might be affected. It is interesting to think about but difficult to study and also outside the scope of this study. If we affect the case companies, we hope it is in a good way and that they can improve their work.

SaaS and “the cloud” is a trendy topic as we were writing this report in 2015. There is a possibility that the popularity or trend itself feeds into its success and thus influence us, our case companies as well as our cooperating vendor partner to excessively believe in the promises of SaaS. Also, since most of our case companies can be considered high-tech, it could be that these companies naturally want to be associated with trendy technology such as SaaS and thus are overly optimistic of SaaS system usage. In that case, this enforces our limitations that generalizations found in this study can mainly be applied to *high-tech* SMEs. Also, the study has targeted companies mainly in the Stockholm area of Sweden where Internet access is taken for granted, and there is a certain level of technological development and technological acceptance in the society in general. Thus, the benefits of SaaS could be lower in lesser-developed countries who are not as advanced as Sweden is 2015, which would affect the organizational effects of SaaS usage.

The fifth principle of dialogical reasoning is about a few things worth mentioning. First we should make the “historical intellectual basis of the research” (Klein & Myers, 1999, p. 76) as transparent as possible. In a more practical on-topic way this is attained with the background including its problem description that explains why we chose to study what we do and why it is interesting. Regarding more philosophical aspects such as the selection of research method, it is attained by this methodological chapter. Regarding the influence of prejudice, we have tried to question our own and other’s prejudice continuously throughout the work. Since we discuss findings with each other as well as other people, this also reduces prejudice to a certain degree.

Lastly, it is also worth discussing how the subjects we interviewed might have regarded us, in accordance with Klein's and Myer's (1999) third principle of interaction between the researchers and subjects. We avoided mentioning other interviews already conducted as well as other arrangements (e.g. the ERP vendor partner) to reduce the likelihood of that influencing the answers received. We were very clear though to explain that we were students from Linköping University writing our master thesis. Also, as already explained we explained that we will be anonymizing the report to ensure honest answers. Also, we used open-ended questions before we went into specific questions about each issue studied. In this way we could get a feeling for what the subject considered important with minimal influence from our own prejudice. It is difficult to ensure that the subjects do not feel judged or inspected by us, however we explained to them that we were mainly interested in their *experiences*.

Below is how we have dealt with the different principles summarized in a table.

Table 2.1 - How we have used the hermeneutic principles according to Klein and Myers (1999)

Principle	How we have applied the principle
1. The Fundamental Principle of Hermeneutic Circle	<p><i>Peer debriefing</i> that tests the understanding of the whole work as well as the correctness of the parts.</p> <p>Example on how we have applied peer debriefing in practice: The opposition process and presentation of findings to an ERP vendor partner.</p>
2. The Principle of Contextualization	<p>Being aware that our interview process could affect the <i>future</i> SaaS usage within those organizations. Also understanding that SaaS is a trend in society as of writing this report, which might influence answers received as well as our own analysis.</p>
3. The Principle of Interaction Between the Researchers and the Subjects	<p>Using our vendor partner contact to discover how their vendors might have influenced our interviewees.</p> <p>To minimize influence on answers we avoided mentioning previous interviews and other arrangements to subjects. Also explained anonymization in the report and emphasized that we were university students interested in their <i>experiences</i>.</p> <p><i>Negative case analysis</i> according to Lincoln and Guba (1985) applied to our data forced us to consider how our interpretation could cause the exceptions in the analysis. For example our hypotheses have been clarified during the process, and exceptions have been minimized.</p> <p><i>Member checks</i> contribute to correctness in interpretation of the researchers and enhanced analysis of the collected data by allowing further input from participants. All case companies received a summary of the most important findings to give them opportunity to clarify and correct key findings.</p>
4. The Principle of Abstraction and Generalization	<p>Providing <i>thick descriptions</i> of interview material according to Lincoln and Guba (1999) and describing how those details were experienced and collected to convince the reader that generalizations regarding the organizational effects are valid.</p> <p>Saving raw data to be able to add further details in the report, or further explain how the data was experienced when collected.</p>
5. The Principle of Dialogical Reasoning	<p>Discussing findings with ourselves and other people to limit possible prejudice. Explaining our choices in the methodological chapter of this report.</p>
6. The Principle of Multiple Interpretations	<p><i>Negative case analysis</i> according to Lincoln and Guba applied to our data forced us to consider how multiple interpretations could cause the exceptions in the analysis. There were some problems incorporating the material from the last interview into the hypothesis regarding vendor relation being more complex for SaaS-based systems. However, the reason for this was that the last subject was a technical director and can thus not be considered a normal end user but rather an internal system provider.</p>
7. The Principle of Suspicion	<p>We used our vendor partner contact to discover possible subject biases that they have received from their vendors.</p> <p>Being aware that the selection of case companies is in part influenced by vendor preferences. Thus, we questioned our findings and compared to our other findings as well.</p>

## 2.5 Techniques

In this section the applied techniques for this study are described. These include theory research, case company studies and interviews.

### 2.5.1 Literature Research

Here the process of finding, selecting and assessing theoretical sources is described.

#### Keywords and Databases

The primary search engine used has been Unisearch, which is provided by the library at Linköping University and contains more than 100 databases (Linköping University, 2015). A simple search on “Software as a Service” renders for example over 78 000 results. Primarily keywords in different combinations have been used (see below) to find articles where the results have been presented in order of relevance by the database in question.

Even though Unisearch covers many databases, more specific databases have also been used to draw on special functionality. In particular Scopus, Web of Science and Google Scholar have been used for that reason. In addition, different databases present different result lists and thus we are not limited to only Unisearch’s way of choosing articles and the order of these in the resulting lists.

Articles that have been especially useful have been further reviewed in Web of Science. Lists of other articles that have cited an interesting article have been generated using this database. Each such list of articles has then been sorted by the number of times each article in the list has been cited by other articles. Further filtering has also been applied to make sure that the results were within topics of interest of this report. It is our view that if the academic world have cited an article many times, then it should be of interest for us as well, considering network effects. However, one risk with this strategy is that you end up in clusters where authors cite each other for any reason. Another risk is that we miss out newly published and not yet widely cited research, especially considering SaaS is a trendy topic. Keeping this in mind we only used Web of Science as a complement tool to find articles we otherwise might have missed out.

Scopus and Google Scholar have been useful to discover new articles by filtering on keywords, in a similar manner that UniSearch has been used. The reason for using several databases is that different databases might have different algorithms to select the list of relevant articles based on the same set of keywords. Our experience has been that the lists differ, mostly in regards to the order of presented articles. Other literature were found by looking in the reference list of articles already considered relevant.

An aspect that we have considered is the risk of ending up in a cluster of authors that just refer to each other for reasons that could be less than desirable for objective research. We have seen some indications of that by studying the reference lists of articles. For that reason we have also broaden our search by finding new articles using Google and Wikipedia references. We have also read some articles which include literature reviews, for example Salleh et al. (2012), which has been helpful in getting an overview in the field and discovering new literature. When reading articles we often checked the reference lists to discover new articles. Also, we were careful to go to the original sources as referred in articles, so we would not be too dependent upon other authors’ interpretation of the original source.

Some of the keywords that have been used in different combinations:

- Cloud Computing
- Cloud
- Software as a System, SaaS
- Enterprise Resource Planning, ERP
- Small and Medium Enterprises, SME
- Vendor lock-in
- Price model
- Critical Success Factors, CSF
- Multi-tenancy
- Organizational effects
- Organization
- Information System Success Model / DeLone & McLean

Selection of theoretic literature when using Unisearch went through a couple of exclusion stages.

- A result in the top 25 articles when sorted by relevancy
- Written in English (some results were in non-English languages)
- Article seeming suitable for our study after reading the abstract
- Reading the articles and finding the contents appropriate for our study
- Quality checks regarding: language quality (grammar) and logic in reasoning

In general, most discovered articles were written in English. The reason for this was probably that our keywords were in English as well. We could have searched for Swedish sources as well, however we would not be able to find as many articles and also we want to keep our references mainly in the same language as the report written so that interested readers can validate our literature findings.

### Selection of Sources

Articles were first screened by being in the top 25 hits, sorted on relevance and written in English. Further relevance check was done by evaluating the title of the article. Thereafter the abstracts have been read. The still interesting articles have then been read to assess if it is a trustworthy source, taking into consideration factors such as: quality of language, published media, consistency in argumentation, use of frameworks and references, and the overall impression. Only sources considered trustworthy have been included into this report. Conference papers have also been considered appropriate since the field of cloud computing is relatively new in academic context and conference papers can provide deeper insights. Some web sources have been reviewed as well, including computer magazine articles, vendor or partner websites, technology news and so on.

In total 36 SaaS and cloud related articles have been reviewed during our literature study for this report, which includes articles referred to throughout the report as well as articles that were not referenced. A full list of these articles can be found in *Appendix B*. The total amount of sources included in the reference list for the full report is 38, which includes web sites, method sources and various articles. We have not set a limit on how many articles to include, but rather those 38 were considered to contribute most to the purpose of our study. Also, the literature search stopped when we thought that we had enough literature considering the scope of this study, and when our described techniques to discover new literature did not provide many more relevant articles.

## Selection of Relevant Issues and Grouping of Literature Findings

In the beginning of the study we conducted a literature study to discover what common issues that exists in SaaS usage. This presented us with a list of common issues, which were the answer to the first research question:

*What common issues exists that affect organizations in their usage of SaaS systems?*

Then two companies were visited, with three interviews in total, where we asked questions about each common issue to discover which ones were most relevant to pursue. These we chose to call "relevant issues". The process of selecting these relevant issues is described further in 5.1.1 *Selection of Relevant Issues*. It has been our ambition to provide depth within a few limited issues since providing depth within all issues would make the report too large and complex. However, the most common issues discovered in our literature study are also mentioned in the frame of reference. This is partly because many of those issues are interrelated and an overview provides room for a better understanding and analysis. Further, to determine the relevant issues to pursue is also one of our research questions.

Another aspect affecting the selection of relevant issues is the distinction between what a relevant issue is and what an organizational effect is. The studied literature does not usually make this distinction, but we have to do this since it is part of our purpose to map the relevant issues to certain organizational effects. Some articles do not even strive to express the factors explicitly but could describe them implicitly or just briefly mention them. Different articles use different terminologies that differ from our chosen terminology, such as "relevant issues" and "common issues". Some articles also differ in what aspects they put in a certain group, when there is some kind of grouping available. Other articles group aspects according to frameworks. For example Seethamraju (2015) with Technology Organization and Environment (TOE) framework and Dutta et al. (2013) with an ontology of risks in cloud computing. Also, there is a relative lack of information in this relatively new topic, especially when further taking into consideration our focused purpose that includes organizational effects, post-implementation usage, enterprise systems and SaaS systems.

This is why there has been a need for us to create our own grouping of findings as well as analytical framework. After the grouping process and the creation of analytical framework was done, the further literature study focused on discovering articles with deeper information within each relevant issue.

### 2.5.2 Case Company Studies

In this part of the methodology concerning the case company studies is described.

#### Grouping of Findings in Interview Material

The purpose of the pre-study was to find out which relevant issues to focus on in the study phase by finding out what information can be retrieved from a customer company. In addition, the pre-study helped to group the relevant issues in a way that fitted the purpose of the report. This grouping has been applied for 3 *Frame of Reference* as well, to give the report a consistent structure. Coming up with a structured way to group information was a need that materialized already in the early pre-study literature review. It was therefore decided to adopt the term "relevant issues" to describe these groups. This was partly inspired by Ehie and Madsen (2005, p.545) who adopted part of the concepts of Critical Success Factors by creating their own label of it. Since we are not interested in issues that necessarily are critical to create success we have chosen a terminology that will not be associated with critical success factors. Rather, we are more interested to explore areas that are *relevant* regarding

the studied post-implementation phase, information retrievable from case companies and how SaaS specific the issue is.

The actual process of grouping the data into relevant issues has been influenced by Peng and Gala (2014) who used a thematic analysis approach to their research findings. Thematic analysis is there described to be a five stage process, described like this by Peng and Gala (2014, p. 25):

Table 2.2 - Thematic analysis, five stages, table from Peng and Gala (2014, p. 25)

<b>Stage</b>	<b>Description of the process</b>
<b>1. Getting familiar with the data</b>	<i>Get to know the data by reading and re-reading the data set.</i>
<b>2. Coding the data</b>	<i>Develop the coding scheme, and code the textual data in a systematic fashion across the entire data set by using NVivo.</i>
<b>3. Connecting codes with themes</b>	<i>Collate codes into themes and sub categories, gather all data relevant to each theme and sub category.</i>
<b>4. Reviewing themes &amp; developing Ontology</b>	<i>Check if the themes and sub categories work in relation to the coded quotes and the entire data set, generate an ontology of the analysis.</i>
<b>5. Reporting findings</b>	<i>Final analysis of selected quotes, relating results back to the research question &amp; literature, presenting findings.</i>

We did however not use NVivo, but instead first transcribed the interviews and then used mind-maps to code and connect the collected data. The resulting ontology in our case is the relevant issues that were selected to further pursue. The resulting ontology, "Issues in SaaS", is the central structure of this report. It is part of our research questions and hypotheses. The ontology is shown in 3.1 *Issues in SaaS* where we present "relevant issues" of which we selected to study. In 4 *Our Adaption of the IS Success Model and Hypotheses* the IS Success model is adapted to the "relevant issues". In 5 *Empirical Findings* and 6 *Analysis* "common issues" are presented and the "relevant issues" are chosen. In the 6 *Analysis* and 7 *Conclusions* we also answer the hypotheses and research questions with focus on one "relevant issues" at a time.

### Selection of Relevant issues To Pursue

The selection of relevant issues to pursue were assessed in the collected pre-study material using three dimensions: post-implementation fit of the issue, information retrievable from case companies regarding the issue, and how SaaS specific the relevant issue was considered. They were chosen since it is our view that these three together form a requisite to make significant contribution within our chosen purpose. The assessment process is described more thoroughly under 3.1 *Selection of Relevant Issues* in the empirical findings.

### Selection of Case Companies

Eisenhardt (1989) recommends having between four to ten case companies, and that having less than four case companies would not be convincing enough. Eisenhardt (1989) described this from the perspective of generating theory. In our study the aim is rather to test theory, but our perspective is that the number of case companies sufficient to generate theory should also be enough to test theory and thus "generate" valid conclusions. This report thus uses five case companies, including the two pre-study case companies, to satisfy this criteria. One could argue that we should have had four additional case companies after the pre-study to satisfy Eisenhardt's criteria. However, since we still included the two pre-study companies to analyze and answer the purpose of the report, we believe our real contribution actually is five case companies.

The case companies were found by searching on Google and visiting different SaaS system vendors' and partners' websites. Possible biases regarding this selection method have already been covered in the 2.6.4 *Critique of Quality*. Whenever we found a list of customers we used "Retriever Business" to further investigate each case company. "Retriever Business" is available to students of Linköping University and contains financial statements and other company related data. We especially chose to look at the number of employees registered for the company to make sure we contacted companies that were not too large and thus outside our limitations.

Whenever there was a customer contact person by name at the vendor website, we chose to contact that person directly. If there was no such person, we looked at the customer website to find a person whose position would imply usage of the system we know the company were using. For example, whenever we knew the company used a SaaS CRM system, we tried to contact someone with responsibilities in sales.

We also contacted CFOs and one technical director. Though a technical director cannot be considered a normal end user. However, we believe that they can provide a broader view of the usage in an organization due to their position. In the interview where we interviewed the technical director he also described how he was an end user of many of the systems and had also moved in different positions within the company, where being the technical director was his current position. So we still considered his opinions valuable since he had experience from other positions involving SaaS usage before his current role. He could especially provide deep insights regarding the issue "vendor relation" where he had a lot of experience. However, we did take into account that some of his experiences are not representative of a normal user. So the interview with him is somewhat different from the others and we have taken this into account. So, we simply had five interviews with normal users at four case companies and one interview at the fifth case company with someone who cannot be fully considered a normal user. However, Eisenhardt (1989) still considered four case companies to be enough so we believe we still fulfill her criteria in any case.

If there were no contact details for individual employees at the SaaS-using company's web site, we instead chose to contact the company through the official e-mail address. So the initial contact was done by e-mail where we described our educational background, the topic of our study and explicitly asked if they were interested to participate in an interview. Whenever we got an affirmative response to participate in our study, we first made sure that they fulfilled our criteria regarding actual usage of SaaS systems, and for at least two years. We then scheduled the interviews and held all of them except one at the customer's own company premises.

### Selection of Analytical Framework

DeLone's and McLean's (1992; 2003) original and updated version of Information System Success model was selected to build the foundation of our analytical framework. There were aspects of both the original and the updated version that we felt was needed to perform our analysis, while some aspects was not considered useful. So the solution was simply a combination of the original and updated version with some adaptations. In 3.4 *The DeLone & McLean Information Success Model* we will go into further detail about our analytical framework and in 4.1 *Adaption of the IS Success Model* we explain further how we adapted the model to our research.

### 2.5.3 Interviews

Interviews were held with employees during visits to the case companies, employees that we believed had the right insight into the system usage to contribute to our study. Which users that were interviewed depended on the type of system, but management positions like chief financial officer

(CFO) were always prioritized. Higher positions were also chosen since we wanted to talk about not only direct end user usage of a system from a computer screen, but primarily usage from a broader organizational perspective. For example the vendor relation aspects that are not a result of direct interaction with the system interface but rather through contact with the vendor. In general, when we talk about usage in this report we imply organizational usage of the system from this broader perspective. Also, in SMEs, some of these systems are used by only a small amount of people and thus the most logical approach is to contact the highest position in regards to the system studied. Further, when finding contact details on vendor websites or similar it most often was a person with higher position in that customer company.

The most important criteria was that the person interviewed could provide insight into the SaaS usage. Since the case companies are not large companies, people in positions such as CFO are considered being closer to the daily operations than they would be in a large company. In the last interview, as already mentioned, we interviewed a technical director. A technical director can of course be considered to be more of an internal supplier of systems. But in this case, as already mentioned, he also had end user experience and deep insight into the broader perspective we were seeking regarding organizational effects. He had especially good insight into vendor relation and integration issues, thus giving the empirical research the depth we were aiming for. However once again, we do consider his experiences to not be fully representative of a normal user, so the interview material is used more carefully from that interview. However the insights are still valuable in the domain of organizational effects and in line with the purpose of the study.

The interviews were semi-structured. The reason for this was that we wanted to have the perspective of the subjects without influencing them too much. Semi-structured interviewing also allowed us to use follow-up questions and let the interview have a more natural flow where we avoided interrupting too much. We believe this also decreases the influence of our own biases.

The interviews started with some general small talk to get to know the subject and his or her background and role in the company. Then we continued with general questions regarding the usage to minimize the influence of our own biases and to get an idea of which areas regarding SaaS usage the subject chose to describe. After the general questions we went into our specific areas to investigate. In the pre-study these were the most common issues discovered in the literature. During the following study phase we chose to focus on the five areas (relevant issues) we had decided to focus our study on. The specific questions asked were a result of our pre-study and our literature review.

All the interviews were recorded and transcribed. According to Bryman and Bell (2011) this allows primarily the researchers to revisit the interviews and reduce the influence of their own values and biases. The risk is that the interviewee will be more hesitant to share or even speak if recorded. Though we believe that by using our mobile phones as recording devices it was more subtle than using a visible microphone, as Bryman and Bell (2011) suggested, and thus might reduce the interviewee's notion of being recorded. To mitigate the risk of speak sometimes being incomprehensible due to lower quality recording devices we used two mobile phones. Lastly after each interview notes about the interview were taken as per suggestion by Bryman and Bell (2011). The notes were in the contexts of: how the interview went, place, feelings and setting. For example in most case companies we were very satisfied with the answers received. In one case however, we felt that the subject was overly concerned with the accuracy of his statements. In that case a second person participating in the same interview could have been good so that he could have discussed his experiences with another system user. In the last interview with the technical director we felt we received a lot of valuable insight into the relevant

issues of integration and vendor relation. Insights like these were noted and served as part of our raw data when writing the *Empirical Research* section.

### 3 Frame of Reference

*The frame of reference for this report consists of several parts that will lead up to the research model in the following chapter. First some theory needed to understand the nature of our topic is presented. This includes the cloud concept and a sensitizing device for price models. After that our findings from the literature study regarding the topic of SaaS is presented. The findings are grouped into different categories described as issues. This leads up to a section describing the five identified most relevant issues in SaaS system usage post implementation that will provide the theoretical input to the research model. Lastly, the inspiration for our research model is presented and described.*

#### 3.1 Cloud

The purpose of this thesis is to study Software-as-a-Service, SaaS, which is a part of what is called "cloud". Mell and Grance (2011) published the National Institute of Standards and Technology's (USA) definition of cloud computing to be used by all US Federal agencies.

According to Mell and Grance (2011) cloud has three types of service models: Infrastructure-as-a-Service, Platform-as-a-Service and Software-as-a-Service. SaaS is the highest level in which all the lower levels are included in the service. This means that the software used by the customer is owned and run by the provider. Then to access the software a thin client interface, such as a web browser, is used. The customer does not manage anything regarding the service apart from configuration settings, where the provider manages for example updates and system maintenance.

