

DRIVERS AND BARRIERS CONCERNING ADOPTION OF CLOUD COMPUTING – FOCUS ON STRATEGIC DECISION MAKING

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John Denham-Smith
Pontus Harvidsson

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Author/s: John Denham-Smith, Pontus Harvidsson

Supervisor: Patrik Hedberg

Abstract

Cloud computing is seen as the new IT paradigm and the biggest development of the decade in computing. The term was commercially formed in 2008 but the technology has been used earlier. Modern enterprises rely greatly on information technology and as it is changing, enterprises need to change with it. The view on ICT-strategy is evolving and becoming more incorporated with business strategy. Cloud computing has grown because of its many benefits, however there are drawbacks which hinders the technology from being widely adopted. This makes strategic decisions on whether to adopt cloud services or not difficult. This thesis provides aspects on drivers and barriers concerning adoption, with connection to ICT-strategy and how they affect medium-sized enterprises. As conditions regarding cloud computing are constantly changing this thesis aims to provide new insight on what drives enterprises to adopt cloud computing, as well as what hinders them. This qualitative study has used semi-structured interviews together with scientific articles and books to reach a conclusion of what enterprises face when constructing a successful ICT-strategy.

Keywords: cloud computing, drivers, barriers, ICT-strategy, IT-Manager

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John Denham-Smith

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1 Introduction

This first chapter is an introduction of the research starting with background and previous research within the concerned field. A motivation of the research problem then follows which leads to a research question being formed. The purpose, targeted audience and limitations of the research conclude the chapter.

1.1 Background

New technology is a key element for business growth and expansion (Lobo & Khanna 2012). Paul Beynon-Davies mentions that information is power and successful information management is crucial for businesses to succeed and stay competitive (2009). For a long time Information and Communication Technology (ICT) has been used as a way to make information systems and management of information more efficient. The way modern organizations operate is built around their ICT structure and some might say without it they are likely to be unsuccessful (ibid). The definition of ICT is often mentioned in business aspects as “technologies that provide access to information through telecommunications. It is similar to Information Technology (IT), but focuses primarily on communication technologies. This includes the Internet, wireless networks, cell phones, and other communication mediums” (Zuppo 2012, p.16).

The demand for information has resulted in growth of many new technologies in managing information systems; one of them is the phenomenon called cloud computing. It is one of the major buzzwords of the modern IT-Industry (Doherty, Carcary & Conway 2015). It has been around since 2008 (Khan & Malluhi 2010) and the field is yet to be fully explored. In the article “Cloud Computing” (Bojanova, Voas & Zhang 2013) a survey conducted on 1000 American citizens is described; 51% believed that stormy weather interfered with cloud computing and 29% believed it to be an actual cloud. In reality, cloud computing can be explained as a method of using computing resources from a third party provider on demand, by using a device connected to the internet (Rajaraman 2014). The development of new technologies is largely dependent on the availability and infrastructure of earlier technologies (Srinivasan 2014). One reason for the rapid growth of cloud computing is the significant growth of Internet and communication technologies (ibid).

Cloud computing can have a great impact on organizations regarding efficiency and saving costs (Kim & Kim 2015). For small and medium sized enterprises (SMEs) the implementation and maintenance of ICT structure can be very costly, especially when compared to large enterprises where these costs are just a small chunk of investment (Tutunea, 2014). By implementing cloud computing services, large upfront investments in hardware may be reduced and operations costs such as updating software can be lowered. IT-personnel can be reallocated to other core business processes (Kim & Kim 2014).

The alternative to cloud computing would be for enterprises to keep using and develop their existing IT-infrastructure with traditional computing, in which hardware and software have to be continuously purchased and updated (Beynon-Davies 2009). Traditional computing means dealing with all aspects of information systems and their use within an organization, such as the implementation of new Enterprise Resource Planning (ERP) systems where return on investments, risk analysis and feasibility studies among other aspects has to be considered (ibid). Within organizations, many choices have to be made regarding IT strategy. One of them being whether to stay with traditional computing or migrating to cloud computing

(Avram 2014). Many authors that have tried to simply express what cloud computing is but it is not an easy task. Tutunea (2014) mentions four common characteristics that all cloud computing services should have: *pay-per-use* (no on-going commitment, utility prices), *elastic capacity and the illusion of infinite resources*, *self-service interface* and *resources that are abstracted or virtualized*.

There are mainly three different service models that are offered through cloud computing, these are; *Software as a service* (SaaS), software is rented from a cloud service provider and the user does not have to install, update or manage applications themselves. Data is often stored on the cloud servers and can therefore be accessed from any user's computer that has an internet connection. *Platform as a service* (PaaS) is in some way an extension of SaaS. In addition to the SaaS service, the cloud service provider also provides the customer with hardware resources. This service lets companies work with for example application development and other tasks that require more powerful hardware than they normally have internally. *Infrastructure as a service* (IaaS) can be explained as the most complete version of cloud computing service, considering hardware infrastructure. The cloud service provider provides the user with hardware, servers and storage. With this service model almost all IT needs of the user lies on the cloud service provider. (Tutunea, 2014)

In a report by The Confederation of Swedish enterprise (2010) the Small and Medium Sized Enterprise (SME) segment is described as a large part of the Swedish and European business. The SME segment amounts to 99.9% of the Swedish companies (Statistics Sweden 2014). SME consists of so-called micro-companies with 1-10 employees, small companies with 10-49 employees and medium sized companies with 50-249 employees (Confederation of Swedish enterprise 2010). SME's positive impact on labor and Gross Domestic Product (GDP) of a country is no secret (Tehrani, Ramezani & Farid 2014). Tehrani et. al. (2014) mention that facilitating the correct ICT structure helps SMEs becomes more efficient and productive. Adopting new technology offers many advantages for SMEs especially the smaller businesses, however it usually involves high costs (ibid). Cloud computing has made a significant impact on how organizations think regarding IT strategy, the cloud has affected the IT management perspective to be more service oriented, emphasizing on relationships and vendor assessment (Qian & Palvia 2013).

1.2 Previous research

Since the emergence of cloud computing, both the technology and research on the subject has increased significantly throughout the years (Bayramusta & Nasir 2016). During the early stages of the phenomena research focused on the definition and evolution of cloud computing, which is expected for newly developed concepts. After understanding the concept, research focused more on adopting new technology, which was the leading research area from 2010 to 2014. Research on legal and ethical dilemmas surrounding cloud computing increased significantly in 2010 and 2011 (ibid).

Various sources mention how organizations can save money and streamline their business processes by using cloud computing (Rajaraman 2015; Avram 2014; Kim & Kim 2015) . In the research paper "SMEs perception on cloud computing solutions" (Tutunea 2014) a large study was carried out with the goal to identify the level of knowledge and awareness of cloud computing services. It also looks at aspects such as how companies intend to adopt cloud services, what services they already use without necessarily knowing about it and what the companies perceive to be the benefits and risks of implementing these services. A conclusion was that SMEs do not have an ICT department with competent personnel who have the ability

to find and look further into the benefits of cloud computing services and how to implement them. The fact that these companies do lack a competent ICT department is actually a good reason for them to implement cloud computing services, as it can cause beneficial developments in their business processes (Tutunea, 2014).

Rajaraman (2014) mention that cloud computing is here to stay and that it is considered as the biggest development of the decade in computing. In the research his conclusion is that there are five major concerns when shifting to a cloud approach; *the security issue*, which applies when outsourcing data to a third party provider. *The provider issue*, if a provider lacks quality or ceases operations. *The communications/availability issue*, if your client cannot connect to the cloud or servers in case of Internet failure or low latency. *Complex legal issues*, when e.g. storing information on servers in other countries. *Secret surveillance of data traffic from intelligence agencies*.

In the paper “Cloud Computing Security: A survey” (Mehmood, Roman, Umar & Song 2015), a literature survey is made on aspects of cloud computing services. Their conclusion is that the greatest issue in adopting cloud computing services is security and that a hybrid cloud approach is required to maintain high security of shared data within the organizations. A hybrid approach means a combination of a public, private, and/or community cloud that collaborates, in other words keeping business-critical services and data in the private cloud (hardware within the company) and non-business-critical services in the public cloud (hardware infrastructure owned by a third party provider) (He, Wang & Wang, 2012).

Patrignani & Kavathatzopoulus (2015) mention among other things, the ethical issue that Chief Information Officers (CIO) will have to deal with when adopting cloud services in their organizations. The automation of different jobs has been an issue for quite some time now since computers and advanced technologies have replaced humans at workplaces around the world. Cloud computing’s role in this occurs when ICT activities are outsourced to cloud providers. Instead of having to buy, install and maintain IT resources, enterprises can now simply pay the CSP and let them take care of the physical data-center, updating and installing software as well as solving problems related to the service. Some jobs will most likely be expandable at IT departments when cloud services are being implemented. (Patrignani & Kavathatzopoulus 2015)

Several crucial issues that lie in the hand of strategic decision makers within organizations needs to be analyzed when considering migrating to cloud solutions. These are mentioned by Patrignani & Kavathatzopoulus (2015); *governance*, which is when servers, applications, storage and network are put on the cloud service provider, might lead to issues like data-loss, lock-ins and power abuse. The problem of “*many-hands*” can occur when different providers administers critical resources, what happens if a provider decides to shut down their services for maintenance for example? *Risk management and reliability* is another issue, if something goes wrong, will it be possible to trace the source of the problem in a cloud environment? The reliability of software and that it will run without disruptions is another issue. Where data is stored will affect what rules there are regarding how data is handled and protected. The question of how open the market will be is also an important issue, users who want to change provider must analyze the possibilities of this as well as how to avoid lock-ins when for example monopolies are created (ibid).

In an article written by Diaz-del-Rio, Salmeron-Garcia & Sevillano (2016) the comparison between using applications on a local computer to cloud based applications is discussed. They state that how much more effective and energy saving a cloud service is depends on several

factors. Firstly the overlapping between communication and computation in the cloud server is crucial to determine how fast a task can be performed. Secondly, applications that store a vast amount of data on the cloud servers will favor cloud computing over local devices (ibid). Another factor is how advanced the computing technology is in a customer's company compared to the cloud service provider. The CSP will most likely possess more advanced technology and this might in the future lead to companies using cloud services attaining much simpler devices in order to get rid of even more investment costs. If the cloud service user is an app-developer the cloud services will most likely be more attractive in the near future (ibid). Real time cloud execution is getting faster, which will lead to much simpler devices required locally, together with new computing techniques that pave the way for a new programming paradigm with automatic code migration, which would be a new form of computation (ibid).

Avram (2014) discusses some of the main advantages of implementing cloud services in enterprises. The most obvious and important of which is the reduction of costs by avoiding large capital investments. This is often very helpful for small businesses and startups that without cloud services would not be able to enter a market. It also reduces costs since it offers scalability by allowing enterprises to only use data resources they need. When an enterprise grows or is simply in need of new software or data storage it is easy to obtain through the cloud. It gives companies the opportunity to use business-analytic tools and access a great amount of data. (Avram 2014)

In a book by Mohapatra & Lokhande (2014) they discuss the role of the CIO in a cloud environment. The CIO as strategic decision maker works in different business cultures and if they are “control-freaks” they often fear a migration to the cloud. It is argued for that cloud adoption and architecture should be carefully thought of and that it needs to be aligned with an enterprise's business goals. Many CIOs share the view that most applications can be outsourced to the cloud but applications that require sensitive data to be stored cannot. Cloud computing is in a developing stage and good standards have not yet been formed, guidelines and some standards are however being formed which will lead to better predictability. The move into the cloud will require transition and proper risk management strategy. (Mohapatra & Lokhande 2014)

1.3 Research problem

Previous research stated that cloud computing is a revolutionary technology which has many benefits for organizations to grow and enhance future business (Tehrani et. al. 2014). The benefits are many especially for startups and micro companies with less complex IT structure and less need for security, but the benefits decreases for larger enterprises and the decision to adopt cloud computing becomes more complex (Kamal 2012). Various research states the benefits and risks but fails to evaluate those regarding strategic IT decisions. When faced with the decision of adopting cloud computing it is important for larger enterprises to emphasize in weighing the pros and cons of the technology and strategically decides whether to adopt or not (Hofmann & Woods 2010). Because of the cloud's long term impact and change in core business processes many enterprises, especially larger ones are afraid of adopting it fully (Patrignani & Kavathatzopoulos 2015).

The use of IT in the SME segment varies, micro-enterprises might use stand-alone services installed on local computers and use technologies such as email, web and simple accounting programs, whilst large-enterprises are in more need of complex solutions such as Customer Relationship Management (CRM) systems, Enterprise Resource Planning (ERP) systems and

Business Intelligence (BI) solutions (Kamal 2012). Therefore the complexity of cloud services differs depending on the business need and size of the enterprise. Challenges that lies ahead also differs, large-enterprises have skill, resources, staff and time for IT planning, which are main difficulties for smaller enterprises (ibid). Issues such as security, trust and communications are more of a threat for larger enterprises (Rajaraman 2014), this inhibits them from a large scale adoption (Kamal 2012). With this in mind the tradeoff for large enterprises in benefits versus risks in cloud computing has a greater impact on the strategic decision of adopting cloud solutions than in smaller enterprises.

Investments in traditional IT among companies have increased enormously and more than doubled since the middle of the 1990's (Hoffman & Woods 2010) but by looking at cloud computing and benefits such as cost savings and decreased hardware investments (Diaz-Del-Rio 2016; Avram 2014; Rajaraman 2014), this development is being turned on its head. What need to be further examined is how enterprises react to this paradigm shift and what reasoning lies behind their decisions.

Drivers are defined in this thesis as; *all reasons, needs and benefits perceived among enterprises to adopt cloud computing services*. The definition of barriers is; *all reasons an enterprise perceives that prevents them from adopting cloud computing*. New research focuses on the risks of cloud computing, especially for large enterprises. However a gap in research was identified, where drivers and barriers of cloud computing are introduced and depicted for medium-sized enterprises. The issues that arise are different from the large-, small-, and micro-enterprises (Rajaraman 2014; Kamal 2012). The function of IT has changed from supporting business processes to being a fully integrated part of the core business and decisions regarding new technology and evolution needs to be made (Martinez-Simarro, Devece & Llopis-Albert 2015) . It is a fact that cloud computing cannot be ignored in regards to IT strategy (Rajaraman 2014). Therefore it must be considered when forming an IT strategy since this is part of making an enterprise successful. Therefore there is a need to further examine what drives or hinders medium-sized enterprises to adopt cloud computing concerning strategic IT decisions.

