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SCHOOL OF BUSINESS, ECONOMICS AND LAW**

Master Degree Project in Innovation and Industrial Management



Master Degree Project in Management

The Organizational Facilitators and Barriers to the adoption of Cloud

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ABSTRACT

Given the technological innovations and technological changes inside and outside of companies, the research carried out in this Master thesis focuses on one of the most important of these technological innovations, the cloud. The cloud and the services offered by it may potentially revolutionize IT resources and IT infrastructure within companies that in part can be outsourced or converted, obtaining an economic advantage over their own management costs. Research has focused on the barriers that prevent the adoption of cloud services within enterprises and how to facilitate their adoption. In order to do this and understand the problems and ways to facilitate adoption, a literature review and interviews with companies in the cloud sector, as well as those wishing to adopt this technology, were conducted. This includes private and public sector companies in order to analyze the differences between them. The research focuses on the Gothenburg area. The results of the research, which focus on these organizational and external barriers and facilitators, have been useful in providing companies, both providers and consumers, with ways to recognise what the issues may be and what they need to do to help and simplify the adoption of this technology.

Acknowledgements

This part of my work should be dedicated to people who have contributed to its achievement with their tireless support. First of all, a huge thanks for the patience and essential guidance of Professors Mark Bagley and Luca Giustiniano for their expertise transmitted in the preparation of the documents. I am endlessly grateful to my parents, who have always been able to support and endorse my decision everywhere, as soon as I have chosen my course. Finally, I dedicate this work to myself, to my sacrifices and to my discipline that has allowed me to get this far.

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1.INTRODUCTION

1.1 Project outline

This master thesis comes from a collaboration with First to Know consulting firm. First to Know is a Gothenburg-based company that maximizes the capacity of businesses and start-ups operating in Sweden. It focuses on sustainable development and innovation and is currently developing many projects in the Gothenburg area including Thespace360. Thespace360 is a project in which several students carry out their entrepreneurial projects or their dissertation on real problems of society and business with the possibility to interview various companies. The field to be investigated is too large, that is why the researcher focused on the technology that is one of the most important nowadays: the cloud. The research is concentrated only on Swedish firms in order to narrow down the area of analysis and to obtain a realistic and practical outcome that would satisfy business demands and academic requirements. The researcher would be able to question IT president, project chief and Chief Digital Officer with exposure to First to Know wide company network.

1.2 Background

Competition in the market is increasing for companies and this is putting many of them to the test. In order to respond to this increasing competition, it is important to be increasingly innovative and companies must respond more and more quickly to changes in the surrounding market environment. Therefore, the change in technology and competition in the markets has led companies to adopt important innovations to be ready and able to face change. The COVID-19 outbreak, additionally, is giving also a new challenge that companies should be ready to engage using smart working and other innovative ways to deal with work. The need for new working technologies has increased the need for many companies to deal with new unknown technologies and paved the way for the main topic of this research: the cloud. Cloud services in this period of great change, thanks to its ability to meet huge needs to increase IT infrastructure and technology resources can be one of the most important responses that companies can give and adopt. In fact, it is recognized that the advantages (Apostu et al., 2020) such as scalability and speed of implementation and the ability to use cloud-related services at any time can be of great help to companies even at times when it is impossible to use the physical workspace. The increase in the use of this technology is always higher and in the coming years we will see an even greater use (BCG – Boston Consulting Group, 2020) given precisely by the profound changes that the world has faced in this period. There is much to be done, however, so that these technologies can be adopted by companies more simply. In fact, it is often complicated to overcome organizational barriers to the adoption of new technology. (Fahim and Gazzar, 2014) From this point of view, in fact, it is easy to understand that some companies that have made large investments in IT infrastructure, where the staff is not trained for these technologies and where the innovation ecosystem is not very developed can compromise the ability to face the challenges of tomorrow. (Horváth and Szabó, 2019) This research aims to find those barriers and ways to

overcome them. This could be useful both for companies that sell cloud services, the providers, to know how to help their potential customers and companies themselves that want to adopt cloud services to improve their processes and change the classical way IT infrastructure are managed to be ready to every new future scenario. The cloud, in fact, allows for the adaptation of technological resources and determines the ability of the enterprise to cope with even unexpected changes in IT needs.

1.3 Research Objectives

This research will try to answer the reason why in some companies the cloud is widely used and in others are used internal IT resources to manage IT infrastructure. For internal IT resources means the use of in-house servers with an IT department that play a role in managing the company's internal infrastructure and therefore a company that do not use cloud services. Therefore, in this research, the main focus will be to highlight what are the barriers and facilitators of cloud adoption. These barriers are due to various reasons ranging from organizational limits like culture and strategy to technical issues such as security, connection, downtime, a difficult integration or conversion of old infrastructure and legal issues (Horváth and Szabó, 2019). If we focus on today environment, given all the challenges, new ways to deploy businesses are being introduced. In this way, as with other innovations, “the cloud” has begun to be introduced within companies. Cloud services are becoming increasingly common today. This is because these types of services are really useful to maintain fast processes without costly and energy eater data centers inside companies. Home Data centers, indeed, have high expenses in maintenance and management (Ajmera and Gautam, 2014). Therefore, the cloud is always a more common theme that is changing the daily lives of people and businesses. The request for these services is spreading fast and also because of the big change to the market caused by COVID-19 are needed new ways to deal with business. More people working from home indeed means more people accessing their files and accounts remotely. Before starting the research, it is important to understand what “the cloud” is formally and substantially with this definition:

“Cloud computing provides on-demand computing resources without users actively controlling these resources.”

As a result of this important innovation, this new way of relying not only on internal IT strength is also starting to become useful for disruptive companies¹ (Christensen, Raynor and McDonald, 2015). Also, for consumers, there are some services used that help them to store and manage data or use online software that helps them in everyday life. Starting from this will be provided with a background that can be followed by companies that want to introduce or modify their approaches to IT infrastructure using the cloud instead. The research will, therefore, aim to bring to light what they are and how to overcome the barriers that prevent the introduction of this new technology, making the work useful for both providers and companies that are interested in

¹ The definition of a disruptive process will be given after in the literature review

innovating their IT processes. This research will mix a comprehensive literature review with research on companies in the Gothenburg area that will provide sufficient data to understand the barriers and facilitators of cloud adoption. In this way will be defined as a model that can be taken as a reference by other companies to make them choose to move or test cloud services. The work will be conducted through a qualitative research strategy by doing interviews with companies in the Gothenburg area and building a literature review that can be compared with the results through a theoretical-test approach. The importance of research is in being able to provide companies selling this service with new insights and ways to implement their service sales by helping their potential consumers to overcome their resistance. It is also useful for all companies that are faced with wanting to adopt these services, but encounter resistance that prevents the immediate adoption of the cloud and must, therefore, find solutions to this resistance or be aware of disadvantages that could arise. In the analysis will therefore be envied these elements of contrast to the adoption of the cloud and the appropriate solutions to overcome them.

1.4 Research Question

For the research, it is important to have a relevant research question. In this research, the researcher has focused on one aspect and one technology without making the research question too broad. The problem to be addressed is then specific to adequately respond to the research question. With an explicitly established goal of understanding the organizational barriers and facilitators of Cloud use in a company the Research question can be resumed in this research question:

1) “What are the organizational barriers and facilitators to cloud adoption within a company?”

The research question is the most important thing that research aims to answer, understanding what are the limits that there are to the introduction of the cloud and how to overcome them. The research question is based also on the assumption that for every objective to be achieved there must also be a positive outcome for the company that intends to make this effort² (Reed and Lewin, 1951).

1.5 Research Delimitation

The delimitation of the research is about three main aspects. The first is related to the fact that in this research the business to business aspects will be analysed in-depth, while the business among consumers will not be part of the research because it is really different from the services provided to companies. This is because a research also on consumers would have involved a shift towards quantitative research on consumer habits which is not covered in this research. The second aspect, however, relates to the interviews carried out. While it is true that the interviews were carried out with international companies, it is nevertheless true that they are localized and therefore could lead to answers that are sometimes determined by the socio-cultural context in

² In the literature review will be explained the concept of “desired state”.

which they are made. This can be understood as a limitation as the results of the interviews could actually be influenced by the geographical location and socio-cultural context of the localised enterprise. The third aspect is instead related to the limits of the cloud, which is a technology that is spreading in recent years and this leads research to be more challenging. This is also because the literature review and articles are often related to similar technologies instead of cloud itself or are few and hard to find. This because the topic is new and for this challenging, but also interesting.

1.6 Structure of the research

The research structure is structured in six different parts. In the first part, there is the introduction which has already been presented and which includes the research question and the delimitation of the research work. In the second part, there is the literature review that characterizes the theoretical basis of the research. It consists of three parts, the first of which focuses on identifying what the cloud is understanding its development history and its disruptive potential, the second to show the series of corporate change needed to adopt or to make easier the adoption of cloud for a company, the third to go into detail about the barriers and facilitators to the adoption of the cloud. In the third chapter of the thesis, there is the methodology and characteristics that the research will follow from a methodological point of view. In the fourth part, there are the empirical findings obtained from the various interviews with enterprises in the Gothenburg region. In the fifth part, there is the data analysis and then the various aspects and points of view compared to the various interviews carried out. At the end of the research are the conclusions highlighting the main aspects of the research and future research proposal. The research will, therefore, be presented in this way:

1. Introduction
2. Literature review
3. Methodology
4. Empirical findings
5. Data analysis
6. Conclusions and recommendations

2. LITERATURE REVIEW

The literature review is based and structured in three different parts:

- 1- The first is an introduction to the cloud, what is its history is and why it is so economically important nowadays, explaining its disruptive potential.
- 2- In the second part of the literature review, we will analyse the two mains theories of the research. The first is about the organizational change, the forces of change and its barriers. The second is about innovation management and the limits of cloud implementation based on the difficulty to integrate it in the environment.
- 3- The third part is based on what are the key elements of innovation related to the cloud, understanding what are the obstacles that prevent the adoption of the cloud services within companies. This is done by focusing on general theory on the introduction of new technologies and also on some specific barriers and facilitators to the cloud including a table of them. After this general introduction of Cloud and its history, we can go in deep relating on the research about barriers and facilitators of a new technology adoption in a company referring to the Lewin theory and the S-curves theories presented in the second part of the literature review.

2.1. FIRST PART OF LITERATURE REVIEW – WHAT IS “THE CLOUD”

2.1.1 - Cloud history

In markets always in change is really important to take action and spend in innovation a considerable amount of resources. Therefore, given all the challenges new ways to implement businesses are introduced in companies. In this way, like for other innovations, “the cloud” started to be introduced inside companies. Nowadays, indeed, Cloud services become always more common because these types of services are really useful to maintain fast processes and without strong and powerful private data centres with all problems that derive from these. Following this important innovation, this new way to not relying only on internal strength spreads in a lot of companies starting to become also useful for disruptive companies. After this also through consumers, there are some services used that helps them to storage and manage data or using software online that helps them for everyday life.

The phrase cloud computing appeared as early as 1966, with the first known mention in a Compaq internal document. The cloud symbol was used to represent networks of computing equipment and after in 1993 “cloud” was used to refer to platforms for distributed computing as early as 1993 by Apple. If we analyse the use of a data centres, we can see that at the finish of the '90s, normally a data centres were using less than 10% of their potential because of the occasional need of more power. Amazon made a great effort to solve this problem adding capabilities by the demand to the users. In this way, Amazon adapts its capabilities to user demand using a modular approach. From 1999, before with Salesforce and after with Amazon (2002) Web

Services (AWS) cloud start its rise followed by Google (Compute Engine) and Microsoft services (Azure). (Ajmera and Gautam, 2014)

Therefore “the cloud” is always a more common theme that is changing and will change more and more the everyday life of people, companies and competition. (Ajmera and Gautam, 2014) Also, if cloud services seem to have only positive aspects because they reduce the needs of having high-level hardware, it hides some pitfalls that will be analysed during this research. This research will then follow the research design and strategy that will end with a model that can be used by other players.

2.1.2- What is the cloud

Cloud computing is defined as “**The on-demand availability of computer system resources, especially database, storage and computing power without direct active management by the user. It is done through a cloud services platform via the internet**” (Ajmera and Gautam, 2014)

All you need is physically close to you so that the cloud makes it quick and easy to access your data. The computer sector works for decades on your hard drive, but this new technology is now changing the game. Also, the cloud does not have dedicated hardware or NAS server in residence. (Varghese, B. & Buyya, R., 2017). The data storage over a home or office grid does not matter as cloud-based. You must then have access to the internet. Cloud systems can be of different types (Balasubramanian and Aramudhan, 2012) depending on the needs and objectives of the company, that is:

- **Private cloud** with the possibility of use restricted to a single company. This is characterized by hardware and software strictly dedicated to your company and therefore adapted to the needs of an organization. The types of companies that make the most use of this type of cloud are government and financial companies.
- **Public cloud**, Public cloud, which instead is available to many organizations. Services are distributed via the web, such as AWS and Azure (Amazon & Microsoft services), and hardware, applications and platforms are shared with various organizations. They are widely used for office applications, storage and development and testing environments.
- **Hybrid cloud**, Hybrid cloud, which is a meeting point between the two types of cloud (private and public). Hybrid cloud combines on-premises infrastructure (or even private cloud) with public clouds in order to take advantage of both.
- **Community Clouds**: The cloud infrastructure is shared among a number of organizations with similar interests and requirements. This may help limit the capital expenditure costs for its establishment as the costs are shared among the organizations. (Mazrekaj, Shabani and Sejdiu, 2016)

2.1.3 – Payment structure

After explaining what can be defined as cloud computing, it is also important to stress why a company should move between internal IT resources and this new way of managing IT infrastructures. One of the main aspects is, of course, the possibility to drastically reduce the costs of companies thanks to a different way of payment that reduces initial expenses and investments: “**from Capital expenditure to Operational expenditure**”. (Mazrekaj, Shabani and Sejdiu, 2016) These modes can be summarized in 4 types, the most important ones:

1. **Pay-as-you-go:** is a payment method that charged based on usage. Cloud provider determines a constant Resource/Service price.
2. **Subscription:** price assigned based on subscription. This model is static. Cloud provider defines Resource/Service prices depending on lease period.
3. **Pay-for-resources (Provider Cost based):** this model is cost-based. Offers maximum utilization for resources. Cloud provider determines Resource/Service prices according to the cost.
4. **Pricing algorithm for cloud computing Resources:** Resource/Service prices are set according to the current market state. It is hard to implement but should be the best method in future to reduce costs for consumers and also providers.