The delivery model is another part of what cloud is. The delivery model decides who the service is available to and it can either be: public, private, hybrid or community. The two extremes are public and private, where "public" means that the service is open for anyone to use while "private" means that the service is only available to a single customer organization. (c.f Mell & Grance, 2011)

In our literature review (see *Appendix B*) we found that a lot of sources used Mell and Grance (2011) but some also used Marston et al. (2011). Marston et al. (2011) further defined cloud. Their definition were:

*"It is an information technology service model where computing services (both hardware and software) are delivered on-demand to customers over a network in a self-service fashion, independent of device and location."* (Marston et al, 2011, p. 177)

One characteristic of cloud, as stated by Mell and Grance (2011), we find important to present is "resource pooling", because in resource pooling the concept of "multi-tenancy" is included. Multi-tenancy is defined by Kabbedijk et al. (2014, p. 144) as:

*"Multi-tenancy is a property of a system where multiple customers, so-called tenants, transparently share the system's resources, such as services, applications, databases, or hardware, with the aim of lowering costs, while still being able to exclusively configure the system to the needs of the tenant."*

The important notion here is that "tenant" often refers to a customer organization. This definition does not separate on which level the sharing of resources are performed, which means it is less important to include the technical implementation of the provider in this type of study.

#### 3.2 The SBIFT-model a Sensitizing Device for Price Models

The purpose of this master thesis is to study SaaS, where "service" is a very important keyword. With SaaS the organization can subscribe to the software instead of purchasing it, as with on-premises systems. The price model is thus different for SaaS systems and on-premises systems. A subscription means that the customer continuously pays for its usage, instead of more or less a one-time payment.

Laatikainen and Luoma (2014) did an empirical, quantitative study of how 324 Finnish vendors have changed their price models due to cloud computing. In their research Laatikainen and Luoma (2014) used Iveroth et al's (2013) SBIFT-model, a model that its creators recommend to be used as a sensitizing device when analyzing pricing strategies.

In this report we are using the SBIFT-model to clarify what we mean by price model and also when analyzing price model aspects to ensure that we have taken the full spectrum into consideration.

The SBIFT-model consists of five dimensions (see *figure 3.1*). All dimensions but *Scope* are discrete, a price model's value within a dimension is at one of the specific points, though the points are not extensive but more of guidelines. *Scope* is instead valued on a scale. Each dimension is explained below.

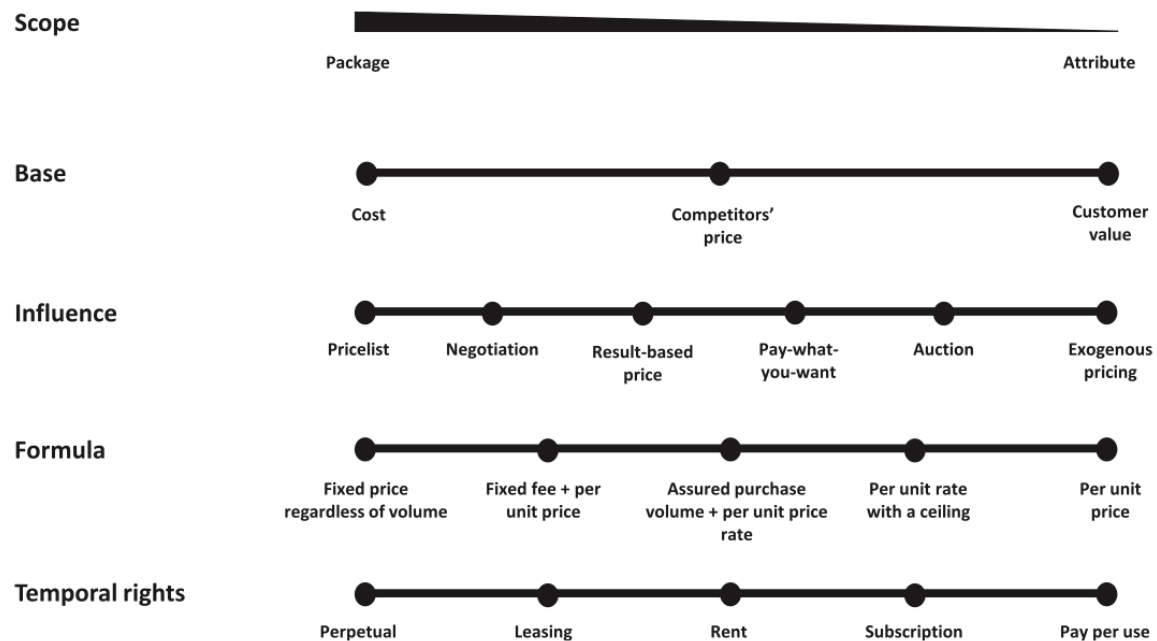


Figure 3.1 – The SBIFT-model (Iveroth et al., 2013)

The first dimension *Scope* refers to how much is included in an offer, which can be very relative. Towards *Package* the customer pays a single price for a product and towards *Attribute* the product is divided into for example different customization offers and a price exists for each customization. An example could be staying at a hotel where an “all-inclusive” stay could be compared to *Package* since most things are included in one price. A stay at a “bed and breakfast” hotel would be further away from package but still not fully towards *Attribute* since some aspects are still included, such as the bed, breakfast, sheets and soap.

The second dimension *Base* specifies on what the base price is derived from. *Cost* is the total cost for the product or service, *Competitor's price* is as the name indicates the prices of the sellers competitors and *Customer value* is the basis of how much is the customer actually willing to pay, for example during an auctioning.

*Influence* is the third dimension, which states how much control or lack of control the seller and the buyer has over the price. The seller has full control, which is *Pricelist*, the buyer has full control, which is either *Pay-what-you-want* or *Auction*, or neither have any control, which is *Exogenous pricing* where the price is set due in accordance with external influences. The points where both seller and buyer have some control are *Negotiation* and *Result-based price*. Haggling at a flea market can exemplify

*Negotiation* because it starts as a *Pricelist* but the customer wants more control over the end price. *Result-based price* is a bit more complicated because the final price depends on the use of the product or service.

The fourth dimension *Formula* concerns the connection between price and volume. We consider the extremes *Fixed price regardless of volume* and *Price-per-unit* to be self-explanatory. The middle points are then combinations of the two extremes to reduce certain disadvantages. *Fixed fee plus per unit price* can be used to ensure that the seller always gets some payment. When applying *Assured purchase volume plus per unit rate* the seller offers a fixed price up to a certain amount and thereafter a per unit rate is used, an example can be regarding mobile surf. *Per unit rate with a ceiling* ensures that the consumer does not pay a lot for high usage, an example is parking meters that has a per hour cost but also a maximum daily cost limit.

The fifth and last dimension is regarding the length and type of ownership. In this dimension the extremes are *Perpetual*, where the ownership lasts "forever", and *Pay-per-use*, which can be applied for consultant's hours since it's hard to own the service for more than the actual hour. An important aspect of *Perpetual* is that future improvements and changes to the product are not included while it is included for *Pay-per-use*. *Leasing* is to buy something for a set amount of time and the opportunity to buy eternal ownership when that time ends. *Rent* is similar to *Leasing* but without the opportunities to buy eternal ownership nor get improvements or updates. *Subscription* adds the opportunity for improvement and updates but ownership is transferred to the buyer for a specified amount of time.

### 3.3 Issues in SaaS

To fulfill our purpose and answer our research questions we needed to know what issues exist for SaaS. So during the conducted pre-study phase we studied primarily literature with topics regarding SaaS, though sometimes the sources discussed cloud in general. Separation has been made through explicitly stating "SaaS" when it concerns SaaS specifically and "cloud" when the authors themselves did not make a clear distinction. Sometimes the authors choose to use the terms SaaS and cloud interchangeably in their articles, and since we do not want to distort the original sources we choose to use the same term as the source. Sources discussing cloud more in general were still considered relevant due to their potential of being applicable to SaaS specifically and the possibility for verification with our case companies.

Below is firstly the found issues and their organizational effects presented. Afterwards is a more detailed description of each of the issues we decided to study further. The issues of further study are Price Model, Vendor Relation, Frequent Updates, Mobility and Integration. We selected these five issues due to considering them more relevant than the others during an evaluation session after a literature study and interviews with two case companies in the pre-study phase. The procedure of the selection of relevant issues is presented in *5.1.1 Selection of Relevant Issues*.

#### 3.3.1 Found Issues

The issues we found during the pre-study phase, their suggested effects and the source where it was stated can be found in *Table 3.1* below. The names of the issues are by our interpretation and derived from the literature. Because sometimes all the studied sources stated the same issue or a similar. Other times they all differed but seemed to indicate the same issue and sometimes they did implicitly relate to an issue. The need for deciding our own names for the issues arose due to the studied sources sometimes using different terms for similar issues or not naming an issue at all. During our study phase

we found other organizational effects from further literature study, which thus are not included in the pre-study *Table 3.1* below.

*Table 3.1 - Summarization of organizational effects for different issues and their effects, with sources.*

<i>Common Issue</i>	<i>Effect</i>	<i>Literature Source</i>
<i>Frequent Upgrades</i>	Less time consuming upgrades	Peng & Gala (2014)
	Less upgrade related costs	Peng and Gala (2014); Marston et al. (2013);
	Reduced complexity	Peng & Gala (2014); Lewandowski et al. (2013)
	Application failure	Lewandowskis et al. (2013)
<i>Integration</i>	Harder to integrate different systems	Peng & Gala (2014); Lewandowski et al. (2013)
	Limited support for operating systems	Peng & Gala (2014)
	Possibility for add-ons without compatibility issues	Johansson & Ruivo (2013)
	Mash-ups	Marston et al. (2011)
	System diversification through common framework	Marston et al. (2011); Lewandowski et al. (2013)
<i>IT Department</i>	Cloud strategy committee	Marston et al. (2011)
	Less time spent on system maintenance	Peng & Gala (2014)
<i>IT Department</i>	Increased resistance from IT staff	Marston et al. (2011)
	Opportunity for value creation focus	Marston et al. (2011)
<i>Price Model</i>	Lower TCO	Johansson & Ruivo (2013); Lewandowski et al. (2015)
	Operational expense	Marston et al. (2011)
	Lower upfront capital investment	Marston et al. (2011); Peng & Gala (2014)
	Increased computing power and analytic resources for	Marston et al. (2011)
	Cost inefficient for larger firms	Marston et al. (2011)
	Less hardware investments	Peng & Gala (2014)
	Less maintenance costs	Peng & Gala (2014); Lewandowski et al. (2015)
	Reduced cost for training	Peng & Gala (2011)
	Increased risk for hidden costs	Dutta et al. (2013)
Increased risk for lock-in	Dutta et al. (2013)	
<i>Mobility</i>	Device and location independent access	Johansson & Ruivo (2013); Marston et al. (2011); Dutta
	Flexible and mobile workforce	Johansson & Ruivo (2013)
	New applications due to location contexts	Marston et al. (2011)
	Increased efficiency and performance	Peng and Gala (2014)
	Mobility is included per default	Peng and Gala (2014)
<i>Security</i>	Fully Internet connection dependent	Johansson & Ruivo (2013)
	Increased security through standardized interfaces,	Marston et al. (2011)
	Decreased security due to sharing and storing data with	Marston et al. (2011); Dutta et al. (2013)
	Provider operations hidden	Peng & Gala (2014)
<i>Standardization</i>	Need for disaster recovery and contingency plan	Dutta et al. (2013)
	Easier and less costly enhancements	Johansson & Ruivo (2013)
	No individual adjustment for customers	Johansson & Ruivo (2013)
	Providing best-practice	Johansson & Ruivo (2013)
	Inability to customize	Lewandowskis et al. (2013)
<i>Functionality</i>	More focus on product and service differentiation	Johansson & Ruivo (2013)
	Inability for low-level work arounds	Johansson's & Ruivo's (2013)
	Risk of higher response times	Peng & Gala (2014)
	Processing speed is less dependent on data size	Peng & Gala (2014)
<i>Vendor Relation</i>	Hosting and maintenance provided by provider	Marston et al. (2011)
	Difficulty changing vendor (vendor lock-in)	Dutta et al. (2013)
	Vendor bankruptcy	Dutta et al. (2013)
	Reduced vendor lock-in (due to price model)	Johansson & Ruivo (2013)
	Risk of the cloud becoming a "victim of its own hype"	Marston et al. (2011)
	Risk of losing control	Johansson & Ruivo (2013)
	Responsibility transferred to the vendor	Johansson & Ruivo (2013)
	Service trust instead of product focus	Johansson & Ruivo (2013)
<i>Performance</i>	Users experiencing cloud systems as slow	Lewandowski et al. (2015)
	Users experiencing system's usability as low	Lewandowski et al. (2015)
<i>Privacy</i>	Criticism regarding the privacy management	Stienger et al. (2014); Peng & Gala (2014)
	Changing location of data without notification	Peng & Gala (2014)

As mentioned above the following five issues as described below are the issues selected for further study.

### 3.3.2 Price Model

To get a clear view of the price models discussed for SaaS systems we are in this section using the SBIFT-model (Iveroth et al, 2013) to support the categorization of the literature findings. This model is also used to ensure that we cover the aspects that can be expected when discussing the price model. The definition of public SaaS according to Mell and Grance (2011) in itself states a couple of things regarding its price model. Concerning the *Scope* of SaaS is that the mobility aspect is included in the definition of cloud and also the possibility to get more resources when required. The definition of Mell and Grance (2011) also limits the *Temporal rights* to be either *Rent*, *Subscription* or *Pay per use* due to the software being owned and run by the provider. This further indicates a *Scope* more toward *Package* due to inclusion of a whole system, from infrastructure through platform to the software, at a single price.

Johansson and Ruivo (2013, p.95) state that one of the differences between SaaS and on-premises systems is the price model. Johansson and Ruivo (2013) interviewed 20 experts involved in the ERP and SaaS fields within Microsoft and stated in the following way the importance of the costs for SaaS solutions:

*“Costs concerns, data security and system availability were perceived by the experts as the most important factors in customer perspective for adopting ERP systems in a SaaS delivery model.”* (Johansson & Ruivo, 2013, p. 96).

The majority of the experts also stated that the total cost of ownership (TCO) is lower for SaaS ERP solutions compared to on-premises ERP (Johansson & Ruivo, 2013, p.97).

Marston et al. (2011) published an early, often cited, business oriented article where they present a literature-based SWOT-analysis of cloud computing and suggestions for organizations. Marston et al. (2011, p.178) claim that cloud computing require no upfront capital investment for the users, and instead turns IT into an operational expense. It also lowers the cost of entry for smaller firms in regard to the computing power and advanced analytics provided. However, Marston et al. (2011, p. 184) also mentioned that for larger companies cloud computing is often not cost effective because they have achieved “best-of-breed” efficiencies already.

Peng and Gala (2014, p.26) did a study where they interviewed 16 members of an IT consulting firm and created an ontology of identified cloud ERP benefits and barriers. They state that the cost issues apparent in on-premises ERP systems can be *significantly* improved by using cloud solutions. Those costly issues in traditional ERPs that Peng and Gala (2014) mentioned were related to the financial and human resources needed in buying, installing, maintaining and improving the software and hardware, which in SaaS is mostly handled by the provider. Also the experts interviewed in that article stated that the customer costs for training are reduced and that the internal IT staff can focus on more important tasks in the company (Peng & Gala, 2014). In Dutta (2013) it is also stated that cloud computing reduces the costs in hardware investment and maintenance, and Peng and Gala (2014) also confirms that the SaaS deployment model requires less hardware investment.

These statements are in line with Lewandowski et al. (2015) reasoning that costs for maintenance and total cost of ownership is transferred to the service provider. Lewandowski et al. (2015) studied critical success factors for implementing SaaS ERP at five different US and UK companies where they describe challenges that SMEs face, including lack of modern technology and struggling with low resources.

They state that many SMEs cannot afford traditional ERP systems, which might be bending the truth. We will have to evaluate the affordability in accordance with our case companies.

Dutta et al. (2013) set up an ontology about risks in cloud computing, collected and analyzed 39 questionnaire answers from IT professionals and IT consultants about the risks. The questionnaire subjects were found through cloud computing interest groups at LinkedIn. In Dutta et al. (2013) they assess cloud computing risks by asking IT consultants and experts. One of the top 10 risks described in the article is that using cloud technology as a result of non-transparent operating models could increase hidden costs. These costs could be associated with data insurance fees, costs for disaster-recovery or costs for configuring applications. There is also a risk that the vendors increase their service fee later on, which in turn could lead to reduced user satisfaction and therefore cause the intention to change the vendor. Changing the vendor though could be problematic since it usually is only possible by the end of a service contract, and could demand time and resources and increase the costs. This in turn could prevent the user companies to change the vendor, causing a vendor lock-in situation (Dutta et al., 2013). This end result is described by Dutta et al. (2013) as an organizational risk of using cloud solutions. According to Marston et al. (2011) some of the pricing policies incorporated by the vendors are: flat fee, pay-per-use fee, or a combination of those two. Initial costs are lowered and studied literature does not disaffirm that cloud solutions also lowers maintenance and hardware costs for SMEs.

Returning to Laatikainen's and Luoma's (2014) study they found that the characteristics of cloud computing can reduce negotiation with the customers and that some SaaS firms employ pricelists due to less room for customization. They also found that a usage-based pricing is employed when "there are big differences in the user's demand" (Laatikainen & Luoma, 2014, p.253). Another finding was that using more volume dependent pricing components are more justified; the infrastructure costs can be transferred directly to the customer. Laatikainen and Luoma (2014) thus stated that the customer has lower influence on the service and its pricing than on-premises systems.

To summarize the above findings together with the SBIFT-model the above sources discuss a lot about actual cost, but not as much as specific types within the different dimensions. In many cases we perceive that they assume the reader to already know certain aspects of the price model. Because they do not always explicitly give information of which could be interpreted and classified into the SBIFT-model. Though, as above mentioned about Marston et al. (2011), the pricing policies could be any type within the *Formula* dimension with Laatikainen and Luoma (2014) stating a more usage-based pricing. Lewandowski et al. (2015) writes that it is possible for organizations to only pay for what they utilize and that, for example, the provider does the updates. This further suggests that the price model for SaaS is to the right side of both the dimension *Formula* and *Temporal rights* while moving *Scope* more towards *Package*. Looking at the websites of some vendors, for example Salesforce.com (2015), show that the Influence could be *Pricelist*. But for Netsuite (2015) they do not show list prices on their website so they might use *Negotiation* or perhaps just give their list prices through direct contact. None of the providers we have looked at show any clear sign that the *Influence*-type for their price model is anything else other than either *Pricelist* or *Negotiation*. Laatikainen and Luoma (2014) add more incitement that *Influence* is *Pricelist* and at most *Negotiation*, with their statement that the possibility for negotiation is lower. For the dimension *Base* the type could be *Cost* or *Competitor's Price*. It could be *Cost* if the system fulfills the essential characteristic *measured service* (Mell & Grance, 2011), which means that every type of usage can be measured and cost determined, which Laatikainen and Luoma (2014) also could hint at when infrastructure costs can be transferred to the customers. *Competitor's price* is also a possibility due to the possible *Influence*-types. Either can competitors' list

prices be compared or negotiation with several providers for comparative reasons is possible. Figure 3.2 shows our interpretation of what the price models for SaaS systems could be.

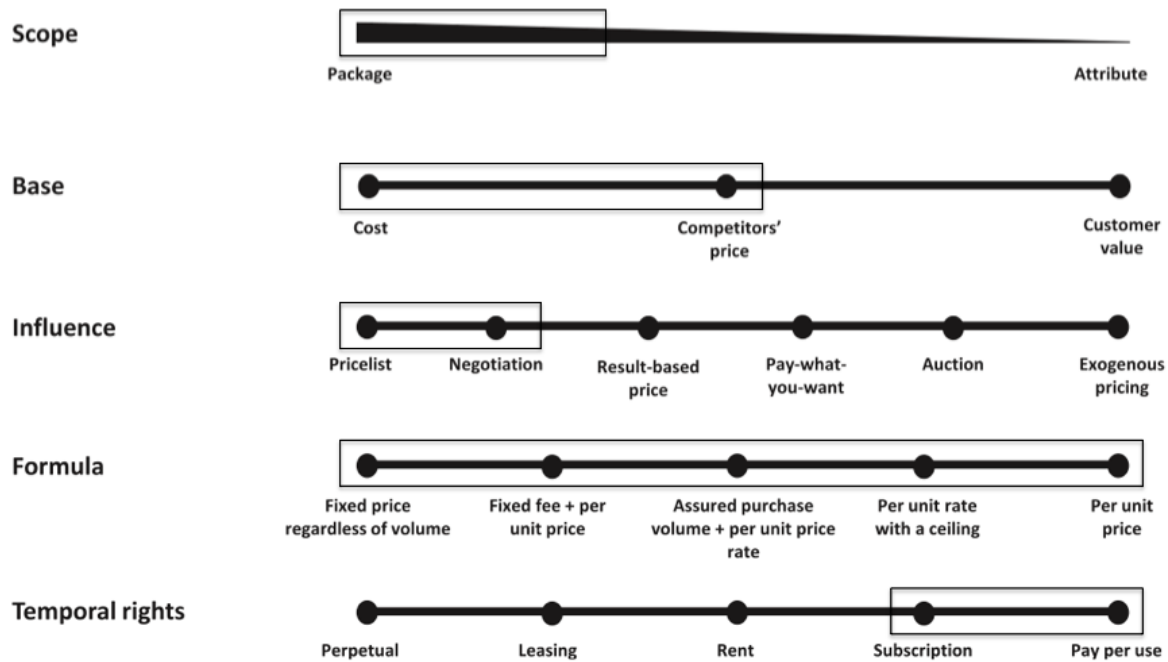


Figure 3.2 – Categorization in the SBIFT-model (Iveroth et al., 2013).