1.4 Research question

From the problems that have been formulated in section 1.3 it is clear that cloud computing has and will continue to change the IT landscape for enterprises. Previous research has shown existing drivers and barriers for SMEs that are now well known within the field. This study will look more specifically on how these affect decisions regarding ICT strategy in medium-sized enterprises in Sweden. Cloud computing technology is still in a developing phase and previous factors affecting adoption may change as well as new ones emerge. These must be taken into consideration when enterprises make strategic decisions on how to approach cloud computing services. What will be investigated is how these can be broken down and further analyzed to help medium sized enterprises in their strategic decision making when moving forward in an ever changing IT landscape. To answer how cloud computing is affecting strategic decision making in regards to IT as well as defining drivers and barriers this thesis aims to answer the question:

In medium sized enterprises, what major drivers and barriers affect strategic decision making in adoption of cloud computing services?

1.5 Research purpose

The purpose of this study is to provide knowledge of what influences strategic decision making process of migrating ICT structure to the cloud within medium-sized enterprises. Previous research states that Cloud Computing is the new IT revolution and that there are a wide range of benefits of using it (Rajaraman 2014; Patrignani & Kavathatzopoulos 2015), which are what drives companies to adopt cloud computing. The adoption is more widespread among the micro and small sized enterprise segment in SME because of lower risk. In the medium sized segment cloud computing is less widespread because of increased risk where ICT structure is complex, this makes the decision making process more extensive. Therefore this thesis will study how enterprises reason when forming their ICT-strategy and to what extent cloud computing is a part of it.

1.6 Target audience

The target audience of this study is medium sized enterprises that have not yet adopted cloud computing and the managers responsible for IT operations and strategy. They can use the research as help when considering ICT-strategy. Reasons behind opinions towards adopting cloud computing are based on totally different backgrounds, thoughts and sources, therefore it is important to find out what these are. Researchers who focus on cloud computing and IT-development within organizations can also find this study useful.

1.7 Limitations

Considering the extent of cloud computing applications focus mainly lie on complex solutions such as virtualization, CRM, BI or ERP solutions in the cloud since they are more important to medium-sized enterprises. This thesis is limited to ICT-strategy that involve the adoption of cloud computing, this is important to state since ICT-strategy normally includes other objects, principles and tactics surrounding the use of technology.

The thesis is also limited geographically since the cases that are analyzed are both situated in Sweden. Therefore the study cannot be generalized with certainty to enterprises located in other countries. The choice of research is highly applicable in modern business environment since many applications and services are based on cloud computing solutions. The focus is also relevant since it applies to the research area of informatics.

2 Theory

This second chapter comprises the phenomenon of cloud computing and main expressions that will provide the readers with an understanding of the research topic. Major drivers and barriers towards adopting cloud computing found in previous research are also explained.

2.1 Cloud computing

Cloud computing offers such a wide range of services and opportunities in today's IT driven business environment that it is hard to ignore for enterprises (Khan & Malluhi 2010). The rapid development of processing and storage units together with the Internet continuously getting faster led to the invention of this technology that is explained by Avram (2014) as resources that are provided as general utilities that can be leased and released by users through the Internet in an on-demand fashion. In an article written by Arutyunov (2012) the cloud computing concept can be traced back to the 1960's when a man called John McCarthy predicted that in the future, calculations would be carried out by public utilities. In 2008 the term cloud computing emerged in a thematic internet conference. Shortly after this it was used by the head of Google, Eric Schmidt and then naturally caught up by media (ibid).

Since then, the adoption of- and migration to the cloud has been massive. From 2015 to 2020, the workload processed in cloud data-centers as a percentage of total data-center workloads around the world is expected to grow from 75% to 92% (Cisco Global Cloud Index 2016). Traditional data-center workloads are at the same time predicted to decline from 25% to 8% (Cisco Global Cloud Index 2016). El-Gazzar et.al. (2016, pp. 77-78) state that "cloud computing has emerged as one of the most influential technologies on a global basis. It is still in its stage of emergence and there is still a lack of both knowledge and empirical evidence about which issues are the most significant for cloud computing adoption decisions".

2.1.1 Essential characteristics

In *figure 1* all the parts of cloud computing is shown. The upper part consists of the essential characteristics of cloud computing. *Measured service*: the providers of cloud computing services measure and control the volume of bandwidth, users and amount of stored data. *Rapid elasticity*: is the user's possibility to demand more space on the cloud computing servers or additional applications. This is easily provisioned for the users of cloud computing. *On-demand self-service*: users can independently control and modify the computing capabilities such as data-storage space and the speed in which data can be accessed, without interacting with human personnel from the provider. *Broad network access*: resources that are stored within a company's private cloud or on a hybrid cloud that can be accessed from different devices, including mobile devices. *Resource pooling*: Is the provider's pool of resources (physical and virtual) that they assign to users depending on their demands. (Arutyunov 2012; Mell & Grance 2011)

NIST (National institute of standards and technology) defines cloud computing as: a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

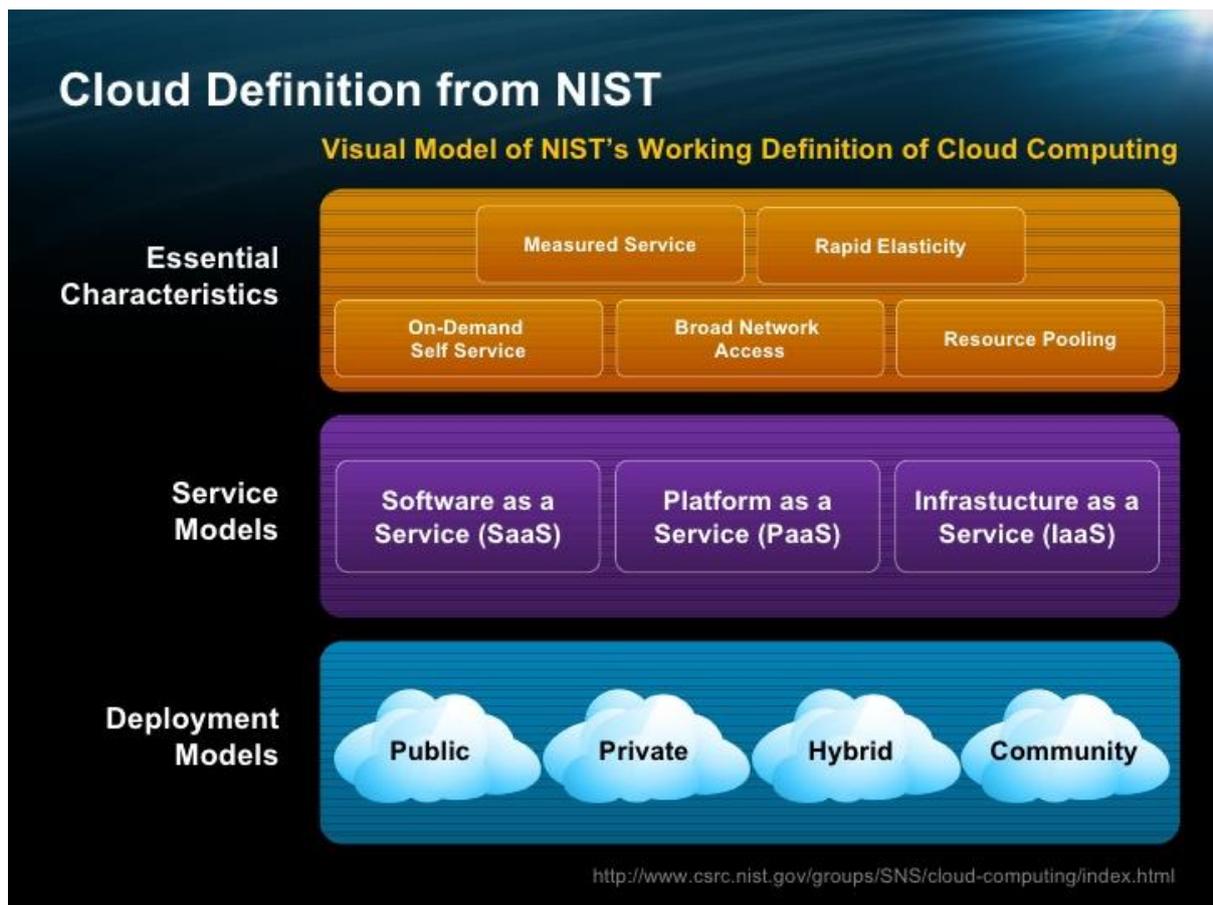


Figure 1: Visual model of NIST's working definition of Cloud computing

2.1.2 Service models

In the middle section of *figure 1* the different service models are shown, these are:

Software as a service (SaaS), Platform as a service (PaaS) and Infrastructure as a service (IaaS).

Software as a service (SaaS), software is rented from a cloud service provider and the user does not have to install, update or manage applications themselves. Data is often stored on the cloud servers and can therefore be accessed from any user's computer that has an Internet connection (Tutunea, 2014). The applications are run through a thin client interface, most often a web-browser (Arutyunov, 2012). Applications do not have to be downloaded or installed by the user. Neither do they have to be aware of backup or be engaged in the upgrades of the data and software. Licenses to run the applications are also paid for by the provider and the user pays for services either monthly or based on how many users there are (Mehmood, 2015).

Platform as a service (PaaS), is in some way an extension of SaaS. In addition to the SaaS service, the cloud service provider also provides the customer with hardware resources. This service lets companies work with for example application development and other tasks that require more powerful hardware than they normally have internally (Tutunea, 2014). This service is the most complex out of the three models since it requires a platform for letting customers work with development. For this to work, web-server and database-servers needs to be set up, managed and administered by the user to be able to run them on their local computers. This provides the customers with an environment where they can work freely and

not worry about processing power and memory resources required (Mehmood et. al., 2015). Customers can require different development tools and programming languages from the provider, who is also maintaining most of the hardware and software infrastructure (Rajaraman, 2014).

Infrastructure as a service (IaaS), can be explained as the most complete version of cloud computing service, considering hardware infrastructure (Tutunea, 2014). The CSP provides users with hardware, software, servers and storage. With this service model almost all IT needs of the user lies on the CSP (ibid). Using this model, the user is provided with secure management of data and hardware as in a data-center. The customers can deploy their own systems and applications or chose to use the provider's applications. To make the applications work in the specific way the users want, they are enveloped in a layer of software, this is called virtualization (Patrignani & Kavathatzopoulos 2015). Other important tools that enable the users to work conveniently are application programmer interfaces and service level agreements (Rajaraman 2014). Unlike SaaS and PaaS, with IaaS the customers themselves are responsible for managing runtime, applications, data, OS and middleware. The cost is based on CPU hours, storage and network bandwidth usage (Mehmood et. al. 2015).

2.1.3 Deployment methods

The lower part of *figure 1* shows four different deployment models; public cloud, private cloud, community cloud and hybrid cloud, which are explained below.

Public cloud: Is a cloud that is open to the public. Many functions of these clouds are often free, such as e-mail and storage, while some are paid for. It may be owned and managed by a business, academic or government organization. The IT infrastructure is shared simultaneously between many users. (Arutyunov 2012; Mell & Grance 2011; Rajaraman 2014)

Private cloud: Is used by a single organization and not available to anyone outside of it, except for maybe some clients. The infrastructure may be owned by the organization itself, the provider, or shared between them. (Arutyunov 2012; Mell & Grance 2011; Rajaraman 2014)

Community cloud: The cloud infrastructure is available to a specific community of users from similar organizations or enterprises. These communities might share interests and values. The infrastructure can be owned and managed by one or several members, it can also be outsourced. Everyone in the community can therefore access the infrastructure. (Arutyunov 2012; Mell & Grance 2011; Rajaraman 2014)

Hybrid cloud: This kind of cloud is a combination of any of the other kind of deployments (private, community, public). They remain as unique entities but are bound together by standardized protocols or proprietary technology. If an organization that is a member of a hybrid cloud has sensitive data that they want to protect they can keep this in their private cloud, while less sensitive data and applications might be shared. (Arutyunov 2012; Mell & Grance 2011; Rajaraman 2014)

2.2 Drivers

In previous sections various “drivers” to adopting cloud computing services have been acknowledged and discussed. The definition of driver in this thesis is; *drivers are considered to be all reasons, needs and benefits perceived among enterprises to adopt cloud computing*

services. It also includes other reasons these companies might define as a necessity or a mean to complete their IT-structure issues. Drivers are a collective expression for all the possible reasons an enterprise have to adopt cloud computing services. The drivers stated below are what were identified as major since they are repeatedly mentioned in previous research.

2.2.1 Cost efficiency

Tutunea (2014) mentions that companies who adopt cloud computing services will benefit from reducing the cost of hardware and software infrastructure, as well as software updates since these costs will be put on the CSP. Avram (2014) argues that enterprises can get more immediate access to hardware resources when dramatically reducing upfront costs to pay for their corporate computing. Customers who use cloud computing services only pay for what they consume, which means they will not have to pay for computing capacities that they do not need (Rajaraman 2014). Kim & Kim (2015, pp. 5) sums up cost-efficient benefits of cloud computing as: “limited up-front investment and operating cost. Rapid allocation and de-allocation of resources on demand and pay-as-you-go model of the service allows customers to expect lower cost for implementation and operations.”

2.2.2 Scalability

Avram (2014) describes how cloud computing enables IT to become an operational-expense (OPEX), instead of a capital-expense (CAPEX) and allows enterprises to scale and balance their computing capacity “on the fly” since additional infrastructure and software can be added fast and seamlessly. Enterprises can scale their services according to their own demands and needs. This is possible since the computing resources are managed through software, which can be deployed easily whenever demands rise or decrease. This scalability is available without interacting with the service provider (ibid). Rajaraman (2014) refers to this kind of scalability as elasticity and states that customers can require more computing resources when needed as well as release them when they do not require them anymore. Resources seem unlimited from a customer’s point of view since all of the computing capacities are put on the provider (ibid).

Another way in which cloud computing services are scalable is the transparency in billing. Since customers can monitor and control their usage they will be able to overview how much the cost will be (Rajaraman 2014). Resources may be better utilized through low local IT-infrastructure when the total aggregated demand will be easier to manage thanks to scalable capacities. The scalability that cloud computing enables will help the customers to get rid of missed revenues because of the lack of computing capacity, such as applications or unexpected future requirements (Doherty et al. 2015).

2.2.3 Flexibility

SMEs who adopt cloud computing services will not have to appreciate future IT-capacity needs since this easily can be added on in a cloud computing environment. At the same time new applications and technology can also be adopted without having to prepare for future requirements (Doherty et al. 2015). Applications can be adopted and tried within an enterprise and later be dropped without having invested in new hardware and software which is a great flexibility (ibid). Doherty et al. (2015) also discuss how the migration to cloud services can help maximize resource utilization by freeing up internal employee resources. Employees can be transferred from performing maintenance tasks to core-activities. This way of reducing the workforce to core-business processes will help when scaling and adapting to the new environment that cloud computing brings.