2.1.3 – Cloud services

After these explanations, is important to describe what types of cloud services are offered by cloud providers. The types of services offered could be categorized into 3 categories (Attaran and Woods, 2018). The first one is the IaaS based on selling “Infrastructure as a service” and is based on simple renting of IT infrastructure from a cloud provider often on a pay-as-you-go basis. This is the most flexible cloud service because it makes possible whatever the consumer wants with servers (always in the limits of the infrastructures rented). With this service anyway, the problem is that the services offered are less than the other two types. The second type of service is PaaS, that is “Platform as a service” and refers to the supply of an on-demand environment for developing, testing, delivery and managing software applications. It is designed to quickly create web or mobile apps, without worrying about setting up or managing the underlying infrastructure of services, structure etc. It is really useful for software developer and videogame producer company for example. In the end, there are services like SaaS, that is “Software as a service” is a method for delivering software applications over the internet as per demand and on a subscription basis. SaaS helps you host and manage the software application and underlying infrastructure and handle any maintenance. This last service is common both for businesses that for individual consumers.

2.1.4 – A Disruptive Potential

Today the cloud is becoming increasingly important from an economic point of view for both customers and businesses. At the moment, there is a market of about \$260 billion and it is growing at a high rate that will reach about \$700 billion in 2025. (BCG – Boston Consulting Group, 2020). This means that growth will be high because companies will migrate rapidly to these new services and products will also be highly interconnected as is happening with the video game industry. Google Stadia and Project X Cloud, for example, are changing the services related to the video game market to allow their playability without a console, conquering market share of incumbent companies. Other important things to underlying are that SME, thanks to this new technology and relying on computing power, can compete easily with incumbent's IT infrastructure creating the "disruption process". The disruption process is based on disrupters that focus on getting or improving the business model, rather than merely the product. When they succeed, they move from the low end of the market to the mainstream eroding first the market share of the incumbents and then their profitability. (Christensen, Raynor and McDonald, 2015)

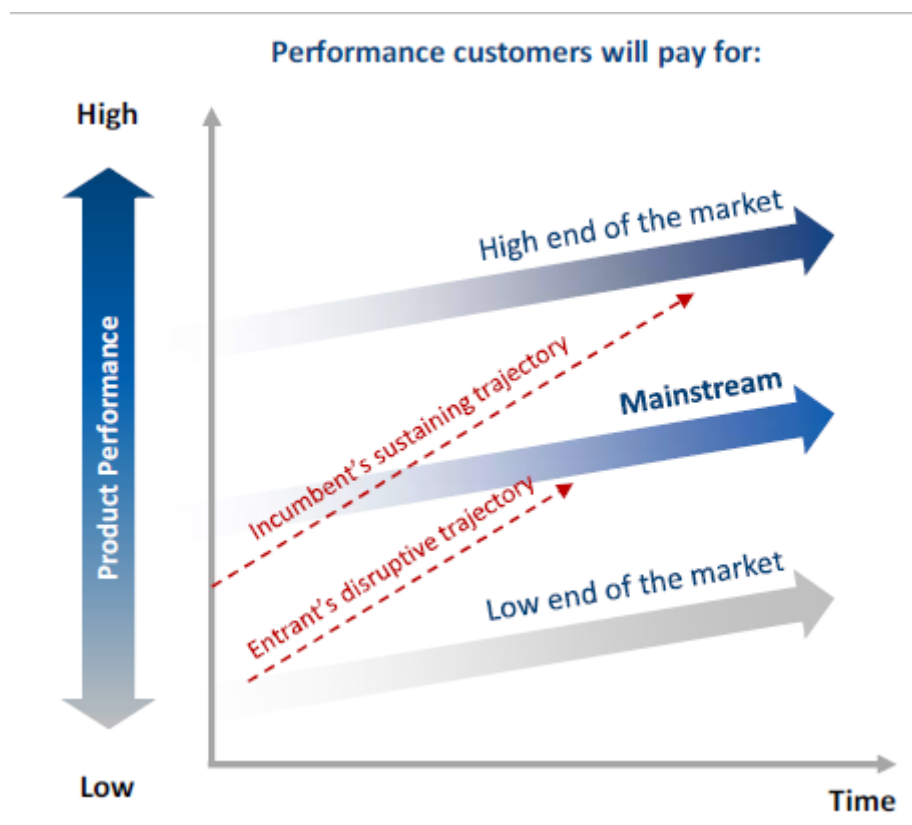


Figure 1 – The disruptive process (Christensen, Raynor and McDonald, 2015)

One example of this can be Netflix who adapted cloud for its streaming video over the internet, after a lot of problem with their internal databased in their first launch. This helped Netflix to become the leader in its industry with low-price, high quality, and high efficiency and speed without interruption; a factor that lead Blockbuster, the incumbent, to bankrupt. Analysing the economic aspects and focusing on the impact that cloud has brought to the economy we can see that the main industries affected are the media and gaming industry that could be completely modified by the use of cloud in a new and powerful way where also the common consoles used until today will be replaced. These are followed by financial institutions, which use the public cloud for fraud detection, risk analytics, smart pricing and personalization, ranked a better security and compliance environment as a key benefit. Also Manufacturing industry, where use cases centre around smart manufacturing, key benefits included the public cloud's ability to help companies to scale-up and also to move further in the development of Industry 4.0. framework. In the end IT companies and also for some aspects the retail companies that can use easier staff like augmented reality and optimizing their customer contact centres.

2.2. SECOND PART OF LITERATURE REVIEW – THE ORGANIZATIONAL CHANGE

In this part of the literature review, we will analyse the two mains theories of the research. The first is about the organizational change, the forces of change and its barriers. The second is about innovation management and the limits of cloud implementation based on its comparison with normal IT infrastructures.

2.2.1 – Lewin's Force-Field Theory of change

The main focus of this research as seen in the introduction is to understand the barriers and the facilitators of the introduction of cloud services in a company. To explain what can implement an organizational change that can help the introduction of new technology is possible to Kurt Lewin (Reed and Lewin, 1951) that developed the concept of force-field analysis. The change in an organization, for Lewin, is a dynamic balance of forces where some forces push for change while there are others that resist to it, in the opposite direction. This change should be then driven by these forces (facilitators) that push from one side that have to be stronger than the barriers to change. Lewin defined these forces as an element that come from outside or inside the company itself and that can also depend on the behaviour of the leaders. (Lunenburg, F.,2010). This change then, linked to the cloud adoption, depends also by the innovative mindset of the leader that must determine the opportunity for progress and opposition and seek to shift the balance of the power. The goal of achieving change and a new status quo could be achieved in three ways for this model: increasing forces for change, lowering barriers or use new driving forces. Although often increasing the driving forces could be the best option sometimes it

can be counterproductive because of opposite forces can answer to this increase with the same power. Another solution indeed can be to lower the barriers to change in a way to make the change in a faster and simple way. After the change is enabled and the goal is on the way of its achievement another status quo starts to be reached. The competing forces go back in position creating a new status quo that in this research should correspond to the cloud introduction. The way the change is achieved can be then viewed as three phases moments of change. The unfreezing moment that usually means reducing the forces acting to keep the organization in its current condition. Unfreezing might be accomplished by introducing new information that points out inadequacies in the current state or by decreasing the strength of current values, attitudes, and behaviours. Crises often stimulate unfreezing and are what is happening nowadays with Covid-19 outbreak that is forcing people to work from home with a higher request for IT infrastructure and computing power. Unfreezing may occur without crises as well as for a choice of the Top management to change of innovative culture of the organization.

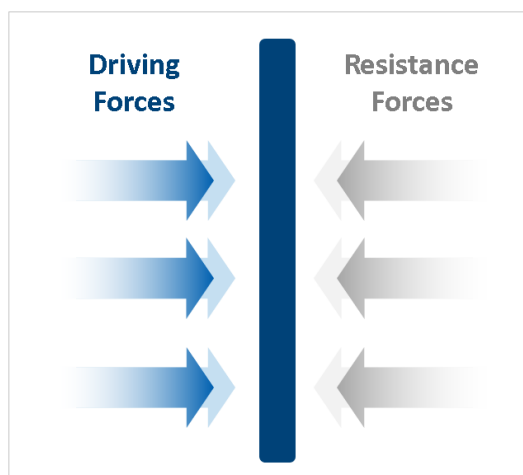


Figure 2 – Phase 1, The Equilibrium. *Source:* Produced by the author

The moving phase that involves the development of new values, attitudes and building an innovative culture. In this part, the facilitators should help to overcome the barriers. In this phase, indeed, as presented before there are three options: increase the driving forces, get lower the resistance forces or add new driving forces.

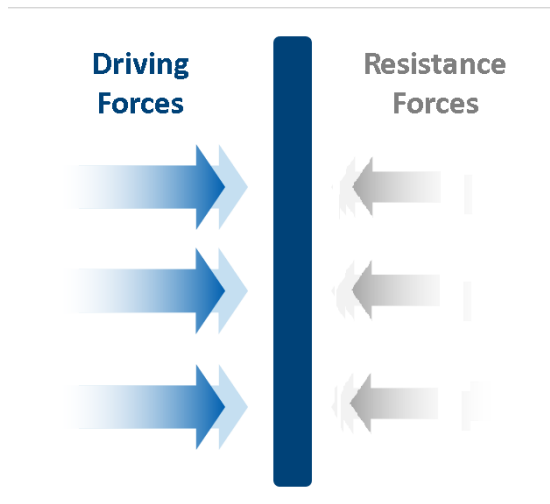


Figure 3 – Phase 2, The moving phase. *Source:* Produced by the author

The final step is a new equilibrium where in the change process involves stabilizing the change at a new semi-stationary equilibrium, which is called refreezing. Changes in culture, changes in process technology, changes in strategy, or modifications in structure often are part of this.

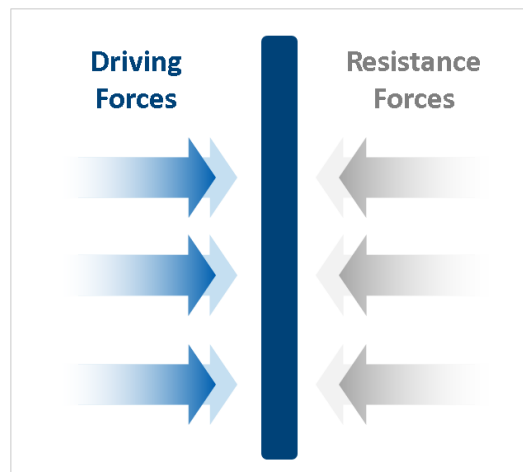


Figure 4 – Phase 3, a new equilibrium – the status quo is changed. *Source:* Produced by the author

As is easy to see from this image there should be a change in the status quo to help the adoption of new technology. In our case, for example, Covid-19 outbreak could be the crisis moment that can push to this change because of the unfreezing moment that derives from it. All the restraining forces like lack of skills of employees, a culture based on efficiency rather than effectiveness and a strong hierarchical structure should be mitigated and reduced to permit the introduction of cloud. The strength of driving forces should be, instead, increased trying to training employees, changing the structure or building an innovative culture. After the crisis

moment, there is a change moment where the organizational change happens and the introduction of the cloud is getting completed. After this, we have then a refreezing moment where there is a new status-quo.

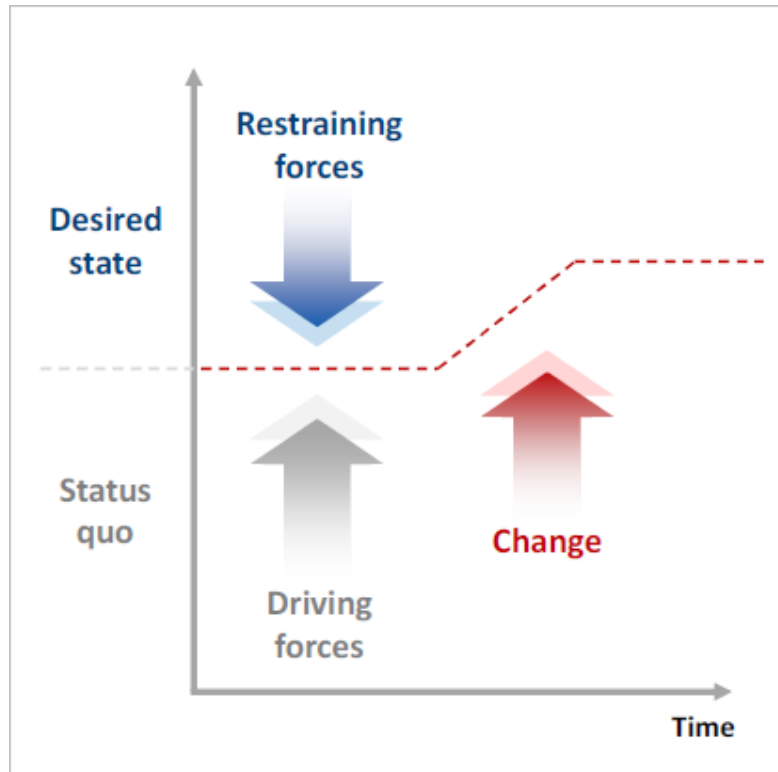


Figure 5 – The desired state to reach (Originally from Reed and Lewin, 1951)

However, before committing to the new desired state is important to keep in mind what should be the outcome and the benefit of it. Then the question is: “What are the advantages of cloud and why should we commit to reaching the new state?”

Analyzing the various aspects of the cloud we can see that it brings with it many advantages (Apostu et al., 2020) for companies ranging from the fact that they no longer have to pay large sums to manage their servers to the possibility of increasing their database in an instant thanks to a very simple scale-up. Scale-up and hence the chance to save more data and using more cloud computing resources in a short period varying the size of operations by companies to satisfy always the consumers’ demands in an efficient way. Another important role is made by cost efficiency brought by cloud, indeed the most cost-efficient method for use, managing and updating IT infrastructure is definitely cloud computing. Analysing another aspect is easy to see that companies pay a lot in terms of capital to manage traditional IT internal resources. The introduction of the multi-user license fees will prove very costly for the organization concerned. On the other hand, the cloud is much cheaper and will also substantially reduce the IT costs of the business. In addition, several one-time payment plans, pay-as-you-go and other flexible solutions are open, making the business very fair. Data recovery is comparatively easier. In fact, most cloud service providers typically are fairly qualified to manage information recovery. This simplifies the whole backup and recovery experiments considerably more than most conventional storage methods. Together with this fast recovery possibility and backup, there is also fast

access to information, after users have enrolled with the cloud, information can be viewed from anywhere with an internet connection. It then helps users to switch through time and geographic challenges. In the end, its fast deployment is important for the business that should be always fast to implement new technology.