Table 3.2 – Effects and consequences in regards to the price model

Effects & Consequences	Source
Lower total cost of ownership	(Johansson & Ruivo, 2013)
IT becomes an operational cost	(Marston et al, 2011)
Lowered cost of entry for smaller firms regarding computer power and advanced analytics	(Johansson & Ruivo, 2013)
Lowered investment in buying, installing, maintaining and improving the software and hardware	(Peng & Gala, 2014)
Reduced customer costs for training	(Peng & Gala, 2014)
Internal IT staff can focus on other tasks (Peng & Gala, 2011)	
Actual costs for maintenance and total cost of ownership moved to the service provider	(Lewandowski, 2015)
Risk for non-transparent operation models	(Dutta et al, 2013)
Risk for increased service fee	(Dutta et al, 2013)

### 3.3.3 Vendor Relation

In this part the relevance of vendor relation is first described and then different aspects of vendor relation are described, including vendor lock-in, service level agreements, customer experience and expectations, control and ownership of the cloud.

The vendor relation for a cloud-based system is different from the vendor relation in an on-premises ERP system, and in some regards even more important. More specifically, Peng and Gala (2014, p. 28) describes the difference in the following way:

“After successful implementation, an on-premises ERP system can be maintained by the system vendor, a selected third-party IT consulting firm, or the IT department of the user company. In

contrast, a successfully implemented cloud ERP package will need to be hosted, maintained and supported only by the system provider throughout the entire post-implementation phase. Because client companies will interact with their cloud vendors in a more frequent and long-term basis, the role of system provider becomes more critical than ever before in the cloud environment.”

Marston et al. (2011, p. 181) reason in similar terms:

"In a traditional computing setup, the main stakeholders are the providers and consumers: the consumers use, own, maintain, and upgrade the systems while the providers deal with the sale, installation, licensing, consulting and maintenance of the technology involved. Cloud computing changes the roles of the traditional stakeholders and adds new ones."

Peng and Gala (2014) discuss that a cloud user could have difficulties changing vendor for various reasons. One such reason could be that it is a time-consuming and expensive task to move data to another vendor. There could also be legal restrictions that hinder the user from moving data at the end of a contract or during the contract (Peng & Gala, 2014). Dutta et al. (2013) confirm in their study that changing the vendor during a cloud contract or moving data by the end of a contract, could be problematic. It is actually found in their study to be one of top 10 risks in enterprise cloud computing (Dutta et al., 2013). These kind of issues can be described as vendor lock-in. However, in Johansson and Ruivo (2013) one expert states that the rental price model of SaaS leads to lower vendor lock-in.

In Lewandowski et al. (2013) 20 percent of the respondents saw vendor lock-in as a concern, which however is lower than some other concerns covered in the study such as customization possibilities and technical performance. Dutta et al. (2013) also raise concerns for the increased cost and difficulty after migrating to the cloud when the need to change back to in-house, or migrate data in general, when something goes wrong. Dutta et al. (2013) gives the example about vendor bankruptcy, but without assessing the probability of this happening without another company taking over.

In Peng and Gala (2014) it is said that a cloud customer has little control over who accesses their data at the vendor site. In regards to those security risks Peng and Gala (2014, p. 27) further describe what one of their interviewed cloud consultants mentioned:

“A Senior Cloud Consultant interviewed confirmed that such data security risks may be more likely to occur with cloud vendors that are ‘smaller in size, using inefficient data protection and monitoring practices, and having higher staff turnover’...” (Peng and Gala, 2014, p. 27)

Another dimension of vendor relation that this reports includes is non-privacy related agreements. According to Marston et al. (2011) many companies specify in the service level agreement that the cloud service needs to have an uptime of 99.99%, which the service providers are not willing to agree upon according to Marston et al. (2011). However, it is also stated that this is much better uptime than what many SMEs can attain building their own infrastructure considering their limited investment capability. In particular, more "cash-strapped SMEs" will be able to use their capital for other purposes instead. One way to handle possible failures according to Lewandowski (2013) is to specify service level agreements and to include updates and training in the contract. This is believed to enhance the service quality itself since it provides something for the vendor to be compared against, which in term will increase the user satisfaction (Lewandowski, 2013).

Another factor making particularly SMEs suitable for the cloud is that they in general have less legacy IS infrastructure (Marston et al., 2011). Further, Marston et al. (2011) say that first targeting these SMEs help building credibility to approach larger companies in the future. Another interesting aspect mentioned by Marston et al. (2011, p. 185) is that the vendor should manage user expectations

regarding the cloud so that it does not "become a victim of its own hype". The authors also recommend that end users also should manage their own expectations. Dutta et al. (2013, p. 14) reasons in a similar manner recommending that companies "must neither hold an over-optimistic view nor rely merely on their service providers" to achieve "success in cloud computing adoption and usage". It is also stated that it is crucial that customers are both aware and understand the cloud related risks and prepare the organization at all levels.

Johansson and Ruivo (2013) write that participants in their study mention that customers are concerned about in which direction SaaS ERP systems will be developed. It is specifically mentioned that customers could "lose the ownership" of the system, "lose the control" and be "forced into the direction" of the system (Johansson & Ruivo, 2013, p. 97). In Lewandowski et al. (2013) 20 percent of the respondents believed loss of control was a concern. However, all the participants in the Johansson and Ruivo (2013) mentioned also that the number one reason for choosing SaaS is that the implementation risk is transferred from the customer to the vendor instead. Further, Johansson and Ruivo (2013, p. 98) concludes:

"However, a SaaS provider should realize that a successful market establishment of its offer lays not so much on the product itself but on the kind of support given in the SaaS model and the customer experience with provided service. That is, the paradigm changes from product feature to service trust."

But it is emphasized that these statements have not been confirmed from a customer context, and the authors recommend further research regarding this.

Table 3.3 - Effects and consequences in regards to the vendor relation

Effects & Consequences	Source
The system provider hosts, maintained and supports the system	(Peng & Gala, 2014)
More frequent and long-term contact with the provider	(Peng & Gala, 2014)
Changes roles of old and adds new stakeholders	(Marston et al., 2011)
Moving data is time-consuming and expensive	(Peng & Gala, 2014)
Legal restrictions may exist to lock-in the customer	(Peng & Gala, 2014)
Moving data during a contract or end of a contract may be problematic	(Dutta et al, 2013)
Rental model may lower lock-in	(Johansson & Ruivo, 2013)
High impact of vendor bankruptcy	(Dutta et al, 2013)
Low control over vendor's access to customer's data	(Peng & Gala, 2014)
High uptime relative a customer's possibility for on-premises system	(Marston et al, 2011)
Cash-strapped SMEs can use capital for other users	(Marston et al, 2011)
Need for service level agreement and include updates and training as well	(Lewandoski, 2013)
Need for customers to be aware of and understand risks and have a prepared organizations for impacts	(Dutta et al, 2013)
The system's development direction crucial for the customer	(Johansson & Ruivo, 2013)
Transferred implementation risk to vendor	(Johansson & Ruvio, 2013)
Less focus on the product and more focus on support and customer experience	(Johansson & Ruivo, 2013)

### 3.3.4 Frequent Updates

Peng and Gala (2014) mention that on-premises ERP systems have inherent disadvantages; one of those is that it is time consuming to update the ERP software on different users' computers. With

cloud computing technology this disadvantage is expected to be reduced significantly. This is because the users can access their data and applications through a web browser without a local installation on a computer. This in turn leads to reduced need for hardware investments, and as stated by the authors: "...less fees and internal hazard for system maintenance and upgrade" (Peng & Gala, 2014, p.22). Also Marston et al. (2011) mention that cloud computing reduces costs related to upgrades. Lewandowski et al. (2013) describe that SaaS frees the customer from the complexity of hardware management and software updates, as well as the costs and time waste associated with such efforts. Lewandowski et al. (2013, p. 4) further make the following claim regarding execution of updates:

"SaaS provides access to latest technology and agile updating as system upgrades are executed seamlessly." (Lewandowski et al., 2013, p. 4)

Lewandowski et al. (2013) later makes this statement as well, indicating that updates can render problems:

"While upgrades and system updates were executed seamlessly, users complained that the application failed occasionally and this was heightened especially after upgrades and updates had been executed." (Lewandowski et al., 2013, p. 6)

Further, the solution to these issues is explained to be using service level agreements that include training and updates (Lewandowski et al., 2013).

Although not mentioned in the context of upgrades, Marston et al. (2011) gives an example of a vendor that guarantees 99.95% uptime over 365 days, which is supposed to be enough for most SMEs, but could be insufficient for larger organizations with "mission-critical applications". However, it is also mentioned that media scrutinizes major cloud vendors and therefore failures could be publicized.

Table 3.4 - Effects and consequences in regards to the frequent updates

Effects & Consequences	Source
Less time consumed to have an updated system	(Peng & Gala, 2014, Lewandowski et al, 2013)
Reduced cost related to updates	(Marston et al, 2013; Lewandowski et al, 2013)
Customers are freed from hardware management and software updates	(Lewandowski et al, 2013)
Access to latest technology	(Lewandowski et al, 2013)
Updates puts the system at risk of failure	(Lewandowski et al, 2013)

### 3.3.5 Mobility

Mobility is nothing new nor is it unique to SaaS, this is clear in Picoto et al. (2014). They discuss mobility in the form of mobile-business or m-business, how mobility aspects can give business value to companies, but they do not mention SaaS nor cloud. Though in our literature review we found that mobility is inherit in SaaS solutions. So even if Picoto et al. (2014) do not mention cloud we find their study important due to them further presenting what mobility is and what it enables. Picoto et al. (2014) used a mixed-method study where they explored the value of m-business and its link with firm performance. In their first phase they did seven interviews over five firms plus two external interviews and in their second phase they used questionnaire responses from 180 Portuguese companies. They state that mobile technology:

“...provide time and location flexibility, enabled by portability (ability to readily carry them), user or product identification (through SIM card or RFID), localization (ability to identify the geographic position of the mobile user), and instant connectivity (ability to be reachable and to have access at any time and in any place)” (Picoto et al., 2014, p. 572)

They also state that:

“The time and space independency is often referred to as mobility, upon which m-business can create distinctive value propositions of (i) ubiquity, allowing easier real-time access to information; (ii) convenience, through devices that store data and have easy and quick connections to the Internet, intranet or extranet, or other mobile devices; (iii) personalization through individual client identification and localization of both clients and products or services; and, (iv) unison, having real-time access to organizational databases through mobile applications” (Picoto et al., 2014, p. 581)

With their findings they state that “m-business has greater impact on sales and marketing and on internal operations than on procurement” (Picoto et al., 2014, p. 572). These findings were not surprising to them since procurement tends to work in traditional offices and that it probably matters less to wait with purchase orders until they are back to the office. Among stating that m-business is enabled by mobility technology the authors also describes that the mobility aspect enables a more mobile workforce, that (i) ubiquity refers to time and location independent access to wireless network to fulfil the need for real-time information and that mobile technology can add location- and context-specific services.

Johansson and Ruivo (2013) state that one of the most important differences between SaaS and on-premises systems is that applications can be accessed and controlled by the customer through the Internet from his or her location.

In Marston et al. (2011) where they provide their own definition of cloud computing, in which one of the defining aspects is ubiquity, which they explain includes "device and location independence". Further, the authors also highlights that the cloud technology enables new kind of applications and services that has not been possible before, and one of such examples is given by the authors like this:

"...mobile interactive applications that are location-, environment- and context-aware and that respond in real time to information provided by human users, nonhuman sensors (e.g. humidity and stress sensors within a shipping container) or even from independent information services (e.g. worldwide weather data)" (Marston et al., 2011, p. 178)

Dutta et al. (2013) also choose to include mobility in the cloud computing definition by referring to Marston et al. (2011). Further, Dutta et al. (2013) refers to the NIST definition of cloud computing by Mell and Grance (2011), which has been covered in the definition of cloud computing in this report as well. There one of the essential characteristics of cloud computing is *broad network access* (Mell & Grance, 2011), which simply can be interpreted as mobility.

In Johansson and Ruivo (2013) the term *ubiquity* is used to describe mobility, which is according to Picoto et al. (2014) is only one part of what mobility is, and that mobile access by any device gives a “flexible and mobile workforce” (Johansson & Ruivo, 2013, p.97). According to Peng and Gala (2014) traditional ERP can limit the usage of ERP system both while a user is inside the company premise as well as when the user is not physically at the company location. Specifically, it is more difficult for manufacturing personnel to access a traditional ERP system, which can lead to a delay of entering new data, or mistakes in entering the data (for example inventory levels). When managers are outside the company premise the manager might not be able to check company hosted ERP data. To enable access

to the company hosted ERP system the company would have to either customize the software package or buy extra hardware equipment. By using a cloud solution they reduce the need for customization and costs related to mobile functionality. In Peng and Gala (2014) it is further said that this increases both the efficiency and performance of a business. Finding possible negative organizational impacts of using mobility functionality in SaaS systems have proven more difficult in this literature study. For example, Dutta et al. (2013) provides an ontology with 39 cloud computing risks, and none of those risks directly include mobility aspects.

Table 3.5 - Effects and consequences in regards to mobility

Effects & Consequences	Source
Native Internet access	(Johansson & Ruivo, 2013)
Device and location independence	(Marston et al, 2011), Mell & Grance (2011), Picoto et al. (2014)
Location-, environment- and contact-aware systems	(Marston et al, 2011), Picoto et al. (2014)
Real-time responsive systems	(Marston et al, 2011), Picoto et al. (2014)
Flexible and mobile workforce	(Johansson & Ruivo, 2013), Picoto et al. (2014)
Extended access even on premise	(Peng & Gala, 2014)
Increased efficiency and performance	(Peng & Gala, 2014)

### 3.3.6 Integration

Peng's and Gala's (2014) findings were that using a cloud-vendor will not give sufficient freedom and right for customization nor integration compared to an on-premises system. Other findings of obstacles for integration amongst cloud systems were that both full systems and applications can be developed using different technologies and platforms, which limits their compatibility. Even though these difficulties they observed that different cloud services were combined into single services or applications.

Lewandowski et al. (2013) found that 40% of their case companies regard the technical performance of the system as a major concern. In their research technical performance included aspects such as application performance and integration. Their continued finding was that some vendors were discarded in the selection phase due to lack of integration with and support for various operating systems. Peng's and Gala's (2014) interviewees concluded that the integration difficulties of cloud ERP is something that the client companies must be aware of when selecting system and vendor.

When it comes to the potential of the cloud, even though integration is regarded as a difficulty, Johansson and Ruivo (2013) stated that one of the benefits of the cloud is the possibility to integrate some systems with add-ons without being concerned about compatibility issues. Marston et al. (2011) presented the opportunity to create mash-ups. Mash-ups was defined by them as: "In web development, a mashup is a web page or application that combines data or functionality from two or more external sources to create a new service in originally unintended ways" (Marston et al., 2011, p. 186). But Marston et al. (2011, p.186) were of the opinion "that without a framework that allows transparent movement of data between organizations who might be with different providers, the success of cloud computing might be very limited". Lewandowski et al. (2013, p.6) presented that to increase adoption and enable users to obtain maximum benefits; vendors need to identify ways of enhancing the product offerings to support the diverse applications and devices that is available to the users.

Due to these integration difficulties and potentials Marston et al. (2011) suggests that organizations develop a "cloud strategy" to determine which system and when the system should be moved to the cloud. They also recommend large organizations to establish a "cloud committee" "that is distinct from the current IT setup and that continually evaluates developments in the cloud computing area" (Marston et al, 2011, p. 185).

Lastly, integration has emerged to the cloud and become a service, Integration Platform as a Service (iPaaS). Pezzini and Lheureux (2011), in their white paper for the technology and research company Gartner, wrote that:

"Gartner defines iPaaS as a *suite of cloud services enabling development, execution and governance of integration flows connecting any combination of on premises and cloud-based processes, services, applications and data within individual, or across multiple, organizations*" (Pezzini and Lheureux, 2011, p. 4)

Pezzini and Lheureux (2011) emphasizes that iPaaS is an enabler of integration between systems and not for specific sets of applications. But they stated that "vendors will provide 'prepackaged integration flows'" (Pezzini & Lheureux, 2011, p. 4), so even if finished integrations are per definition not given providers can possible have some pre-made integrations. These "prepackaged integration flows" is said to be closer to SaaS level than PaaS level. (Pezzini & Lheureux, 2011)

Table 3.6 - Effects and consequences of the integration issue

Effects & Consequences	Source
Low customizability and integration freedom	(Peng & Gala, 2014)
Limited possibility for integration due to different technologies and platforms	(Peng & Gala, 2014)
Add-on possibilities	(Johansson & Ruivo, 2013)
Mash-ups of services	(Marston et al, 2011)
Need for a cloud strategy	(Marston et al, 2011)
Implementation of iPaaS can support integration needs	(Pezzini & Lheureux, 2011)

### 3.4 The DeLone & McLean Information Systems Success Model

Above the foundation of our study have been presented, for the five issues we have chosen, as will be further explained in 5.1.1 *Selection of Relevant Issues*. As explained in the introduction, the purpose of this report is to find organizational effects of using SaaS systems in SMEs. To analyze the findings we need to use a framework. The studied literature sometimes used *Diffusion of Innovations, DoI*, (Rogers, 1962) or *Technical-Organizational-Environmental, TOE*, (Tornatzky & Fleisher, 1990). For example Stieninger et al. (2014) used DoI and Seethraju et al. (2015) used TOE. Both of these frameworks regard the adoption of technology and what may influence it. We were not surprised that the found articles use these frameworks since many of our studied articles in the literature review discuss implementation and adoption of cloud-based services. The framework we needed for this study is one central to the usage of enterprise systems and the effects the usage can have on an organization. The DeLone & McLean Information Systems Success (IS Success) model (DeLone & McLean, 1992; 2003) is such a framework. Its two version, the original and the updated, are explained below and later in 4.1 *Our Adaption of the IS Success Model* we describe how this model will be used in our study and how we will use it in analyzing our findings in 6.2 *Organizational Effects of Usage*.

The IS Success model was created to answer what causes management information system success. The model initially consisted of six interdependent dimensions. These dimensions are: *system quality*, *information quality*, *use*, *user satisfaction*, *individual impact* and *organizational impact*. As shown by figure 3.3, DeLone's and McLean's model illustrates how qualities of an enterprise system affects the *use* and the *user satisfaction*, how *use* and *user satisfaction* affect each other and how they also cause *individual impact*. The *individual impact* is then said to cause the *organizational impact*. (DeLone & McLean, 1992)

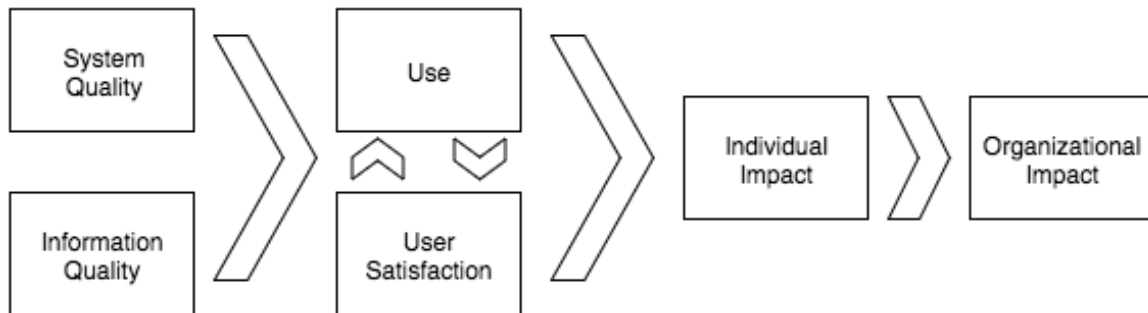


Figure 3.3 - DeLone and McLean (1992) IS Success Model

- *System Quality* is the characteristics of the system itself
- *Information Quality* is the characteristics of the system's outputs
- *Use* is the degree and manner of how the system is utilized
- *User Satisfaction* is how satisfied the users are with the system
- *Individual Impact* is the effects the system has on the users
- *Organization Impact* is the impacts on the organization the Individual Impact has.