2.2.4 Shared benefits

Patrignani & Kavathatzopoulus (2015) mention a “network of SMEs” which refers to collaboration between SMEs that is made possible by cloud computing services and the virtualization of enterprises. Benefits that stems from these networks are their complementing competencies, cross boundary platforms, the possibility to grow independently while data and information can flow in the network and a participatory design that allows enterprises to evolve together (ibid). Without this network, companies in the SME segment do not have the critical mass or innovation power needed to compete on a global scale (ibid). Business-analytics tools that let companies study for example the behavior of their customers, require huge amounts of data that they would not have access to without cloud computing (Avram 2014).

2.2.5 Environmental benefits

The environment and how a company affect it, is an ethical dilemma according to Patrignani & Kavathatzopoulus (2015) and the question is in what way cloud computing will lead to reduced CO₂ commissions and more efficient energy use or not. Even though the ICT industry reduce emissions to a much larger extent than what it contributes, researchers will have to look more into the whole lifecycle of the ICT, including mining materials, development, manufacturing and e-waste management (ibid). When the data-centers and hardware are being reduced at cloud service users, their energy consumption will probably rise, it is therefore important to find out whether this shift in resources will lead to a positive or negative impact on the environment (ibid). The energy consumption is discussed more specifically by Diaz-del-rio (2016), where he argues that most of the energy consumption is made when offloading applications to the cloud. The article compares the energy consumption from offloading with the consumption in local processing and comes to the conclusion that for simpler devices and applications that do not use much offloading, cloud computing will clearly consume less energy. It also argues that as the technology evolves and more effective ways of processing data on cloud servers emerges, the more energy efficient cloud computing will get (ibid).

2.3 Barriers

As mentioned there are many advantages in using cloud computing, however there is also a cost when implementing new ICT structures. In previous research many barriers to adopting cloud computing services are identified, the major one's are: Security, trust in CSP's and communication/availability issues (Rajaraman 2014; Avram 2014). A reminder to the meaning of barrier is; *barriers are considered all reasons an enterprises perceive that prevents them from adopting cloud computing*. The barriers stated below are according to previous research what hinders cloud computing from being widely adopted.

2.3.1 Security

Research proves that the security issue is a major barrier for adoption of cloud computing (Carroll, Alta & Kotzé 2011; Ali, Khan & Vasilakos; Mehmood et. al. 2015; Tang & Liu 2015). Ali et al. (2015) mention that not only conventional security issues from traditional IT structures still exist but new security risks arises when thinking of adopting cloud services. These concerns differ from traditional ICT structures and should be considered and dealt with before reforming it (ibid). Main reasons for security concerns are privacy, integrity, availability, identity management and confidentiality (Carroll, Alta & Kotzé; Alghazzawi & Hasan 2013; Chowdhury 2014). As cloud computing services continue to grow, countermeasures towards security issues are being formed (Ali et al. 2015). However these countermeasures are mostly being developed towards singular issues, which leads to deployment of multiple security tools for different problems and that the need for one

integrated comprehensive security tool is needed for easy management (ibid). Tang & Liu (2015) mention that security for SaaS applications have developed greatly however there are no set of standards to build information security.

2.3.2 Trust

When outsourcing services to third party providers, trust and quality of the CSP is an issue (Rajaraman 2014). Lack of standardization and the growth of the market have resulted in multiple vendors, which lead to the issue of choosing the right one (ibid). Trust in technology is one part of this issue; another part is trusting the CSP both regarding quality of the service provided and the possibility of provider bankruptcy (ibid). Khan and Malluhi (2010) discussed that the adoption of cloud computing came before suitable technologies were developed that could manage trust issues.

Pathan & Mohammed (2015) define trust as a situation distinguished by certain aspects; a trustor who relies on a trustee; the situation is directed to the future and the trustor lets go of control of processes performed by the trustee. In a cloud computing situation an organization trusts a CSP to manage and maintain certain services in the cloud, hence letting go of the control of the action (ibid). Trust is a major barrier for the potential of cloud computing being widespread, mainly in terms of data not being released to outside parties, service level agreements (SLA) must be arranged and an agreement that no data for any reason should be released or sold without authorization of the owner (Pathan et. al. 2015). In an article by El-Gazzar, Hustad & Olsen (2016), top issues when implementing cloud computing are identified, one of them being that enterprises are faced with weak, undetailed SLAs from providers (e.g. providers may not be transparent about where and how they store the data. The reason for this is avoiding paying penalties to clients in case of security breach or data loss incident.

2.3.3 Availability & Communication

One of the criteria for a service to be regarded as a cloud computing service is that it can be accessed anywhere, anytime and with any standard device that has internet connection (Rajaraman 2014). With this in mind, a major disadvantage of cloud computing is the demand for uninterrupted communication with the cloud server (ibid). Apart from the risk of no connection to the cloud, the communication issue also regards the need for high-speed Internet connection to process the large amounts of data required by organizations (Libor S. 2012). In “Cloud Computing Basics” Srinivasan (2014) discusses cloud outages and service availability as a major risk in cloud computing. The book mentions a study on major outages among 13 cloud service providers between 2007-2012; the result was 568 h of downtime, which resulted in loss estimated at \$72 million (Kopytoff 2012 see Srinivasan 2014, p. 108). This proves the importance of availability and constant access to cloud servers. No matter how large the CSP is, the risk of outages is always there (Srinivasan 2014). Even if backup generators are applied problems still exist, this has been seen in multiple cases regarding some of the largest CSPs such as Amazon, Salesforce and Gmail (ibid).

2.4 ICT as a strategy

Information and communication technologies (ICT) have changed during the last couple of years. In many enterprises ICT has become an essential component in business processes and in facilitating customer relationships. ICT has become a strategic issue rather than a technological one and must be seen as such (Stace, Courtney & Holtham 2012). ICT investments are increasing and millions are spent in public and private sectors in hope of enabling better decision-making and business performance (ibid). However the question of

ICT as strategy and its importance to business performance is not always obvious in enterprise management (ibid). Stace et. al. (2012) mention in a research that only 32% of chief finance officers (CFO) views the chief information officer (CIO) as a strategic partner and that 70% do not believe IT is providing business benefits. IT enabled resources have been found to have significant effects on an organization's capabilities (ibid). The reason is that they are essential in creating customer value and implementing competitive strategies (Chen 2012). A reason for CFOs to doubt that IT provides business benefits could be that it takes time for investments to make its mark (ibid). Learning and adjustments are reasons why IT investments might take time before gaining positive financial outcome (ibid).

Cloud computing in regards to ICT strategy is ranked high and a key aspect of technological and application development in IT management (Luftman, Zadeh, Derksen, Santana, Rigoni, & Huang 2013). In Europe, cloud computing was ranked as the second most important application and technological development, it jumped from 13th place in 2010 which proves the development of cloud computing in regards to IT strategy between 2010 and 2012 (ibid).

2.5 IT outsourcing

IT outsourcing (ITO) market is growing significantly and has evolved during the last couple of years, it has gone from the previous simple view of a twofold relationship to a more complexed operation (Bensch, Andris, Gahm & Tuma 2014). Enterprises are not only outsourcing simpler IT operations but also passing on critical business processes to third party providers (ibid). Single outsourcing is seen as the classic and simple case of outsourcing where a client collaborates with one provider (ibid). Thatcher et al (2011) mention that research within single outsourcing is decreasing and of increased importance is complex outsourcing provider configurations e.g. cloud service networks. Multi outsourcing partnerships, which means one client collaborating with several providers has advantages of increased competencies (ibid). The client can utilize competition among providers and the client's ability to choose an expert provider in a certain area (ibid). The result of this shift in ITO has led to an increase in the number of applications (ibid).

Schneider & Sunyaev (2016) provide a comparison between cloud computing and ITO. They mean that the two phenomenon share common characteristics but that there are significant differences. Among other things, what are important to mention is that the decision process in cloud computing is dependent on the business or IT-department of the service taker, while traditional IT-outsourcing is dependent on top management (ibid). Another important aspect is that with cloud computing, the IT-department at enterprises work as a service integrator and the service itself is most often standardized to provide an anonymous market. In traditional IT-outsourcing the services are custom-tailored to fit a single enterprise's needs (ibid)

2.6 Service level agreements

El Gazzar et. al. (2016) mentioned Service Level Agreements (SLAs) as one of the top issues when implementing cloud computing services. Wieder (2011 p. 14) defines SLA as "A common way to formally specify the exact conditions (both functional and nonfunctional) under which services are or should be delivered". The reasons for its importance is that the society and organizations are more dependent on ICT services especially in cloud environments therefore SLAs are a foundation for the service provider to deliver what has been promised (ibid). CSPs deliver weak agreements to avoid paying high penalties if a contract is breached. SLA is a legal bond between the client and the service provider. An SLA should include goals through Quality of Service (QoS) attributes, Quality of Protection (QoP)

attributes, and action descriptions to fulfill the QoS and QoP (Radha, Rao, Babu, Rao Reddy & Saikiran 2015). With regards to cloud computing SLAs should also consist of Confidentiality agreements, Nondisclosure agreements, legal location etc. (ibid).

3 Research methodology

The following chapter presents the specific ways of conducting this study in form of collecting, analyzing and approaching theoretical and empirical data. It also describes what knowledge it aims to contribute to the field of informatics and how this knowledge was created.

3.1 Research perspective

This Study has collected and analyzed data with a hermeneutical perspective. Hermeneutics is a way of interpreting the world and in fact the word “hermeneutics” and “interpretation” is derived from the same Greek word (Schmidt & Lawrence 2014). From the beginning, hermeneutics was the interpretation of religious texts as well as laws and other literature. However, today it also includes spoken language and actions as argued by the author Hans-Georg Gadamer in the book “Truth and method” (ibid). The adoption of a hermeneutical approach was chosen since it aims to answer how medium sized enterprises and their managers view the phenomenon cloud computing.

Hermeneutics is basically all interpretation, from reading a poem and understanding the meaning that the author intended it to have, to interpreting directions a friend is giving you to their house when driving a car or interpreting answers from an interview. “The Hermeneutical circle”, is an expression describing that the parts can only be understood by understanding the whole and vice versa. The goal of hermeneutics is to understand correctly through trying to see things from a wider perspective and create meaning from looking at “the whole” rather than “parts” (Schmidt & Lawrence 2014). This way of viewing the world and data, is applied to this study, especially since the aim is to gain an understanding from interpreting texts as well as non-textual data. By interpreting previous research, empirical data and analyze it together with a hermeneutical approach the research question can be answered.

Kvale & Brinkmann (2009) also discuss the Hermeneutic circle and speaks of it as canons between interpretation where a back and forth process takes place between the parts and the whole. The circle is continuous and by going through this process several times, more understanding is gained (ibid). This study has applied the hermeneutical circle by collecting information empirically through conducting interviews, studying literature and then iteratively gaining more understanding of all data collected.

When interviewing, interpretation of answers might differ. This does not have to be an issue when looking at it from a hermeneutical perspective. There is only one true meaning to be derived in an answer and by formulating explicitly the evidence and arguments of the study’s interpretation, interviews presented in the research can be interpreted by the readers themselves (Kvale & Brinkmann 2009).

In an article written by Rennie (2012) the importance of how education is made, can be enhanced by performing the hermeneutical circle. When interpreting a text or performing a study, previous experience and beliefs the researcher has about the author/subject will affect his/her understanding and creation of meaning within themselves. Going back and forth between theoretic and empirical data and working with it iteratively while writing this thesis has been a tool to keep these previous beliefs and experiences from being included in the results. Researchers also tend to expect certain outcomes from their study. When findings do not correspond with their expectations, they tend to make up a hypothesis that is not necessarily correct to try and make findings more in line with their beliefs (ibid). To avoid this, findings that are unexpected was analyzed properly and not overlooked. This thesis has

carefully analyzed all the empirical data as well as meaning derived from literature. Findings from all analyzed data, empirical and textual, has been inductive and avoided being influenced by values and expectations from the researchers.

Enterprises make a choice when it comes to adopting cloud computing services or not. Drivers and barriers are factors that determine what these choices will be and by applying a hermeneutic approach this thesis can answer what underlying thoughts and reasons there are behind choices, this will answer the research question. By performing interviews according to the seven stages that are presented in the book *InterViews* (Kvale & Brinkmann 2009) and adopting a hermeneutical approach, the purpose of this study can be reached.

3.2 Research strategy

Bryman (2012) discusses two directions of deriving theory in social studies, inductive and deductive approach. He mentions that it can be hard to notice differences between the two and that they should be thought of as tendencies rather than a clear strategy. Patel & Davidsson (2011) mention that the researcher's job is to provide knowledge of the reality in the most real way possible. The basis of theory is data gathered from the real world which is studied and make up the empiricism of this thesis. Induction and deduction are introduced as two alternatives in how to relate theory and empiricism (ibid).

An inductive approach is said to be the way of discovery where a researcher studies an object without studying previous theory about it. The researcher's job is to discover something that can be generated and formulated into theory (Patel & Davidsson 2011). An inductive approach has tendencies from grounded theory because it is often an iterative process involving jumping between data and theory (Bryman 2012). Induction is commonly used in qualitative studies where theory is based on empirical data gathered (Patel & Davidsson). When using a deductive approach the research subject uses a chosen method to prove certain phenomena. Theory is derived from what is known in the research area and it depends on hypotheses that are created and empirically tested (Bryman 2012). Deduction is commonly used in quantitative research (ibid).

This study has taken on a mixed research strategy where both induction and deduction has been used. To gain knowledge of the subject and to identify what the focus of this thesis would be a deductive approach was used. Knowledge and understanding about the subject was gathered from previous research and would build the basis of this thesis, ultimately leading to the research question. Thereafter an inductive approach was used where new theories and conclusions was made by inductively deriving theory from the empirical data that was gathered during the study.

3.3 Research approach

By choosing an inductive strategy a natural choice was therefore a qualitative approach since the study does not test any existing theory. The focus of the research was to obtain empirical data together with the interpretation of literature to try to understand the social world, which are typical characteristics of a qualitative research (Bryman & Bell 2015). The reason for adopting this approach is because of the aim of the study, which is to gain a deeper knowledge of drivers and barriers towards adopting cloud computing. This kind of knowledge cannot be gained or derived from a quantitative approach to the same extent as with a qualitative one (ibid). Due to the nature of this thesis and the research question it wants to answer, the fact that it tries to explain human behavior and the reasons behind it, the argument to adopt a qualitative approach is further advocated. Critics of the qualitative approach will

say that there is not much value in research that cannot generate theories that are supported by a vast number of responses. However, to adopt a quantitative approach, means quantification and looking at matters with objectivity and maintaining distance between the researcher and participants (Robson & McCartan 2016). This would contradict the very purpose of this study, which is to reveal thoughts and feelings of the research participants through what they express verbally.