Despite the benefits is important to keep in mind that there are also some drawbacks (Apostu et al., 2020) to be analysed and understood to make the right choice for your company. The main risks involved in Cloud Computing are technical issues. Even if is accurate that cloud information and data can be viewed from anywhere any time, there are occasions where technology could be not working well. Businesses should realize that this system is often vulnerable to interruptions and other technological difficulties. Despite upholding high maintenance levels, even the finest cloud service providers are facing these difficulties. After this security is the other main concern of Cloud, indeed, before adopting this tool, beneficiaries should give the data management and their security to a third person (the provider). This could virtually put a great risk to the company and can be a big barrier. Together with this, there are possible downtimes determined by the reliability of the connection to the provider and the respective internet connection. Also, the price that should be determined carefully to avoid a higher price compared to internal IT resources.

2.2.2 Innovation Management

Innovation is crucial nowadays and when we speak about innovation shouldn't be only considered the aspects of the product, but as in the case of the cloud, we should consider also a new way to deal with processes, a new business model etc. Since customers are more demanding companies and competition always stronger, companies need to manage all types of innovation. Innovation is considered as the best way to achieve growth. A good definition of innovation comes from Schumpeter (Schumpeter, 1942) that defined innovation focusing on five components:

- 1- The introduction of a product which is new to consumers, or one of increased quality than was available in the past;
- 2- Methods of production, which are new to a particular branch of industry;
- 3- Opening of new markets;
- 4- Use of new sources of supply;
- 5- New forms of competition, which leads to a restructuring of an industry.

This is important to highlight that the focus on innovation shouldn't be just on the product but also on other factors like how products and new processes are carried out. In the case of our research cloud computing can be compatible with all these five aspects of innovation since it could be linked to a product (gaming industry – Stadia), it could be linked to a new method of production (cloud manufacturing/Industry 4.0), it opens new markets, it could be considered a new source of supply (changing, for example, the supply of our service like

Netflix did) and create a new form of competitions. Another important aspect of innovation is its needs, that Goffin and Mitchell (Goffin and Mitchell, 2016) defined as related to technological advances that are important for the growth and the competition of a company. This need is followed by the changing of customers and their needs that led inevitably to a need for innovation. Although the main reasons are then external like the changing business environment and an intensified competition also the strategic intent and so the need of the leader and their inclination to innovation play an important role. To answer to all these needs is needed “*Innovation management*”. One of the most famous studies about innovation & innovation management is focused on S-curves, indeed Improvement of Technologies typically follow an S-Shaped curve (Kondratieff and Stolper, 1935).

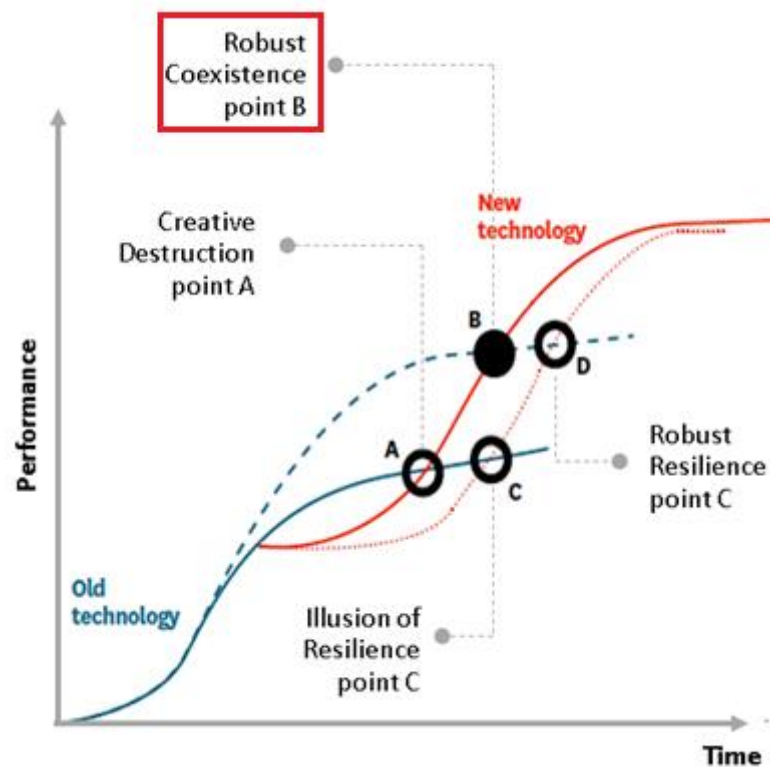


Figure 6 – S-curves (Goffin and Mitchell, 2016)

Cloud computing is an important technology that is showing advantages compared to traditional computing. Also, if right now there are some disadvantages caused by a not completely ready and developed ecosystem in the next years' cloud computing could become a standard technology for a lot of companies. It is always important to be aware of not just looking at the technology itself but also at the broader ecosystem that supports it since the competition may take place between the new and the old ecosystem, rather than between the technologies themselves. The S-Curves are an important tool to make choice on the adoption of new technologies. Is important to be in time for a change of technology to not be too late and miss the technological revolution, trying contemporary to not act too soon consuming resources. From this, analysing the S-curves, it is possible to show that there are four different ways in which technology changes and there is a revolution

in this sense. The first is creative destruction, which is indicated in the image with point A and represents the fastest of the changes in which the ecosystem is ready to “welcome” new technology and old technology and its ecosystem cannot be improved. Point C instead represents the situation of “illusion of resilience” in which new technology and its ecosystem require considerable development and old technology can improve a little. Point D also represents a situation where the new technology and its ecosystem need considerable development and there are many opportunities to develop the old technology. In the end, is possible to see in point B that comparing old technology and the new one there is a **Robust coexistence**. (Goffin and Mitchell, 2016) This happens when new technology is compatible with the existing ecosystem and the old ecosystem can be significantly improved, substitution takes place later and at a higher performance level (eg: cloud computing vs internal IT resources).

2.3 THIRD PART OF LITERATURE REVIEW – BARRIERS AND FACILITATORS OF CLOUD ADOPTION

The third part of the literature review is based on what are the key elements of innovation related to the cloud, understanding what are the obstacles that prevent the introduction of the cloud within companies. This is done by focusing on general theory on the introduction of new technologies and also on some specific barriers and facilitators to the cloud including a table of them. In this last part of the literature review, we can go in deep relating to the research about barriers and facilitators of a new technology introduced in a company. The third and last part concerns the digital transformation and organizational needs to overcome the barriers to the introduction of the cloud. The focus is therefore shifted to organizational solutions to overcome the limitations and barriers encountered previously.

Digital transformation and Organizational readiness to Innovation and adoption of new technologies

For company, is important, in an increasingly digital world, the digital transformation. The incorporation of digital technology in all areas of a business is a digital transformation which fundamentally changes the way you work and provide consumer service. It is also a cultural change that demands that organisations continuously confront the situation, explore and cope with loss. It is not just about implementing more and better technologies, it involves digital congruence aligning your company's **culture, people, structure and processes**. To do this then is important to understand and manage every aspect of the company transforming it and getting it ready for innovation and future. (G. C. Kane et al., 2016)

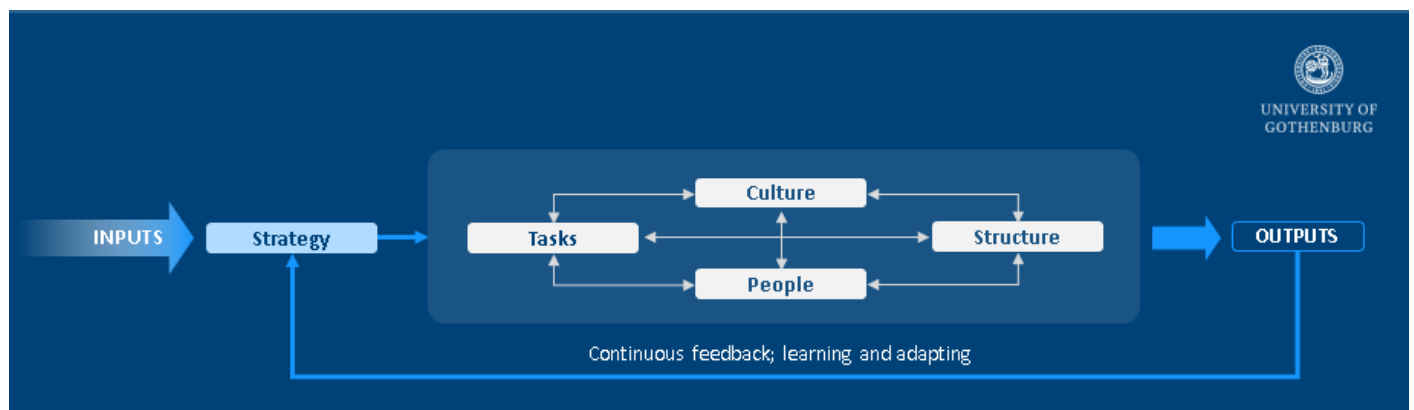


Figure 7 – The Digital transformation (G. C. Kane et al., 2016)

2.3.0 -BARRIERS OF CLOUD ADOPTION

2.3.1 – Internal Barriers

The barriers of a new technology introduction can be resumed in these general (Horváth and Szabó, 2019) and particular ones (related to the cloud) categories (Fahim and Gazzar, 2014) that can be divided into internal and external barriers to change. In the research are chose these five elements because are important to create a framework and are all relevant for the adoption of new technology like cloud as analysed in the previous section.

PEOPLE

One of the challenges for the adoption of new technology is that companies do not currently have workers with the necessary skills for the future. It can also be difficult to retrain workers because it can be very expensive. So, for IT employees, it can be difficult to make this change and is needed to make it as easy as possible for them. Companies that need to be able and ready to change are more than five times more likely to provide employees with the opportunity to develop needed digital skills (G. C. Kane et al., 2016). In a company the people are fundamental, referring to the company, then from an organizational design perspective, we can refer to the organizational climate that is the relatively enduring quality of the internal environment of an organization. It is really important then to have the right climate to build new skills and to be able and ready to innovate and change the company towards new technologies like cloud computing. Organizational climate matrix can be then divided into four categories shaped by two variables (Tension and readiness to change). Of these four categories, the fittest with the goal of the innovation and with an easier capacity to introduce new technology like cloud, with proactive employees that can easier develop a new skill is called “**Developmental climate**” (Burton, Obel and Døjbak, 2013). It has a low tension and high readiness to change, which make easier for the organization to innovate and as a consequence the introduction of cloud computing. The best climate to keep for an innovative company, ready to change and to try new processes and technologies like Cloud computing is then the Development climate that should be implemented and nurtured by the Top Management and mid-management. This climate fit the best with companies that won't take the road of innovation and in companies that are, for example, ready to change and introduce in our case cloud computing. In figure 8 is indeed possible to see that there are four different climates that could be reached in a company that is based on Internal process climate with a low readiness to change and high tension. The group climate, indeed, is characterized by low tension and low readiness to change. A rational goal climate with high tension and high readiness to change and the best climate for a company with an innovation goal: the development climate.

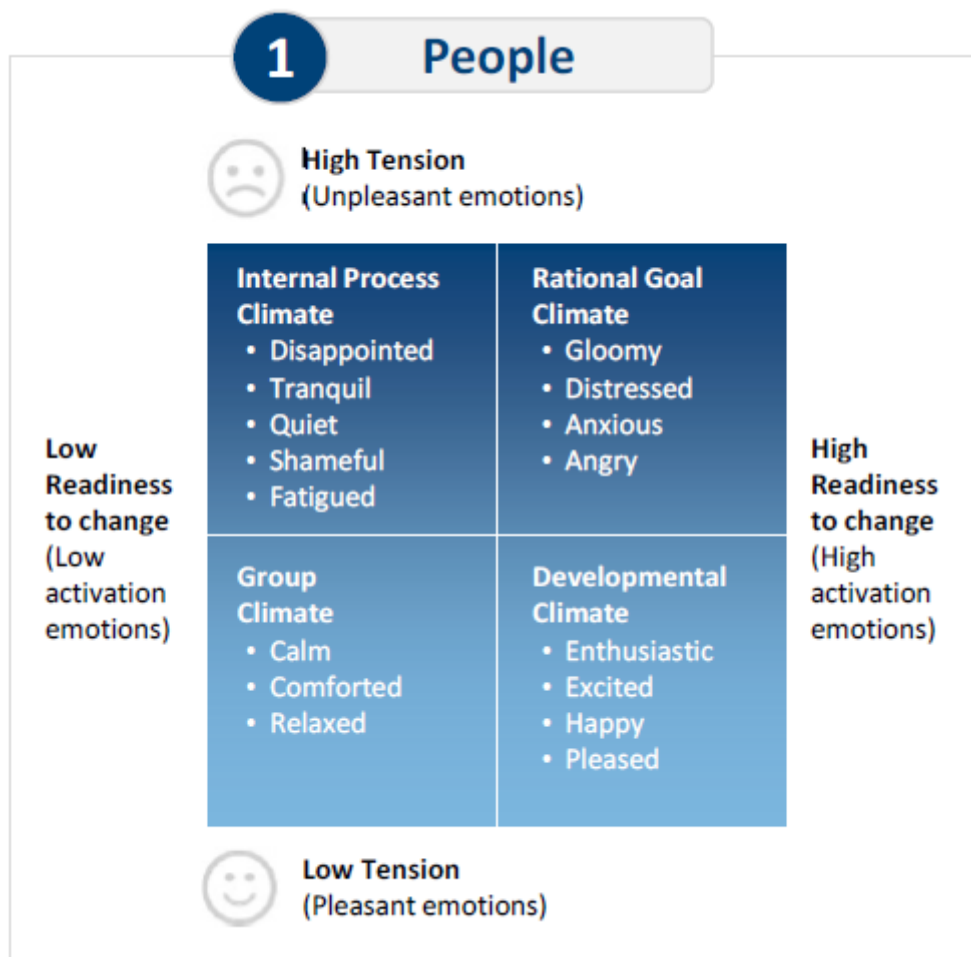


Figure 8 – Organizational climate (Burton, Obel and Døjbak, 2013)

CULTURE

Another important barrier is corporate **Culture** that is not ready for change. It is therefore important to have a corporate culture towards change and innovation (Burton, Obel and Døjbak, 2013) with lean processes and proactive workers. In cloud adoption indeed is important to have a culture toward innovation mainly because there is a shift between the management and protection of your data from your company to your provider. Another factor that can prevent the adoption of cloud services in companies is **the lack of a leader** with the necessary skills and experience to manage innovation and the introduction of new technology. Top management, in fact, could be against the introduction of new technologies including the cloud in relation to its focus on efficiency rather than effectiveness. (Burton, Obel and Døjbak, 2013) The first element that should be kept in mind is the culture that should be shaped to embrace risk and undertake the innovation road. The digitally maturing organization chose and have to choose riskier innovation portfolio and this is possible accepting, respecting some boundaries, the risk to innovate. (G. C. Kane et al., 2016). Burton, Obel and Døjbak in their book speak indeed of the **leadership style** as an important element that should fit with the organizational culture needed in the company. The leadership style is the predominant model used by the Top

Management of your unit of analysis to manage employees. About the leadership style, we can see four different categories shaped by the preference for delegation and uncertainty avoidance (Burton, Obel and Døjbak, 2013). The right leadership style for an innovative and explorative goal is found by Burton and Obel to be a “Leader”, based on low uncertainty avoidance and high preference for delegation. This leadership style can make easier for a company the adoption of new technologies like cloud and is perfect to achieve high flexibility and a flatter structure.