A decade later, in 2003, DeLone and McLean updated their model. As shown by figure 3.4, they added the dimension *Service Quality*, merged *Individual Impact* and *Organizational Impact* into *Net Benefits*, and created a feedback link from *Net Benefits* to *Use* and *User Satisfaction*. They also specified that *Use* can be changed to *Intention to Use* instead, where they state the difference as "'Intention to Use' is an attitude, whereas 'Use' is a behavior". (DeLone & McLean, 2003, p.23)

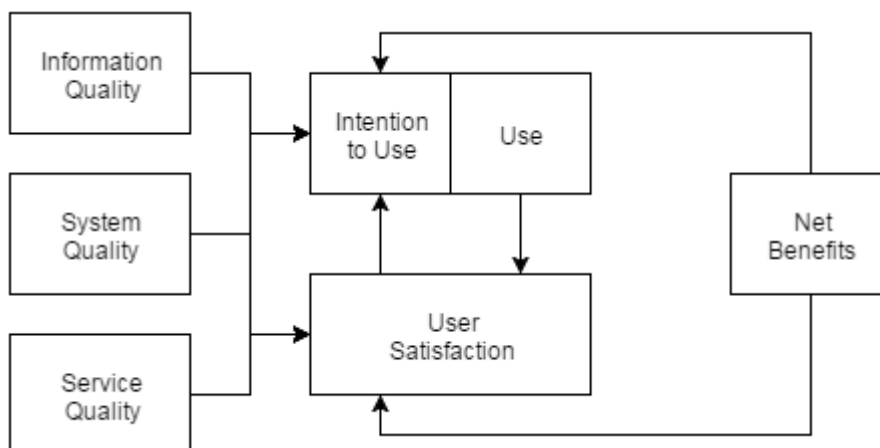


Figure 3.4 - DeLone and McLean (2003) IS Success Model

- *Service Quality* is the quality of service and support the users get from the vendor, partner and their own IT staff.
- *Net Benefits* are all effects through usage of a system, both positive and negative.

In their visualization of the model (DeLone & McLean, 2003) it can be hard to understand the box containing *Intention to Use* and *Use* and the connected links. As per their description the user of the model chooses either *Intention to Use* or *Use*, and thus all links connected to the box is connected with both *Intention to Use* and *Use*. We can only assume the visualization of the model is faulty.

Lastly concerning *Net Benefits* DeLone and McLean (2003) state that it is to the researchers discretion to "define clearly and carefully the stakeholders and context in which 'net benefits' are to be measured". (DeLone & McLean, 2003)

Applying or using the IS Success model in cloud studies have been done before, by for example Walther et al. (2015) and Azeemi et al. (2013). Walther et al. (2015) studied continuance of cloud-based enterprise systems where they adapt the IS Success model by selecting a few dimensions and combining it with dimensions from another framework to study continuance intention. The study of Walther et al. (2015) is somewhat close to our study with their focus on cloud-based enterprise systems, but instead of focusing on organizational effects from usage they focus on what affects continued use. We take inspiration in *4.1 Our Adaption of the IS Success Model* from how they discuss, restructure and apply the IS Success model to their work and also how they describe the dimensions. The study of Azeemi et al. (2013) extended the IS Success model for measuring success of an IS migrating of a cloud. Since we are not explicitly interested in migration of an IS to the cloud we only use Azeemi et al. (2013) as inspiration when applying the IS Success Model to the subject of cloud. What both of the mentioned articles have in common is that they adapt the IS Success model into their own model. This is something we also do in *4.1 Our Adaption of the IS Success Model* when combining the model with the *Relevant Issues*.

## 4 Our Adaption of the IS Success Model and Hypotheses

*In the first part of this chapter we present our adaption of DeLone and McLean IS Success model together with the selected relevant issues. In the second part of this chapter we present the hypotheses, which aim to answer the final research question. For these hypotheses we visualize how they were incorporated into the adapted model.*

### 4.1 Adaption of the IS Success Model

We did neither consider the 1992-version nor the 2003-version to fully fit as a framework to drive the needed analysis of this report. The updated model took *Service Quality* into consideration, which we found desired since the purpose is to study *Software-as-a-Service*. We also needed to include *Intention to Use* to analyze how SMEs have adapted their organization to enable use of the SaaS system. But considering this report's purpose is to study organizational effects we accepted DeLone's and McLean's suggestion that finer granularity of categorizing impacts might be needed for some studies. In our adaption we separate *Organizational Impact* from *Net Benefits*. The other impacts left in *Net Benefits* we rename to *Non-organizational Impacts*, which includes work group, industry, individual and societal effects. But seen to the interviewed *Non-organizational Impacts* is mostly from an individual perspective. Since the impact dimensions belonged to the *Net Benefits* before, we consider *Use & Intention to Use* to be linked with both of the impact-dimensions, the impact-dimensions linked between each other and also a feedback loop from both the impact-dimensions back to *Use & Intention to Use*. (DeLone & McLean, 1992; 2003)

For this study the relevant interlinkages are those where the issues affect *Use & Intention to Use* through qualities and how *Use & Intention to Use* affect the impact dimensions. Concerning the impact dimensions it is also relevant how *Non-organizational Impacts* affects *Organizational Impact*, but not the other way around, because of the purpose to study organizational effects. We have removed *User Satisfaction* from our adaption since it is outside our main area of research. This is due to us considering satisfaction of the users to be much more tied to their specific system than SaaS systems in general. So by taking *User Satisfaction* specifically into account we believe we would have gotten much more answers from an individual perspective rather than an organizational perspective. Lastly since the perspective is from issues in SaaS the qualities will be grouped on each relevant issue instead of splitting them up into their quality dimension categorization as per the original model. This is to say that the linkages from each issue in *figure 4.1* represents that the qualities affect *Use & Intention to Use*.

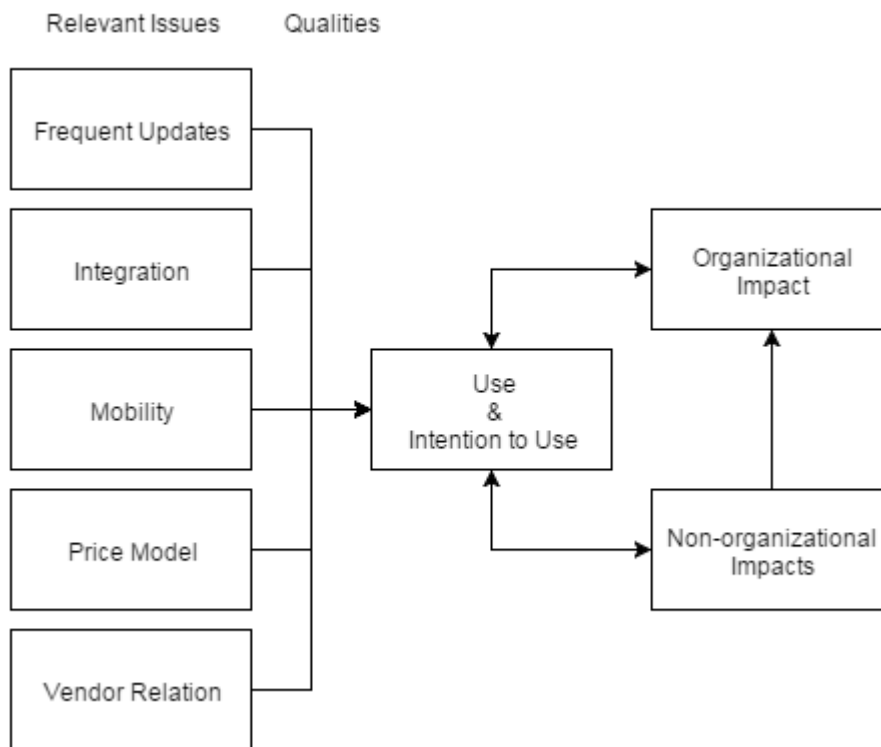


Figure 4.1 - Our adaption of the IS Success Model

#### 4.1.1 Relevant Issues

Each relevant issue has certain qualities that affect *Use* and *Intention to Use*. Specifying each quality's dimension group will not be needed to fulfill our purpose. The important aspect is if and how a relevant issue affects *Use* and/or *Intention to Use*, no matter if it is through information, system or service qualities.

#### 4.1.2 Use & Intention to Use

This dimension describes how SaaS systems are used by the studied case companies, the desired use and how it is affected by the qualities of the relevant issues. When analyzing we are looking at both *Use* and *Intention to Use*. Selection of both is done due to the need for discussions about what effects the case companies' further usage have on the organization. For example if their intention of future usage have present effects on the organization. Another example is to enable the analysis of consequences on *Use* and *Intention to Use* from both the impact dimensions and also if this might cause further organizational effects. Another example of why we consider us needing *Intention to Use* is because a company may have the intent to change system but they are unable to due to lock-in effects.

#### 4.1.3 Organizational Impact

We have used Daft's (2010) definition of an organization to understand this dimension and what an organizational effect is. Daft used the definition:

"[O]rganizations are (1) social entities that (2) are goal-directed, (3) are designed as deliberately structured and coordinated activity systems, and (4) are linked to the external environment." (Daft, 2010, p. 12)

With this in mind we consider organizational effects to be effects that affects any of the four parts of an organization: the social entity, the goals, the structure and coordination of activities or the link to the external environment.

Organizational Impact is the dimension that collects all found organizational effects. A notion is that an organizational effect can be considered either positive or negative. According to the model Organizational Impact is not directly linked with any of the issues, since it is difficult to link a certain effect to just one specific issue. Simply speaking, one can track one issue to one effect, but several issues can cause one effect. In this study we discuss what issue might or do cause a certain organizational effect. We do not consider effects on financial results because we consider it hard to validate whether financial results are due to only the usage of SaaS systems, or if other factors also influence. It would also be difficult to retrieve financial numbers that we can attribute to the SaaS usage solely. We are also doing an interpretive study, which means we take preconceptions into consideration and it might not be wise to do this when it comes to financial data.

#### 4.1.4 Non-organizational Impact

There are other effects through usage of SaaS systems that do not directly affect the organization. These effects belong to *Non-organizational Impact*. As mentioned above, *Non-organizational Impact* includes effects on for example groups, industries, individuals and society but will primarily consist of individual effects. Though effects that do not cause further organizational effects are not interesting for this study and will not be presented. This is due to that we are in general not interested in these effects in this study. But, as said, some effects will be interesting if they are found to further cause organizational effects.

## 4.2 Hypotheses

Now that our adapted research model has been presented we will hereby present the hypotheses set to be answered through the model.

From earlier our three research questions for this study are:

1. What common issues affect organizations in their usage of SaaS systems?
2. Which of the common issues are most relevant in the post implementation phase?
3. How does the relevant issues affect the customer organizations?

We consider the first two answered from the pre-study with its literature review and case company interviews. The first two questions are handled in *3.3.1 Found Issues*, *5.1.1 Selection of Relevant Issues* and *6.1 The Common and Relevant Issues*.

Then to answer the third research question we need to setup hypotheses, which are answered in *6.2 Organizational Effects of Usage*. Each hypothesis is related to a certain relevant issue and they are based on our findings from the pre-study. To answer the hypotheses more thoroughly, three more case companies were studied.

H1: The price model of SaaS systems enables companies to be flexible in managing their IT portfolio.

H2: The use of SaaS systems involves a complex relation to the vendor.

H3: Vendor-managed updates reduce time and effort needed for maintenance by customer.

H4: The mobility offered by SaaS systems extends the ability to work.

H5: Integration of services enables new possibilities in usage of SaaS.

With our adaption of the IS Success model we will answer the hypotheses by starting the analysis in each relevant issue, proceed through the model and present the found organizational effects, as visualized by *figure 4.2* below.

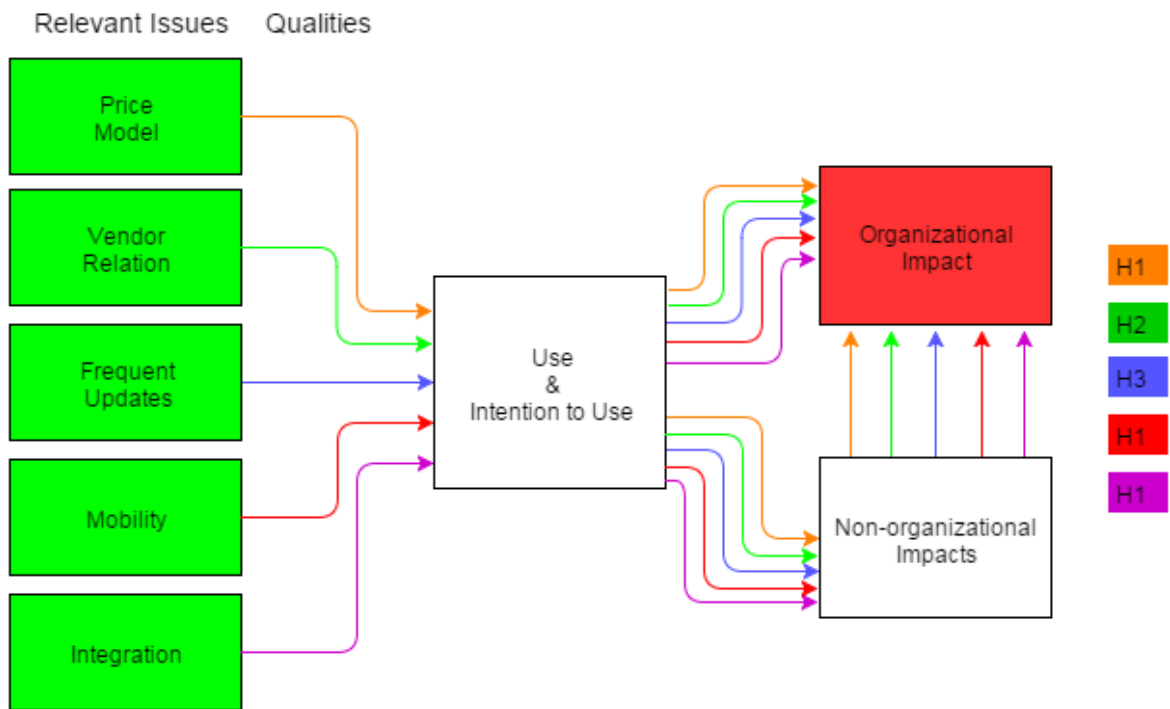


Figure 4.2 - Generalized hypothesis illustration

## 5 Empirical Research

*In this section the empirical research is presented. The section starts with the pre-study where the results from interviews with two case companies are presented. These findings serve as a base for the selection of what issues the rest of the study will focus on. Following that comes the study phase findings with an additional three case companies.*

### 5.1 Pre-study Research

The initial literature review aimed to discover what common issues there are in SaaS system usage. The pre-study aimed to further clarify which of these that are relevant issues worth pursuing for the rest of the study. To do this a selection model was created, the process and results are presented below. Following this more details regarding the actual findings will also be presented. Finally, the issues excluded are shortly mentioned together with the reasoning for not including them.

#### 5.1.1 Selection of Relevant Issues

As mentioned, the aim of the pre-study was to get an overview of the organizational impact of using SaaS based systems, and thereby be able to know which aspects to pursue in the deeper case study. After gathering this information through interviews, each aspect was individually evaluated by three criteria: post-implementation phase fit, useful empirical information we were able to retrieve and how SaaS specific the aspect was. Post-implementation fit deals with how specific the issue is for the post-implementation phase. For example, some issues are more important during the selection phase and would thus score lower in this dimension. The useful empirical information we were able to retrieve is from the perspective of our pre-study. Obviously we had already found information in literature, but we also wanted to find information in our case companies as well. A high score in “SaaS specific” means that we consider the issue highly associated with SaaS itself. For example even though the subscription based price model could be used for an on-premises system, our findings and literature tells that it is the norm in SaaS system usage.

Below are the results of the selection process. The total score for an aspect is the sum for every dimension, where the possible points are 1, 2 and 3. Using multiplication instead of addition would not change which five relevant issues that were actually selected. Number three indicates the highest interest and number one indicates the lowest. The five highest ranked aspects were considered suitable for further research. This was to ensure that enough depth can be achieved, while taking into consideration the need for a limited scope.

Table 5.1 - Pre-study selection model; aspects sorted by total score.

Aspect / "common issue"	Post-implementation fit	Information available	SaaS specific	Total score
<b>Price model</b>	3	3	3	9
<b>Frequent Updates</b>	3	3	3	9
<b>Mobility</b>	3	3	2	8
<b>Integration potential</b>	3	2	2	7
<b>Vendor Relation</b>	2	3	2	7
Availability & Down-Time	2	2	2	6
Performance	2	2	2	6
Data Integrity	1	2	3	6
IT Department	1	2	2	5
Standardization	2	2	1	5
Lock-In	3	1	1	5
Privacy/Confidentiality	1	1	3	5
Usability	1	2	1	4

The common issues in the list above (*table 5.1*) are the result of the iterative process of the pre-study, and differ somewhat from the list of issues described in *3.3.1 Found Issues*. There are simply four additional common issues in the table above (*5.1*) that were not in the table (*3.1*) in the frame of reference. These issues are *data integrity*, *lock-in*, *availability & downtime* and *usability*. The *security* issue from the frame of reference has simply been split into other issues here: *data integrity*, *availability & downtime* and partly *privacy/confidentiality*. *Lock-in* has mainly been included in the *vendor relation* issue above instead. *Functionality* was also part of the common issues from the literature review, but we considered it very difficult to be able to retrieve data from users that could confirm or disaffirm those effects. However there was one effect regarding functionality that could possibly be proven, which can be attributed to usability. That is the reason that the issue *usability* is included in the table above (*5.1*). So there is not much difference content-wise, but rather some slight differences regarding the grouping of the issues.

The values we arrived at was the result of first each of individual put a score for each issue and dimension. We did this without involving each other at first. After that we compared our results, and were we have put different scores we discussed until we reached agreement regarding which score that fitted.

We both considered *price model*, *frequent updates*, *integration potential* and *mobility* to be among the top five issues. However, *vendor relation* did not reach top five for both of us at first, but after discussions regarding the scoring it qualified to be in top five. *Availability & Downtime* could have been in the top five as well if only one of us would have decided, however it has usually been a consequence of *frequent updates* so it can be considered included in our top five relevant issues anyway.

The exact reasoning behind the scoring is described in more detail for each relevant issue below. In the end of this pre-study sub-chapter we also explain why the rest of the common issues were not included. However, it can be said that our individual scoring of the issues were based upon our individual understanding of the literature review conducted up until that point, in combination with the findings from the two pre-study case companies.

### 5.1.2 Case Companies and Systems Used

In total two case companies were interviewed. Both case companies had experience in the same two systems. The first system (Bookkeeping System) is a smaller SaaS ERP system focusing mainly on bookkeeping and decision support. Both case companies had used this system for at least 2.5 years. The second system (Salary System) is provided by a larger multi-national vendor and was used by both case companies. The system is SaaS-based where functionalities for salary management or time reporting was used by our case company interviewees.

The first company was a small biometric solutions manufacturer with about 20 employees. We choose to call them Biometric Corp here. They had in total five users of Bookkeeping System, out of which two were interviewed. The first interview was with the CFO of the company, she and her assistant used Bookkeeping System for economic operations as well as a tool for decision-making. The second interviewee at case company Biometric Corp was with the economic assistant. Her work was the practical parts of the economy department, which are the *practical* parts of economy and bookkeeping. She had been working in both systems.

The second case company is a space systems company in Sweden with about 80 employees. We choose to call them Space Corp here. One interview in total was conducted with the CFO of the case company. He mainly used Bookkeeping System for functions like accounting, time reporting, project follow-up, invoice handling and payments.

### 5.1.3 Price Model

The subscription based price model is SaaS specific in the sense that the technology makes it easy to charge by both usage and number of licenses, since the vendor can easily measure and control these as a result of the applications and data being hosted at the vendor site. It is an apparent difference from on-premises systems. The price model gives cloud systems its service nature, since the vendor provides SaaS, which leads to organizational effects in regards to what is included in the service, for example vendor supported Frequent Updates. The interrelatedness of the price model to other aspects as well the price model's service nature, makes it academically interesting to pursue further.

The pre-study findings regarding the price model were mainly discussed from the point of view of Bookkeeping System. The common properties for both case companies were that they pay for the amount of user roles of a specific type. At Biometric Corp they also paid for the usage cost, which could for example be creating an invoice. At Biometric Corp the interviewee said that the current monthly cost is higher compared to an on-premises system, however in their current system the cost of updates is included and her impression is that it is cheaper with this SaaS based system. Despite paying for the usage of the system, they are not limiting how much they are using the system, and neither are other users compelled to limit their usage. The interviewee said that she believes that some users are not even aware that the usage has a direct impact on the cost. At Space Corp the reason for choosing Bookkeeping System was the subscription based payment model itself. This was because the case company had low financial liquidity at the time of selection. This decision cut the initial investment cost from roughly half a million SEK to about 50 or 60 thousand SEK. Another benefit mentioned by the interviewee was that the solution comes as a package, which included backups and frequent updates in the service agreement. This was believed to reduce the need for external consultancy for upgrades, and thus reducing the costs of those. However, the interviewee believed that the total cost would still be larger over a longer time span with SaaS since the monthly payments add up. Worth mentioning is that the normal price model for Bookkeeping System is based upon user roles and the actual usage.

#### 5.1.4 Frequent Updates

Frequent Updates were also chosen as a relevant issue to focus deeper on. This because there were clear organizational effects of Frequent Updates, regarding the frequencies, timing and impact on system stability and thus system usage. The vendor manages the updates, which was not the case in previous on-premises systems for the pre-study case companies. The updates are provided in the post-implementation phase and thus fits our purpose well since we focus on the *usage* of SaaS systems.