Social constructionist research is closely related to hermeneutics, which indicates that social properties are constructed through interactions between people (Robson, McCartan 2016). This view argues that people interpret the world through social interactions as well as creating meaning. This view is central in this study since it seeks to describe these meanings and properties through collecting and analyzing empirical data from strategic decision makers within enterprises. Researchers also possess meanings and values and it has been important to realize this as well as trying to not let these have an impact on the results of the research (ibid). By realizing one's own values it is possible to not be bias and avoid trying to substantiate preconceived notions (Robson & McCartan 2016). Another important aspect of the qualitative approach is the epistemology when conducting interviews. It is important that the researchers take the view of the people they are studying, or in other words, to “take the role of the other”, to acquire social knowledge (Bryman & Bell 2015).

Jan Recker (2013) mentions how qualitative research studies phenomena in its context. Unlike quantitative research it focuses on text rather than numbers to be able to explain what people have experienced, said, believed and done. He also suggests qualitative research for studies where a phenomenon is not yet fully explored and still emerging as in this study.

3.4 Research design

The research question aims towards gaining in depth knowledge about the cloud computing phenomena, which applies in its real life context. The most suitable design was a case study, one reason being that cloud computing and ICT is about human and technological interaction in its natural setting. Recker (2013) mentions that case studies are suitable when conducting qualitative research and most popular for studying research in information systems. The meaning of case studies is conducting an in depth analysis of a single case which can be an organization, a single location, a type of person or a single event (ibid).

Case studies are normally the study of a single case however it is not limited to one case only, multiple case studies are becoming more common (Bryman & Bell 2015). Single case studies are most advantageous when trying to identify new or unchallenged phenomena or issues (Recker 2013) and Bryman & Bell (2015) mention it as “The Unique Case”. Multiple case studies are often thought of as comparative studies because they are used to compare cases. Case studies can also be confused with cross-sectional design but the difference between them being the focus. In multiple case studies focus is on the individual case; with cross sectional design, focus is on the sample of cases (Bryman & Bell 2015).

Case studies may be among the most used research design but there are some downsides to it. Bryman & Bell (2015) mention criteria's of research, which are reliability, replicability and validity. The most questionable of them with regards to case studies are validity and generalization (ibid). How can the result of one case be representative and applied generally to other cases (ibid)? Recker (2012) puts this in other words as “a lack of adequate evidence to support evidences beyond any doubt” (p. 95).

As the choice in this thesis was to investigate two organizations and their perception on the research area, the chosen design was a multiple case study whereas the two organizations are referred to as the two cases. This approach was chosen also because it aligns with the research perspective hermeneutics, as mentioned in section 3.1. A case study will help us to see things from a wider perspective by looking at the “whole” picture rather than “parts”. By using a case study approach it was possible to gain deep and detailed information to reach the purpose of deeper understanding. It is important to note that this study is not a comparative one since the aim is not to compare the two cases.

3.5 Data collection

When selecting a data collection method it is important to consider the research question, research focus, data sources and even your own life experience (Pickard 2013). This study aims to obtain qualitative, descriptive in-depth data and to be able to conceive that, the data collection tool that will be used is interviews together with analysis of texts. When starting the research on cloud computing databases at University of Borås was used as a search tool together with various scientific books. Through reading, discussing and analyzing the information found, knowledge was gained within the field and a knowledge gap was identified, which is the first step in scientific research according to Bryman & Bell (2015). After reading relevant literature from the library and articles online, the gathering of theoretical material that could be used in the thesis started. Cloud computing and its development is relatively new and therefore relatively new scientific articles and papers online were very useful. After deciding on performing a multiple case study using empirical data interviews was found to be the most suitable option for collecting data.

There are many forms of interviews and to gain as rich information as possible it is important to choose an interview with a suitable structure (Bryman & Bell 2015). Interviews are a proper tool to use when the data sought after cannot be answered easily (Pickard 2013) which was the case in this thesis. The structure of an interview range from structured and semi-structured to unstructured and they differ mainly in the depth of the response as well as to how open the questions are (Robson & McCartan 2016). Structured interviews use questions that are closed and asked in a pre-decided order and are used mostly in questionnaires and surveys while semi-structured and unstructured interviews are more flexible and allow questions to be asked in the most suitable order (ibid). As mentioned in section 3.4 the chosen research design was a case-study and Robson (2016) mentions how interviews can be used as the only tool of data collection.

Semi-structured interviews were used because it enables flexibility and allows the respondent to be comfortable and answer questions in a relaxed and elaborate way (ibid). Semi-structured interviews give the interviewer freedom and flexibility in both writing the questions and in which order they are asked. This allows for the interviewer to be attentive to what questions the respondent can elaborate on, which will result in rich and in-depth answers (Pickard 2013). Semi-structured interviews are also convenient because it allows two way communication where the respondent could ask questions to us as interviewers when something was unclear (Recker 2012). Information obtained from these interviews encouraged the respondents to explain reasons behind their answers, which is important since the purpose is to provide knowledge of underlying reasons behind strategic decisions. Conducting interviews this way created a conversation where the respondents felt comfortable. It also let them speak more easily about sensitive matters, which is key when investigating deep motivations and thoughts behind strategic decisions (Recker 2012).

When preparing for the interviews the questions were sent to the respondents a couple of days before the interview was conducted to let them read and get an understanding of the nature of the information that was sought after. The actual interviews were conducted at the enterprises' head offices that are both located in Viared, Borås. During the interviews it was made sure that permission was granted to record the dialogue by asking the respondents if they felt comfortable with it. Then the interviews went on with asking open questions at the beginning and more specific questions towards the end. The interviews took about 45 minutes and afterwards both respondents agreed to answer any further questions by email. The transcribed interviews were then sent to both respondents to let them confirm that everything corresponded with what had been said.

Recker (2012) argues that interviews are a useful data collection method when it comes to targeting the specific topic that is researched. It is also good because it leads the interviewee to be insightful and come to conclusions while faced with face-to-face questions that are open (ibid). Weaknesses of interviewing that needed to be avoided were reflexivity, which is when the person being interviewed tries to respond in a way that pleases the interviewer. Inaccuracy in form of poor recall of answers, artificiality because the interviewee and interviewer are strangers as well as poorly constructed questions (ibid) was also avoided to the highest possible degree by following the seven steps of interviewing, mentioned in section 3.1. The interview questions can be found in the appendix.

3.6 Sampling

When considering sampling in social research studies, mainly two methods are mentioned; probability sampling and purposive sampling. With regards to qualitative studies purposive sampling is most used (Bryman & Bell 2015). The main idea behind purposive sampling is that the research question is a key indicator of what is needed to be sampled and provides guidelines to the choice of what needs to be the focus of attention. As a qualitative approach was chosen and the goal not being generalization but rather seeking greater knowledge of the phenomena, a fixed purposive sampling method was most suitable. The question also allows the research to take on this sampling method since it clearly states what needs to be examined. Fixed purposive sampling means establishing the sample early in the research process rather than adding samples as the research progresses (Bryman & Bell 2015).

Our samples were chosen because of its congruity with the research question. Probability sampling was not chosen since it is most common for quantitative studies. If it is to be used in qualitative studies the following two criteria need to be met; it is important or significant for the researcher to be able to generalize to a wide population and if the research question does not suggest a particular category that should be sampled (Bryman & Bell). These two criteria are not met in this thesis, which also argues for the sampling choice. When using probability sampling the researcher chooses a sample of what can reflect the wider society and enables generalization to be made from a small proportion, which this study cannot do (Higginbottom 2004).

As stated in the previous paragraph the samples were based on the research question, which stated that the choice of samples had to be medium-sized enterprises. Since this thesis focuses on complex IT-solutions the enterprises chosen also need to have a high degree of IT usage when performing daily operations. Samples were chosen early in the research so that they could be present throughout the whole process. The area of cloud computing is a complex phenomenon and to be able to receive correct and relevant information from the respondents it was important that they had knowledge about cloud computing and ICT-strategy, which was made

sure of before the interviews took place. Since the focus of this thesis is strategic decision making the respondents needed to have the right to make decisions regarding ICT-strategy. It was also important that the respondents had worked for a significant amount of time at the chosen cases since the study aims to find out what had influenced previous decisions as well as what influence future decisions regarding ICT-Strategy.

3.7 Data analysis

When analyzing data in research there are two different ways according to Briony J Oates (2006). A quantitative and a qualitative way, they are in nature different in the same way that quantitative and qualitative research are in that quantitative analysis looks at numbers while qualitative analysis regards themes and categories (ibid). It is possible to use quantitative analysis in qualitative research by for example looking at how many times a word is mentioned in an interview to measure its frequency which is the case in this study and is performed in the analysis (ibid). Qualitative analysis was mostly used since its aim is to understand people and how they view the world. Qualitative analysis is discussed by several authors as less straightforward than quantitative analysis due to the need of data interpretation in interviews, as discussed in section 3.3 and 3.5 (Oates 2006; Robson 2016; Thorne 2000; Patel & Davidson 2011).

This study involves a multiple case study, Patel & Davidson (2011) propose an ongoing analysis throughout the study, which was applied in form of writing down thoughts and discussion. By applying this method, what was said and done during the interview could be clarified to make sure that correct interpretations were made. It is important to go through the text that has been produced and make notes to make sure it is being written and formulated in a way that is possible to understand for the readers, which were particularly done throughout the whole research (ibid).

This study involves people, their relationship towards cloud computing and how to adopt it in their ICT-strategy, to be able to give the reader a good understanding of the cases and this complex relationship it was decided to separate them and put the empirical data into text in the analysis section. This text is complemented with quotes from the respondents, which is a good way to make it approachable according to Patel & Davidson (2011). The analysis is then further divided into what drivers and barriers that could be derived from the empirical data, which is followed by a table that was created using a quasi-statistical approach that is described in the paragraph below. The aim of the analysis was to find underlying thoughts and values of the respondents that would contribute to answering the research question, which is made clear in *table 1*. At the end of the analysis is an overall case summary, showing inter-correlations between them as well as how they differ.

Robson (2016) shortly describes different approaches to qualitative analysis, which was partly used. Quasi-statistical approaches use word or phrase frequencies and inter-correlations to determine relative importance of terms and concepts. This was used when analyzing and categorizing the data gathered from the semi-structured interviews to put in a table where the most frequent words and terms were categorized. This way of categorizing data was made through thematic coding, which is described by Robson (2016). By coding data such as frequently mentioned drivers and barriers and putting them into categories of importance to the research question, data could be sorted and filtered according to how Oates (2016) describes three segments. The first are segments of data that is not relevant for the specific research and should therefore be filtered out. The second segment is data that provide general descriptive information for the readers and lastly, segments that are relevant to the research.

By realizing and categorizing data into these three segments it was made sure that the data was relevant to either answer the research question and/or to provide context to the readers. Oates (2016) says that qualitative research and analysis are made simultaneously throughout a project. This approach was used by collecting and analyzing data iteratively as described in section 3.3, in the hermeneutical circle.

Transcribing data from interviews are necessary to be able to analyze them and is also a way to get familiar with the data (Robson 2016). When transcribing the interviews, notes from when the interview took place helped to get a better understanding of what was said. For example through describing gestures and atmospheres in the room or when the respondent paused to think. According to Oates (2006) this is a good way of understanding true meaning of what the respondent is trying to communicate. The transcripts were then read several times during the project to code the data and define categories as well as iteratively gain more understanding (ibid).

3.8 Evaluation criteria

It seems hard to find clarity in what criteria are used to evaluate qualitative research. In quantitative research mainly two criteria are used; reliability and validity (Patel & Davidsson). Some researchers proposed that qualitative research should be evaluated with slightly different criteria such as trustworthiness and authenticity (Bryman 2012; Robson & McCartan 2016). However, reliability and validity was used in this thesis.

3.9 Validity and transferability

The concept validity differs in qualitative studies and quantitative studies. In quantitative studies validity focuses on the conformance of what the research says it studies and what it actually studies. In qualitative studies it rather refers to that the research focuses on the right phenomena and is strengthened by a solid theory base, good instruments and accuracy in data collection (Patel & Davidsson 2011). Validity in qualitative studies applies during the entire research process rather than in what is being measured (ibid). Reliability also differs in qualitative studies compared to quantitative. If a respondent answers the same question different if it is asked several times indicates bad reliability. However this may not be the case in a qualitative study since the respondent's perception or knowledge about a subject can change (ibid).

What is important regarding validity in qualitative studies is providing a valid description of what is seen or heard during the collection of the data, where a large threat is inaccuracy or incompleteness of the data (Robson & McCartan 2016). What is a threat in validity is the transcription of the interviews, which is commonly used in qualitative studies (Patel & Davidsson 2011). Spoken language and textual language is not the same. Gestures, mimic, pauses and body language are lost in transcription. It is important for the researcher to reflect on these issues when transcribing (ibid).

Patel & Davidsson (2011) mention the importance the reader's possibility to form his or her own opinion about the validity of the research, they mention it as "communicative validity". Meaning of this is that other researchers and respondents should be able to partake in the results. A way of providing this is to give the respondents the transcription and result of the study and receive feedback. It is also normal to provide the reader with a "thick description" (ibid), which is a description of the cultural details and case environment. Therefore the "thick descriptions makes it possible for others to judge the transferability to other environments (ibid) and therefore enhancing validity in the way of making the study more transferable

(Bryman 2012). Transferability is hard to uphold in qualitative studies since findings are highly dependable on the cultural context in which it is being studied (Bryman 2012).

4 Empirical study

As a result of previous chapter where a multiple case study was considered to be the most suitable way to collect empirical data, this chapter gives a thorough explanation of the two enterprises on which the study was conducted. The interviews performed at each enterprise are written in a comprised flowing text to provide the readers with a context.

4.1 Case 1 Silvent AB

The first interview was at Silvent AB who operates in delivering products within the compressed air segment such as air guns, air knives and custom made compressed air products. The company was started in 1989 by four entrepreneurs and is still owned by them. They are now located in Viared outside Borås in Sweden where they have been located since 2008. To evolve their business new companies has been established outside the borders of Sweden, which the respondent refers to as satellite offices. These offices are located in Chicago, England, Nice, Salzburg and Shanghai. They also have distributors in other parts of the world and sell to 77 countries worldwide. Numbers of employees at Silvent are 72 employees working worldwide.

4.1.1 Respondent

The interview was conducted with Ulf Persson who is the only employee working with IT-management at Silvent AB, and has done this since they first started using IT back in 1995. He has worked at the company for 25 years and has a background in mechanical engineering and product development. Ulf is involved in and manages all of the enterprises strategic decisions regarding IT, with the board as the only head above him.