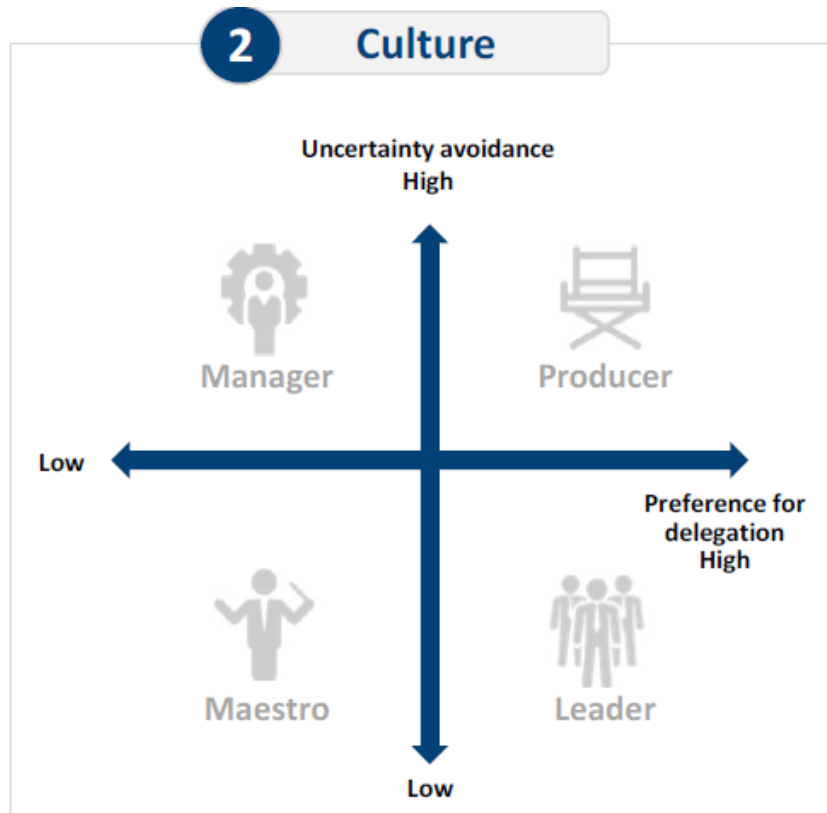


Figure 9 – The Leadership style (Burton, Obel and Døjbak, 2013)

STRUCTURE

Companies also need to cope with important **structure barriers**. From this point of view, we can observe that for the introduction of the cloud, flexible structures are needed that allow a fast flow of information. From this point of view, it is, therefore, easier to introduce innovations and be ready for change with more flexible companies and a flat structure. In many cases, contradictory interests among organizational units, lack of understanding of the new technology, and fear of the unknown are likely to be experienced. Hierarchical leadership structure was designed for complex organizations in more stable times. To become a more nimble and foster collaboration, some large enterprises are simplifying their structures. Some organizations are turning to cross-functional teams to become more agile and letting formal structures fade into the background. In general, we can see that to implement innovation and introduce new technologies, companies are focusing on flatter organizations or, for example, networks. (G. C. Kane et al., 2016). One of the barriers found about the

adoption of new technologies by Fahim and Gazzar, 2014 is the hierarchical structure, with bad information flow and the lack of flexibility.

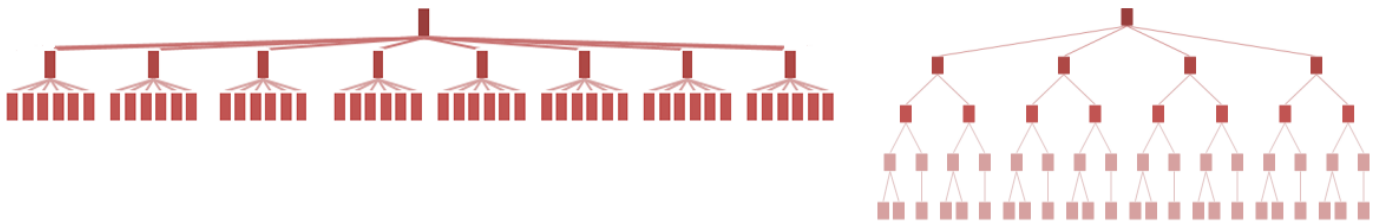


Figure 10 – Flat and Hierarchical organizations³

STRATEGY

The strategy of all the firm, to be ready for the change and introduce new technology, should be aligned and ready for the future and the digital world. The strategy helps to determine its organizational design. A firm's strategy reflects management's assessment of the firm's situation and its choice of how to pursue the firm's goals. A simple and powerful way to describe a firm's strategy is in terms of the following typology: reactor – defender – prospector and analyser without or with innovation. Exploration and exploitation (Sollosy, Guidice and Parboteeah, 2015) are dimensions of strategy that can be used to form the basis for categorization of a firm's strategy into one of four types. If your firm is a reactor it is low on both exploration and exploitation and it lacks an intentional strategy toward innovation. It makes adjustments when forced or when there is an urgent need or problem. If your firm is a defender it is high on exploitation and low on exploration, it is innovative only in narrow, limited areas. Its innovation is confined and highly focused. If your firm is a prospector it is high on exploration and low on exploitation, it takes an aggressive approach to innovation, systematically searching for new opportunities. It experiments regularly with change. Analyzers take a mixed approach to innovation. If your firm is an analyser without innovation your strategy is similar to a defender but with more emphasis on exploration. If your firm is an analyzer with innovation your strategy is similar to a prospector but with more emphasis on exploitation. (Burton, Obel and Døjbak, 2013). A strategy based on reactor or defender than don't fit well with the goal of the adoption of a new technology, the best approach is to follow the prospector strategy that best fit with a strategy focused on innovation and finding innovations both internally and externally to the company. This is depicted in **Figure 11** where there are five different strategies.

³Image taken from <https://www.nngroup.com/articles/flat-vs-deep-hierarchy/>

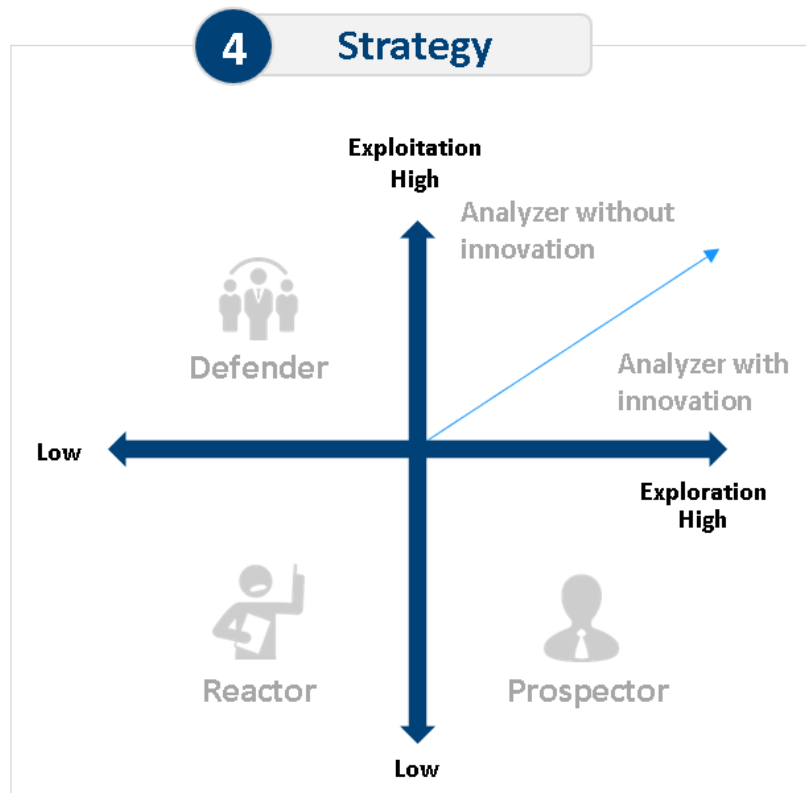


Figure 11 – Company’s strategy (Burton, Obel and Døjbak, 2013)

Anyway, also the approach of analyzer with innovation could be a good choice but is difficult to reach. This approach in innovation management theories is synthesized in the ambidextrous approach. (O’Reilly III and Tushman, 2004) This approach is based on put effort for both nowadays and tomorrow, so without focusing only on the short or long term.



Figure 12 – Ambidextrous approach (O’Reilly III and Tushman, 2004)⁴

It is based then on both sustaining the today business and launches new innovations. At the end willingness to invest is another barrier always determined by strategy and can be lowered by changing the mindset and strategy of the enterprise from exploiting to explorative (Burton, Obel and Døjbak, 2013). The investments

⁴ Figure from: <http://sebastianhartmann.com/can-you-bend-that-way-revisiting-the-ambidextrous-organization-for-managing-professional-services-today>

are important since with no-investments and innovation the company will be soon out of the market. (Goffin and Mitchell, 2016).

PROCESSES

Another barrier found by these authors is the difficult integration of technological processes. This is difficult because the new technology could not be completely compatible with the existing IT infrastructure. Other problems could arise in connectivity that can give problems of downtime. Downtime are problems relative to the missing connection with the providers' servers and then the impossibility to use the cloud and in some cases, it can cause also a break of the work of the company or of its IT department. The Downtimes are becoming less frequent given the higher reliability of servers that is insured by companies like Amazon or Microsoft, but still exist. Other problems could arise also in security, given the problem of sharing data with providers and the scare that this data somehow could be stolen. The security problem is one of the biggest barriers for a company since every company can be scared to give data to a provider if thinks that this data is not safe.



Figure 13 – Security implementation mechanism by the biggest providers ⁵

2.3.2 – External Barriers

The **external factors**, instead comprise factors from the outside social environment in which the enterprise operates and by which its cloud computing adoption process is influenced. (Fahim and Gazzar, 2014). The external factors then are identified by Fahim and Gazzar, 2014 and Horváth and Szabó, 2019 as:

- **International laws** can be one of the biggest limitations to the introduction of the cloud in businesses because there is no widely agree data privacy policy among governments.
- **IT industry standards institutes**, like government regulation, also here there are missing parts and, even if some effort to develop security standards has occurred.

⁵ Figure credit - https://www.trendmicro.com/it_it/business/products/hybrid-cloud.html

- **Cloud providers** would have to comply with government regulations and industry standards to gain liability, reputation and trustworthiness among their potential and present enterprises users. Additionally, they are required to be transparent in explaining information to enterprises about possible benefits and risks from adopting cloud.
- **Technical risks**, which include data leakage, loss of data, downtime, data bottlenecks, and cyber-attacks.
- **Security in the cloud**, since when shifting to the provider the data control the security of data can be in danger for a data breach because it is not anymore in your control.
- **Possible downtime**, for connection problem or provider's server problems that can always happen.

2.3.3 – FACILITATORS OF CLOUD ADOPTION

After this presentation of the barriers it is also important to present their counterparts and thus the **facilitators** (Fahim and Gazzar, 2014) of the introduction of cloud services (Dóra Horváth, Roland Zs. Szabó, 2019).

PEOPLE

To increase the IT know-how of the organization a possibility could be knowledge sharing inside the company. This is important to find the right innovative mindset to follow. "Knowledge sharing, indeed, not only have a positive relationship with performance directly but also influence innovation which in turn contributes to firm performance." This finding is clearly explained by Wang and Wang, 2012 in their work "knowledge sharing, innovation and firm performance" that imply important effects and a high concern towards the innovation speed and quality. This could be achieved through a knowledge sharing and web-based knowledge-sharing platform and so a technology that put in communication internally the enterprise employers.

The other important thing about People in the company is to develop and push to a better climate as is possible to see in the barriers paragraph, to implement a development or "innovative" (Goffin and Mitchell, 2016) climate. To do this is important to do some actions, for example, encourage action, use informal meetings when possible, reward innovation and accepting failure because it increases the know-how of the company. These actions, for example, can help to achieve a development climate that is important to increase the possibilities for the company to implement new innovation or adopt new innovations like cloud.

CULTURE

Involve employees early and making them aware of the need for change is critically important for further development of corporate culture in a highly dynamic world. Eventually change the leadership style in a way to be ready to digitalise your company and be ready for the new competitive environment (Jetter, Satzger and Neus, 2008). The business culture represents the competitiveness of the company in the market environment.

A good corporate culture in a changing environment, indeed, is the one that is innovative and is ready to challenges of the future. Important, to build this culture, is to build teams and foster creativity internally, empowering and respecting workers in different ways. A solution then can be to build an atmosphere in which every individual is self-sufficient and seeks to innovate in different ways and taking risks. This keeping in mind that failing is a part of the process and sometimes shouldn't be avoided, but should be a part of the innovative process. All of this should be accompanied by the best metric (Kramer, 2019). From another point of view, instead, a culture of innovation as presented from Ishak (2020) can be nurtured instead reinforcing the cultural benefits of innovation parenting opening up organizational space to allow innovators to bypass barriers and hierarchies that often sap creativity. In this could be important to let employers think outside the box. Last but not least is important to cultivate an external relationship, in a way to increase the know-how also of your firm and increase the innovativeness of corporate culture.

STRUCTURE

Help to the adoption of new technology can come from the flattening of the structure and make teams help leaders and themselves to change in a high competition world. This could be facilitated through the adoption of an open platform inside the company, sharing IT knowledge and know-how internally building the basis for a structural change. This strategy of flattening the structure is really useful to achieve a perfect fit to the goal of implementing cloud since thanks to it there is no longer need to be in a hierarchical structure and everything could be managed and accessed with its related sources. We have seen in the document "adoption barrier of cloud" (Fahim and Gazzar, 2014) indeed that is difficult to implement cloud in a hierarchical structure that is fixed and facilitate the shift to a flat and flexible structure can be a solution. There is also an innovative way to deal with a structure that is flexible (Schwer and Hitz, 2018). One of this is The Holacracy based on trying to imitate digital start-ups that are faster, more agile, and are usually less concerned with corporate organization and are usually less concerned with the corporate organization and internal policy than large, established companies. They are faster to react to change in the market and customer needs. Leaders dominate over managers, as opposed to large corporations, where managers deal with complexity rather than with change and innovation, and where they reluctantly give power to their team. One solution to this can be holacracy, where there are no managerial positions, conventional structure and employees are given more self-responsibility and self-organization. There is no fixed job description, but they are flexible depending on the project. Employees are then motivated to deliver better results. Holacracy is then definable as a holistic system to self-manage the organization. (Schwer and Hitz, 2018). Anyway is probably a change too extreme for a big company then Another example to deal with an ever-changing environment and with the needs of always new technologies like the cloud is the Network Structure. Network structures are formed when the organizations are faced with rapid changes in technology, short life cycles of product and dispersed and specialized markets. In a network, required assets are distributed among some network partners as there is no unified organization in a network to generate the products or services and the network is producer or supplier. In a network structure,

the partners are associated via customer-supplier relations and a type of free-market system is created. It means that the goods are traded among network partners as in a free market.