Both case companies described how the system had become unavailable a couple of times due to the vendor trying to update the system. Once the system was down for two days at Biometric Corp, and it happened at the worst possible time: when the company were doing the closing of the books. Another time the numbers in the system changed completely after an update. Luckily there was no real data loss due to this, however the interviewee had to manually confirm this by going through the system afterwards. Previously they had to update at least twice per year, being both time consuming and difficult to perform. This was because people from the external hosting company had to be involved as well. The CFO at Space Corp however made it clear that automatic Frequent Updates were the best benefit of having a SaaS based system, since it saves both time and money. But sometimes, updated functionalities caused unexpected confusion and also triggered the interviewee to even contact the vendor for them to explain changes made. This happened according to the interviewee likely due to the vendor not fully understanding the company's way of working. Problems regarding updates however were mostly prominent in Bookkeeping System and not so much in Salary System. Bookkeeping System is used more often in the daily work than Salary System at Biometric Corp, which could explain why these problems are discovered and experienced more often. It could also be that the problems are system specific and that problems do not occur for SaaS systems in general regarding updates. These issues will be further elaborated in the main case study.

#### 5.1.5 Mobility

Mobility as a mobile application is not unique for SaaS based systems since one of the interviewees mentioned that on-premises systems can offer this functionality as well. However, the SaaS systems in the pre-study are accessed by a web browser, while a similar solution for an on-premises system would imply remote desktop access configuration. So the mobility aspects of a SaaS system is of an inherent nature to the service itself, while that is not the case for a traditional system, which gives it the score two in the dimension "SaaS specific" in *table 5.1*. There are clear organizational effects of mobility aspects regarding amount of work, change of work distribution and where one works. It is of academic interest since its effects are apparent in the post-implementation phase.

The mobility relevant issue includes both usage of a mobile application and the main mode of system usage through a web browser. The mobile application had made it easier to scan receipts for Biometric Corp, resulting in saved time for employees, which actually was one of the main reasons for choosing the system to start with. The web browser access had added several benefits for both case companies. At Biometric Corp the sales staff could create orders themselves, this unburdened the economic assistant interviewed, and increased the control over invoices for the sales staff. Also, both case companies' employees were able to work more from home when needed. For example whenever there would be internal IT trouble at their work places, during work-related travelling, or during weekends and holidays. This was especially useful for the CFO at Space Corp who could retrieve information to answer specific customer questions whenever he was off the company's premises.

#### 5.1.6 Integration

The case companies did not express any need for system integration, but did however express some fear regarding the organizational impact of increasing integration with other systems. It is thus

interesting to further investigate reasons a company might have regarding whether to integrate systems, and the organizational effects the interviewees expect or even fear. System integration in itself is not unique for SaaS based systems, but there are possibilities for and problems with integrating different SaaS systems with each other that the case companies might not be aware of. It is thus interesting to further pursue this topic and investigate the user awareness of the potential of cloud enterprise systems.

Biometric Corp did however express that even though they have no need for system integration, it would be a good thing to have. However, one of the interviewees believed that it would increase the complexity, and also that their company was too small for the need of integration. She also mentioned that she had experience working with larger systems at a previous employer, and that it was more difficult to make corrections in larger systems since one had to trace it deeper into the system. At Space Corp, the CFO did not need the integration since he thought it was as easy to just extract the data he would need into for example Excel files. However, he did admit that one kind of integration could be useful: comparing the time reports from Salary System with their other ERP system's time reports.

Specific types of possibilities and challenges we would like to investigate further is for example if a company have several SaaS solutions, have they then integrated them or at least considered it. Even though Biometric Corp was afraid of the complexity, obviously integrations could lead to benefits in similar ways as for on-premises system integration. There could also be other possibilities or challenges that are unique for SaaS systems, which remains to be seen.

#### 5.1.7 Vendor Relation

There are some empirical data regarding the vendor relation that is not SaaS specific, however other aspects such as the price model and frequent updates, which are more SaaS specific, have been shown to have impact on the vendor relationship. Thus, the vendor relationship issue is interrelated to other aspects, and is therefore interesting to investigate more thoroughly, and also ensures that there is enough empirical data to retrieve.

A concrete example of a vendor relation aspect is support. At Biometric Corp the economic assistant stated that a frequently updated system that is highly standardized is much easier to get good vendor support for. This is because one of the systems she had been working in before, had not been updated for many years and was customized to the degree that there would be "nobody" there to give her good support. The only way to get support would then be to hire expensive consultants. However, support costs for Bookkeeping System were not included in the service level agreement. So it cost extra to receive support, which was charged by every half hour that had begun, which led the interviewee to "gather" questions before calling the support. The CFO at Space Corp did not express any special need for support contract though, since he only contacted the support one to four times a year.

A functionality that was very helpful at Biometric Corp was that the vendor could log on to the customer part of the system, either in the demo version or the live version. According to the interviewee, the strength of this functionality was that the vendor could work with the same setup and data as her, thus making the support more relevant and easier to understand. Biometric Corp did not find any concerns regarding the privacy of their data due to this functionality, since the vendor every time had to ask for permission before accessing the data.

### 5.1.8 Other Issues

All other common issues in this pre-study (see *table 5.1*) except the five mentioned above have been excluded from further investigation.

*Data integrity* and *privacy/confidentiality* is of low academic interest since those aspects have been shown to be a concern mainly during the selection of a system, which is not within the limitations of this study. *Standardization* and *lock-In* is not very cloud specific in itself, with not too much empirical information retrievable, and the organizational effects apparent for at least lock-in can also be included in the *vendor relation* issue instead. The *availability and downtime* issue does have organizational effects, but it is difficult to attribute downtime occurrences to SaaS itself in other cases than when updating the system, which is instead covered in the *frequent updates* aspect. Another availability aspect, *mobility*, has its own category instead, thus there is not much left to study regarding *availability*. *Performance* differences are also difficult to attribute to the SaaS itself and there were no clear organizational effects shown in the pre-study. The *IT department* is more of an organizational effect itself than a cause of other effects. *Usability* can be seen as more system specific than SaaS specific, and since we are trying to generalize over the SaaS usage itself, this aspect would not contribute much to the study.

## 5.2 Study Findings

Now we will present our empirical findings from the study phase covering three additional case companies. First comes a brief introduction regarding the case companies and systems they used. After that the findings are presented for each relevant issue.

### 5.2.1 Case Companies and Systems

The first two pre-study case companies were Biometric Corp and Space Corp. After the pre-study had given the list of relevant issues to further pursue the three additional case companies were studied. These additional case companies were Mobile Devices Corp, Creative Apps Corp and Media Corp. In *table 5.2* an overview of all the case companies' are given.

*Table 5.2 - Overview of the case companies in this study and their used systems. Numbers are rounded.*

Case Company	Industry	Employees	Turnover (2014) [MSEK]	Number of SaaS-based Systems
Biometric Corp (pre-study)	Biometric systems	20	40	5
Space Corp (pre-study)	Satellite platforms and systems	70	180	1
Mobile Devices Corp	Mobile devices manufacturer	50	200	3
Creative Apps Corp	Software Development	70	60	4+
Media Corp	Media (news) industry	170	220	32

So, in total five case companies were involved in this study, and all of them were using at least one SaaS based systems. All of these companies were SMEs with between 20 – 170 employees, and the turnover varied between 40 to 220 million SEK. The industries differ between the companies, however most of the companies are in more technical and knowledge-intensive industries. We have also given the companies and systems new names (as described in the method chapter) since we are anonymizing the companies and systems used. Further, we have also included the case companies from the pre-study since the findings will be used in the further analysis as well.

Table 5.3 - Overview of subjects interviewed and respective position

Interviewee	Company	Interview type	Position
1	Biometric Corp	On customer site interview	CFO
2	Biometric Corp	On customer site interview	Economic Assistant
3	Space Corp	On customer site interview	CFO
4	Mobile Devices Corp	Skype interview	Service and Support Manager
5	Creative Apps Corp	On customer site interview	CFO
6	Media Corp	On customer site interview	Technical Director

As can be seen in *table 5.3* in total six interviews were conducted, three at the first two pre-study companies and three more at the following case study findings presented in this sub-chapter. Also the names of the interviewees have been anonymized. All of the people interviewed were users of the system and had good insight into larger organizational context issues, knowledge important for us to be able to answer our research questions.

The first case company was Mobile Devices Corp where we conducted a Skype interview with the Service and Support Manager of the company. He had good insight into their system usage of three different SaaS solutions. Their business is manufacturing mobile devices and developing software for them. Their ERP system was one of the SaaS systems where they could add modules, and this system had been in use for about four years. This system was highly configurable to fit their needs. The second system was used only for salary functions, and the third system was mainly a communication tool and thus we did not focus our questions on this last solution too much.

The second case company we visited was Creative Apps Corp where we met their global service manager whose responsibilities mainly was accounting. They were creating and developing mobile apps for customers around the world and thus the usage of different system solutions are crucial to their business. He had experience in using mainly four SaaS based systems. One system was for project management that had been used for 1.5 years. A second system was for accounting and other related economic tasks, and had been used for 2.5 years. Also, another system was used as an extension for their resource planning due to lack of functionality in other systems. The fourth system the interview covered was an internal communication tool, which once again is a little bit outside the scope of our study.

The third case company was Media Corp and we visited their office to have an interview with their technical director who was responsible for most of the IT services used in their company. Media Corp is involved in the media news industry and the use of SaaS solutions is a major part of their core business. In total they had 32 SaaS systems with different functions and purposes. They were early adopters of cloud services and the interviewed subject said they had been SaaS users before it was even commonly referred to as “the cloud”. So the interviewee meant they had simply been users since before 2009. In general the company was far ahead of any other case company we interviewed regarding how advanced their usage was, especially for integration issues and insight into vendor relation. However, as was mentioned in the method chapter, his role as a technical director means that he cannot be considered a normal end user. We will go into much more detail about our very interesting findings for the appropriate sections.

### 5.2.2 Price Model

Here we present what the interviewees have said regarding the price models for their SaaS services and SaaS systems. In this section we are using the SBIFT-model (Iveroth, 2013) to clarify what dimension of the price model is discussed.

The first dimension of the SBIFT-model is *Scope*, whether it is one price for the whole product or if the customer is able to customize the product and pay for each customization. In the cases of the interviewees, the cost of their systems were often depending on desired amount of users and what role in the system each user had. There were also possibilities to pay for added extensions. But updates and often also support were included in the standard fee.

Concerning what the interviewees thought that the price could be based on, we only explicitly asked the interviewee of Media Corp who said that it is probably the cost. But Media Corp, like other interviewed companies, stated that they often negotiated prices. Media Corp would compare the pricelists between used systems and other systems not used, which could indicate that the prices are set depending on competing systems' prices. The above mentioned also answers the possible types for the dimension *Influence*. In the cases where negotiation happened it was often to lower costs, which however usually also led to signing up for the service for an extended amount of time. For most cases the agreement was for one year. For example Media Corp had previously signed for up to three years to get lower prices. All companies paid either a monthly or yearly standard fee for their systems together with an extra fee per role. As mentioned above, if there were any added modules these were also paid for through an extra fee per module. For some services the cost were set per usage of certain tasks, but Media Corp aimed to always pay a flat rate to save both them and the vendor the "headache" of a difficult price policy. Because by paying a flat rate it was much easier to estimate operational cost of the service. The fees were often paid monthly or yearly depending on the contract. But the policy of having a fixed license fee stopped Creative Apps Corp from getting the SaaS version of their financial system for all of their companies. This was due to some of the companies only required one user, the interviewee, and he used the systems only a few times per year. Thus the price of the SaaS based solution was not financially viable.

In our cases, other than Media Corp, none seemed to have a *Formula* were they only paid per usage. The primary *Formula* for the systems was to pay a basic license fee for the system and then an extra fee for each highest ranked role per user. The user's rank depended on how much access in the system the role had. If the company wanted to add any modules to the system this was also added as a monthly or yearly cost. For Media Corp there were some smaller but vital services that had the *Formula Pay-per-use*, since every time showing an item cost money. This meant that Media Corp needed to make sure that their income increased with the visits to their site so that the expenses did not exceed their income during high seasons.

Lastly the *Temporal right* was *Subscription* for the systems at all companies. All companies had their system at their vendor and upgrades of the system were included and often came a few times per year.

The greatest effect mentioned about a subscription service is that it is initially cheaper with only a low initial cost, but it might be more expensive in the long run. Another positive part was that through the characteristics of the systems it is easy to scale when more or fewer users were needed. For example Creative Apps Group used to scale up the possible number of users in their project management system when they had people from outside the company helping in their work. For a growing company it can be hard to estimate the required hardware and amount of users. The scalability that comes from the SaaS price model lets a company grow as needed, and to some extent without putting effort into extending their system.

Creative Apps Group stated that the actual cost for the service was not their primary priority and the interviewee believed their prices to rise after re-negotiations. The interviewee at Mobile Devices Corp stated that even though the initial cost is low it is still not a free system. The costs will pile up during

the period of usage; it is just distributed over a longer period of time. A large raise in prices for Mobile Devices Corp would be if the partner they are subscribing the system through increased the cost with 100 percent. Even though the companies paid for the amount of users for each system it was not something they wanted to limit. They rather looked at what access each employee need and thus which role were required, then they considered what it would cost them. For Mobile Devices Corp support for their system was included in most areas, but not when creating adaptations or solving bugs in their adaptations. They had to pay extra consultancy hours to the partner or do it themselves, where one consultant hour cost as much as three hours pay for a normal employee. This led them to focus on increasing the internal knowledge to perform their own adaptations and only hire the partner for cases they could not handle themselves. Media Corp had the same agreement with their partner, but the interviewee did not speak about the option of them doing as much of the work as possible themselves to lower consultancy costs.

Lastly when considering whether SaaS decreases the total cost per ownership none of the interviewees stated that their company had made such calculations. For example considered the costs to it could end up being higher than owning a perpetual system. But none of the interviewees seemed concerned about whether subscribing to a system would end up being cheaper or more expensive in the end.

Summary of effects regarding the price model:

- Pay per use can lead to a complex price policy and difficulty in estimating actual costs
- Fixed costs simplify cost estimations
- Reduction of prices in negotiations usually leads to requirement to sign up for a longer period of time
- Possibility to benchmark prices of SaaS services to other competing services
- Fixed license fees reduce the possibility for customers to adopt systems with a low amount of users and infrequent usage
- Per-unit-price needs to ensure that income increases with the usage
- Total costs over time may still be high even if initial costs are low
- Reduced need for hardware investments due to scalability of the SaaS price model
- Estimation of hardware and amount of users required is no longer an issue
- More in-house handled adaptations to reduce consultancy hours

### 5.2.3 Vendor Relation

Vendor relation is a broad category and thus we will cover topics such as ability to change system, contracts, cultural differences in vendor relation, customer support and backups.

The case companies had different views regarding when they could consider changing their SaaS systems. Mainly two reasons were given: when there is a better system out there, or when there is a cheaper system available that can replace the current system(s). For Mobile Devices Corp changing the system could be considered when there are so many users that hosting their own system would be more economical. Creative Apps Corp would consider it mainly when something better was found. At Media Corp the interviewee said that they always look to change services, especially when there is something better or cheaper available. Sometimes Media Corp were even able to get better prices by comparing prices to competitive SaaS systems and then using that information in negotiation with their current vendor. Also, he did mention that the media industry is tough now so it is important to keep the costs down in order to survive. The subject also mentioned that if the vendor is more eager to squeeze money out of their customers than to actually help, then that could damage the relation

to the degree that they would like to change the system. For example, once a provider wanted to sell extra storage space to Media Corp even though there were a lot of old unused data in the system, which due to the nature of the system the vendor should have brought to the attention of Media Corp instead of trying to sell extra space.

This naturally takes us to agreements between customers and vendors. At Media Corp the interviewee stated that they are very careful to not sign contracts that would be binding them for too long time since they did not want to become locked-in by the vendor. Usually they did not want to be bound to a service for longer than one year at a time, and preferably not at all. He also stated that if their system was good enough there was no need to lock in customers with contracts, especially if there is a lot of data in the system since it is a hassle to migrate all the data anyway. If a service is especially troublesome then Media Corp wants Service Level Agreements (SLA) that specify the guaranteed uptime of the system, but also how much they should be compensated if the provider does not deliver as promised. This is especially important for systems that were part of the core operations. This need stemmed from errors in systems that had happened before and caused a lot of trouble. Media Corp also wanted in the agreement the ownership rights to the data. This included still having the right to the data even if they cancelled the service. Media Corp also demanded that security should be specified in the agreement, that nobody else should be able to access their data. This was also important to have in the agreement for Creative Apps Corp. For Media Corp this was especially important in the systems that were part of the core operations since they had their customer data there.

At Media Corp they also value working with local vendors or with local representation since it gives more personal contact, and it is easier to negotiate the prices. Cooperation with vendors outside of Sweden usually did not provide the same good communication and service as those within. One reason given was that this could be because the large vendors usually have bigger customers than Media Corp so they prioritized those customers instead. Another factor was that the time differences can sometimes make phone calls and customer support troublesome, an issue also mentioned by Mobile Devices Corp. So it seems like Media Corp found working with foreign vendors without local representation less practical and less personal. However, at Mobile Devices Corp they usually found the customer support quality for the vendor in the USA to be better than the Swedish support from the vendor's partner in Sweden. This was because for the international support had more experts so it was easier to get good answers for very specific questions, while the local support for the same vendor can only give more general support. Also Creative Apps Corp confirmed that the vendor country origin affects the service quality, but in this case more for functionality aspects. For example vendors outside Sweden had problem with the Swedish VAT in this case. Another factor affecting the quality of support according to Creative Apps Corp was how new the system was and how many users there were. Since some of their systems include a forum functionality it was the customer user base that determines the quality of this forum. Both Creative Apps Corp and Mobile Devices Corp appreciated both community and FAQ functionality and tended to use these functions before contacting the vendor provided support. Mobile Devices Corp usually used something called a "sandbox", simply a mirror of their system with data that they can try things on without risking the original data. It is a good thing for training purposes according to the interviewee.

Backups are another interesting part that could be part of a SaaS system offer. At Mobile Devices Corp they did not manage any backups by themselves but let the vendor handle them. The vendor did backups and mirrored data to different geographical locations. At Creative Apps Corp they thought that vendor-managed backups were important and neither they took any local backups. Media Corp did not take any full backups either, but they did download some information from their vital SaaS

services every night to store at their local server. This data was then compared to previous nights' data to see if the data was consistent. In this way they had actually discovered when their vendor had for example crashed hard drives but still not notified Media Corp about these events. Another interesting detail in regard to this is that Media Corp sometimes add extra tracking data among the ordinary data to be able to discover if there has been data leakage or misuse. For example they can put extra e-mail addresses into some e-mail lists that is in the SaaS service, and if Media Corp starts receiving e-mails to those accounts then they can suspect that data has been leaked. This is to ensure that the private information they store in the SaaS systems has not being compromised.

Summary of effects regarding vendor relation:

- Willingness to change systems when there is a lower cost option available
- Willingness to change systems when there is a better system available
- Trust damage if vendor puts the interest of making money before helping the customer
- Avoiding agreements longer than one year since it creates a lock-in scenario
- Demanding SLA:s including financial liability in instance of system failure
- Having the contract specify ownership of data in all situation
- Preferring personal relationships with SaaS vendors, which often was the case when the vendor had local representation.
- Being hindered by time zone differences in regards to telephone support for foreign vendors
- Using tracking data to detect data leakage
- Making frequent data downloads to local servers to verify data consistency

#### 5.2.4 Frequent Updates

The case companies had different experiences regarding how noticeable updates were, how much problems experienced, and how significant updates were at all. Possible reasons for this vary and we will cover those for each company below. One explanation worth mentioning right away though is that depending on which person we spoke to their insight into the practical issues of a system varies.

Mobile Devices Corp is the case company who could provide us with most detailed feedback regarding experienced problems. Their vendor provided about two major updates per year and patches were released more frequently in between the major updates. The major updates could also be tried out in their own system before release so that they could give feedback to the vendor. There had been bugs experienced as a result of the updates, and when that happened they just reported those to the vendor. They have also experienced occasional down times, but not more than four times during the last few years. At most the system had been down for one day each time. One reason for bugs occurring was that Mobile Devices Corp had configured their system on top of the solution provided by their vendor. So whenever an update was received, these configurations might stop working, and then the company had to fix these issues. It could be small disparities in for example the formatting of serial codes in their own configured system that differs from the basic layer provided by their vendor. For this reason, every time there was a major update they re-tested about ninety percent of their frequently used self-implemented code to make sure everything worked as it should. If the problem after an update however was isolated to the vendor provided system, then usually a fix was received within a day or they made their own quick fixes until the bug has been fixed.

So it is quite obvious in this case company that Mobile Devices Corp's own configurations led to more issues and testing. However, it is good to keep in mind that this is their ERP system and thus is the central system in their business. Also, since they configured the ERP system to such a degree, it remains unclear if they really had a public cloud solution, though they did not seem to share the

software level with other customers but probably shared platform and thus also infrastructure. However, the technical implementation is not our major concern but we still want to mention this point since that could possibly isolate these effects to a solution that actually is outside the limitation (of public cloud) of our study.