4.1.2 Current IT solution

Ulf is able to handle IT on his own because he has outsourced the entire IT department to Evry in Borås, which is a local IT supplier. Before 2003 when they had offices in Sweden, USA and England who all used separate IT structure, all of the offices had their own ERP system and local IT solutions. Since 2003 they decided to integrate all offices into the same ERP system that was in the form of a community cloud solution. Several organizations shared the same infrastructure, which was owned by the supplier Evry. They implemented all of their IT applications to the community cloud such as CRM, ERP, File and mail-servers and integrated all of their satellite offices into the solution. In 2013 Silvent decided to waive from the community solution to a private cloud solution where they leased the infrastructure from Evry but was now the only organization using specific dedicated infrastructure. So since 2003 they have used a cloud solution where the employees use Virtual Desktop Infrastructure (VDI) technology, which is a form of desktop virtualization. It is the process of running a user desktop on a virtual machine that is stationed in a data-center. It allows for powerful personalized desktops to be used anywhere and on any device.

4.1.3 Interview with Silvent AB

The respondent at Silvent AB, Ulf Persson works mainly with business-development. He has worked at the enterprise for 25 years, almost since it was founded. He started working at Silvent as a product-developer and has a degree in mechanical engineering. Ulf worked as a product-developer for 10 years since IT was not yet very widespread. When the use of IT became more common for supporting business processes Ulf began to focus more on how to implement it in Silvent's daily processes. After being the enterprise IT manager for about 10 years he started to focus more on business-development, for example in Shanghai where he

helped setting up and running Silvent's satellite-office and performing tasks such as educating employees in their new ERP system.

Ulf has the mandate to decide on how the enterprise builds their IT structure and strategy. He is a part of the management at Silvent and answers only to the board regarding IT decision making. When the enterprise decided to implement a new ERP system in January 2016 he was responsible. Silvent now works in an ERP system that is fully integrated in all offices around the world. They all access data from the same server located in Borås and work with the same software in all offices around the world. This centralized ERP system-solution was something they implemented back in 2003 when Ulf felt that it was hard to work when their offices in England and USA had different systems that could not be integrated with their headquarter in Sweden. The solution was cloud based since the server space was rented from a supplier called Evry. With this solution all the offices could work on a centralized server that was shared between many enterprises on a community cloud. They put ERP, CRM, file-server, mail and all related software into this solution. Ulf explains that this solution worked well in the beginning but as more and more enterprises started renting space and processing power from this server it eventually got slower and in 2013 he decided to move Silvent's data and processes into their own server. This server was still rented from Evry but with Silvent's own infrastructure. Another reason for moving out from the community cloud was the ability to make updates and changes, which can be challenging since it affects many enterprises except themselves.

When moving to a private cloud they also migrated to a VDI. Before this, they had connected to the external servers through Citrix, with the new solution they could now connect any devices belonging to Silvent and get a brand new PC-desktop including their software every time. Ulf also mentions how he decided to buy thin-clients to all employees back in 2003, those were slow and clumsy so shortly after he changed his mind and bought MacBook airs instead. He says that it does not matter what device the employees have as long as they can connect using the VDI technology.

When discussing risks with shifting from local servers at their satellite-offices to a centralized server Ulf explains one main motive that they want to work in the same way at all locations. He also wanted to be able to manage all the offices from his location in Sweden and this was easier with a common ERP system and no local servers. The enterprise was also in a period where they looked to hire more staff in their sales department and therefore they started with integrating ERP and CRM into this solution. Ulf explains how he started thinking about how to make it possible for all offices to work in the same way and that it was not possible with locally installed solutions. He would then have to travel around the world installing and updating systems, which did not seem very attractive or hire local IT staff, which was not preferable. When analyzing the risks, he realized that slow internet connection, latency or even a broken connection would mean that offices would not be able to work, especially in the U.S, which is far away from the server in Sweden. After doing tests and working on backup-plans, he decided that it was worth implementing. He also considered aspects such as trusting their supplier with storage and management of all their data. Since they had a long going relationship, continuously kept contact and had discussions regarding IT he thought it would be safe.

When elaborating on the risks connected to third party providers Ulf mentions one case when they were attacked. It was when they had IP-telephones integrated with their ERP-system. The attackers infiltrated the enterprises telephone line and made expensive calls. This was solved quite easily through blocking some addresses and adding security. However, he

believes that the suppliers they collaborate with can maintain a higher level of security than he could do internally. He is totally comfortable with having their data stored on an external server because of their good relationship with Evry. In the future, if they decide to migrate to for example Microsoft and their cloud servers he thinks he will feel safe with them as well but that is not up for discussion at the moment.

The new ERP system is called Jeeves and before that they used Garp, which are local suppliers. They are both small companies but since Silvent works with pretty simple processes Ulf says that it has worked well and that working with local suppliers is good since they have a close relationship and strong communication. The reason for migrating to Jeeves from Garp was the need to develop their business processes. The initial thought was to make the move in the beginning of 2014 but since they were in the process of setting up a new office in Shanghai, Ulf decided to push the project forward one year. The fall of 2015 was tough since they implemented the new ERP system in 6 countries simultaneously. Even though this was a challenging task Ulf mentions that Jeeves used their enterprise as an example at seminars to prove that migrating to a new ERP system can be fast and efficient.

When implementing Jeeves, Ulf decided to keep the sales-personnel out of the system. Instead he let them work in a web-based interface that was connected to the ERP. This interface was built to be very simple and designed almost as a web-shop enabling them to get rid of educating 40 out of 60 employees in how to use the ERP. Another up-side of using this interface is that if they decide to change ERP in the future they can still keep the interface.

In November of 2016 the enterprise decided to migrate their email solution into the cloud in the form of Microsoft office 365. This is the first cloud solution that is located on a server outside Borås, which according to Ulf is contradicting his earlier beliefs of having control over all of their own data. He says the migration into Office 365 was almost inescapable because of the cheap pricing and new functions it offers. The employees at Evry are responsible for all maintenance and operations regarding IT. He has meetings quarterly with them and it was they who first suggested migrating to Office 365. Ulf then made some preparations in Silvent's system to prepare for the move.

When it comes to storage they have had a SharePoint locally but they moved this into the cloud when implementing Office 365. Silvent has an intranet where they share information between employees but this has become redundant since a chat-function called Jammer was installed together with Office 365. Ulf admits that he is uncertain regarding how storage and other functions will work in the future. Although they keep working mostly in systems that are located close to their headquarters for the time being, they might migrate more processes into other cloud solutions in the future. Ulf sees advantages with having the kind of structure they have since this gives them the power to manage all offices from their local office in Sweden, he says that satellite-offices in other countries should not have to worry about their operations and IT-management. This has been the biggest motivation to adopt the kind of solution they have. Even though the move to a private cloud has been a bit costly Ulf thinks that it definitely has been profitable in the long run. If he had decided to hire staff to manage IT at all offices along with consultants or developers it would be more costly. If they on top of this worked in different ERP systems it would be like separate islands on which business was conducted in different ways without being able to communicate. As long as they can work effectively and in the same way it does not matter if they have to pay a little extra, Ulf says.

Communication and availability are of great importance to Silvent, high speed connectivity, latency and availability to servers are key aspects. When discussing these aspects in regards to

migrating to other CSPs Ulf believes that the availability probably would be better but speed and latency would probably not because of their VDI technology. He has SLAs with all his suppliers and third party providers and when it comes to Evry he has never had a problem. Once in a while he reviews the agreements to make sure that no circumstances have changed because of new functions or processes. He feels comfortable with working together with local suppliers because of the good communication they can have as well as fast connection to their servers. The issue of communication over the internet and latency is something Ulf sees as a weakness when it comes to their office in Shanghai. He mentions that China does not have the best network infrastructure and together with their regulations and laws this has become a problem. The VDI technology is the fastest solution so far when it comes to low latency and according to Ulf he could put both ERP and CRM in a different cloud solution that was managed by Amazon or Microsoft if he was not worried about the latency.

When thinking about the future Ulf plans to keep working towards their server that is located in Borås when it comes to ERP and CRM. It is the migration to Microsoft office 365 that goes against his earlier beliefs of keeping all IT-infrastructure close to their headquarters. Therefore he says that he has started to mentally prepare for what the future might hold, Silvent could possibly move more infrastructure into the cloud such as ERP and CRM but for now the communication speed/latency is the biggest weakness of such solutions according to Ulf. In the end he is not worried about migrating to a different cloud solution, as long as they can operate effectively. Spending some more money to achieve good efficiency in their system is not a problem. Regarding security, Ulf thinks a move into another cloud solution such as Amazon or Microsoft would be even safer than what it is in their current solution. Even though he has had a mentality of wanting to own all of his data and hardware historically he does not want to be resilient. He will always look to what is best for the enterprise and if that is where the technology is going he is prepared to follow it.

Silvent works with several different suppliers, CRM from Lundalogik, ERP from Jeeves and email from Microsoft. Evry runs all infrastructure, which is also where they have got their ERP from. Ulf's job is to make sure that these things are well integrated and he does not see it as a problem to have several suppliers. Engineers that are employed by Silvent works in a Computer Aided Design (CAD) program that is connected to the enterprises rented server as well. the CAD program works with large amounts of data and Ulf had to buy a "heavy machine" with processors and graphic cards that are "insane". There are only four employees working towards this computer, which is dedicated to them, Ulf thinks this is pretty unusual among similar enterprises. Ulf says that he is proud to have installed this kind of solution and that it has helped being very early with implementing their own cloud solution instead of staying in the hybrid cloud with a cluster of around 3000 enterprises. The benefits of having a private cloud are the scalability and the freedom it gives the enterprise to do what they want regarding updates and functions. When they opened their office in China Ulf could simply "push a button" to add 10 or 20 more employees into their system. Since Silvent plans to open more satellite-offices around the world this kind of scalability is "super important" to them. Nowadays they also work with a module called intercompany transaction that makes all offices integrated and all transactions internally are automatic.

New services and functions will be invented all the time says Ulf. Today, with all the digitalization and phenomena such as inbounding appearing, customers will stand for 70-80% of the journey themselves and the salesmen at Silvent can be connected in the end. This kind of digital marketing can be compared to before, when salesmen had to follow "cold leads" and do the whole job themselves.

4.2 Case 2 Hööks Hästsport AB

The second interview was conducted with Hööks Hästport AB that aims to supply all active horse riders with affordable equipment. They are Scandinavia's leading business in equestrian sports goods with stores in Sweden, Norway, Denmark and Finland as well as online. The company can be traced back to 1931 when a man called Oscar Waern started manufacturing saddles in the town of Eksjö in Sweden. In 1976 the business was taken over by the owner's son, Bengt Höök, who started manufacturing all sorts of horse equipment and began building towards what the company is today. In 1986 they opened their first physical store followed by their online store in 1999. Today the enterprise has 169 employees and 51 stores around Scandinavia.

4.2.1 Respondent

We had the interview with Hööks at their headquarters in Viared, Borås. The interview was held with Patrik Back whose official title is CFO. IT is not his main concern but he is responsible for the operational IT management and has full decision rights regarding strategic ICT decisions with the approval from the board. When facing larger decisions regarding ICT structure he prepares and manages the question in place and then brings it to the board for an investment decision and then he manages the process operationally. Patrik has a background in IT studies from Handelshögskolan in Gothenburg where he studied "Internet as a marketplace". He did a store concept project with Hööks after his studies but remained at the company after and has been there for 15 years. Patrik is also responsible for the relationship and agreements with IT suppliers.

4.2.2 Current IT solution

The Current solution of Hööks mainly consists of a few cloud services, core IT functions are outsourced to IT suppliers. The heart of their ICT structure is an ERP system called Harmony, which is supplied through a supplier in Borås called Pulsen. The respondent describes it as a commerce system. They have most of their processes embedded in Harmony such as: Warehouse Management (WMS), Point of Sale (POS), Wholesale Store Supply (their own stores) and more common ERP functions such as purchasing, order management etc. They implemented Harmony in 2005 where they had the chance to be the first to try the system through their partner Pulsen. They run the application through Pulsen's servers who are in charge of the operation and application support. The servers are shared between many other organizations.

Another important IT application that is used for daily operations is their CRM system, they have a customer club called Hööks & Friends. The CRM system is packaged and integrated in Harmony through Pulsen but is originally developed by a third party provider who is responsible for the development and some operational functions, therefore there are two providers collaborating in delivering the service to Hööks.

Along with previous large IT solutions the respondent mentions other main SaaS solutions which all are delivered and hosted by third party providers, they are; Office 365, Tooeasy, Qlikview and EPiserver web platform.

As described in this section many services Hööks use are deployed in the cloud but they have some servers located locally at the office which are dedicated to a product management information system and image database. The reason for having this locally is latency issues where they experience delay when placing data outside of the organization.

4.2.3 Interview with Hööks Hästsport AB

Together with two employees Patrik is responsible for the IT operations. Among his responsibilities are relationships with IT suppliers and issues regarding IT procurement and major ICT-strategy decisions. Changes regarding smaller operational IT questions are well within his decision rights but he must present a solution to the board when handling major strategic change. They then make a decision on how to invest. An example of this is when they decided to change web platform recently, he prepared and negotiated the solution, brought the proposition to the board and an investment decision was made. Then Patrik integrated it operationally. His two colleagues are responsible for maintaining daily operations and notifying the suppliers if something is wrong so that they can solve the issues that arise.

Patrik described the current IT system as composed of several small and large sized applications, which are used in daily operations. Since 2005 they have used the same ERP system, which they were the first to use. Reasons for accepting to pilot the system were because of the long relationship with the same local IT provider named Pulsen in Borås. He also thought they could influence and help develop the system to their advantage. The ERP system named Harmony is the heart of their IT structure. It is a commerce system with traditional ERP functionality but he believes that they run more applications through it than enterprises normally do. These applications are Warehouse Management System (WMS), Point of Sale (PoS) and Gross Supply System (GSS). They buy Harmony as a service from Pulsen who have servers located in their datacenter and are responsible for maintaining and developing it. Along with Harmony they use a CRM system where they run a customer club called Hööks & Friends which is delivered by a third party provider. This provider is responsible for developing the application but it is distributed through Pulsen and it is fully integrated with Harmony.

The decision to change ERP system in 2005 was a long process and Patrik was involved but at that time he was not as high in the hierarchy as today and had no impact on the decision. The decision was a board decision as all major IT change. What hugely impacted the decision to change was the relationship with the supplier Pulsen. Hööks had complete trust in them and Pulsen wanted them to be a part of a journey and grow together with a common goal to enhance business development. Even if 2005 was early to use cloud solutions they were ready and needed the change. Bottom-line was that Hööks had the intention to grow and understood that to enable this they needed supporting technology to enhance their business processes. Patrik described the application they used before switching ERP system as a text based, monochrome and outdated system, which clearly needed to be changed.