PROCESSES

In our case to adopt cloud there is an important barrier that is the shift between control of data to the provider, this can be avoided obtained insurance from the company to maintain secret our data and also to **store data in some areas of the world** where third entities cannot access to the company data. Another facilitator to the innovation and the adoption of the cloud is the adoption of Hybrid cloud storing data (Balasubramanian and Aramudhan, 2012). To facilitate innovation of processes and the introduction of new technology can be useful to understand the pros of cloud to improve the performance objective:

- **Quality:** Cloud can be really useful to improve the processes quality and improve the level of operations.
- **Speed:** The speed increase in operations compared to internal IT resources is certain and is guaranteed through the possibility to connect and access the information from every part of the company and also everywhere.
- **Dependability:** the system can be easily accessible and it doesn't shut down so often.
- **Flexibility:** The possibility to fast scale-up operations and processes and be ready to increase the data stored or the process deal through the cloud can be an important reason to adopt it.
- **Cost:** The price-scheme and business model are improved.

One important aspect that could be implemented thanks to the cloud is productivity and efficiency, which covers several factors. Reduction in lead times and increased production efficiency also play a prominent role. Additionally, we have lower human work and allocation of the workforce to other areas. Overall, by implementing all of these factors, more reliable operations can be achieved, Other drivers the cost efficiency that can be achieved through the use of cloud and its innovative price scheme (Mazrekaj, Shabani and Sejdiu, 2016). The storage almost unlimited, the backup technology and also the always easier integration can be important drivers to its introduction. In the end, is crucial to underline the possibility to scale-up and makes it easier for enterprises to scale their service according to the demand of clients and easy access to information from anywhere, where there is an internet connection. Lastly and most importantly, the cloud gives the advantage of quick deployment. Once opting for this method of functioning, the entire system can be fully functional in a matter of a few minutes.

STRATEGY

Competition pressure and the risk to be out of the market push the company to embrace an innovative mindset. Then to shift from an exploitative to an explorative mindset is important to get ready for an innovative technology (Burton, Obel and Døjbak, 2013). Another facilitator is the need to have a **closer bond with business partners** to shift to easier management of the supply chain. Additionally, **competitors**, play an important role in incentivizing enterprises to adopt cloud for going market visibility, operation efficiency, and new business opportunities. This happens especially when the enterprise operates in a high-tech, rapidly changing industry. Is important indeed to innovate business model and this can be an important way to achieve this result keeping in mind, for example, Netflix excellent results in its cloud implementation, one of the main reasons of its success. The change in the competition and the need to survive for companies push to the adoption of the cloud. A company indeed needs to be competitive in the long term and for this an explorative approach to strategy or an ambidextrous should be used.

FACILITATORS	FACTORS	BARRIERS
<ul style="list-style-type: none"> Knowledge sharing, web-based knowledge-sharing platform and educational program. This will give then the possibility to reallocate workforce to other areas. Training employees 	People	<ul style="list-style-type: none"> Lack of skills by employees
<ul style="list-style-type: none"> Innovation culture adoption with change of leadership style Be risk prone with managers with a higher risk appetite and introduction of new technologies. 	Culture	<ul style="list-style-type: none"> A culture based on low readiness to change that deal more with efficiency than exploration and with a leader without innovative mindset
<ul style="list-style-type: none"> Holocracy and Network structures can be a solution, but in general also the common structures with a flattening strategy can be useful to a ready to innovate company. 	Structure	<ul style="list-style-type: none"> A hierarchical structure without a good information flow and without a flexible, flat and ready to change structure
<ul style="list-style-type: none"> Store data in other parts of the world or use a hybrid cloud can be really useful strategies to reach the advantages of cloud: <ul style="list-style-type: none"> Storage almost unlimited of data Scale-up or scale-down your company without changing your IT infrastructure Quick deployment 	Process Innovation	<ul style="list-style-type: none"> Security of data shift from you to your provider Down-time dangerous for you company Connectivity problem
<ul style="list-style-type: none"> Competition and business partner pressure to change and to make the supply chain tightly connected are important drivers. Also, the need to business model innovation could be important in the change of strategy. 	Strategy	<ul style="list-style-type: none"> Exploitative goal of strategy that can prevent the innovative mindset to adopt cloud.

Table 1: Barriers and Facilitators of cloud adoption. *Source:* Produced by the author

3 – METHODOLOGY

3.1 Research Design

The research design provides an important framework for the collection and analysis of data and is important to give a way to proceed in the research. The research design **comparative design**. This design uses two or more different cases or situations. It is based on at least two cases and it is based on the collection of data from each of them. (Bryman A. & Bell E., 2011). The comparative design is the best choice when comparing two or more cases or situations and, for the research question chosen, is important to highlight the difference finding barriers and facilitators of cloud services introduction in a company. In business research, indeed, the comparative design is really popular since it usually takes more organizations as cases for comparison then I chose this because I thought it perfectly fit my goal.

The goal is thus to understand and highlights differences to gain a deeper understanding of social reality. It is really useful because it improves the theory building. After all, the researcher can test the theory and analyse it. Some pitfalls of it are linked with the argument that the researcher pays less attention to the specific context and more to the way the cases can be contrasted. With this research design, the research is ready to start but is also important that the research design guarantee a high level of validity and reliability.

Since this research is qualitative, I chose what Guba and Lincoln (1994) proposed as an alternative to assess the quality of qualitative research and that is an alternative to reliability and validity. These are considered the equivalent four components (Bryman A., Bell E, 2011) that in this research are guaranteed:

- **Credibility:** The findings will be based on data found in the literature review and a sufficient number of interviews to reach a conceptual saturation giving validity to the work of research.
- **Transferability:** The data obtained interviewing companies will be extended to a considerable number and different companies that will lead to a conclusion that can be generalized also outside the area of Gothenburg.
- **Dependability:** The stability of data will be tested asking the same questions to some similar company to test the findings. In this way, thankful to the comparative design chosen it will be easier to test dependability and analyse if the stability of findings holds.

- **Confirmability:** Confirmability could be implemented by theory testing, then the comparison with the theory of literature review could be a useful tool to maximize the confirmability together to the research design chosen.

Research design, then, based on a qualitative approach and a comparative design will be ready to give the right tools to the research question. In this research, indeed, is a key thing to analyse different aspects and point of views of companies and a single case study, otherwise, will not lead to a complete answer. Therefore, through this research design, there is the possibility to investigate on every point of view making a framework for other companies and to highlight the main point of views of cloud introduction inside a company both positive and negative. To put this design into practise there will need a strong link with the data collection method in the research to be sure to gather the right data from the companies and to choose the right companies for the data collection.

3.2 – Research Strategy

The research strategy is important to build a framework that will guide and explain what are the tools and methods that will be used to answer the research question. Is important, thus, to analyse what type of approach will be used and what type of interview will be held with an important mention to the companies that will be interviewed and key people of these. To answer the research question and find the barriers and facilitators of cloud services introduction inside a company is important to find the right data. The approach followed in this research is qualitative and so the most important way to collect data is through interviews. The interviews are being made in Gothenburg Area thanks also to the help of a consultancy company, First to Know, that helped me in this research. The comprehension of the social world and the perception of this context by the participants are one of the characteristics which Bryman and Bell (2011) Identify for qualitative analysis and which matches well with their objective of this research. Another important thing about qualitative research and this research is that it is based on an abductive approach where the emphasis is placed on a mixed approach of induction and deduction of data between literature and interviewees. Therefore, to gather information will be interviewed companies, public and private companies, both providers and consumers of cloud, that work in Gothenburg and Sweden and that are going, have already implemented a cloud utilization inside their companies or it is impossible to adopt it for them. The interviews will be conducted with IT managers of these companies that work to innovate their companies or to manage IT processes. Then, the chosen strategy is to conduct a qualitative study that is the most appropriate for the goal to gather data from companies. An explorative approach is followed in this research, this because is important to define the things more clearly when the problems are analysed more in-depth while working on the research. Exploratory research helps determine the best research design, data-collection method and selection of subjects. To follow this method is also fundamental to relies on techniques like reviewing available literature and theory testing. In the end, thanks to all these approaches and guideline, will be possible to fully answer the wide research question with

all its questions and give also a model to other companies that can be followed to better chose if or if not introduce cloud inside a company. In the conclusion of the research will be made also theory-testing, that can be useful to test the research comparing findings with the literature review to understand and speak about the similarities and differences found comparing empirical findings with the theory. In this way, the study will acquire more credibility and also will be compared theory with real interviews/data.

3.3 – DATA COLLECTION METHOD

The data collection, as can be observed, is characterized by two main elements that are the primary collection of interview data, thanks to the interview guide in the appendix, and the secondary one characterized by the theories and elements of the literature review.

3.3.1 – Primary data collection

In the data collection, I'm going to interview six companies in the area of Gothenburg in the private and public sector. To do this I will work with First to Know (A Gothenburg company that will help me with this research) to choose my target companies in the public and private sector, also understanding the differences between the two different types in the adoption of new technologies.

In this research, the qualitative approach is realized with a semi-structured interview that is based on high flexibility and dynamicity, this because the questions can be adapted depending on the respondents' answers. Semi-structured interviews are based on open questions that allow the respondents to answer in-depth and in a wide way. Another important thing that characterizes semi-structured interviews is the increased validity thanks to clarification and wide questions asked to the respondent. The interviews were recorded and transcribed individually to have correct information without using a simple memory.

Important is the follow of **Purposive sampling**. Purposive sampling is supposed to continue until a point of theoretical saturation is reached (Bryman A., Bell E, 2011). Purposive sampling is a form of non-probability sampling in which researchers rely on their judgment when choosing members of the population to participate in their study.

To follow this data collection strategy is important to have an interview guide that covers the themes of the research questions and that is going to be analysed in data analysis with a depth grounded theory analysis. The grounded theory analysis is based on coding and therefore the main concepts and categories

The interview guide will be based **on three different parts**:

- **The first one** will be based on a general question to understand better what is the job of the people interviewed and in what they are involved in the use of the cloud. In this way is important to ask the right questions that will be important to categorize and after insert properly the companies that have to be compared with other of the same type. This will have a focus on explaining properly all the things and to show the pros and cons of cloud in the company relative group and with the different challenges that they face.
- **In the second part**, there is a focus on the main questions relative to the research questions and all themes will be covered. Therefore, this will be the longest parts with questions that will cover everything from costs, cybersecurity to connectivity etc. This because is important to focus on every topic to work after on a grounded theory analysis that highlights everything that is needed to answer the research questions.
- **In the last part** is important to clarify what remains unclear with questions that go also very far from the standard and prefixed interview guide. Following this path, everything will be led to an answer to compare after with the other companies in the group. Given the nature of the semi-structured interview, this will be easier because it will be possible to analyse different aspects and points of views remained unclear.

Thankful to a wide interview guide (in appendix) and an important research strategy followed it will be easier to give a wide answer to every part of the research question. In this way will be then easier to make the right questions to investigate on the most important themes and give the right answers keeping always in mind that there is the possibility to make other questions during the interview given the nature of semi-structured interview that always leaves open this possibility to not leave questions not fully answered. In **table 2** it is possible to observe the respondents of the research that are found in the Sweden area and interviewed through the interview guide mentioned above.

Selection of respondents

These companies were chosen precisely to get an overview of the barriers and facilitators, including in the research public and private companies that have tried or succeeded in adopting cloud services and cloud service providers.

Interviewees	Job Position	Company	Type of Interview	Duration
Daniele Cassani	CDO – Digital Transformation leader	 byBrick management	Skype call	34'
Magnus Hartmann	Business developer	 Göteborg Energi	Face-to-face	60'
Frode Langmoen	Technology Executive	 IBM	Skype call	30'
Niclas Ingeström	CDO – Chief digital officer	 CASTELLUM	Skype call	30'
Roberto Söderhäll	IT architect	 ATEA	Skype call	35'
Lars-Erik Lindberg	Innovation Leader	 ERICSSON	Skype call	25'

Table 2: Respondents. *Source:* Produced by the author

In this research, the work of finding the right respondents is made in collaboration with First to Know in Gothenburg. First to Know is a consultancy company focused on innovation and start-up. For purposive sampling, the help of First to Know has been fundamental. In this way, important companies have been reached and interviewed to find an answer to the research question. The respondents found are CDO (chief digital officer), technology leaders and business developer. The companies are providers, consumers and a consultancy company (ByBrick Management). Both Public sector companies and private companies are included in the respondents. The companies are then:

1. ByBrick – Consultancy –Provider
2. GBG Energy – Public sector company – Consumer – Has not adopted cloud services
3. IBM – Private sector company –Provider
4. Castellum – Private sector company – Consumer – Has adopted cloud services
5. ATEA – Private sector company – Provider
6. Ericsson – Private sector company - Provider

3.3.2. Secondary data collection

In addition to the interviews, it is possible to observe a literature review to understand and have a basis for analysing the interviews. This literature review is based on innovation theory (S-curves), digitalisation and barriers to the introduction of cloud services. The secondary data were collected thanks to the resources provided by Gothenburg University and Luiss university and their respective libraries. The documents found are therefore of high quality and reviewed.

3.4 – Data analysis

In the data analysis will be used the Grounded theory methodology This is one of the most used analysis techniques in qualitative research. It is a framework for design, collection and analysis that serves to develop the analysis and answers to research questions. Fundamental features of the grounded theory methodology include theoretical sampling, specific coding methods with a comparative analysis approach. Therefore, the compilation and review of data alternate and communicate during the testing process. Diverse coding approaches allow researchers to build more complex principles and thoughts, first integrated into codes, then into categories for data analysis.

4.EMPIRICAL FINDINGS

In this section will be presented the various companies interviewed with their background and the characteristics that distinguish them. In the second part of each paragraph, the various results of the interviews and the answers obtained with short paragraphs for each company will be presented to present the findings.

4.1 IBM

IBM is an American multinational technology company that works with clients in the area of digitalization. International Business Machines (IBM) delivers hardware, applications, cloud-based infrastructure and intelligent computing to the digital technology sector. It was originally named Computing-Tabulating-Recording Company and was founded in 1911, after the merging of four New York State firms by Charles Ranlett Flint. In 1924, it was called IBM. Given that the company is over 100 years old, it's no wonder it has had to adapt over the decades to different technology changes. The business is already transforming into a cloud to a data-based network player. IBM has been focused on continuous innovation for more than a century. For the 20th straight year, IBM has top-ranking the annual list of US patent recipients as an important barometer for this breakthrough. IBM is indeed one of the world's leading innovation companies and has invented licenses that have changed the world.