At Creative Apps Corp frequent updates was seen as an advantage in itself with SaaS systems, since the customer do not have to manage the updates or installations by themselves at all. In general, they did not notice the updates since those were conducted during weekends and nights. They had never experienced any downtime due to updates either. Similar to Mobile Devices Corp there were bugs sometimes, which could need quick fixes to be solved as well. It is worth mentioning in regard to these issues that both these case companies use different SaaS ERP systems. A final effect of frequent updates was that added functionality could cause some irritation at Creative Apps Corp, which we also heard about from Space Corp regarding their system, however eventually they accepted these changes and even if they would have managed their own updates they would still had accepted these changes.

Media Corp had over 32 different SaaS services as we mentioned earlier. However, despite having so many different services, our interviewee said they did hardly ever notice updates taking place. However, they did notice that an update had taken place when there was a change of the user interface. According to the interviewee updates in PaaS or IaaS systems however usually affected the system on a deeper level, so whenever these happened they were more involved in the process. Another interesting perspective regarding frequent updates was that they as customers did not want to wait for example a full year to have new functionality, but rather demanded the SaaS system vendor to keep adding functionality continuously. It is also worth mentioning that the same vendor as Mobile Devices Corp provides Media Corp's SaaS ERP system. However, the interview with Media Corp did not render as many details about possible issues in configurations after updates as the information we retrieved from Mobile Devices Corp. The reason for this could simply be that the interviewee at Media Corp was not as close to these processes as the interviewee at Mobile Devices Corp, since he is not what can be considered a normal end user due to being the technical director of the company.

Summary of effects for frequent updates:

- Bugs as a result of updates lead to work around solutions
- Bugs interfering with own program code lead to extra testing and re-programming
- Freedom from manual updates and installations
- Irritation with changes in functionality or with added functionality
- Added functionality is received frequently

### 5.2.5 Mobility

All case companies experienced benefits regarding the mobility aspects of their SaaS system usage. In fact, this is probably the only relevant issue where we have found almost no negative experiences. All companies highlighted the advantage of not being bound to a certain location when accessing the system, however it varied to which degree they were actually using these possibilities.

Mobile Devices Corp said that only the people who are not physically present at the company use the mobility functions. However, SaaS is a mobile solution in itself so there might have been some misunderstanding regarding what actually mobility includes in this aspect. He also said that people who travel much can use the time to work due to the mobility functionality. This was however possible before as well, but he claimed that it is much more efficient with their SaaS solutions. This could however be more of a system specific benefit that they are more efficient. However, it could also be

that since SaaS systems are mobile in themselves the system have to be efficient to use in its “mobile” form since that is the *only* form. Mobility has also enabled coworkers to attest bills while travelling in the work, for example at the hotel during evenings. In this way people avoid building up these kind of tasks but can finish them sooner instead.

At Creative Apps Corp the mobility aspect was especially important since they let their customers get access to their systems to view the prototypes of the developed products. In this way they could more easily reach global markets. He even gave an example of when they had worked with a client in Asia that they would not have been able to work with without the mobility functionality. In addition, it was seen as positive that coworkers could reach the system when they were outside the company premises as well. Some older systems they had did not allow mobility functionality that led to that administration could not be conducted outside the premises according to the interviewee. Another clear benefit with SaaS the interviewee mentioned was the platform independence it contributed with. Since one can access the system with a web browser it does not matter which operating system the computer has.

At Media Corp the subject mentioned that they have always had access to their internal systems through Virtual Private Network (VPN) tunnels (remote access functionality) even before they were using SaaS services. One effect of mobility that he mentioned was that you can work during weekends, which is good since “the work never ends”. However, he did admit that this could stress certain people.

All case companies mentioned that the mobility aspect was useful when being outside the company premises. However, nobody mentioned how Internet access' *availability* affected them. The reason for this could be that it never crossed their minds, possibly since we never explicitly asked them if they ever felt the need to work when there is no Internet access (e.g. during a flight). For this reason, whether they feel restricted by Internet access availability or not cannot be established for certain. However, nobody brought up the issue by themselves.

Summary of effects for mobility in SaaS:

- Not restricted to a specific location (with Internet access) for working in the system
- Possibility to let customers see product under development.
- Increased ability to reach global markets.
- Platform independence due to web browser access.
- Being able work while travelling (if there is Internet access).
- Possibly increased stress due to increased ability to work from home.

### 5.2.6 Integration

The studied cases differed from the pre-study cases concerning integration. They had all taken different decision in how they were going to utilize the potential of integration to minimize manual labor.

Mobile Device Corp had the policy of first establishing that there is a need for further functionality, then they primarily looked at modules available for their ERP system and if there were no official modules then they would look at third party modules. Third party modules usually needed more integration and thus were not the first hand choice. They also tried to influence the vendor to create an official module if there were only third-party solutions or no solutions at all. Other than extra modules to their ERP system they had also integrated their system with their website and to "ups.com". The website integration was for automatic creation of support tickets from the website into the system. It was very important to them because it removed the manual labor of insertion, that someone had to find the issue in their mailbox and manually insert it into the system, instead it was

automatically inserted after creation. The integration with ups.com was to automatize deliveries so they got all the correct information when an order was sent to shipment. The one system they would never integrate was their salary system, to limit the internal visibility of salary data. These kind of integrations they did saved them need for manual work.

Creative Apps Corp considered integration to be a very important issue. The interviewee stated that the possibility for integration lies in the strength and openness of the APIs (Application Programming Interface). They had two practices when it came to integration: either they waited on the vendor to create an integration or to add the desired functionality, or they performed the integration or extended the system themselves. For example, they had got another project management service together with their base project management service. This was due to the other service had extra functionality they really needed. So until their vendor for the base service updates with the desired functionality they are using these two services in conjunction.

Media Corp had the most extensive integration of their services; several of their 32 different services were integrated. The other interviewed companies mainly focused on extensions to solve their needs for added functionality, while Media Corp mainly added new services. Due to the many systems it was thus beneficial to interview the technical director of the company since he had good insight into all systems used in the organization. As mentioned before, he cannot really be considered a normal end user though. The interviewee said that they did not feel that they integrated enough even though they perhaps was the company that integrated the most out of all their sister companies and even perhaps in Sweden. But he also mentioned that sometimes they might be integrating the systems too much. For example, when changing system they sometimes integrated that system as well even though it might not be needed. The partner for their ERP system primarily performed the integrations, but sometimes they did it themselves. For Media Corp they had to assign the responsibility to keep track of all created integrations, which became the System chief's responsibility. Media Corp however also mentioned that without their integrations they would likely need more employees for the work that the integration saves. Media Corp had also done an integration with several services with vital data so that it was downloaded each evening and stored in local servers. An example of mash-up they had created was their data platform where they collect data from different sources. They then use this combined data sift through possible attendees when they are sending out invites to conferences to just send invites to the most probably attendees. This is done by checking what contacts they have, the subject of published material these contacts are tied to and also if they have the rights to contact them.

Also at Media Corp the way of introducing new SaaS services in the organization had been decentralized, that is, employees could sign up and try out new SaaS services to be used in the company. Their organization was flat and they encouraged employees to take their own initiatives, such as introducing new SaaS. This was one of the contributing factors to why they had so many services in the organization and also drove the need for the System chief to keep track of all purchased SaaS solutions as well as the created integrations. Also, the interviewee mentioned that their industry was highly competitive where there was a lot of things going on, so there was a need to continuously try out new solutions. Further, Media Corp were very open to making integrations to it is reasonable to assume that the openness and ease of introducing new SaaS solutions in the organization increased the actual integrations made.

The interviewee of Media Corp stated that with the increased strength and standardization of APIs the difficulty is not to collect data but to handle, analyze and present it. Further, substituting a service is easier if it is not integrated. Because when substituting an integrated service not only has the migration of data from one service to the other to be made but also the integration has to be

rewritten. The integration of the services thus increases the lock-in. However, this kind of lock-in effect is not really limited to integration of SaaS but would also be prominent in integration of on-premises systems. However, we have already mentioned that Media Corp tend to easily introduce SaaS solutions, leading to more integrations, which could also increase lock-in effects even more.

Summarization of effects regarding integration of systems:

- Reduced need for continuous manual labor and employees
- Need for someone to keep track of integrations made
- Increased ability to collect information from different services and thus achieving better decision basis
- Vendor supported extensions reduces the need for creating their own integrations
- Integrating services causes more lock-in

## 6 Analysis

*The analysis is structured in the same order as the research questions were posed. First the common issues discovered will be mentioned and the most relevant of those established. Using our analytical framework in combination with literature and case study findings we will end up with a summary of organizational effects.*

### 6.1 The Common and Relevant Issues

In this sub-chapter we will present what common issues that were found in both literature and in our empirical pre-study. The findings will be compared to answer the first research question regarding what common issues that are present in SaaS. After that we will also describe which of these issues that are most relevant and thus the limitation of our study. This will answer the second research question regarding which issues that are most relevant post SaaS implementation.

The first major part of this study was to cover what issues and organizational effects that affect organizations using SaaS systems. At this stage we did not filter our research by only covering what can be considered mainly post-implementation issues. The reason for this was that we did not want to exclude topics that could possible overlap throughout different phases.

The common issues we discovered through studying the literature were: *Frequent Updates, Integration, IT Department, Price Model, Mobility, Security, Standardization, Functionality, Performance, Privacy and Vendor Relation*. Some of these categorizations are our own making as described in the method section in *2.5 Techniques*. More details regarding which effects that are prominent for which common issue can be found in *table 3.1* in *3.3.1 Found Issues*.

The pre-study further aimed to identify what can be said about these issues by interviewing users, and thereby to validate if they really are a concern for SaaS system usage. So questions were asked to probe for effects within these areas. One possible risk of this is that other issues or effects than was originally found in the literature could be missed out. However, we did ask broad and general questions as well regarding for example benefits and disadvantages of their system usage to probe for such possibilities. But in the end, the purpose at this stage was mainly to discover which of the issues found in the literature review that we would pursue in the case study. Another risk is that we did not find all possible issues in the literature review, however since we are looking at the common ones that is not a real problem. Once again, the purpose was not to cover all of them.

The same common issues from literature that was mentioned were also found in the pre-study. Some issues had more or less relevance and impact on the daily work though. The grouping and naming of the issues in the pre-study and in frame of reference can vary slightly though, as explained in *5.1.1. Selection of Relevant Issues*. For example, in the pre-study we had one group called “lock-in” that we merged into the “vendor relation” issue in the frame of reference. Availability and data integrity from the pre-study is included in the security category in the *3.3 Issues in SaaS*. Also the minor issue usability is part of performance in *3.3 Issues in SaaS* as well.

The common issues discovered through the literature review (as described in *table 3.1*) were supported by our pre-study (with slight differences in grouping). Therefore, we hereby present the answer to the first research question: *What common issues affect organizations in their usage of SaaS systems?*

The common issues found that affect organizations in their usage of SaaS systems are

- Frequent Updates
- Functionality
- Integration
- IT Department
- Mobility
- Performance
- Price Model
- Privacy
- Security
- Standardization
- Vendor Relation

Some of the issues were however more relevant than others, which is the topic of our second research question:

*Which of the common issues are most relevant in the post implementation phase?*

As has already been described, the literature review found 11 groups of common issues, which we regrouped and revised to 13 after confirmation by the pre-study interviews. To answer the second research question we scored each issue in accordance to three different dimensions, as described in *5.1.1 Selection of Relevant Issues*. Since that selection process has already been thoroughly described, we here just state the answer to the second research question:

The relevant issues post SaaS system implementation are Frequent Updates, Integration, Mobility, Price Model and Vendor Relation. These are the issues that the study is limited to. In the next section we will delve deeper into these relevant issues.

## 6.2 Organizational Effects of Usage

In this subchapter the organizational effects of the usage will be analyzed. This will be from the perspective of how the relevant issues lead to certain organizational effects using our research model seen in *figure 6.1*. The analysis will be driven by our research model with focus on the right side part of the model, which is everything including usage, intention to use, organizational impacts and other impacts with the foundation in the left part.

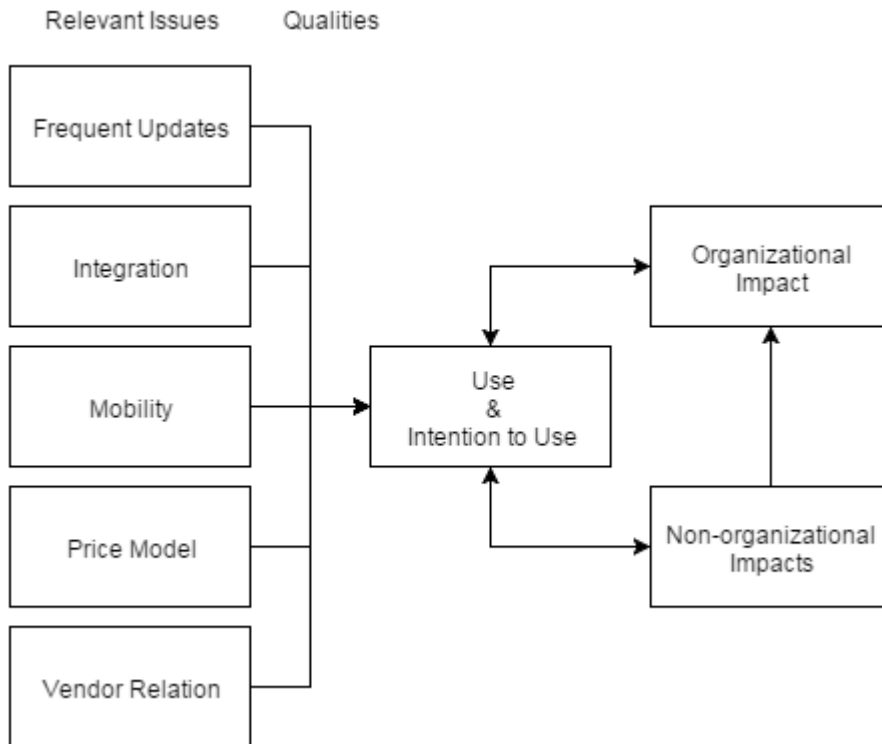


Figure 6.1 - Our adapted IS Success model

As presented in section 4.1 *Adaption of the IS Success Model* we used an adaption of the IS Success model (DeLone & McLean, 1992; 2003) to drive the analysis. As presented in 4.2 *Hypotheses*, there are one hypothesis for each relevant issue. The analysis will be done for each relevant issue to discover organizational effects (see figure 6.2), and then answer the hypothesis in question.

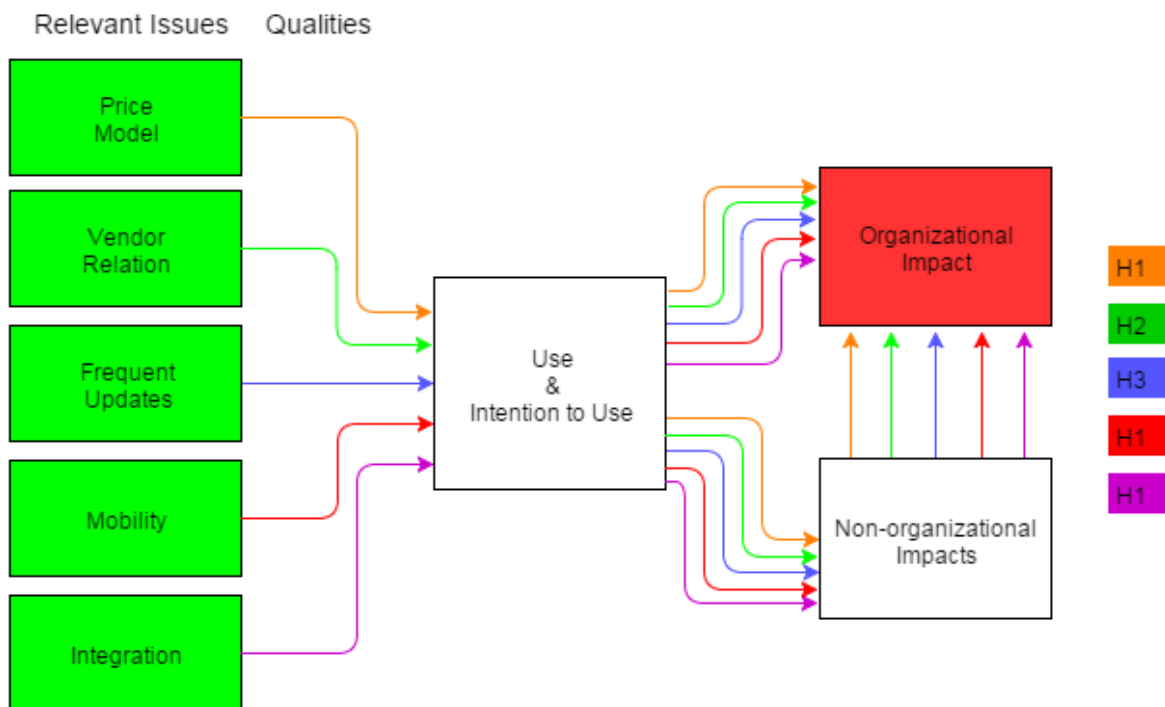


Figure 6.2 - Generalized hypothesis illustration

### 6.2.1 Price Model

In the analysis in this section the aim is to establish the organizational effects for the price model, and based on those effects be able to answer the first hypothesis. The first hypothesis is:

*H1: The price model of SaaS systems enables companies to be flexible in managing their IT portfolio.*

Summary of effects from the empirical study:

- Pay per use can lead to a complex price policy and difficulty in estimating actual costs
- Fixed costs simplify cost estimations
- Reduction of prices in negotiations usually leads to requirement to sign up for a longer period of time
- Possibility to benchmark prices of SaaS services to other competing services
- Fixed license fees reduce the possibility for customers to adopt systems with a low amount of users and infrequent usage
- Per-unit-price needs to ensure that income increases with the usage
- Total costs over time may still be high even if initial costs are low
- Reduced need for hardware investments due to scalability of the SaaS price model
- Estimation of hardware and amount of users required is no longer an issue
- More in-house handled adaptations to reduce consultancy hours

The price models described by our interviewees does not differ from the suggested types in the SBIFT-model's dimensions as derived from the literature in 3.3.1 *Price Model*. The price models are seldom fully toward Package due to the systems can, for example, be extended with extra modules or more user roles can be added at a cost. An interesting point was made by Media Corp, that even if they find that SaaS' strength lies in the flexibility they would rather pay a fixed subscription fee instead of pay-per-unit to simplify the cost estimation. Because pay-per-unit creates the need to ensure that the costs from increased usage can be covered. This is much what Dutta et al. (2013) state with the risk of non-transparent operation models. Though Creative Apps Corp did not substitute all of their non-SaaS financial systems to SaaS due to only requiring a few users and a low usage of the system. This was due to the SaaS provider of their financial system requiring them to pay a yearly license fee. To pay a subscription fee, either monthly or yearly, would be too expensive for them for these seldom used systems. But for the systems where the number of users and the usage varied, SaaS' price model flexibility helped them despite fixed license fees. They thus preferred to pay-per-role, to be able to add or remove users as needed. Also any necessary increase in hardware capacity did not become an issue for them through usage of SaaS, much in line with the findings of Peng and Gala (2014).

Concerning the total cost of ownership that Johansson and Ruivo (2013) considered to be lower none of our interviewed could say for sure that this was true. This was due to the fact that none of the interviewees had done any calculations about the total cost of ownership. Though Space Corp thought that the total cost of ownership in the end could be higher, thus having a contradicting view to Johansson's and Ruivo's (2013). The reasons for it to actually be more expensive could be that the customers still pay for the updates in their fee, and not just paying a separate updating fee. This combined with a price policy that makes it hard to estimate actual usage costs could make the total costs higher. Even the usage-based pricing could make it more expensive. For example it could be more expensive in the end if a service is used to create a lot of reports when the customer pays per created report. But applying a fixed price to the service could avoid the issue at the risk of paying too much for low usage.

All the interviewees mentioned how easy it became to manage their systems with SaaS. In accordance with Marston et al. (2011) their costs for their systems became operational costs and in many cases they did not put extra effort into managing updates. Only Media Corp and Mobile Devices Corp needed to put effort into handling their configurations to and integrations with their ERP system after an update. So it can still be considered to be easier to readapt their configurations and integrations than to perform the whole update themselves. This aspect of updates is further discussed in 6.2.3 *Frequent Updates*.

We consider Space Corp a good example of what both Johansson and Ruivo (2013) and Peng and Gala (2014) stated about increased availability of stronger systems to smaller firms. Because Space Corp had a low liquidity and could not afford a perpetual system. Instead subscribing to a system made them able to get a financial system that suited their needs. But this is more toward selection of SaaS then a post-implementation effect.

To answer the hypothesis H1 whether SaaS systems price model enables companies to be flexible in managing their IT portfolio, we do answer “yes”. There are other factors in Vendor Relation and Integration that limits the flexibility, but as a price model SaaS systems offer a lot in reducing the complexity of the investment.