As a complement to Harmony they use other smaller SaaS applications. One of them is a mail solution that they recently decided to outsource to Microsoft and use their Office 365 for business application. Previously they had an email server delivered by Pulsen but they have now decided to migrate it. The change was made quite close to the interview and apparently it was a time consuming project that did not proceed as planned. When starting the project it was deemed to be completed much earlier. Tooeasy is a personnel management system, which is delivered through a supplier called Asivio in Gothenburg. They also use a Decision Support System (DSS) called Qlikview to aid them with business intelligence.

Apart from previous mentioned cloud services they have a couple of servers locally at the office. They are mainly used for a Product Information Management system and image databases. The reason for not outsourcing them is latency issues because of the largeness of

the files and practically it is not possible to have them anywhere else. However the data stored on the local servers is not very critical.

A system which can be seen as one of the most important one's in the modern times of e-commerce is Hööks web platform. As mentioned they recently decided to change it to a new platform. They previously used an EPiServer e-commerce platform but are now changing to one called Jetshop. Patrik mentions that Jetshop may be the e-commerce platform where most online trade in Sweden is done. Traditionally mostly small enterprises use it but lately some larger enterprises have migrated to Jetshop. A company with approximately 50-60 employees deliver it. What is interesting in the relationship between the supplier of Jetshop and Hööks is the charging model where Hööks pays a percentage of their sales to the supplier. Therefore they have a common goal of selling and converting online sales. The more Hööks makes the more the supplier gets.

The reason for changing e-commerce platform is mainly performance issues with the current system. This made the choice of a new system pretty important since a large part of the business is run through the e-commerce platform. Because of previous issues with the e-commerce platform Patrik put great emphasis on the SLA with the new provider. He mentions that the problems with standard SLAs are that they look great on the surface but if dug into they are filled with disclaimers and exceptions. During the years he has gained more experience in negotiating and reading SLAs, which has helped him in recent negotiations. He is aware that high SLA levels do not come free, the higher the demand the higher price since the supplier will have costs related to keeping the agreement. Regarding the e-commerce platform and communication infrastructure he is more than willing to pay for a high level agreement whereas on services that are not as business critical he normally uses a lower level agreement. SLA strategy is something that is highly considered and prioritized in procurement processes where he wants to find a solution that favors both the supplier and Hööks.

As mentioned most of the ICT structure of Hööks is outsourced, using some type of cloud solution from different suppliers. As they started to use cloud services early they chose a path where they decided to have a small IT department locally at the office. They have considered the risks of outsourcing and placing their data in other hands. The argument for still going with cloud services was mainly the trust in the provider and the provider security. Security would still be an issue if they would have used a traditional solution and the security both in the physical security aspect and the data security aspect are in better hands at their provider. Another reason for choosing to outsource their ICT structure is that he does not only buy a service from the provider but also the competencies it comes with. An example he uses is that if he would need an expert on firewalls he could never afford to employ one since it would be too expensive and he would need him about three times a year. However Pulsen can afford to employ an expert in firewalls cause he is shared among several enterprises, using Pulsen as a provider. The day Patrik needs a firewall expert he has one at Pulsen. He lets go of the control of data and applications but he buys a higher competence than would be possible to employ himself. Pulsen have 24 seven monitoring on their systems which would not be possible if Hööks were responsible for their own maintenance.

Patrik mention advantages that the organization has gained from outsourcing their IT he discusses two aspects, which he believes, has been very useful to them. One of them is the shared benefit of many organizations using the same supplier. Developing your own system that is tailored to fit your organization, can be to your advantage but Patrik mentions that he would not be able to think of all the functionality he needs on his own. By sharing the same supplier with other organizations that have similar requirements such as Nelly and Qliro

group, two major players in the e-commerce market, Hööks indirectly take advantage of their knowledge as well. Pulsen's customers' demands functionality which Patrik may not have been able to think of but could be useful to their business also. The other main advantage is the possibility to amp up the power when needed to as you grow. He mentions it as avoiding bottleneck effects when growing, you can twist the tap when needed which leads to more variable costs than fixed costs.

The greatest threats with the highest risk of occurrence are communication and availability with their ERP system. They had a connection issue with Harmony a couple of weeks prior to the interview where it crashed for 20 minutes, which is highly noticeable in their organization. No sales can be made in the stores, the web page is down and no purchasing systems can be accessed, mainly all functions cease to operate.

When standing in front of a strategic decision regarding IT applications they usually compare different options, both using traditional technology and services using newer technology such as cloud computing. They are in the process of changing their telephone exchange and were presented with different options. One was placing a local switchboard in the building and the other was using IP-Telephony through the cloud, where the latter was chosen because of the advantages in price, functionality and flexibility.

Patrik's general perception on IT development in Hööks is not necessarily that they have to adopt cloud services. However it has just become that way since they have proven to work for them and they have good experience in buying IT infrastructure and applications in that way. As mentioned they always compare different technologies when choosing new applications. What is important to them is that these applications work and he always chooses the solution he believes will be most profitable for their business no matter the technology. He also emphasize on the change in suppliers, they seem to want to package their products in a cloud solution. Pulsen are the ones who convinced Hööks to migrate to Office 365 since they believed it would be better for them to use, both functionally and economically. When regarding future investments and development of ICT-strategy they will never stop in trying to find new more efficient ways to support their core business. They are willing to continually invest and develop their ICT-strategy since he acknowledges that the significance of IT has changed drastically.

5 Analysis & discussion

To show and motivate the results from the empirical as well as put it in relation to previous research, this fifth chapter consists of an analysis and discussion. The analysis is divided into four sections. Section one and two contains an analysis of the two cases individually where drivers and barriers identified from the empirical data are further analyzed. The third analysis part contains an overall case analysis where correlations between the two cases are presented and analyzed, followed by effects drivers and barriers have on an organization. The last part contains a discussion of these effects and how they relate to ICT-Strategy in medium sized enterprises.

5.1 Analysis Case 1 Silvent AB

5.1.1 Drivers

As mentioned in 4.1.2 the respondent has the power and control to make important decisions regarding the organizations strategic ICT decisions. The driver behind moving into the community cloud in 2003 was to centralize the organization's data resources. Since they had satellite-offices at several locations at the time it was a way to gather their hardware and software resources at one single location on which they could all operate. Through using Citrix which is a supplier of applications, hardware and software, they put their ERP system, CRM, mail and file-server on this third party infrastructure. The respondent decided to outsource their IT-infrastructure and management relatively early back in 2003. This has spared him from the ethical dilemma of cutting down IT-personnel, which is mentioned in the theory chapter. This is because the respondent from the beginning has been the only employee concerned with IT at Silvent.

“We want to have as much power and control as possible to govern our subsidiaries from our head quarter. Our satellite-offices should not be concerned with IT-related issues, it is just supposed to work. This has been the main purpose, to centralize our data-resources”.

They operated on this kind of infrastructure for 10 years until 2013, by that time there were approximately 3000 enterprises that shared the same infrastructure. This affected the possibilities for Silvent to install updates and new functionalities the way they wanted to since such decisions affected many other enterprises. This led to a new drive of having the possibility to control their IT environment regarding functionality and processing power. To achieve this they decided to stay with the third party provider but instead of sharing servers they now operated on their own with a solution that is more of a private cloud. This gave Silvent the power to be flexible and to scale their IT infrastructure and functions any way they preferred. This kind of control and flexibility is something the respondent mentioned several times throughout the interview. Flexibility is a well-known driver which is mentioned in the theory chapter, control on the other hand is something that might to some extent be lost when migrating to a cloud solution that is not private, something that Ulf is aware of.

Another strong driver is the way in how to work and how a centralized private cloud allows for all offices around the world to perform tasks using the same software and accessing the same data. The respondent says that:

“traveling around the world, training personnel, installing ERP systems and constantly working with maintenance does not seem very attractive”.

Silvent has outsourced all of their IT-infrastructure to the supplier Evry and with that comes another drive. The respondent admits that by outsourcing IT and the tasks included, the opinions and drives of this provider also affects his decision making. This year they implemented Microsoft Office 365 which moves their e-mail server from the local spot in Borås into the cloud and Microsoft's servers. The respondent mentions how this move was somehow inevitable since they have been driven towards this solution based on its cost-efficiency and additional functionality. He admits that Evry definitely had a part in this since they made the proposition in one of their quarterly meetings. This kind of external force that Silvent's IT-provider causes is in some way affecting their degree of freedom. If they had owned their own infrastructure they could chose to install any software and email-solution they would want to. Since Evry as a provider is not developing their own software but work as a middle hand in supplying other enterprises solutions such as Microsoft, they will be affected and influenced by what these bigger suppliers' drives are and what solutions they decide to develop.

New functions that the cloud brings are also a drive according to the respondent. Silvent have had their own intranet where information between employees has been shared. Now that they have adopted Office 365 a chat-function called "Jammer" has been deployed, which basically makes their own intranet redundant. The respondent also says that storage and some processes might be moved into the cloud in a near future since additional functions are being created and enabled all the time.

5.1.2 Barriers

As discussed in 4.1.3 Silvent was early adopters of what can be classified as cloud computing, they migrated to a community cloud solution already in 2003. The barriers at that stage were the availability and communications issue. In Sweden it would not be a problem since the internet infrastructure was very good but the problem was USA and England, how would the speed and latency be, would it be possible to conduct normal work? Strategically they weighed the possible advantages and possible risks and put a backup plan in action and implemented the cloud strategy and it seemed to work. As Rajaraman (2014) discusses communications is a major barrier and risk when adopting cloud computing services, Not only in form of no connection but also latency issues how fast data can be accessed.

"What happens if internet is down? An entire office would not be able to work, that was one aspect. Also the speed and latency between the satellite-offices, how would they be able to work in those conditions from USA, it is far away from Sweden".

When discussing cloud computing within Silvent Ulf clearly distinguishes cloud computing from fully adopting the cloud, which in the respondent's case means migrating to the third party provider's server and environment. From the empirical data gathered control was identified as a driver for adopting private cloud solutions but it can also be seen as barrier to fully migrate to a third party cloud environment but he is after many years starting to change his mind. It relates to previous research in the way of security and trust. Handing over your sensitive data and control of your IT and actions is hard for some organizations. In the case of Silvent control was very important, to own your own data, and they are happy with the solution they have today where they still have control but can use some main advantages of cloud computing

"I have always wanted to own what's ours, we should have complete control of our environment, data and infrastructure. We should be able to upgrade and do exactly what we

want with our infrastructure. However we migrated our mail server to office 365 which was almost inevitable since they almost force you there with prices and functionality”.

He also mentions communication as the greatest barrier of migrating fully to the cloud. Their core IT solutions such as the CRM and ERP system has cloud service packages ready for implementation. However they are not fully convinced that they are as efficient as the current VDI solution. Ulf mentioned that their VDI technology is what handles the latency the best and that the worry of fully migrating is that the latency will be too high and the employees will not be able to work accordingly. He could already notice a difference when migrating their mail server to Microsoft that it has become slower than their previous solution.

When asking questions about the security issue, which is mentioned in previous research as the main barrier and risk with cloud computing. The belief is that if they would have local servers and IT-infrastructure it would be more exposed to security threats that they are when a third party provider is in charge of the data security. Although he mentions that they have sensitive data in forms of patented drawings of their products he believes that they are in safe hands with their IT partner.

5.2 Analysis Case 2 Hööks Hästsport AB

5.2.1 Drivers

The respondent mentioned early in the interview that the need for new IT-solutions stems from new requirements in the ERP system and new ways to support business processes. These drives are often discovered and acknowledged by other employees than himself, such as IT personnel within the organization or one of their IT suppliers. Hööks is not a “know-how” enterprise according to the respondent and they are therefore open to discussions and willing to listen to their IT-providers and how they perceive drivers. The trust that Hööks have in their suppliers lead them to adopt solutions that were suggested by them. The fact that the respondent mentions that Hööks are not a “know-how” enterprise themselves are most likely also causing them to adopt the solutions that Pulsen and other third party providers argue for.

Within Hööks own organization there are only two employees who works strictly with IT and their main tasks are to keep up a good relation and communication with the third party providers and to do follow-ups. The respondent explains that this is a way of outsourcing knowledge and high-tech solutions. Instead of hiring several employees to work with IT development and purchase expensive hardware they make IT an operational expense instead of a capital expense.

As mentioned in section 4.2.3, Hööks implemented a new ERP system in 2005 together with Pulsen. However, Pulsen have provided the enterprise with IT-solutions before this as well. This has led to great trust between the two organizations and this was a big drive when it came to adopting the new ERP system. Another strong drive was the ability to affect the way the system was built and adapted to Hööks requirements by being an early adopter of the ERP. The respondent also acknowledges that by adopting this kind of solution they can outsource development to some degree and know that new functions can be added “on-the-go” and as their IT-needs increased. When describing their ERP system the respondent says:

“We buy the development and function, which is custom-made to suit us and driven by our requirements. The access and operations in these systems we don’t manage ourselves”

Höök's were in 2016 migrating to a new mail-solution in the form of Microsoft office 365 as well as launching a new website. Both of these solutions are being outsourced and the respondent says that this is simply more profitable. If you compare the prices and functions of different solutions offered by third party providers to just a couple of years ago there is a big difference, according to the respondent. With their new website they conduct a model of paying a small percentage of their sales to the provider as payment for the service. This way they are reducing some risk of investing too much capital. Microsoft office 365 was implemented through Pulsen which according to the respondent was the only option if they wanted to keep using e-mail services through them. This means that if Höök's would like to shift to a different email-solution they would have to turn to another provider, a migration like that would most certainly cause some problems and big effort according to the respondent.

By adopting an IT-infrastructure that is owned and managed by a third party provider, data security is also outsourced. The respondent does not see this as a problem but rather as a possibility to keep their data safe, he says:

“Sure, we lose some control but we are in some way buying competence in a way that we could never obtain ourselves. Today we can have 24 hour surveillance of our systems and data.”

5.2.2 Barriers

What becomes clear in the empirical study is that Höök's clearly has regarded the benefits as higher than the risks with cloud computing but during the interview it was also clear that some barriers were identified during the process of migration. One barrier which seems to be regarded as a core issue for Höök's is SLA agreements, during the years the respondent has become more knowledgeable in the area and can see some mistakes he has done in the past. Many times he has come across SLAs where they look good on the surface but they actually have many exceptions and disclaimers. When making strategic decisions regarding the organization's ICT structure he pays a lot of attention and effort in negotiations. Some services and providers has been excluded and not chosen because of the poor SLA. Because of a lack in standardization of cloud computing solutions it is common to use many suppliers for cloud services (Rajaraman 2014) therefore it becomes necessary to negotiate with several suppliers for all applications. Even though the heart of Höök's ICT is delivered by the same supplier they still have relationships with many other suppliers who they do not trust as much as they trust Pulsen.