4.1.1 IBM and cloud

IBM is one of the biggest cloud providers in the world and is operating also in Sweden. IBM started with hardware and now is changing its core business implementing cloud and software to its customers. The interview made with IBM was really important to clarify what are the advantages and disadvantages of cloud understanding barriers and facilitators to its adoption. From these points of view it is possible to see that for IBM the main advantage is the possibility for companies to use the cloud to develop their software and do it in a cheap and fast way. For other companies, scalability and the ability to access these services at a low cost is also important. In the interview, the respondent said indeed "The advantages are that you can implement it easily, doing also new solutions and prototypes and it is pretty cheap to scale-up too".

Anyway, there are disadvantages and barriers related to the legal issues related to some companies such as healthcare industry that sometimes cannot transfer sensitive data to the cloud, like said in the interview. "The disadvantages are the security and there could arise some problems with regulations of cloud, for instance in medical and healthcare department. In this area, you can't store your data in another country and so you need to use servers on-premises."

The Barriers are then also related to the IT department that does not allow the transition to this technology for three reasons:

1. The first is the fear of job loss by employees within the IT department even though costs are decreasing. This in practice is due to the fear that their department is partly outsourced and therefore loses its function and importance. The respondent explicitly said indeed that “One of the barriers is the “feeling” of IT department in a company that is doing all the staff that now are going to outsourced with scare to lose their job”.
2. The second is the problem of security, cloud connection and the possibility of data loss. Companies are afraid of data loss and of entrusting third party companies with the management of data. This leads to strong resistance as data is considered gold in this period.
3. The Training of people is the third aspect to keep in mind and should be made by both companies and providers (“Yes, training should be done by providers or company itself, is important.”)

The top management must, therefore, be involved or just love the idea of adopting the cloud and certainly, its innovativeness is crucial to overcome the barriers posed by the IT department. An important sentence was said by the interviewee related to this: “The Top management has to be involved or should love the idea to go to the cloud and of course, their innovativeness is crucial.” IBM also identifies the importance of being an innovative company and not “traditional/old”. From this point of view is underlined the importance of the success showed in the market from companies like Netflix that adopted this technology. The connectivity also, according to IBM, depends more than the cloud on the infrastructure in the country and therefore the possibility or not to have stable connectivity for your company. Finally, IBM made a reflection about the future and the needs of a company today, stressing the importance of new technologies such as AI and the modernization of existing ones and the important role that cloud can play in their implementation.

4.2 Castellum

Castellum is one of Sweden’s leading real estate companies. It is, in fact, one of the largest builders and real estate companies in the country and is listed on the Swedish stock exchange. The company rents are more than anything else to companies and every day many workers estimated in more than 250 thousand people use their buildings. Castellum operates in 20 cities in Sweden, in Copenhagen and also in Helsinki in Finland. The organization is decentralized and guarantees knowledge of the territory to know possible consumers. In addition to these aspects, Castellum’s attention to sustainability and the desire to constantly innovate that characterizes this company, which is now, for example, innovating its business model trying to develop useful services for its customers.

4.2.1 Castellum and Cloud

Castellum, a real estate company, has chosen to switch to the use of the cloud, overcoming the barriers to its introduction. During our interview, the CDO was able to list me what are generally the difficulties to its introduction. The main aspect that he showed me is related to the conflict between the business area of the company and IT department, indeed he explained that “More times than you think is the IT department that is afraid with this because the employees are afraid that their job will disappear and security is in danger. The business part of the company wants to go with cloud while IT is afraid of the cloud, but now for years we uploaded everything there, we shifted to it. They are scared (the IT department), this is the problem. The security is safer of at least 2X or 5X better than an IT department inside a company. The problem is the dangerous connection to it, not the database itself.” From this point of view, it is possible to observe that the business area of the company is usually more than willing to lower costs and introduce the cloud, while the IT department is more reluctant to introduce it because it is afraid of security and job loss. “It is a corporate culture problem and an IT department problem, both size problem because is hard to convince everyone. It is like to convince 80 years old people to use a smartphone.” However, he wants to emphasize, that the cloud in fact about his experience is 2 to 5 times more secure than an IT department and therefore the problem is the corporate culture. He explained anyway that “It is important that there are some drawbacks like the place of data that is difficult to deal with cloud position like Microsoft in the USA and is a danger for Swedish companies to place data in another country.” The role of Top Management, therefore, becomes crucial. The advantages of the cloud observed by Castellum after its introduction have been related to the possibility to implement more services, scalability and costs.

For Castellum it was a real success the shift to the cloud because they increased their capability of storage, computing power, the speed to access these resources from everywhere and they created new services for their customers. The connectivity is an important question underlined by Castellum; indeed, the main point here is that there are more problems with internal IT resources than Cloud computing since also the reconnection with the cloud is easier. Also, about the scalability, is explained that it is a useful tool that can help from a need for more space but also for security reasons and sometimes to protect the company from DDoS attacks. The respondent indeed explained that “With scalability, we had a DDoS attack versus us and then we just bought more space in the cloud in that day and we protected our data and website just like this for some euros. Eurovision, for example, a big event that can just rely on cloud services, scaling it up for three weeks and with a pay as you go scheme. “

It is clear from the interview with Castellum that Cloud has incredible advantages, but there are still problems related to the transfer of responsibility for the data, the IT department and the security regarding the connection to the servers.

4.3 ByBrick Management

ByBrick was founded in 2011 with the goal of building a company to drive development within Service Management. Since 2011 it has developed and expanded its business and today is an important player in the support of clients in the digital transformation process. ByBrick is a Swedish company that operates in six different cities in Sweden and has five different divisions that provide consulting services mainly related to operations and digital transformation.

4.3.1 ByBrick Management and Cloud

In the interview with CDO and business developer Cassani, it was possible to capture important elements regarding the cloud and its use in companies. Being ByBrick a company that deals with the transition to the cloud and in general with the digital transformation of companies was one of the most useful interviews. As far as the advantages are concerned, the most important is the cost and scalability according to ByBrick. As explained by the CDO “The advantages are certainly the cost and scalability because if you as a company want to create a database for customers, you can rely on a cloud so you can increase capacity without increasing costs exponentially because the TBs (a measure of hard disk memory) are cheap now. You’re paying for a service instead of loading assets.” This is, therefore, one of the main elements that are emphasized by ByBrick’s manager, in fact, the feature of reducing the cost of IT infrastructure can be very beneficial for a company and can be an important element that can push the company to change. From this point of view, therefore, it is possible to observe from Figure 14 that there is actually a possibility of flexibility that is not present in traditional IT infrastructures and thanks to the cloud there is practically never the possibility of not having the ability to respond to customers’ requests or to slow down the internal operations of the enterprise. Also is important to not forget a cost reduction that can be achieved thanks to the cloud.

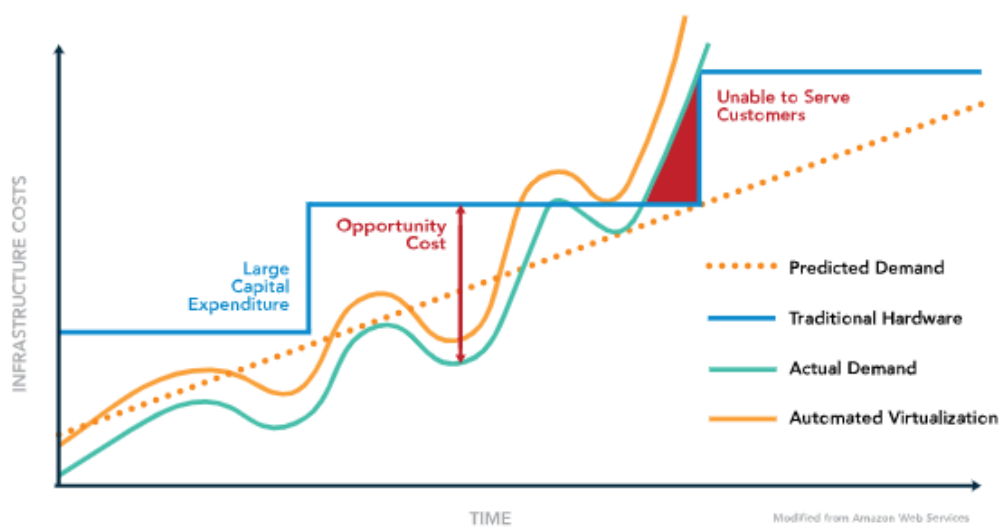


Figure 14 – Cost efficiency – (Image taken from Open group⁶)

⁶ http://www.opengroup.org/cloud/wp_cloud_roi/p3.htm

This is underlined by the fact that there is the possibility of increasing storage and computing capacity without increasing costs exponentially. There is the possibility to pay for a service without loading assets and without burdening the company's budget. The disadvantages, however, are related to security as there is a shift of responsibility for the data from you to the provider and therefore the data is no longer in your control. The manager indeed said that "From the point of view of the disadvantages there is security because you are not directly responsible for the security and therefore you have no control over data and it's a risk that you take." The barrier to the introduction of the cloud is related to the costs of data transfer and the fact that some companies are reluctant to give their data to providers. Going in-depth he explained that " in Sweden, there are companies such as Volvo etc. do not want their data to be available and also for a matter of capacity since there are very high connectivity costs. The solution they see is to use private cloud that can give higher personalization, but **not** to have large servers within the company. "

Another difficulty you may encounter is that of integration with a company's old systems, while downtime is very rare if you choose a reliable company from this point of view. The CDO also emphasizes the aspect of innovation that today is often driven by a sense of emergency as is happening today with the COVID 19 outbreak. He said indeed that "If I'm being cynical, it must be a company with big problems. Now the covid, for example, causes companies "sense of emergency" to innovate. However, the fact of having an open mind and an eye for the wallet and an eye for the future. What is needed, however, is the moment of crisis for big innovations. "

4.4. ATEA

ATEA is the leading Scandinavian IT infrastructure company for Nordic business and public sector companies. It has more than 7500 workers in seven countries (Norway, Sweden, Denmark, Finland, Lithuania, Estonia), which has allowed the development of unique IT infrastructure expertise and a prominent local presence in every market it serves. ATEA, therefore, offers hardware and software from the best technology companies like Microsoft, Cisco, HP, Apple, IBM and is able to develop technology solutions for its customers who also have complex IT requirements. Sustainability is also very important to Atea, one of their objectives is to improve their company and at the same time society. This working with sustainability goals that can have a positive impact on the world and the environment.

4.4.1. Atea and Cloud

Atea is an important reality of IT infrastructure that is also characterized internally by a very broad knowledge of innovation and cloud-related knowledge. Many ATEA customers ask their engineers to implement on-premise servers or to adopt cloud solutions. Atea points out that in the public sector customers demand more private servers than using the cloud. Acceptance of these services is in fact very complicated for public bodies as demonstrated by ATEA. This is because there is a barrier to the transfer of data to a provider with the

consequent fear of third parties interfering. The IT strategist interviewed explained that the advantages of the cloud is more about the scalability and pay as you go because in this way the consumer is purchasing what is needed at the moment and doesn't need to spend more to increase its IT infrastructure. There is also high flexibility of cloud services in a way that is possible to use different services by different companies like AWS and Microsoft using a modular approach to obtain what is needed for the customer. The manager summarized the advantages saying that "The scalability and pay as you go are great advantages, indeed you are purchasing what you are using for the moment and this is one of the pros when it comes to cloud. When you need to scale up or down is great and is really useful to buy a high level of security and other services. There is a high flexibility thanks to cloud services like Office 365 or AWS etc. You can buy everything from different providers also, is a matter of risk management. We can define it as an open book and you can mix as you prefer. The barriers of the cloud, on the other hand, are focused on regulatory issues and There is also a problem with the corporate culture that is sometimes poorly innovative. The IT architect summarized saying that "When you come on public cloud is less regulated and this could be a problem. But my opinion is that they feel that is less safe because they don't understand fully how the data is stored and how the data is taken care of. Because when you have data classification or critical data you don't know If there is a proper regulation on the public cloud it could be a big issue when it comes to public companies or public authority." He added also about this argument that "is a culture limit of public sector company but also the private one. Our responsibility is also to define the security level, but many of this issue comes from "Cloud ACT". It is an aggregation used by government organizations that, for crimes, these organizations can ask for data. So, they can look at data stored by companies also in Sweden." The ability to choose where to store data can be a solution provided by providers to overcome these problems: "Microsoft, AWS etc. permit also the possibility to choose where to store your data and emotional threshold become lower and lower when it comes to storing data."

From the financial point of view, there is the possibility to avoid large expenses and pay only what you need and this is no small advantage. The truth also about security is that the disadvantages are more emotional than real about the cloud, in the interview is indeed underlined that is more a cultural problem than a true security problem since they exponentially increased the protection of data. Indeed, he explained that the truth is that "we have an increase of security and firewall and high level of resilience (recover fast) and reduction of redundancy and operation costs. In a technical perspective, there are only pros. " Down-time also have almost completely disappeared from the modular structure of the servers used by providers. The possibility of open-innovation thanks to the cloud also opens an important new way to its implementation. In the interview is concluded with a focus on what companies need to innovate in nowadays and is underlined the need of openness, curiosity to interact even outside the business and to spend in innovation with a focus on an innovative based strategy also with a focus on sharing ideas and let the business become more efficient through the use of cloud services.

4.5. Gothenburg Energy

Gothenburg Energy is the main electricity company in Gothenburg. The company is controlled by the city of Gothenburg. The company is committed to creating sustainable and safe energy and fibre solutions to offer Gothenburg a sustainable future. The company is focused on the development of renewable energy, smart systems and efficient solutions for homes, businesses and transport. Gothenburg is facing an important urban development and must respond to future city scenarios. Gothenburg generates, distributes and sells electricity on the energy market, constantly looking for good sustainability, efficiency and cost-effectiveness. For ventures that favour people and community, and not only in the energy sector, but their income will also contribute to the region.