Summary of verified effects after analysis:

- Pay-per-unit complicates the cost estimation
- Pay-per-unit enables scalability
- Pay-per-unit creates the risk of costs increasing more than income when the usage becomes more extensive
- Less effort managing hardware and updates
- Using the system becomes an operational cost

### 6.2.2 Vendor Relation

This section aims to answer our hypothesis about Vendor Relation. The hypothesis is as follows:

*H2: The use of SaaS systems involves a complex relation to the vendor.*

The effects discovered in the case study were:

- Willingness to change systems when there is a lower cost option available
- Willingness to change systems when there is a better system available
- Trust damage if vendor puts the interest of making money before helping the customer
- Avoiding agreements longer than one year since it creates a lock-in scenario
- Demanding SLA:s including financial liability in instance of system failure
- Having the contract specify ownership of data in all situation
- Preferring personal relationships with SaaS vendors, which often was the case when the vendor had local representation.
- Being hindered by time zone differences in regards to telephone support for foreign vendors
- Using tracking data to detect data leakage
- Making frequent data downloads to local servers to verify data consistency

We found in the case study phase that mainly two situations could trigger the willingness to change system, that either a better or a cheaper system can be found. However, Peng and Gala (2014) said that moving data can be time-consuming and expensive. Also, even if the case companies speculated that costs and better system could trigger the need to change system, none of the case companies

except one had a plan of changing systems. Media Corp were the company that showed the most openness to change systems, but they also had 32 different SaaS, and the combination and integration of their services were an important part of them being competitive and profitable. It remains unclear how large improvements and how much the cost differences have to be before one of the companies would decide to change services. It can be said though that costs and quality of the system are important for the customer to still want to be in a business relationship with the vendor. Thus costs and quality affect intention to use. There might be different factors that lock-in the customer that makes the decision to change vendor more complicated, for example contracts, which is the next aspect we will discuss. But there is a balance between the degree of lock-in and the costs and quality of the service. High costs and lower system quality could cause a company to reduce its intention to use the service, but if the company actually will reduce the usage depends on the level of lock-in. No matter what, the organizational impact is that the organization is more *willing* to change system if the costs are high and the quality of the service low compared to similar services. So we conclude that costs and system quality *could* lead to the organizational effect of changing system.

Contracts also affect the vendor relation, lock-in and other aspects as shown in the case study. Media Corp wanted short binding periods in their contract to reduce the lock-in effect and also wanted ownership to their data specified in the contract. Especially they wanted to own the data even if they would cancel the service. Dutta et al. (2013) confirmed that moving data by the end of the contract might be problematic. Johansson and Ruivo (2013) however said that the rental model might lower the lock-in effect. We interpret that claim as if you have a subscription contract that can be cancelled on short notice, then that could have less of a lock-in effect than if you have invested in an on-premises system for a large initial cost. This is the case since the large initial cost cannot be recovered (sunk cost) whereas in a subscription model you would only have paid for what you have used so far if you are not in a binding period. However, lock-in problems are bigger and more complex than that, since Dutta et al. (2013) said that moving data can be problematic at the end of a contract. Media Corp also confirmed that this is a lock-in effect for them. However, even though it is not the purpose of this report to compare with on-premises systems, it is important to note that migrating data from one system to another is a problem that is not unique for SaaS systems. And the argument that the subscription model actually can lower the lock-in effect has been supported in literature (Johansson & Ruivo, 2013). So in comparison to on-premises systems it can be argued that the lock-in effect actually is lower for SaaS systems. However, this is under the assumption that the contract gives the customer ownership of their own data, and that there is no contract binding period.

The next topic to cover is the culture of the vendor and how it affects the business relation. Media Corp stated they preferred local vendors since they are more open to price negotiation and it is easier to develop a personal bond. Also Media Corp felt that large vendors did not prioritize them, since Media Corp is a small customer to them. So it might be that the local vendors prioritize SMEs more if they do not have as large customers like some of the larger international vendors have. In that case the vendor target market size actually influence the relationship as well. Peng and Gala (2014) did however say that cloud systems are characterized by more frequent and longer contact with the provider. When it came to support the quality varied due to factors such as time zone differences, highly specialized international support, local tax laws for Sweden, and so on. These issues are not very SaaS specific in themselves, but are still important to mention in these contexts since we have just established that the vendor relation for SaaS systems are more frequent and longer. This is not strange when considering that the fundamental difference between on-premises systems and *Software-as-a-Service* is the service-nature, and it can be argued that a service appears in the interaction between the service provider and the customer. Even though service in the cloud definition by Marston et al. (2011) is of a self-service nature, the service is still provided by the vendor

and dependent upon the vendor continuing providing this service. In most interviews we conducted the vendor relation aspect to be important, especially having good support. It is difficult to summarize all these things into a single organizational impact. The general takeaway is that contact with vendor is frequent and the case companies put importance into this relationship.

Next we will cover the broader aspect of trust between the customer and vendor. Johansson and Ruivo (2013, p. 98) explained that the SaaS model changes the paradigm from “product feature to service trust”. Thus, the trust between the customer and vendor is important. Johansson and Ruivo (2013) also explained that some risks, for example implementation risk, is transferred to the vendor instead of the customer. Dutta et al. (2013) further explains that customers should be aware of the risks and prepare the organization for those. So even if you transfer the risk, the customer should still in some sense not completely give away control. For example Media Corp downloaded their data from most of their SaaS systems every night to check for consistency and to establish that there has not been any loss of data. The interviewee stated that the reason they were doing this was because of previous experience with a provider that had tried to hide the fact that they have had hard drive failures. So the trust damage caused by one or few vendors have led the company to implement control measures. These measures are thus in accordance with Dutta et al.’s (2013) recommendations. Another interesting instance was that due to instances when there has been data leakage from the vendor, for example due to hacker attacks, the vendor have been open about it. According to the interviewee at Media Corp the reason for them to be open about it could be to that customers do like Media Corp, adding tracking data to see if there is a data leakage. For example e-mail addresses can be such tracking data, which they monitor to see if they start receiving e-mails to these e-mail accounts. So this is a trust issue between the vendor and the customer. A third example was when the vendor puts his interest of selling and making money before the interest of the company, then Media Corp were less eager to continue working with this vendor. One last example was that Media Corp wanted financial liability for the vendor if the service stopped working since they have had instances where money have been lost due to system failure.

The common triggering factor for all these examples is that an external event causes trust damage between the customer and the vendor. The external event is characterized by the vendor in most cases consciously does something in opposition of the customer interest. Hiding important events such as data leakage or hard drive crashes, or simply putting the interest of making money before customer success. This trust damage then *changes* the intention to use the SaaS system as a reaction to the event that triggered the trust damage. As we have explained in our research model, “intention to use” is an attitude while “use” is a behavior. So the changed attitude of the customer as a result of this trust damage changes the usage, that is, the behavior of the customer. The impacts we have shown in regard to some of these examples are that the customer has implemented their own control mechanisms to discover the fact that a vendor has hidden hard drive crashes. So the organizational effect of the vendor hiding important information in these cases is trust damage that causes the customer to implement extra control mechanisms. In the instance where the vendor put interest of profit before customer interest then the intention to use the system was reduced and they started looking for alternative vendors. These behavioral responses of the damaged trust can be summarized to the organizational effect that the customer continuously evaluates the vendor. This is not strange, since after all, Johansson and Ruivo (2013) did say that SaaS changes the paradigm from a product to a service focus. However, it is not only the specific SaaS vendor that misbehaves that comes under extra scrutiny, but rather all of the SaaS system providers Media Corp used become evaluated under the same tough scrutiny.

The trust issues mentioned so far all stem from Media Corp's interaction with their SaaS providers. All of our other case companies brought up at most three different SaaS systems each. None of these case companies have had any major problems with their vendor. Even if there had been occasional bugs and downtimes as previously described, these were rare incidents and not anything that had damaged the relation in any significant degree. Mobile Devices Corp attributed all their re-configuration and testing as a result of updates to them having a highly configured system, and they did not attribute it to the vendor providing bad service. They all appreciated and used the vendor provided support when needed. Johansson and Ruivo (2013, p. 98) also stated that "a successful market establishment of its offer lays not so much on the product itself but on the kind of support given in the SaaS model and the customer experience with provided service".

The above discussion has shown that customer and vendor interact throughout the post-implementation phase, and the service is continuously being evaluated influenced by factors such as trust, costs and quality of the provided service. SaaS systems might remove complexity in some regards, for example by outsourcing the system updates to the vendor or by having greater freedom in mobility. However, when you give away control you also reinforce a relationship. This relationship is then continuously being evaluated throughout the whole usage phase. If there is a trust damage then that causes reaction, or even the intention to change vendor.

But this experience of difficulties were isolated to only one case company in this study, and that case company had a large number of SaaS services that were highly integrated. Further, that interviewee was the technical director who is more involved in vendor management in his job role, which a normal end user would not be to the same degree. We have shown that all other case companies claimed they appreciate the vendor relation they had, and especially appreciated the vendor provided support. There are however indications that the relationship is sensitive due to trust being incorporated into the service nature, as the example of Media Corp has shown. However, the service nature is rather of a self-service fashion so as long as the system is running as normal without problems the relation is quite unproblematic.

However, we can conclude that when there is no trust damage between the vendor and customer, then the use of SaaS systems does not create a complex relation to the vendor. The hypothesis is thus rejected.

Summary of verified effects after analysis:

- Increased costs and lowered system quality compared to alternative systems increases the intention to change systems, and thus *could* lead to the organizational impact of changing system.
- The nature of the contracts between the customer and vendor in regards to, for example, data ownership and subscription binding period affects the degree of lock-in.
- SaaS system customers have frequent and long term interaction with their vendors, and the customers put importance to this relationship.
- If the vendor puts their self-interest before that of the customer then that could damage the trust, leading the customer to implement control mechanisms to discover future destructive behavior of that vendor and other vendors.
- Vendor misbehavior causes trust damage which leads the customer to put extra effort into continuously evaluating the vendor services.

Summary of potential effects after analysis

- SaaS systems could lower the lock-in effect compared to on-premises systems if there is no contract binding time and the customers fully owns all their data even in the case of service cancellation.

### 6.2.3 Frequent Updates

In this section we answer the third hypothesis about how vendor-managed updates can affect the customer organization. The hypothesis is:

*H3: Vendor-managed updates reduce time and effort needed for maintenance by customers.*

The main points discovered through our empirical study was summarized into these concrete effects:

- Bugs as a result of updates lead to work around solutions
- Bugs interfering with own program code lead to extra testing and re-programming
- Freedom from manual updates and installations
- Irritation with changes in functionality or with added functionality
- Added functionality is received frequently

The first two effects concern bugs that appear after updates, something that all case companies experienced. Bugs can be classified as *Non-organizational Impact* since it is not directly an organizational effect. The organizational effects in turn that stem from bugs were that the employees had to make work around solutions. This will naturally take time to make, so a further organizational effect of bugs is thus time wastage, especially in the case of Mobile Devices Corp where they had to do substantial re-configure and testing. This though can be attributed to them adding a layer of configurations on top of the base SaaS system configuration. So even though it is true that the updates trigger these issues, it can be argued that the real cause for the bugs is something in their configuration. So a potential organizational effect here is that the implementation of customer configurations in the system lead to bugs when there is an update, which in turn lead to time wastage. It can be argued that the real price of having a highly configured system is putting a lot of time into making these configurations and also re-configuring them whenever there are updates. Thus, if there are *too* frequent updates, then it can be argued that this leads to even more time wastage. With an on-premises ERP system the company would instead have more freedom regarding *if* and *when* to actually implement updates. That could possible reduce the occasions needed to re-configure the system. However, it could also lead to larger and more demanding tasks of reconfigurations whenever there is an update. So it could also be that frequent updates forces the user to spread out and correct these issues more frequently. However, no matter if it leads to more or less work of re-configurations when having frequent updates provided automatically by the vendor, the fact remains that the *choice* is taken away from the customer if an update should be implemented at all (and when it is done).

Lewandowski et al. (2013) wrote that updates put the system at risk of failure, which is the only negative effect of updates that we have discovered in the studied literature. In the pre-study both case companies had experienced system failure as a result of updates. But both pre-study case companies were referring to the same system, and due to its multi-tenancy nature it is likely that they were referring to the same specific instances of down times affecting all customers. But also Mobile Devices Corp had experienced down time as a result of errors with updates. However, it is not clear why these down times occurred and if their own configuration contributed to these down times. So the error could be attributed to vendor mistakes in the pre-study companies' cases, but for Mobile Devices Corp it is more difficult to say for certain. However, since the updates are forced onto the customers the fact remains that the errors mostly occur outside the control of the customers. At the pre-study case companies they said that system failures cause their work to stand still since they are

dependent upon the system to do their bookkeeping. So the organizational effect is that their work stops since no case company had a contingency plan.

Peng and Gala (2014, p. 22) stated that the lack of local installations would cause “...less fees and internal hazard for system maintenance and upgrade”. From our case study we would like to suggest that this is an oversimplification since as we discussed the configurations made in a system will still need to be changed as a result of updates, as described for Mobile Devices Corp. However, the two other case companies that did not have any major configurations were more positive to vendor-managed updates, but for different reasons. Media Corp saw it more as a benefit for receiving extra functionality, similar to the benefit of access to new technology that Lewandowski et al. (2013) mentioned. However, the interviewee at Media Corp were as previously mentioned not a normal end user so there could be problems that he is not aware of, but other users in the organization have experienced. Creative Apps Corp appreciated the fact that they did not have to manage their own updates at all. Both of the pre-study case companies saw the main benefit of vendor-managed updates to be saving time. All these three benefits can be attributed to what Lewandowski et al. (2013) described as being freed from hardware management and software updates. Space Corp saw it also as a way to even save money due to not needing external consultants. The opinion of Space Corp that costs are reduced is also supported by Marston et al. (2013) and Lewandowski et al. (2013).

Saving time and reducing costs can be seen as organizational effects in accordance to our model. However added functionality is more of a *Non-organizational Impact*, or maybe not even that, since the added functionality needs to be used to lead to an effect. It is difficult to say for sure what the organizational effects of added functionality are since it depends on the nature of the functionality added. However, this benefit was brought up by Media Corp, who were always looking for new solutions since they were in a highly competitive and tough industry. One reasonable effect of added functionality in general is that they always want the best solutions to ensure competitiveness. Freedom of updates, as Creative Apps Corp described a benefit of the updates, is also vague and difficult to classify as an organizational effect in itself since “freedom” can imply several different things. However, Lewandowski et al. (2013) and both of the pre-study companies described that the main benefit was the time being saved so it is reasonable to conclude that this is the effect Creative Apps Corp were implying.

Creative Apps Corp and Space Corp both expressed some irritation with added functionality or other changes occurring after an update. At Space Corp this caused the interviewee to call the vendor and complain. He explained that the irritation he felt was due to the changes in functionality did not match his needs, which often was a result of the vendor not fully understanding their way of working. At Creative Apps Corp he also expressed similar irritation although he accepted the changes in the end. At Media Corp however added functionality was expected, however his lack of normal day-to-day end user experience makes it difficult to contradict the experiences of Creative Apps Corp and Space Corp. Studied literature did not express many possible negative effects regarding updates except application failure (Lewandowskis et al., 2013). However the risk of losing control was mentioned by Johansson & Ruivo (2013). No matter what, if the irritation can cause a user to call the vendor to complain then it can be argued it affects the vendor relation.

As has been discussed above, vendor-managed updates can cause bugs and down-times in the system, especially when the customer has extra configurations. However, these occurrences can be seen as incidents that happen reasonably rarely. The general experiences described in literature and confirmed by our studies is that the updates saves time and reduces costs. Thus, it can be concluded that vendor-managed updates in general reduces the time and effort for customers whenever there are no bugs or downtimes as a result of the updates. But since updates are vendor-managed at their

discretion bugs can be solved in a patch. The important aspect is that there are no customer projects or coordination to update their system.

To answer the hypothesis H3 whether vendor-managed updates reduce time and effort needed for maintenance by customers, we answer, “yes, it does”.

Summary of concluded effects after analysis:

- Frequent updates sometimes lead to bugs that demands time consuming work around solutions.
- Frequent updates can cause system failure that hinders or stops work.
- Vendor-managed, frequent updates, when there are no bugs or downtimes, save time in the organization.
- Frequent updates, when there are no bugs or downtimes, keep the costs down

Summary of potential effects after analysis:

- Added functionality with frequent updates could possibly lead to a company staying competitive
- Added functionality can cause irritation which could possibly affect the vendor relation.

#### 6.2.4 Mobility

In this section we analysis the effects of the issue Mobility to answer the hypothesis:

*H4: The mobility offered by SaaS systems extends the ability to work.*

Effects that were discovered in the empirical study were:

- Not restricted to a specific location (with Internet access) for working in the system (all case companies)
- Possibility to let customers see product under development.
- Increased ability to reach global markets.
- Platform independence due to web browser access.
- Being able work while travelling (if there is Internet access).
- Possibly increased stress due to increased ability to work from home.

Mobility has mostly been discussed in literature how it enables a user to access the system independent of the location (Marston et al., 2013; Peng & Gala, 2014; Johansson & Ruivo, 2013). All case companies confirmed that they were able to use the system independent of their location. All these companies also confirmed that they did work from home in the system at need. Some of the case companies also used the system while travelling or being at the customer's site. The case companies did see mobility as a positive thing, especially Creative Apps Corp since they could even let the customer see the software products being developed by remote access. The only negative aspect brought up was possible stress due to being available all the time, but only the interviewee at Media Corp mentioned it and it was more of a speculative answer and not representing his own experience. Also, it would be difficult to attribute the stress level to the SaaS system itself since most people are available through mobile phones or online e-mail accounts as well. However, the mobility property of SaaS systems leads to the organizational effect of being easier to work from home and other locations.

Creative Apps Corp were the case company that experienced most of the mobility benefits of the companies in this study. The ability to let customers into their system led to the organizational impact of easier reaching global customers since they could see the product under development. Also the

platform independence of web browser access was seen as a positive thing, since the employees could reach their systems no matter which operating system they used. This led to the organizational effect of having a workforce not being bound to a certain technical platform. This is in accordance with what Marston et al. (2013) described as device independence access. Peng and Gala (2014) also mentioned that mobility leads to more efficiency and increased performance, however this is difficult to conclude from our study due to the difficulty of proving such a causal relationship.

As was discussed in the empirical research (5.2.3 Mobility) the issue of dependency on Internet availability to work in SaaS systems was never discussed with the interviewees. Nobody brought up the possible issue, however we never asked either. One reason the interviewees did not mention it could be that they might not have felt the need to be working in the SaaS systems under circumstances where there were no Internet access. It could also be that there have not been many occurrences without Internet access in their daily life where they have had the need to work in SaaS systems. A third option could be that some of the SaaS systems could possibly provide offline-working abilities. However, it is reasonable to assume that the possible issues regarding this would be larger for users who travel a lot in their work or live in areas where stable Internet access is not provided. As described in our limitations our interviewees were mainly located in the Stockholm area. Johansson and Ruivo (2013) did mention that SaaS requires Internet connection, but did not express lack of Internet access as a problem to be aware of. Except for that we have not noticed Internet dependency issues mentioned in studied literature. However, we do not exclude the possibility that some of our interviewees actually have felt limited by the need for Internet access to work in the system outside the premises, e.g. when being on an airplane. Thus, it remains inconclusive whether it is an issue or not.

We have found strong evidence in both literature and in all our case companies that they can, and do, work at distance due to SaaS systems inherent mobile access nature and using an operating system of their own. This hypothesis thus holds true. As also have been seen, in some cases the ways of working can even further be extended to also let the customer draw the benefits of mobile access. Lastly, it has been shown that the web browser access allows coworkers at a company to use an operating system of their own choice.

So, to answer the hypothesis H4 whether mobility offered by SaaS systems extends the ability to work, we answer “yes, it does”.

Summary of verified effects after analysis:

- Increased ability to access the system and thus easier to work at distance at need.
- Letting customers see the product under development by mobile access and thus being able to easier reach global markets.
- Being able to access the SaaS systems from different web browsers increase technical platform flexibility in the organization, regarding for example which operating system used by employees.

Summary of potential effects after analysis

- Perhaps increased stress levels due to being able to access the system from home during non-working hours.
- Possibly users can feel restricted to work in SaaS systems only when there is Internet access available (effect remains inconclusive)

### 6.2.5 Integration

For this section we aim to answer the fifth hypothesis by analyzing the found effects concerning the issues Integration. The fifth hypothesis was:

*H5: Integration of services enables new possibilities in SaaS-usage.*

Summarization of effects from empirical findings:

- Reduced need for continuous manual labor and employees
- Need for someone to keep track of integrations made
- Increased ability to collect information from different services and thus achieving better decision basis
- Vendor supported extensions reduces the need for creating their own integrations
- Integrating services causes more lock-in

In most of our interviews integration seemed to be something the interviewees feared due to it increasing the complexity of and lock-in to the system. Media Corp was primarily the company that rather integrated their services than not, perhaps even, as stated by the interviewee, to a too large extent. For Creative Apps Corp and Mobile Device Corp they primarily depended on their vendors to include the desired systems or modules. Because this would keep the complexity as low as possible and letting the vendor manage the integration. The possibility to integrate some systems with add-ons without compatibility issues was also a benefit with SaaS mentioned by Johansson and Ruivo (2013). However, Lewandowski et al. (2013) also stated that vendors need to find ways to enhance product offerings to support diverse applications. If the vendor did not have any official modules the case companies took different approaches to fulfill their needs, Creative Apps Corp developed something on their own and Mobile Devices Corp searched for compatible third-party solutions.