“You know how these standard SLAs which the suppliers show up with are formulated, it looks great on the surface but when you look closely there are many exceptions and disclaimers, and then you are stuck there.”

Some issues and concerns Höök's has had with their cloud services have been with performance, for instance the e-commerce platform. As mentioned in 4.2.3 they use an EPiServer e-commerce platform, which has not been working as planned, too much downtime and slow response time has been problems. This relates to the issue of availability and communication, which he mentions as a key aspect when choosing ICT strategy. Since they are dependent on their ERP system it would be a huge problem if it were to be down since it affects all parts of their organization. If the connection to Harmony would fail most of business operations would cease to function, which is a risk when putting all eggs in one basket. As stated in previous research downtime can result in huge losses, especially with organizations with high degree of e-commerce (Srinivasan 2014). In Höök's case outages and downtime would result in no sales being made online or in physical stores, purchasing

operations would cease to function, economy, warehouse management and much more would not be able to work. However something the respondent mentions is that he believes that outsourcing to a third party providers enhances communications compared to having the infrastructure and applications locally. Availability is one major barrier for adopting cloud services since the demand for uninterrupted communication and high speed connection with the servers are necessary (Rajaraman 2014). It clearly agrees with HÖöks viewpoint since they still have some local servers that manage image databases and product information management (PIM) systems, which cannot work properly on a cloud solution because of latency issues.

“Of risks that are more likely to arise the communication is the largest risk, if connection to Harmony would be lost, which it did a couple of weeks ago. It was down for 20 minutes and it had a critical impact on our business. No systems to make sales in stores, the web is down and the logistics cease to function among other”

When asking the respondent about the security issue the response is pretty mellow. He believes that the security is better among third party providers than if they would have had their own infrastructure. He mentions that because of the lack of in-house competencies he would have to employ staff to handle security among other issues. He also mentions physical security as a threat, by that he means that the datacenter where the servers are placed are better equipped to handle for example in case of a fire.

5.3 Overall case analysis

As outlined in section 3.7 a quasi-statistical approach has been used, phrases and words was analyzed to identify inter- correlations to determine important terms and concepts related to the study. The statements in *table 1* represent the segment of data that is highly relevant to answer the research question according to how Oates (2016) describes three segments in data analysis. This was made since drivers and barriers needs to be identified to answer the research question. In *table 1* these are stated from the perceptions and beliefs of the respondents, which were coded from the empirical study.

Table 1. Statements, affects, drivers & barriers

<u>Case</u>	<u>Citation</u>	<u>Affect</u>	<u>Driver / Barrier</u>
Case 1	<i>“I was looking at the possibilities to centralize our IT and make all offices around the world work in the same way”</i>	Centralized IT Processes	Driver
Case 1	<i>“We had 3 offices with local infrastructure in England, USA and Sweden. To maintain this kind of infrastructure I would have to travel around to maintain it and I would need local IT support at all sites”</i>	Cost efficiency	Driver
Case 1	<i>“Of course the aspect of what would happen if connection to internet fails. All offices would stop working. And there is also the latency aspect, USA is quite far from the datacenter in Sweden.”</i>	Communication / Availability	Barrier

Case 1	<i>“It was almost inescapable to migrate to Microsoft Office 365 since we were driven there by price and functionality”</i>	Cost efficiency	Driver
Case 1	<i>“I have outsourced all my IT to Evry, so basically I am the only employee out of 80 who works with IT at Silvent, I am just a client”</i>	Cost efficiency	Driver
Case 1	<i>“We want to own are subsidiaries and have as much power and control as possible at our headquarters. I mean, our satellite-offices should not have to think about IT-related issues, it is just supposed to work”</i>	Centralized IT processes	Driver
Case 1	<i>“Thanks to our cloud solution we can help and support sale- and business-processes at our satellite-offices from our headquarters which makes us more effective and flexible”</i>	Efficiency	Driver
Case 1	<i>“I consider communications and latency to be the greatest obstacle. For example our newest office in Shanghai where the internet connection is not always the best together with firewalls protecting China's traffic”</i>	Communication/ Availability	Barrier
Case 1	<i>“I could migrate fully to the cloud and for example adopt Jeeves own cloud solution which is run through Amazon servers but there is the issue with latency once again”</i>	Communication/ Availability	Barrier
Case 1	<i>“The industry seems to be heading towards fully migrating to the cloud and it is worth considering. However the latency issue is my main concern when it comes to working smoothly at our satellite-offices”</i>	Communication/ Availability	Barrier
Case 1	<i>“My mentality has been that you should own your hardware and infrastructure but I am trying to follow the development and not be perverse”</i>	Control	Barrier
Case 1	<i>“Our goal is to keep growing and open more satellite-offices, with our solution I can basically push a button when setting up the systems for these offices. This kind of scalability is extremely important to us”</i>	Scalability	Driver
Case 1	<i>“We recently implemented new powerful hardware into our private cloud server to enable our engineers to work in CAD”</i>	Scalability	Driver
Case 1	<i>“We now have around 80 virtual pc's which</i>	Flexibility	Driver

	<i>anyone can connect to. You can access it from any type of device using a tablet, a phone or a laptop”</i>		
Case 2	<i>“We buy development that is developed for our own needs, the maintenance is run by our supplier”</i>	Competence	Driver
Case 2	<i>“To evolve our business we needed to change our supporting systems, so the timing was perfect and because of our perennial relationship with Pulsen we trusted each other and they offered us to take the next step together”</i>	Trust	Driver
Case 2	<i>“You know how these standard SLAs look, really nice on the surface but then there are a lot of disclaimers and exceptions in the fine print “</i>	Trust	Barrier
Case 2	<i>“Availability is one of our main concerns, if the connection to Harmony would fail, like it did a couple of weeks ago, it is critical since many of our processes shuts down”</i>	Communication/ Availability	Barrier
Case 2	<i>“Sure, you give up some control but at the same time you buy higher competencies that we could ever afford to have in-house. We how 24 hour surveillance of hour systems today, something we would not be able to have if we would have maintained our own servers”</i>	Competence	Driver
Case 2	<i>“I don’t believe I can figure new functionality on my own. By sharing supplier and system with other enterprises we can take advantage of other enterprises knowledge and newly developed functions”</i>	Shared benefits	Driver
Case 2	<i>“I believe this is a good way to work, we can avoid bottleneck effects when we are growing. We can add new functions and computing power easily through our cloud solution. This leads to more variable costs instead of fixed costs”</i>	Scalability / Flexibility / Cost-efficiency	Driver
Case 2	<i>“Pulsen is one of the suppliers who has wanted us to migrate to Office 365 cloud solution even though we already use Pulsen’s mail service”</i>	Trust	Driver
Case 2	<i>“We have some servers locally which handle image databases and product information management systems. Because of delays it is not practical to have it anywhere else than locally”</i>	Communication	Barrier
Case 2	<i>“In 2005 we were actually the first company in</i>	Trust	Driver

	<i>this ERP system. We had the same supplier with our old system and that was why we dared to implement it”</i>		
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The enterprises in case 1 and case 2 depend highly on their ICT to conduct daily operations. However they do have some different needs and different perception of how cloud computing has impacted them. What is common between the two enterprises is that they work with local suppliers and have done so for a long time. If not for the long and trusting relationships with their suppliers none of them would have adopted some type of cloud solution as early as they did, when the buzzword “Cloud” was not even commercialized.

Cost efficiency is seen in previous research as one major driver to adopt cloud computing, ICT structure switches from a fixed cost investment to a variable cost, limited investments in hardware, infrastructure and paying for unnecessary power (Avram 2014; Kim & Kim 2015). However what can be reduced from the empirical data is that cost efficiency is not only seen in this way in the eyes of Silvent and Hööks. In the case of Silvent, cost benefits from efficiency is highly emphasized, less travel time and saving money through having less employees working with IT. Hööks sees it in the same way, as reducing costs by not having to employ personnel to handle IT locally but rather outsourcing it. Except from the pure cost benefit cloud computing enables, both Silvent and Hööks sees Cloud Computing or IT overall as a way of creating economic efficiency rather than cost efficiency. The strategic choices they make regarding major ICT change is based on what is most efficient, not necessarily what is cheapest or largest but rather what supports their processes in the most efficient way.

5.4 Discussion

By analyzing the empirical data, drivers and barriers that affect medium-sized organizations are identified. Some of them confirmed what previous research stated, some new ones were identified and others can be found in previous research but with different perspectives. These are discussed in the section below. The drivers and barriers have an impact on decisions regarding ICT-strategy and to what degree enterprises decide to implement cloud computing.

While cost-efficiency, scalability, flexibility and shared benefits were already known drivers from previous research, trust and competence was discovered as new ones. They are in some way intertwined. As Bensch et al. (2014) mentioned enterprises are outsourcing more critical processes and providers with more specialization are being used. This means that more competence is lying in the hands of the providers rather than in-house. The two cases acknowledges that their supplier possess competencies, which enhances trust towards them. IT-departments at medium-sized enterprises are shrinking and with it the competence. More outsourcing leads to less in-house competence and since trust and competence seem to feed each other’s growth, this way the trend will be hard to reverse. It will naturally lead to a wider adoption of cloud based solutions which is an example of multi outsourcing collaborations (Bensch et al. 2014).

What can become an issue is when an enterprise realizes that their IT-needs are changing and they are already dependent on the competencies of suppliers. What if they cannot provide a service that an enterprise need? As mentioned in the article written by Schneider & Sunyaev (2016), IT-departments at enterprises are responsible of making decisions regarding the adoption of cloud services, the question is if they will have the technological knowledge and competence to make these kind of decisions without having to put a great deal of their trust in

letting their providers make these decisions for them. As Ulf at Silvent mentioned, he is afraid of letting go of the control over the enterprises data but that he is now having to put this control in the hands of his providers when adopting Microsoft office 365. A decision that was taken partially by their third party provider Evry. Schneider & Sunyaev (2016) also mention how cloud computing software and infrastructure is standardized to provide an anonymous market. Silvent is not affected by this through having a private cloud solution but Hööks on the other hand is operating on a community cloud. Hööks are satisfied with the applications and the flexibility they have today but as Patrik mentioned, their IT-needs are constantly changing and they have to trust that suppliers can meet these needs.

We also identified a new barrier which is control, it is mentioned somewhat in previous research from a security aspect where enterprises are afraid of losing sensitive data (Chowdhury 2014). However in the case of Silvent Ulf stated that he wants to have control of his own infrastructure, this means that he has a hard time trusting something he cannot affect. Control in Silvent's case does not concern the security aspect of losing sensitive data but rather not being able to govern his own infrastructure. The migration to Microsoft Office 365 however, is a step in a new direction where he lets a new CSP manage their email solution and therefore letting go of some control. This aligns with what Mohapatra & Lokhande (2014) discuss on how people that are "control freaks" are fearing a migration to cloud computing services. Ulf fits the description of such a person and since he has the ability to affect Silvent's ICT-strategy it resulted in the adoption of a private cloud solution instead of being part of a community cloud.

Both enterprises have been using a type of cloud solution for a long time, maybe without realizing it themselves. What can be concluded is that they have weighed the benefits higher than the possible risks. The drivers mentioned above are what affected the strategic decision to implement a cloud solution with the common goal to improve and streamline business processes using IT. The ambition of both enterprises has never been to answer to these drivers separately but rather to reach this common goal. The purpose of IT has changed from supporting business processes to being an integrated part of the core business; both enterprises have realized this and continuously develop their ICT-strategy. Seeing as there are no set of standards regarding cloud computing services, enterprises are more likely to choose multiple SaaS solutions rather than one solution (Rajaraman 2014; Mohapatra & Lokande 2014). This can also be seen in the cases; Silvent are running an IaaS cloud solution in form of a hybrid cloud where they use applications delivered from many providers and they are also using SaaS solutions e.g. Office 365. Hööks are using one main provider for their main applications but they also have collaboration with several suppliers regarding SaaS solutions e.g. e-commerce platform and Office 365. This might be the result of increased applications due to IT outsourcing (Bensch et al.) or the lack of standardization (Rajaraman 2014; Mohapatra & Lokande 2014). However with this in mind it might be hard to manage all these SLA's and relationships with suppliers.

Both enterprises realize that cloud computing cannot be ignored. Except from the mentioned drivers and barriers two other aspects that affect ICT-strategy have been found:

- *IT-Managers* - the perception, knowledge and experience of IT managers affects ICT-strategy
- *IT-Suppliers* - long and trusting relationships with IT suppliers have an impact on ICT-strategy

The background of the IT managers at Silvent and Hööks are different, this has affected the choices regarding ICT-strategy and cloud computing. Ulf at Silvent comes from a background in engineering and has more technical knowledge. Because of this he has had an idea and perception of how he wants to form his ICT-strategy. His technical knowledge enabled him to understand that being a part of a shared cloud environment was not beneficial to Silvent. Hence came the drive to change infrastructure in their supplier's server environment and therefore adopting a private cloud solution. Patrik's official title is CFO and he lacks technical knowledge, because of this he has relied on his suppliers in hope of implementing the right type of IT service which in fact was a cloud solution. Since IT's role in enterprises has changed to becoming a part of core business (Stace et. al. 2012), the role of the IT-Manager has also changed. With traditional computing IT-Managers needed deep technical understanding of IT but with the new IT paradigm the IT managers need a better understanding of business strategy and processes. In conclusion the role of IT managers has changed into more of a business architectural role (Patrignani & Kavathatzopoulus 2015; Mohapatra & Lokhande 2014). Since more enterprises relies on the competencies of their suppliers, trust and SLAs become important to ensure that they recommend appropriate solutions that are most beneficial. Can the suppliers be trusted with the task of providing you with what will be most beneficial for your business or will they provide what is most beneficial to them? Because of this the IT-Managers need to have the knowledge of business and IT combined to judge what solutions will be most beneficial for the enterprise and to be able to negotiate SLAs. This becomes an issue with cloud computing since you constantly have to rely on suppliers and third party providers, enterprises have less control and it might be hard to evaluate what the CSPs interests are. Is it to enhance your business, their own business or most preferably both?