4.5.1 Gothenburg Energy and Cloud

The interview made with Gothenburg Energy is really important to understand the barriers of cloud introduction for a public sector company. A public sector company like Gothenburg Energy indeed don't like the idea of the cloud because they have to share classified public data with a provider. This, together with the fear related to the security of data stored in the cloud, leads public sector companies to avoid the cloud. Another problem relating to public sector companies is that of legislation which is described to us as limiting and which poses a barrier which is difficult to overcome for public sector companies which have data from the citizens of the country. However, Gothenburg Energy presents a possible and interesting solution to this and that is to bring a part of the data, the classified ones, on servers on-premises, while the part of the unclassified data on a public sector cloud. We can observe in this specific case a barrier to the introduction also of the IT department that does not want to give up part of its work and this leads to a further effort for the change and adoption of the cloud. As far as private companies are concerned, the respondent states that sometimes the barriers are related to regulation and the possibility of intrusion by government agencies The interview explained also the Cloud Act as an element that could slow the adoption of cloud from companies, CLOUD Act provides that U.S. information and communication providers will provide the user or client with storage data on any server where they own and run upon warranty order, even that they supply the providers or courts for denial or appeal if they find that this requirement violates the privacy rights of the foreign country in which the information is held. Moreover, sometimes the cost is not always clear and this can lead instead of a benefit, to an economic loss for companies that adopt the cloud. As far as the advantages are concerned, there is certainly the scalability and flexibility of the services offered and the increasing reliability of these services offered by large companies.

4.6 Ericsson

Ericsson is one of the most important providers of Information and Communication Technology (ICT). It was founded 140 years ago and is focused on connectivity creating disruptive technologies and services that are

easy to use and successful for consumers in an interconnected world. Ericsson has always tried to put a lot of effort in order to work with others to set technological standards that make communication and connections possible. Ericsson has the world's leading patent portfolio in cellular technology, with more than 54,000 granted patents. One of Ericsson's great innovations is Bluetooth, which revolutionized data transfer in the 2000s.

4.6.1 Ericsson and Cloud

Ericsson deals with both sales and cloud usage. Cloud is being a very popular service and it is currently under development by Ericsson. From the interview to the company it was possible to draw some main aspects including the advantages that the cloud can bring in a company. Among the advantages was explained a relationship between the cloud and cost efficiency, the flexibility (“Cost efficiency – Flexibility – Security”) that the cloud allows, for example, the scalability as the main element and finally the security, which in the interview with the innovation leader it was possible to see that it has definitely improved. In the interview, it was also possible to identify what was the barrier for Ericsson's introduction of the cloud, which is related to the alignment of stakeholders to its introduction and their initiatives. He explained indeed that” It Is more about aligning stakeholder and also align different data storing methods between different stakeholder.” In order to overcome this barrier and align initiatives and decisions regarding the cloud, it is important to adopt a Top-Down approach and therefore involves Top Management in the decision making and adoption of the cloud. The disadvantages that it has been possible to capture instead are related to the integration of the old products or systems in the new framework, therefore an integration problem. As for the financial aspect instead, we have a decrease in costs and greater efficiency because this aspect, related to the scalability of the cloud, allows to increase costs more evenly and not exponentially. Scalability increases or dominates the ability to use the cloud for computing or storage and provides high flexibility. After this interesting interview, it was also possible to understand that according to Ericsson innovation is very important and you have to spend resources, energy and take risks in order to achieve innovation.

5. DATA ANALYSIS

The analysis of this paper is based on an analysis of what is found in the interviewees and with main focuses on elements introduced in the literature review. Through this analysis will be then depicted how to deal with the adoption of cloud in companies and how to deal also with the benefits and drawback of the cloud. The approach used for this analysis is based on the grounded theory analysis. The grounded theory analysis is based on coding and therefore the main concepts and categories (in the appendix tables are explaining the coding carried out). In the end of the chapter there is a summary table using the framework (culture – strategy – processes – people – structure) presented in the literature review with which a direct comparison will be made. This keeping in mind that facilitators and barriers can be depicted also without a direct comparison.

5.1. ANALYSIS OF BARRIERS AND DISADVANTAGES OF CLOUD

In this paragraph, the barriers to cloud adoption will be presented with a focus on the main limits that enterprises have to overcome. Change and technological innovation in processes are important for enterprises and understanding the barriers is fundamental.

5.1.1IT DEPARTMENT

One of the biggest barriers found in this research is about the IT department resistance to change because of a main reason: The problem related to the fear of the IT department to lose its job. This because of the outsourcing of many of the functions performed by this department and/or the modification of the functions performed and consequently the need for new training. For this problem, it must, therefore, be understood that the IT department places great resistance to change caused by the substantial change needed in their functions or the possible elimination of their functions. This, however, can be mitigated by the intervention of Top Management which must, therefore, have the function of overcoming this resistance to change by using its leadership for the adoption of the cloud with a possible modification of the activities carried out by the IT department and conversion of the same to cybersecurity functions. As we have analyzed in the research it is possible to understand that the problem that exists after the adoption of the cloud is the persistence of a security problem that remains, more than in the cloud itself, in the connection to it (web browser for example). This new problem can, therefore, be mitigated by an evolution of the functions of the IT department that must therefore no longer be focused on computing or storage functions, but mostly on data protection. The clash as found in this research is, therefore, relative to the positions of the business part of the company and the IT department sometimes at the antipodes. The business part of the company is in fact often more inclined to adopt this solution, unlike the IT department, which is often reluctant to make this choice, which could affect their positions or change them. The result is, however, as witnessed by the companies interviewed, positive from an economic and security point of view (“the cloud is two to five times more secure than the IT department’s internal management”).

5.1.2 CHANGE IN DATA MANAGEMENT

The change in company data management and data transfer to providers often poses an important barrier to the introduction of the cloud. This barrier is determined by the fact that customer or company data is now considered gold. Data management is therefore very important in a modern enterprise and involves a careful analysis of the benefits and disadvantages of moving data to a third-party company. It is very interesting to note that this problem is reported by most respondents and this underlines the importance of the problem. Indeed, companies are often reluctant to pass their data to the cloud as there may be intrusions from third party companies or government agencies. In order to overcome this barrier and therefore find a solution, two of the companies interviewed (GBG energy and IBM) presented a solution in which the importance of the possibility to use different types of cloud services. In this case, it is in fact possible to use hybrid clouds and therefore the use of on-premises and public cloud servers. The strategy to use is, therefore, to divide the data into two different categories: classified and non-classified data so that you can decide which data to keep on your servers and which data to hand over to the management of third-party companies in order to allow secure management of customer and business data. Another solution is provided by the possibility (IBM) to use for large companies such as Volvo private cloud so you can have more customization and data protection.

5.1.3 CULTURE

Culture tends to separate one group from the other, on the basis of a certain collection of values, opinions, actions and attitudes. It is expressed, perceived and communicated within a society over time. In a business sense, it could be defined as the atmosphere and activities that companies create around the way they handle people or the endorsed principles and credo of an organization. Individuals are affected by the organizational culture in which they live, both at a national and organizational level and it is therefore essential to create an organizational culture that is directed, in our case, to innovation. A lack of innovative culture, as is observed in the interviews carried out, can prevent the introduction of new technology like cloud and then is important to build an innovative culture. An innovation culture is defined as a culture that facilitates the generation and implementation of innovations using the potential of the company's employees. In order to develop such a culture, it is important to exploit various techniques like important to communicate the intention to innovate to the employees in a way to make them aware of the intention of the company towards innovation, in this role the Top Management and mid-management will be really important. Another important role can be made by the right infrastructure to communicate ideas, knowledge and problems. Like explained in the literature review an important role can be played by a system that put in communication easily the employers inside the company and that can foster innovation. This role can be implemented directly thanks to cloud system implementation. Another important role could be made by room of creativity inside companies and incentives for innovation for employees.

5.1.4 REGULATORY

The fourth important barrier identified is related to cloud regulation issues. These problems put a strain on the possible adoption of the cloud in certain companies working in the public sector (e.g. Healthcare or energy also) and a small number in private sector companies. This can also lead, as reported in the cloud act, to external intrusions such as government agencies into company data (only in exceptional cases, however). This is why public sector enterprises often do not use the cloud as a service and instead opt for on-premises servers within their enterprises. From this point of view, it is therefore very difficult to overcome these barriers and the only opportunity in this sense would be to use the cloud in locations around the world where it is legally possible to use it without problems. However, even in this case, its implementation is often difficult due to laws that completely prevent its use. This is, therefore, a barrier to adoption that cannot easily be overcome. For private companies, on the other hand, this barrier is more simply surmountable because in reality, even if companies believe that there may be interference from third parties, the possibilities in this sense are in fact almost nil and only related to exceptional events such as serious crimes committed by themselves or by clients. From this point of view, therefore, we are talking about cultural rather than regulatory barriers. There is, therefore, a barrier determined by the lack of an innovative culture of the company and that prevents the adoption of the cloud. This barrier can also be identified as an emotional barrier since the real possibility of an intrusion by third parties is low and cloud gives anyway a higher protection than an old IT infrastructure. Therefore, it is easy to use a hybrid cloud or a private cloud that limits the intrusion of third parties and makes this event practically impossible.

5.1.5 STRATEGY

The fifth barrier identified is determined by business strategy. The strategies of certain companies, it could be understood from the interviews, are characterised by a defender (or reactor) approach in relation to their markets and market position. This can lead to a worsening of their economic condition in the medium-long term as well as being a limit to the introduction of the cloud. This is characteristic of “old or traditional companies” that use such approaches and strategies as they are confident of their earnings by limiting innovation and new ideas within companies. Another aspect highlighted in the interview about the strategy of companies that differ in innovativeness. Some companies indeed prefer to use their resources for nowadays rather than to innovate. In these different two cases, we can see a different approach when comes to introduce new technologies, indeed there is a stronger effort to introduce cloud in companies where there is a strategy towards innovation. The public sector companies sometimes are for example less involved in this process of innovation than private one that has to fight to survive. While this can be seen by public sector companies as the best strategy sometimes is important to innovate processes and introduce new technology to increase profit and efficiency. In some interviews, it emerges the characteristic of some “old” companies not to innovate and not want to adopt the cloud because they are focused on the present and not the future and have already earned

enough money to do so. In this way, however, the possibility of losing competitiveness is high and must be taken into account. In this way, Top Management should think about changing its vision and start, when necessary, an innovation of the business model. An example of this could also be the case of Blockbuster vs. Netflix which has chosen not to innovate and to continue relying on its old business model. The importance here, in the innovation and the change in strategy, is made by Top Management since the change should start from the highest part of the company. This could facilitate the change and the adoption of cloud and can also overcome internal resistance to change of some parts of the company like the IT department. From this point of view then there is great importance to change the strategic approach of the company from exploitative to explorative.

5.1.6 PROCESS

One of the problems of the cloud is that being a new technology does not allow perfect integration with the existing ecosystem. This leads at the same time to a more difficult adoption by companies that already have, for example, their own IT infrastructure. These characteristics are therefore in contrast to what was analysed in the literature review, in fact, the ecosystem in this analysis confronts us with a significant barrier. This leads us to consider the new technology, the cloud, in an intermediate situation between robust resilience and robust coexistence (Goffin and Mitchell, 2016) with the old technology, internal IT resources that could be seen in **Figure 15**.

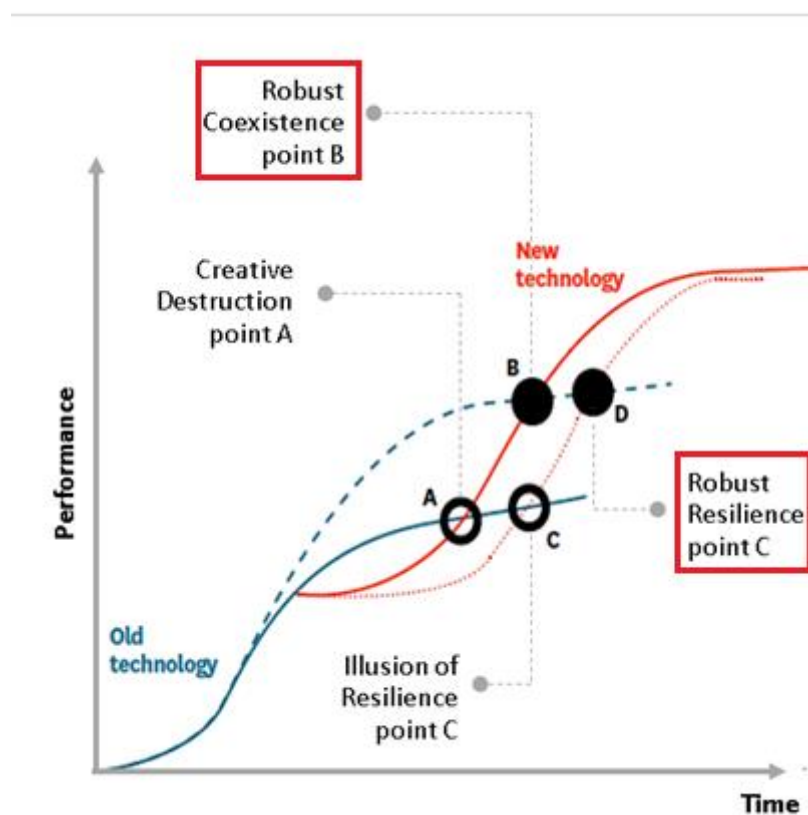


Figure 15: Robust Resilience and Coexistence (Goffin and Mitchell, 2016)

Also, concerning the second barrier, not only the direct but also the indirect cost of the cloud must be taken into account. Data transfer is, in fact, the cost of transferring data between the cloud and the enterprise, a cost of connectivity that rises as the data transferred increases. This can be observed, for example, in automotive companies that use large amounts of data for their tests. The third is related to poor connectivity, but it was possible to observe in the research that it is more relative to the infrastructure of the country where the company works than from the cloud. In fact, the more developed the telephone infrastructure, the more this risk decreases until it disappears almost completely in certain countries.

5.1.7 Structure

The structure of a company could be an element that limits the adoption of new technology. As seen in the literature review (Fahim and Gazzar, 2014) is confirmed in the interview, since the old hierarchical structure can't be an answer to innovation and to the introduction of new technology. From this point of view is possible to see that is easier for the introduction of cloud flexible structures that allow a fast flow of information. The solution to these could be to introduce then new structures or let the structure becoming flexible, simple and highly communicative. Flatter organization can be indeed a solution to the innovative needs of nowadays. In the interviews, it is in fact easy to identify in the structure an important element for the information flow and to allow in a simpler way the innovation and the adoption of new technologies.

5.1.8 People

About the people barriers to the adoption of cloud computing, there are different point of views on this argument. The barriers found on training the employers on the use of cloud are less high than what expected, while there are some problems of education on understanding properly the benefits of cloud use in a company as highlighted by ATEA and Castellum. Keeping in mind the important role of cloud "education" that should be made, the role of the sharing platform is "reversed". With this last affirmation, I want to highlight the possibility to use cloud itself as a sharing platform obtaining something similar to open innovation directly inside the company and sometimes outside it. Indeed, having a lot of people connected to the same application is better to share ideas and resources. However, it remains important for the adoption of a technology to have a business environment that is more open to risk and change.

5.2 ANALYSIS OF FACILITATORS AND ADVANTAGES OF CLOUD

In this section, we will present the facilitators of cloud adoption. Change and technological innovation in processes are important for enterprises and understanding the facilitators to the adoption of this new technology is important.