The complexity and lock-in effect that comes with integrations are due to increased management of the made integrations and the increased difficulty of substituting a service with another. Since if a service is substituted with another, it not only requires its data to be migrated to the new system but the integration also has to be rewritten, from connecting to the old service to connecting with the new service.

The strength of integrations for Mobile Device Corp, Creative Apps Corp and Media Corp was to limit the manual labor and to save on salary costs. Other interviewees thought that they would rather deal with the manual handling than the extra complexity of integrating the system with other systems and services.

Both Creative Apps Corp and Media Corp stated that APIs of SaaS have become stronger and more open. It is thus possible to directly create the integrations themselves or with the help of consultants, which might reduce the need for iPaaS. Media Corp did not seem to have any difficulty with SaaS having a low customizability and integration freedom, possibly due to the strength of the APIs.

Both Creative Apps Corp and Media Corp told that they had add-ons to their systems or created mash-ups of services as suggested by Johansson and Ruivo (2013) respectively Marston et al. (2011). Adding or combining services gave both of these companies either help with missing functionality in their base service or were able to retrieve more detailed information due to collecting and analyzing data from different sources. For Media Corp did the usage of mash-ups give a performance edge when for example they were to invite conference attendees by retrieving and inviting the most likely attendees.

Only the interviewee of Media Corp had discussed their need for a responsible for the purchases and integration of SaaS, which can be seen as in line with Marston et al.'s (2011) suggestion of creating a cloud strategy. According to Marston et al. (2011) a full *cloud committee* would be suitable, but for Media Corp it seems to suffice with one person, the System chief, whose role had not solely cloud as responsibility.

The hypothesis is confirmed through the examples above about add-ons and mash-ups. Also reduced manual labor could also mean that the leftover resources after integration has been made can be used in other parts of the company.

Summary of verified effects after analysis:

- More lock-in effects are created when integrated
- Increased system management due to integration management
- Reduced manual labor and required workforce due to integration
- Requirement of an employee responsible for integration
- Add-ons give the ability to extend a service with more functionality
- Usage of mash-ups gives extended and more precise basis for decision-making

## 7 Conclusions

The purpose of this master thesis has been to find *organizational effects of using SaaS systems in SMEs, by studying customer organizations post implementation*. To fulfill this purpose we have performed an interpretative study with a deductive approach. We started by doing a pre-study in which we performed an initial literature review together with three interviews at two companies. After the pre-study we entered a study phase in which we extended the literature review and also interviewed three more people at three other companies. In our study we focused on five different issues in SaaS. These issues were selected for further study as a result of our pre-study phase and our aim has been to understand how each of these issues can affect an organization in their usage of SaaS systems.

But to fulfill our purpose we started with setting up three research questions, which we in this section will answer one by one. The research questions were:

1. What common issues affect organizations in their usage of SaaS systems
2. Which of the common issues are most relevant in the post implementation phase
3. How does the relevant issues affect the customer organizations?

So to answer the first question:

*What common issues affect organizations in their usage of SaaS systems?*

We found through our literature review and the interviews that common issues affecting organizations were:

- Availability & down-time
- Data integrity
- Frequent updates
- Integration
- IT department
- Lock-in
- Mobility
- Performance
- Price model
- Privacy and confidentiality
- Standardization
- Vendor relation
- Usability

As mentioned in 3.3.1 *Found Issues* we sometimes found the need to group and name potential areas of study within SaaS usage. This need stemmed from literature not always having clear categorization by themselves or having conflicting categorization with other literature. To choose which issues to further study we had to answer the second research question already in the pre-study phase.

Which of the common issues are most relevant in the post implementation phase?

We answered this research question already in *5.1.1 Selection of Relevant Issues* and we considered these relevant issues to be most relevant to study:

- Frequent updates
- Integration
- Mobility
- Price model
- Vendor relation

An important notion is that even if "lock-in" existed as its own issue, during our study we also included it into vendor relation due to considering it to be an important part when researching vendor relation.

The third research question was:

*How does the relevant issues affect the customer organizations?*

The five relevant issues from the previous research questions will structure the answer to this research question.

### Price Model

The price model is SaaS-specific in that for example subscription and pay-per-unit is SaaS and only possible in SaaS. The conclusions regarding the price model can be summarized into that the costs of SaaS are based upon usage, which also makes it harder to estimate, especially if the usage varies. There is also a risk that the expenses at a certain level exceeds the income justified for that usage. But when the usage varies the scalability of the price model can also be a strength enabling the customer to pay for exactly what is needed. For example if the amount of users in a project management system needs to be increased to include temporary external project members. Laatikainen and Luoma (2014) found that vendors apply usage-based pricing when there is differences in the user demand, which thus also could be good for the customer. The concerns about usage-based pricing came from Media Corp concerning an important operational function, that the cost for running a website could end up decreasing their net profit when they got a large increase in the number of visits. While, for example, Biometric Corp had usage-based pricing for a supportive system and accepted it. So we cannot for example answer whether pay-per-unit would be more accepted for operational systems than supportive systems, our findings rather show that it depends on the company. Concerning total cost of ownership one of our interviewees have said that it is probably more expensive for them in the long run with SaaS, thus contradicting Johansson and Ruivo (2013). But none of our interviewees seemed concerned with total cost of ownership in comparison to non-SaaS. So in the end SaaS will increase the flexibility for SMEs when handling their IT portfolio, through the offered scalability in the price model and its offer of more usage-based pricing.

### Vendor Relation

Vendor relation is a broad topic that involved many things in our study, including: intention to change systems, lock-in effects, support, frequency and nature of contact, and trust related aspects.

However, our findings regarding this broad topic have been spread out among the different case companies. Further, those sub-topics are unique for SaaS to a varied degree. The major part of our empirical findings regarding vendor relation also came from the technical director, especially trust

related aspects. However, his experiences cannot be considered general for an end user since he rather manages the systems in the company.

Several of our interviewees expressed appreciation for customer support. Also, this aspect is not very SaaS specific and thus not our main interest to generalize over. Neither studied literature touched the support topic much, possibly since it is not very SaaS specific.

The interviewees expressed that the need to change system could arise if there was a lower priced or better option available. Dutta et al. (2013) confirmed that low prices could increase the intention to change system. Also, Dutta et al. (2013) and Peng and Gala (2014) expressed difficulties in migrating data due to limitations in the contracts. This situation can cause a lock-in scenario according to Dutta et al. (2013). In our studies we found several aspects that affects a customer's degree of lock-in, which were: contracts, data ownership rights and subscription binding periods. We did not find a definite answer in literature whether SaaS increases or lowers lock-in effects, however different aspects that characterizes SaaS could either increase or decrease it. The rental model was considered to lower the lock-in (Johansson & Ruivo, 2013) while legal restrictions could increase the lock-in effect (Peng & Gala, 2014). However, mostly Media Corp expressed fear of lock-in, while the other interviewees did not. This might imply that this is a problem that concerns mostly employees who are responsible for the internal system delivery management or their type of industry. We only interviewed one such person so we cannot give a generalized conclusion regarding whether SaaS increases or decreases vendor lock-in. What we can say is that we have support in literature that SaaS affects the degree of lock-in, with some recognition in our interviewees that so is the case. Though what is common for all who use SaaS is that all of their data is located at their vendor's server. This combined with the above mentioned difficulty in migration of data they can all be considered locked-in to their vendor to a certain degree, which together with the contract binding period provides two lock-in effects which are can be considered specific to SaaS.

In literature it was stated that the frequency of vendor contact increases with SaaS. If excluding support related errands, it is difficult to say whether this is true or not based on our empirical findings. Due to the nature of SaaS there is a continuous service usage, but that is not the type of "contact" we have in mind.

### Frequent Updates

The vendor-managed frequent updates can be seen as part of the service nature of SaaS, especially since vendor-managed updates usually involves minimal user interaction. We have found that frequent updates usually save time and effort in the organization, but can also cause problems, which our interviews have shown. Especially if the customer has their own configurations, which however can be classified as an integration related issue. Also frequent updates have been shown to reduce the direct costs of updates when there are no problems since the vendor manages the updates. These benefits regarding frequent updates were supported in literature by Peng and Gala (2014), Marston et al. (2013) and Lewandowski et al. (2013). We can thus conclude that frequent updates do indeed save time, effort and costs in an organization with support in studied literature.

Other problems due to frequent updates found in some of our case companies include bugs and system failures that can hinder or stop the daily work. Some users we interviewed have also expressed irritation with added functionality after updates that do not fit their work routines. The support in studied literature for problems related to frequent updates has been less prominent. Lewandowski et al. (2013) did however mention users complaining that failures happened more often after recent updates. Our case companies had been users for at least two years, and failures had only happened a

few times at most in any of our case companies. However, in one of our case companies it happened at a critical point of time. So system failures and bugs after updates have been established in several of our case companies, as well in one studied article. Problems experienced due to updates were not isolated to one type of system or for one specific vendor, thus these problems can be considered general for SaaS systems. So we can conclude that system failures and bugs as a result of frequent updates happens occasionally causing disturbance in the daily work, with some support in literature.

### Mobility

The mobility aspect is not unique in itself, but it comes naturally with SaaS since the service is accessed over the Internet. The interviews showed that mobility can increase the flexibility of where employees can work. All interviewees confirmed that the mobility functionality is actually used to access the system outside the premises of their organization, for example at home or when travelling. Literature also supported that the location independent nature of SaaS enables a flexible and mobile workforce (Johansson & Ruivo, 2013; Picoto et al., 2014). Thus, with support in literature we can conclude that SaaS enables flexibility regarding when and where employees can work. This was the main effect regarding mobility that we could establish. However, a similar effect could be achieved with non-SaaS based systems by remote access configurations, as for example Media Corp mentioned.

Other mobility effects have less support in our interviews and literature. The web browser access nature of many SaaS systems enables platform independence, thus not limiting the employees to only use one operating system throughout the whole organization. One case company explicitly expressed this as an appreciated benefit, however several companies mentioned the web browser access nature of their SaaS services. However, studied literature did not emphasize the technical benefits of platform independence. Further, one case company could more easily reach customers on a more global market by allowing the customers to see their software product under development in the SaaS system. This was also not mentioned in studied literature, but this effect can be attributed more to the circumstances of that company, plus it involves a SaaS system closer to the operations. The systems mentioned at other companies were mainly about supportive systems. Thus it is difficult to generalize that effect.

### Integration

Integration has some interesting organizational effects. If the system is highly integrated then there are more lock-in effects, increased system management, and there could be a need of someone to manage these integrations. However, integration also lowers the need for manual labor and thus could reduce the workforce needed. Also integration can extend functionality or increase decision quality compared to choosing not to integrate their systems. One finding is that some of our interviewees chose not to integrate their system to keep the complexity low. We have found some indication that support Johansson's and Ruivo's (2013) add-ons, to add another service on top of another, or Marston et al.'s (2011) mash-ups, to combine services into something greater. We believe that the reason for these findings just being related to a few of our case companies is due to the other companies not being as extensive SaaS users as Creative Apps Corp and Media Corp. That with an extended use of SaaS and integration comes the need or possibility for add-ons and mash-ups.

Media Corp was the most extensive users of SaaS and integration. But Media Corp did not according to the interviewee use an iPaaS, as explained by Pezzini and Lheureux (2011), nor did we find out whether their vendors had any "prepackaged integration flows" for their customers to use. Though seen to our findings, what we know about SaaS and information systems in general, none of these findings seem cloud-specific but are more concerning integration in general. Perhaps most companies

are not ready for a more cloud-specific integration or integration is not fully a cloud-specific issue at all but more of a general information system issue.

### About our case companies

When it came to our case companies it was easy for us to get companies with primarily financial administrative supportive systems. All of our case companies used this type of solution as SaaS. They often had other supportive systems or the financial administrative system was combined with other type of supportive systems. There were not many operational systems in use other than for Media Corp, the service system of Mobile Device Corp and the project oriented systems of Creative Apps Corp. Due to the fact that all companies have had financial administrative systems it is probably not surprising that we have talked mostly to CFOs. Because when we contacted each company we often either contacted their CFO directly or got directed to their CFO when we asked after suggestion of who we could talk to. What all our case companies have in common is that they are all high-tech companies and all were developing software and/or hardware. We cannot explicitly say anything about non-high-tech companies, other than that we did not get to interview any, which could indicate that SaaS solutions are not as often utilized by lower tech companies.

Finally, as have been described before, most of the interviewed companies in our study have mainly been located in the area of Stockholm in Sweden. So SaaS has been studied in a setting where there is in general widespread Internet access, with also a certain level of technological development and acceptance of technology in society in general. This might affect the generalizability of some findings of our research, especially the mobility aspect.

### Further Research

During the research process some new potential areas to further investigate have emerged. Since some of these spin offs are outside the purpose of our report we present them here instead, to serve as inspiration to future researchers. Especially the relevant issues concerning the price model and vendor relation have given us some ideas of such topics.

We have described the relation between the customer and the vendor in regards to SaaS usage from the user perspective. However, it could also be interesting to look at the vendor partner perspective in the emerging SaaS market. A vendor partner who previously has helped customer organizations with implementation and configuration of a system to the customer processes might have to re-think certain aspects of their business. For example how the vendor partner should focus on helping the customer with integration issues and local backups of their SaaS services. Other strategic issues to consider could be if the vendor partners should take the role as a local representative for SaaS vendors to satisfy the need of customers who especially value local support. Local representation can also be important in terms of where the data is geographically hosted (due to legal reasons) and the vendor partner could perhaps offer hosting solutions to that.

We have also described how certain customers take precautions when there is trust damage, such as making local backups or adding tracking data. It would be interesting to get the vendor's perspective regarding these issues. For example to further investigate the existence of procedures in how the vendor protects the data from security breaches (due to for example hackers). It could also be interesting study how the vendor partners plans for and reacts to such incidents, and how they manage trust issues related to those reactions. It can be argued that trust is especially important in SaaS due to the continuous service relationship between the customer and its partner. Our research also indicates that some customers continuously evaluate the service provided by the vendor or vendor partner, where degree of trust is an important outcome.

Regarding the price model it would be interesting to further investigate which pricing model that actually is the most attractive for customers, and also which ones that are potentially most lucrative for the SaaS providers. For example, it could be interesting to compare SaaS payment plans with other service-based pricing models; such as mobile phone payment plans. In Sweden as of writing this it has been increasingly common to sell mobile phone subscriptions where the customer pays for the right to spend up to a certain amount of mobile surf data per month, with phone calls included in the cost. Also, some online streaming services such as Spotify and Netflix charge for a fixed cost for unlimited consumption of music or video, however with some versioning in regards to video quality offered for Netflix (2015). This makes it easier for the customer to predict the costs in comparison to variable costs. So investigating the customer preferences regarding these different payment models for SaaS systems in regards to the spectrum of only fixed costs to only variable costs would be interesting. This can be compared to the "formula" aspect of the SBIFT-model (Iveroth et al., 2013) as shown in *figure 3.1* in *3.5.2 Price Model*. However, as have been seen in our case studies a customer can be charged both for the amount of active users as well as the usage (e.g. number of invoices issued). Perhaps the SaaS provider would be able to add a premium when only providing fixed costs for one or both of those aspects, that is, that some customers would be willing to pay a higher price in exchange for being able to fully predict the cost each month. So simply speaking, we suggest further research into which pricing models that are preferred among either user companies or SaaS providers.

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## 9 Appendix A - Study Phase Questions to Case Companies

Below are the questions we used as foundation in our semi-structured interview with the case companies in the study phase. Since all interviewees could speak Swedish our questions were in Swedish, however below the questions are translated. The questions are also marked with "1" or "2", this was a priority marking to highlight the questions we found most important to ask. The questions marked with "2" mostly are potential follow-up questions. The questions are divided into the topics: introduction, price model, vendor relation, frequent updates, mobility, integration & integration potential and closing of interview. Parenthesis by the end of a question indicates specific information of interest in regards to that question, which we however usually did not mention but rather kept in mind when dealing with that question.

### Introduction

Initially we tell the subject

- Our background
- The purpose of our study
- That we will anonymize the report

(1) Are we allowed to record?

(1) Please tell us a little bit about your background (position)

(1) What is this company doing?

(1) Who are you and what is your position and assignments in this company?

(1) Which systems do you use? Which of them are cloud-based (SaaS)? For how long time have you used the cloud-based?

(1) Who uses the different systems?

(1) What do you use and do in the cloud-based system?

(1) How has your work been affected/changed by using cloud-based SaaS systems? (For example: routines, processes, time and effort)

(2) Who use what parts of the systems?

(2) What is the most important reason that you are using the systems?

(1) Do you have any IT department?

- How does it look like?

### Price Model

(1) How does the price model look like for the different systems you use?

(1) How many licenses do you got?

(1) What do you think is the basis of the prices, and how was the price set? (based on cost, competition or value)

**“To rent”**

(1) What is your opinion in regards to "renting" a system instead of "owning" it?

- How are you affected?
- Do you feel limited or greater freedom due to the model?
- Are you satisfied with your current price model?

Follow up question: How do you see your price model in comparison to a classical one (non-cloud-based) with large initial costs?

### **Costs**

(1) Is the cost of the system important to you? (Have you made any calculations?)

(2) Do you consider it to be cheaper or more expensive in the long run to use cloud-based systems? (Have you saved any money on the system?)

(1) How have your costs been affected in regards to

- Initial costs
- Hardware
- Maintenance
- Education

(2) Has there appeared or disappeared any costs during your usage that you had not expected, in contrast to other non-SaaS-based systems?

### **Price changes**

(1) Have the prices of the services increased or decreased since you started using the services?

(2) Do you protect yourself from price increases? How?

(2) If the prices were negotiated, how can you make sure that they will not increase at the next negotiation?

(2) If your vendors would increase the prices, would you consider changing the vendor? Is it possible? (lock-in effects, data migration etc.)

### **Changes**

(1) How has using a "rental" price model affected your work processes and possibilities to control your ways of working?

(2) Has it been difficult for the employees to use the service? (resistance to change etc.)

### **Vendor Relation**

(1) How is the contact with your vendor?

- Have you had any problems with your vendor? How did you handle that?
- Do you value having frequent contact with the vendor? (more personal contact)
- To what degree do you trust your vendor?
- Does it differ between different vendors? (and in that case, why?)

Do you give more or less time in contact with the vendor regarding cloud systems compared to non-cloud-based systems?

(1) What is most critical in your agreements? (privacy, uptime, storage location, etc.)

- Has it happened that the vendors have not fulfilled the agreements?
- If a vendor does not fulfill the agreement, what happens then? (compensation etc)
- How do act in situations like those?

### **Privacy**

(1) Is there any data you would not like to share with your vendor?

(1) Does a vendor explicitly have to ask for permission before accessing your data?

### **Lock-in**

(1) Have you done anything to reduce the dependency to your vendor? (agreements, easiness of migrating data to another system, etc.)

(1) Do you feel capable to change your SaaS systems? (data lock-in, dissatisfaction)

(1) Do you make any local backups? (vendor trust)

(1) When can the need to change vendor appear for you? (price increases, business take-over, re-structuring)

(2) Have you thought about the possibilities to change your data to a new system at need?

(2) How can you affect the relationship to your vendor?

### **Training and Support**

(1) How easy is it for you to use the system? (education)

(1) Do you have any support agreements?

- How does it look like?
- How do you pay? (per hour, fixed cost, included)
- Are you happy with it?
- How is your support-usage affected by the cost of it?

### **Frequent Updates**

(1) Do you notice system updates? (during updates, bugs in applications, usability changes, improvements etc.)

(1) How often do you receive updates?

(1) Are there any benefits or disadvantages with not doing the updates yourself?

(2) Have the updates hindered you in your work at any time?

(2) Has functionality been added or disappeared as a result of updates?

(2) What is your experience when functionality is added or disappeared?

(2) Have you started using new functionalities?

(1) How has your IT department been affected by the updates now being handled by the vendor?

## **Mobility**

(1) Do you have any need to work from different locations with the systems?

(1) In what way do you work at distance? (mobile app etc.) Could you work from distance before with non-cloud-based systems?

(1) Have there been any major changes due to the ability to work from distance?

- How have you been affected?

(2) If you were not able to work from distance anymore, how would that affect you?

(1) How are you affected by being able to reach the system from more locations? (stress, relief, more efficient etc.)

- Do you experience any advantages or disadvantages with accessing the system from different locations)

## **Integration and Integration Potential**

(1) Have you integrated your cloud system with other systems you are using?

- If no: Why not? Have you investigated opportunities for integration?
- If yes: How did you do it?
- Do you know if it is possible to integrate different cloud services?

(2) How do you exchange data between the systems and services you use?

(1) How are you affected by linking or not linking systems?

(1) Have you heard about integration platforms for the cloud? Have you considered using them?

(2) Have you considered introducing more SaaS solutions into the organization?

(2) Have you considered the opportunities or difficulties with integration of different SaaS services?

(1) Will your organization introduce more SaaS services or systems?

(1) Do you have anyone who is working with cloud questions in the organization?

## **Closing of Interview**

Is there anything else you would like to add?

Remind the interviewee of our purpose to see if that makes him or she want to add anything further.

Mention that we will send a summary of the interview, and ask if they can read it through and give feedback.

## 10 Appendix B - Literature Review

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