Both enterprises have long relationships with several different IT-suppliers that manage, maintain and develop their IT-infrastructure and applications. Silvent mainly works together with Evry while Hööks use Pulsen as their supplier. The enterprises work in different kind of cloud-solutions but they both stress the importance of keeping a close relationship with suppliers that are local. This enables them to communicate face to face and also supplies them with a high speed connection from closely located servers, with the exception of the satellite offices Silvent has. What can be concluded from the empirical data is that choices regarding both enterprises ICT-strategy have in some way been affected by their suppliers. This impact becomes obvious with the migration to Microsoft Office 365, which both enterprises has adopted because their suppliers common opinion. As the IT department decreases in size and technical competence and the role of IT-managers change, more power is automatically given to the suppliers in affecting enterprises ICT-strategy. Therefore a driver or a barrier for implementing new technologies such as cloud computing may be highly influenced by the perception and beliefs of the suppliers. There are several risks associated with the fact that the suppliers gain more power, as mentioned, are they influencing choices for their own profit or for your profit? There are ways of eliminating that risk with agreements (El Gazzar et. al. 2016; Radha et. al. 2015), this is proven by Hööks new agreement with Jetshop. The charging model is so that the more Hööks sell on their e-commerce platform the more they can charge them. It then becomes obvious that the supplier wants what is best for them because of their own interests as well. Hopefully this kind of charging model can be applied to other cloud computing services. If traditional computing gives an enterprise total control and power of their data and decisions while lacking competencies, outsourcing and cloud computing means having other enterprises and people contributing with competence but also having something to say when it comes to taking strategic decisions.

Previous research states that security is identified as a major barrier for adoption of cloud computing (Carroll, Alta & Kotzé 2011; Ali, Khan & Vasilakos; Mehmood et. al. 2015; Tang & Liu 2015). However in the case of Silvent and Hööks this does not seem to be the case, both mention that they have sensitive data to some degree but are not worried about letting go of control. Some of the barriers e.g. security that is mentioned in previous research seem to be more of a psychological issue rather than a real one. Both Hööks and Silvent argue that using cloud services enhances the security and protection of their data. Their argument is that the suppliers and CSPs have more competencies, better locations for physical security and more advanced technology for protecting data. The trust and long relationships with suppliers and strong SLAs are what enable this belief. They are happy with their solutions and have never had problems with data intrusions or loss of data. More complex data centers, surveillance and competence are some reasons they believe the suppliers has better understanding of than themselves. They could hire in house security experts but they both state that it would not be profitable.

Among the drivers that have been confirmed from previous research are shared benefits (Avram 2014; Patrignani & Kavathatzopoulos 2015). Here the two cases differ since Hööks operates on a community cloud while Silvent have their private cloud. Shared benefits is described in section 2.2.4, it gives enterprises the ability to grow independently while taking part of information and designs that allows enterprises to grow together. Hööks can benefit from information flows within this kind of network and development that is implemented into the community cloud. Silvent on the other hand has greater control by operating on their private cloud at the expense of not taking advantage of shared benefits.

6 Conclusion & reflection

Based on the analysis and discussion chapter, this chapter below is used to reflect and provide an answer to the research question. A reflection is also presented in this section in form of an evaluation of the study, contribution to the field of informatics and recommendations to future research.

6.1 Conclusion

The purpose of this study was to provide knowledge of what aspects influenced the decision making process of migrating ICT structure to the cloud. Answering the research question fulfills this purpose

In medium sized enterprises, what major drivers and barriers affect strategic decision making when migrating to cloud computing services?

Below the major drivers and barriers that were identified or confirmed in the research are listed.

Drivers that were confirmed or identified:

- Cost efficiency (Confirmed)
- Scalability (Confirmed)
- Flexibility (Confirmed)
- Shared benefits (Confirmed)
- Trust (Identified)
- Competence (Identified)

Barriers that were confirmed or identified:

- Trust (Confirmed)
- Availability/Communication (Confirmed)
- Control (Identified)

The above-mentioned drivers and barriers are some aspects on what can affect the decision to migrate ICT to the cloud. Many of them are in line with what previous research stated, however some of them are not. These aspects have to be weighed against one another to evaluate which ICT strategy to choose to reach the goal of overall business efficiency and enable business to grow.

What differs from previous research is the security aspect, which was identified as one of the barriers. What can be concluded from this study is that the security barrier does not seem to be a major one when thinking of migrating to the cloud. In this thesis, a conclusion is that a major barrier is the communication/availability issue. Since medium sized enterprises rely on IT applications, low speed or no connection to the internet has a great impact on daily operations and will be costly in case of downtime or latency issues. Therefore being closely located to the physical servers might be of great importance and future adoption of cloud services might depend on how far away the suppliers/providers servers are located and how the availability/latency is affected. For cloud services to continue to grow this issue is something that the enterprises needs to take into careful consideration.

Based on this study, depending on what type of deployment method an enterprise decides to implement, e.g. a community cloud versus a private cloud, there might be different scales of benefits given by the drivers. Enterprises that have less control of their cloud service gains more competence from the suppliers while enterprises with more control might lose

competence since they will rely more on their own competence regarding the infrastructure solution.

In this study two other aspects were identified that can impact on the decision-making process regarding ICT-strategy.

- *IT-Managers* - the perception, knowledge and experience of IT managers affects ICT strategy
- *IT-Suppliers* - long and trusting relationships with IT suppliers have an impact on ICT strategy

As mentioned above, IT-managers' perception, knowledge and experience of cloud computing might affect strategic decision-making. Since IT departments nowadays are low on employees, or maybe even the one single person, IT-managers have a large influence on the ICT strategy of an enterprise. Decisions regarding ICT-strategy might be based on IT-managers perception, beliefs and knowledge of an area rather than analyzing and weighing drivers and barriers against each other. Like mentioned in section 5.4 the reduction of IT-departments and the increased outsourcing of IT-competence are interrelated.

This study shows that enterprises who have long relationships with their suppliers are affected by them in choices regarding ICT-strategy and cloud solutions, this might be true whether it means adopting or avoiding them. As mentioned in previous paragraph, reduction of IT-departments means lesser in house competence, which ultimately leads to having to trust suppliers in aiding an enterprise in the decision-making process. If the development of cloud computing and IT outsourcing continues it is likely that this trust towards providers grow and can be strengthened by strong SLAs.

Based on the analysis and discussion in this thesis, some major drivers and barriers have been identified that should be thought of when standing in front of strategic decisions on whether to migrate to cloud services or not. These aspects together with forces from IT-managers and IT-suppliers affect strategic choices regarding cloud computing among medium sized enterprises.

6.2 Evaluation method

This study was conducted using a qualitative approach and a hermeneutic perspective since it was necessary to analyze texts and empirical data on a level that could not be obtained from a quantitative approach. Hermeneutics and its way of approaching data through iteratively reading and interpreting it was especially helpful when analyzing the interviews and comparing with previous research. Personal beliefs and values are impossible to completely exclude but to be objective has been important in the study. The data collection was successful thanks to the semi-structured interviews. By constructing open interview questions the respondents were able to speak freely and touch upon relevant matters, since the interviews were more of a dialog. That the respondents played a large part of decision-making within the two cases was important since it gave aspects that would help answer the research question, which is proof that the sampling was efficient. Choosing to conduct a multiple case study helped to obtain rich and descriptive information that was needed, but to further strengthen and validate the findings more research is needed.

By adopting an inductive approach theories could be formed by interpreting the semi-structured interviews, a deductive approach was by studying previous research, which was the basis for the research question. This mixed approach proved to be useful where the initial use

of a deductive approach helped in maintaining focus the research and find major drivers and barriers whereas the following inductive approach was successful in identifying new ones .

This study focused on strategic decision-making regarding ICT. To conduct a quantitative study would mean collecting a large number of answers that are general and can be answered without having the kind of dialogue that is possible in an interview. A qualitative approach is therefore still considered to be most appropriate. The form of a multiple case study was fruitful since it gave the research a view on cloud computing from different perspectives and individuals with different backgrounds. However, a single case study in which several interviews within a single enterprise could have contributed with even more rich information and opinions from different departments and positions within an organization. Both enterprises had a similar view on cloud computing and adopted it when the technology was new, the study could have been improved by getting the perspective of an enterprise that has not adopted cloud computing and therefore have different opinions.

After collecting empirical data through interviews and transcribing them the same day it was made sure that meaning and interpretation was understood in its context and managed in the right way. These transcriptions were sent to the respondents to make sure that they agreed with what was being said and given a chance to point out any misconceptions. By iteratively reading through and analyzing the transcription it was made sure that the analysis was based on correct interpretation.

Using a hermeneutic perspective helped when interpreting the empiricism correctly through thoroughly analyzing it iteratively. This perspective and its way of approaching the real world has permeated the whole research and inspired the transcription of the interviews that in extension allowed a deep analysis. By analyzing previous research and connecting it to the empirical data conclusions could be made of what corresponded or what did not. From these conclusions some drivers and barriers were confirmed as well as new ones found, which made this study meaningful and helpful to the target audience.

6.3 Evaluation of result

During the entire study the concept validity according to Patel & Davidsson (2011) has been regarded, to answer to their concept of if being present during the entire research. The quality and evaluation of the result will be presented in the section below. The criteria are based on section 3.8. The focus of the chapter will be validity and reliability of the research but it is not divided in chapters since the two concepts are intertwined according to Patel & Davidsson (2011).

Patel and Davidsson (2011) mention “communicative validity”, meaning the readers possibility to form an opinion about the validity of the study. By recording the interviews and directly afterwards transcribing them the validity of the data collection was answered for. When transcribing the interviews it was important to distinguish the spoken language from the written language so that pauses and sentences were presented in the way it was said during the interview. According to Patel & Davidsson (2011) this is an important part of the transcribing process. When the transcription was done they were sent to the respondent’s receive feedback if anything was misinterpreted. In the report a thick description was provided to give the reader a clear view of the cases, this enables gives the reader a chance to understand the settings and environment of the enterprises. Transferability in qualitative studies is hard to uphold (Bryman 2012), however this “thick description” increases the possibility of the research to be replicated.

To enhance the reliability and validity of the study a brief description of it was made before the interview started. The questions during the interview were designed in a way to not be leading and affect the result. Since the research purpose was to gain deeper knowledge about the subject the respondents and organizations chosen had to answer to the sampling criteria. Especially that they had IT decision rights and enough knowledge to answer the questions.

To further increase the quality of the research a pilot interview could have been performed, where the questions were tested to leave no room for misinterpretations. Both cases chosen for this study had been using cloud computing, therefore the sampling of the cases could have been different to receive more aspects. If an enterprise who have not implemented cloud computing but have thought of it had been interviewed the reliability of the barriers would have been increased and more barriers could have been identified. If the interviews were videotaped the quality of the research would be further increased since facial expressions and mimics would be possible to acknowledge.

6.4 Contribution to the field of informatics

In the introduction to this thesis a gap in previous research was identified, where drivers and barriers were both introduced and how they affected the strategic decision making regarding cloud computing. This study complements previous research by confirming previous identified drivers and barriers and also the identification of new ones. Another complement to the field is providing aspects on the suppliers and IT-managers role in strategic decision making is and what the effects are. To further strengthen the conclusions and to fill the gap, a recommendation is that more studies should be made. This contribution is relevant since cloud computing is still in a developing phase where conditions are constantly changing, which can bring new thoughts to other researchers.

6.5 Recommendation to future research

The area of cloud computing is not yet fully developed and is ever changing, which is why it is still in need of further research. Drivers and barriers for adoption of cloud computing has been studied in an overall perspective with regards to their impact on strategic decision making. This study was conducted on two enterprises that had long relationships with their suppliers and this had an impact on their ICT-strategy. A recommendation would be to conduct a comparative case study between enterprises that have long relationships with suppliers such as ours and enterprises that have relatively new relationships and compare the perceptions of drivers and barriers or benefits and risks in the area of cloud computing.

One conclusion of this thesis is that the perception of security in the cloud computing area seems to have changed. A recommendation to further research is to study the security issue in cloud computing, to further look if it still is a major barrier like previous research states.

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Appendix

Interview questions

Opening questions

- Do you allow that we record this interview?
- What is your role at the enterprise?
- For how long have you worked at the enterprise?
- What is your previous work experience?
- Can you give us a short introduction of the enterprise?

Specific questions

1. What is your current IT-Infrastructure?
 - a. Do you have any cloud based services today? (If yes, how has it affected your business? What affected the decision to adopt the service?) (If no, what affected that decision?) (Why did you choose this specific service/services?)
 - b. Do you have any services “locally” (traditional IT-infrastructure)? (Why, the reasons to not migrate this service/services to the cloud?)
2. Previous research mentions some major drivers and barriers towards adopting cloud computing services, have you thought about what these are? (How do they affect strategic decision making regarding IT?)
 - a. What drivers/benefits do you see in adopting cloud computing today?
 - b. What do you consider to be the barriers/risks with adopting cloud computing today?
 - c. Do you consider the benefits exceeding the barriers or vice versa?
3. What thoughts come to mind when considering future ICT strategy?
 - a. Do you work actively with developing your ICT-strategy? (If no, why not?)
4. Do you think that the IT-needs of your enterprise will change in the near future?
5. Do you have any sensitive data within the enterprise that you fear leaking out/being compromised?
 - a. Would you feel safe with letting a cloud service provider store and manage this data?
6. Do you trust your IT-suppliers and the service level agreements you have with them?

University of Borås is a modern university in the city center. We give education programs and courses in business administration and informatics, library and information science, fashion and textiles, behavioral sciences and teacher education, engineering and health sciences.

At the **Department of Information Technology**, we have focused on the students' future needs. Therefore, we have created programs in which employability is a key word. Subject integration, wholeness and contextualization are other important concepts. The department has a closeness, both between students and teachers as well as between industry and education.

Our **courses and programs** with a major in informatics are centered around basic concepts as system development and business development. In our wide range of specializations there is everything from programming advanced systems, analyze the needs and requirements of businesses, to conduct integrated IT and business development, with the common purpose of promoting good use of IT in enterprises and organizations.

The department is carrying out IT-related **research** within the university's research area called Business and IT. In terms of field, the research activities are mainly within **computer and systems science**. Particular areas of focus are **data science** and **information systems science**. Both scientifically and professionally-oriented research are performed, which among other things is manifested through that research is often conducted based on domain specific needs of business and government organizations at local, national and international arena. The professionally-oriented research is also often manifested through our participation in the Swedish Institute for Innovative Retailing (SIIR), which is a research center at the University with the aim of contributing to commerce and society with the development of innovative and sustainable trade.



UNIVERSITY
OF BORÅS

VISITING ADDRESS: JÄRNVÄGSGATAN 5 · POSTAL ADDRESS: ALLÉGATAN 1, SE-501 90 BORÅS
PHONE: + 46 33 435 40 00 · E-MAIL: INST.HIT@HB.SE · WEB: WWW.HB.SE/HIT