5.2.1 Top Management involvement and leadership

The first facilitator is the one related to the involvement of Top Management, this can help in the adoption of the cloud as many difficulties are encountered at the organizational and departmental level. Given the presence of an internal barrier within the company, with an IT department against the introduction of the cloud for example, the best way to overcome it is through top management. They should be involved to help them understand the benefits of cloud adoption. It will be up to top management to decide and lead the way to the final adoption of the cloud. In this sense it will be important to understand if the desired state is more advantageous than the cost to the change required, remembering that it will be necessary to change in part the function of the IT department that will be revolutionized in this sense because it will no longer have to perform the management of internal servers, but more than anything else control the security of the connection to the provider's servers.

5.2.2 Build innovative culture

To make the adoption of new technologies easier, it is important to have an innovative culture within the company. In order to develop such a culture, it is important to exploit various techniques like important to communicate the intention to innovate to the employees in a way to make them aware of the intention of the company towards innovation, in this role the Top Management and mid-management will be really important. Another important role can be made by the right infrastructure to communicate ideas, knowledge and problems. This role can be after implemented directly thanks to cloud system implementation. Another important role could be made by room of creativity inside companies and incentives for innovation for employees. An important facilitator in this could be the CEO innovative mindset and a leadership pointed toward innovation with also the possibility to share ideas and expertise inside the company in a way to be ready to introduce new technology (using, for example, the platform of sharing that is presented in the literature review). From the interviews and literature review the outcome is that:

- Important for companies that want to build this kind of culture is to be customer-centric with a high focus on customer needs. Like Castellum's manager said indeed "You need to understand the customer needs to make their life simpler and make the world a better place"
- Another important thing and attribute are the openness to new ideas that Atea's manager explained as the "Openness, curiosity to interact even outside your business. Is really important to innovate and this could be made by a strategy focused on innovation and openness thankful to sharing things with cloud services"
- Have ways to generate new ideas. Important techniques are to develop creativity through activities within teams such as brainstorming, Left-right brain technique, Five Ws - One H technique and Attribute association. Together with these, there are many exercises such as storyboarding and zero

drafts that help workers and push them towards creativity. Many companies have also developed a strong focus on design thinking.

- Risk tolerance to experiment and fail in a way to increase also the know-how of the company.
- Give appropriate leadership that can be innovative and provide a clear vision toward innovation in a way to build the right culture for the future.

5.2.3 Hybrid cloud and Choice of location

To respond to the problem of data management and its transfer to a provider outside the company is presented the solution of being able to adopt a hybrid cloud. This solution, in fact, allows limiting the risks for the company that intends to adopt the cloud. It is possible to achieve this objective by dividing the data as classified and not in such a way as to be able to distinguish which ones to insert in servers on-premises (or private cloud) and which ones to insert in the public cloud. Thanks to this method it is possible to overcome the barrier found concerning data management outsourcing and the needs of public sector companies. Alternatively, you can also adopt, as many companies that do not work in the public sector, private cloud. The private cloud is characterized by superior customization, which allows companies to have a higher level of security or use new services that are not provided in the public cloud. Due to regulatory problems, some companies cannot store data in certain countries. This can be solved thanks to certain services (AWS – MICROSOFT etc.) that allow the choice of where the data will be managed, in which country exactly. The problem of the data management barrier in other countries and jurisdictions can, therefore, be partially overcome.

5.2.5 Cost efficiency and no asset loading

The cost of taking over the assets is lowered as you move from these to an external service. In fact, there is a transformation from capital expenses to operational expenditures. This is important for a company and you can achieve great cost efficiency that allows large and small companies to reduce fixed costs. The possibility of achieving greater cost efficiency is therefore inherent in the adoption of the cloud. This can once again be seen in the literature review and the interviews in Gothenburg. It was identified that the desire to lower costs within the company and lower fixed costs is one of the most important drivers for change and adoption of this technology. In fact, it allows the outsourcing of much of the IT infrastructure that is now sold to a third party and which allows, when needed, the immediate increase of computing or data storage availability.

5.2.6 Sense of urgency

The moment of crisis and the sense of urgency is important to bring about change. This moment can be found today in the outbreak of COVID-19. This outbreak is pushing companies to adopt new technologies so that they can face the new challenges of the work of the future. This is visible in the increasing use of smart working for example, which benefits greatly from the use of the cloud. Such moments of crisis or "unfreezing moments"

(Reed and Lewin, 1951), confirm their importance both in the literature review (Lewin) and in the interviews ("Now the COVID-19, for example, causes companies "sense of emergency" to innovate."). Hence the impact of these elements of discontinuity also on the adoption of new technologies including the cloud. From this point of view, providers, for example, can leverage these aspects and new solutions related to smart working to increase sales in this sector.

5.2.7 Process Technology Innovation

The Innovation about the introduction of new technology inside the company is really important to update processes and make them more efficient and less costly. One of the barriers that we found on the introduction of the cloud is the risk of breach of data. There is instead a wrong consideration of security since the real problem is not the security of the cloud itself as found in the literature review, but the connection to it with web browsers. Then the solution in this aspect should be found in more secure access to the cloud using the right tools like a firewall or converting, as we have seen before, the functions of the IT department to cybersecurity functions. A risk anyway that is higher with internal IT resources.

Another barrier to its introduction that is found in interviews is then about the security of data that is transferred from your company to your provider. To solve this problem is possible to use (as GBG energy explained) some servers on-premises where store classified data and public cloud to store not protected/classified data. Cloud seen in another perspective of security can be really useful also to protect against DDOS attacks increasing fast the dimension of the availability of data stored (scaling-up) with a small amount of money.

Down-time, that was a problem highlighted in the literature review, is really difficult to be considered a barrier when there are reliable providers like Amazon or Microsoft. Also, about connectivity is to keep in mind that the problem is more about the infrastructure of the country than the cloud itself. While connectivity is not the main problem it could be a problem when there are companies that should transfer a lot of data and in this situation, the price of cloud can increase because of the need of personalization of it and the need then of a private cloud.

A big barrier is about the regulation since some laws prevent the use for some industries of cloud storing data in other countries and other problems relative to laws that permits the use of data stored by companies by the government. These barriers could be overcome trying to use some cloud services that let you chose where to store data, also if the first barrier is still difficult to overcome.

Another important role is played by the big advantages of cloud that facilitate the passage to a scalable IT infrastructure and also a new system of payment (pay as you go). This system of payment is often balanced by a problem of standardization and then an increasing cost if is needed a personalised cloud.

5.3. Explaining Barriers and Facilitators

After identifying all the barriers and facilitators of cloud adoption in a company, it was possible to identify that these elements are not only internal but also external to the company. This is therefore represented by **Figure 16**, which represents an evolution of G. C. Kane et al. (2016) model. This is because it is important to take into account, as observed in the empirical findings, also the exogenous elements and include them in a new updated model. In table **three**, moreover, there is a summary of the various barriers and facilitators found during the analysis and an addition of a row representing precisely these elements external to the company.

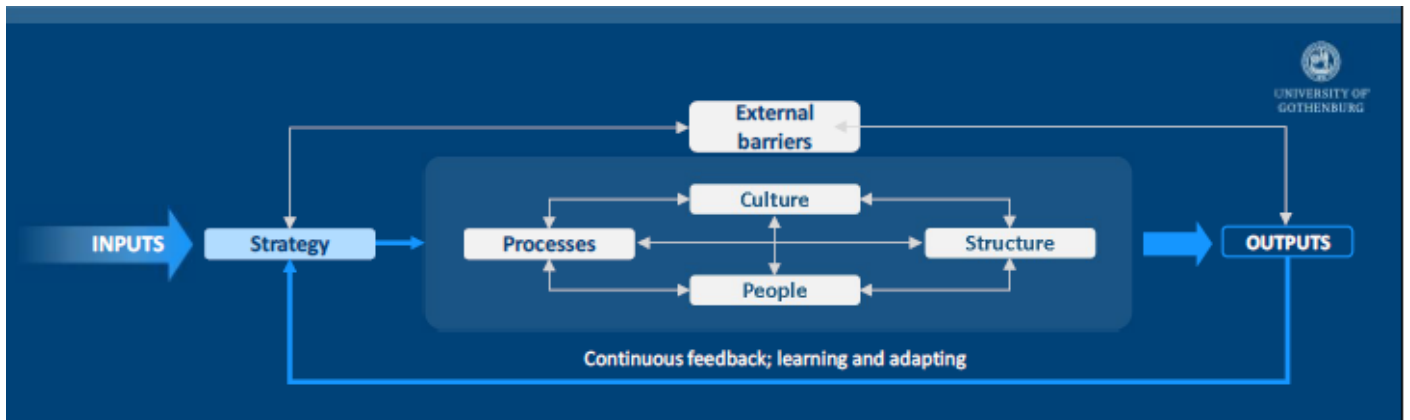


Figure 16 – Digital Transformation model including external barriers. Originally from G. C. Kane et Al. (2016)

Comparing this with the literature review, it can be seen that some barriers have been added to those previously identified in the literature alone. The additions are highlighted in **blue** in **Table 3** and represent what was absent in the literature review, providing a direct comparison. As you can see from the table there are many changes that can be listed as:

- In the culture is now identifiable the IT department that poses an important barrier to the introduction of the Cloud and that must be mitigated by involving the Top Management or adopting solutions such as the hybrid cloud.
- As far as the strategy is concerned there is a new barrier that is quite similar to the one identified in the literature review and is more of a relative addition to it.
- As far as the organizational structure is concerned, the recommendations remain the same.
- About Processes, the new barriers identified relate to data security, which is in fact endangered by the connection to the cloud more than by the cloud itself as could be observed and therefore differs from what was found in the literature review. This limit can be mitigated by using the old resources available to the IT department, converting them to data protection and therefore to cybersecurity functions.
- For People is essential to build an innovative climate thanks to the solutions provided in data analysis and at the same time involving Top management.

- Finally, the external barriers are essentially the same, but the solutions change in relation to the possibility of using, for example, more reliable providers and the choice of country in which to store data.

However, it is important to consider that barriers and facilitators should be considered in a general sense and not in direct competition with each other, in **Table 3** I have tried to outline them in a way that they are opposed to facilitators and barriers in a direct sense even if they can simply be considered in a general way.

FACILITATORS	FACTORS	BARRIERS
<ul style="list-style-type: none"> • Build an innovative climate • Innovate the role of IT department, increasing their role on increasing the connection security instead of working to keep servers working • Involve Top manager in the process of change and overcome these barriers • Train the employees 	People	<ul style="list-style-type: none"> • IT department strong resistance and scared to lose their job • Lack of innovative climate • Lack of Skills
<ul style="list-style-type: none"> • Build an innovative culture • Involve top management and adopt a developer leadership • Change the way cloud is seen by the IT department • Adopting Hybrid cloud can be a solution 	Culture	<ul style="list-style-type: none"> • Lack of innovative culture • Lack of innovative leadership • Resistance to share data with providers • Resistance of IT department
<ul style="list-style-type: none"> • Holocracy and Network structures can be a solution, but in general also the common structures with a flattening strategy can be useful to a ready to innovate company structure. 	Structure	<ul style="list-style-type: none"> • A hierarchical structure without a good information flow and without a flexible, flat and ready to change structure
<ul style="list-style-type: none"> • Increase web browser protection using your IT department • Use a hybrid cloud (on premises servers for classified data and public cloud for not classified data) 	Process Innovation	<ul style="list-style-type: none"> • Security/Risk of a data breach • Classified data protection • Down-time
<ul style="list-style-type: none"> • Change the approach and adopt a new, explorative strategy or an ambidextrous strategy • Use resource also for tomorrow and innovate the business model 	Strategy	<ul style="list-style-type: none"> • A strategy focused on today and not on innovation • Old company mindset
<ul style="list-style-type: none"> • Regulatory issues • Connectivity and down-time 	External barriers	<ul style="list-style-type: none"> • Use reliable providers • Choice the country

Table 3: Comparison of forces using the new model of digital transformation *Source:* Produced by the author

5.4 CHOICE OF ADOPTION

After all this analysis of barriers, facilitators and pros and cons found in the research the important question to answer is “what company should adopt cloud?”. The answer to this question is not easy and depends on the barriers of its introduction of a company compared with the advantages obtainable from this introduction. Making a simple equation if:

$$\text{The desired state} > \text{Cost to change}$$

could be a good idea to change. As is analysed in the research the highest barrier is the culture followed by people, process technology, strategy and structure. Following this is important to understand what are the barriers of your company and act consequently to this keeping in mind the advantages of the cloud. If the

advantages are higher than the cost to change, the cloud could be the right choice for your company. The advantages found with the adoption of the cloud are what determine the desired state. This last concept should be also balanced on the disadvantages of cloud adoption. The scalability of the cloud is one of the main elements to take into account together with the cloud price structure, which is not scalable but linear. This leads companies to consider cloud adoption. It is also necessary to consider advantages such as the high flexibility of services that can be adopted in a modular way (some services from one provider and others from another provider). Also, there is a financial advantage determined by the price structure which, however, must be considered about the company that will adopt it. There is also a lower down-time than in the past and if the best providers are chosen. There is the possibility to quickly implement what is required and also new services that before, with internal IT resources, were almost impossible as artificial intelligence.

The security is another ambiguous concept, since after all the interviews are possible to see that the problem with cloud and its relation with security is more about a connection problem to it rather than a real security issue with servers themselves, then is not considered a disadvantage anymore. In the end, the open innovation could be also a reason why of its adoption because cloud put in communication with your employees and sometimes also external ones in a way to increase the know-how of your company. Together with advantages, some disadvantages still exist and should be considered in the choice to put the effort in the change. These are the law regulation that is still problematic for some industries like the healthcare one. Some companies, such as the automotive industry, must also consider higher prices for data transfer, which sometimes makes a normal cloud service inconvenient or in need of customization, which inevitably increases the price. Integration with old infrastructure must also be taken into account as well as a need for increased data protection during connection (web browser).

As analysed in the literature (Reed and Lewin, 1951), to activate the change, it is necessary to increase the strength of the driving forces or decrease the barriers identified in the analysis. To do this and to facilitate the introduction of the cloud clearly requires effort and resources. It is, therefore, necessary to identify whether a company is ready for change and if the expenditure of resources is justified understanding the advantages and disadvantages of this change. Adoption is therefore characterised and influenced by various elements ranging from achievable benefits to disadvantages; from barriers to facilitators. The final judgement of what the situation is and whether or not the adoption agrees is up to the company that intends, after reading this document, to adopt the cloud. Given the Covid-19 outbreak, it is clear that new technologies will take over and change the way of working at least in the medium term. From this point of view, the need for change for companies will become very important and frequent and this paper can, therefore, give an important solution or point of view to those who want to adopt the cloud or even new technology.

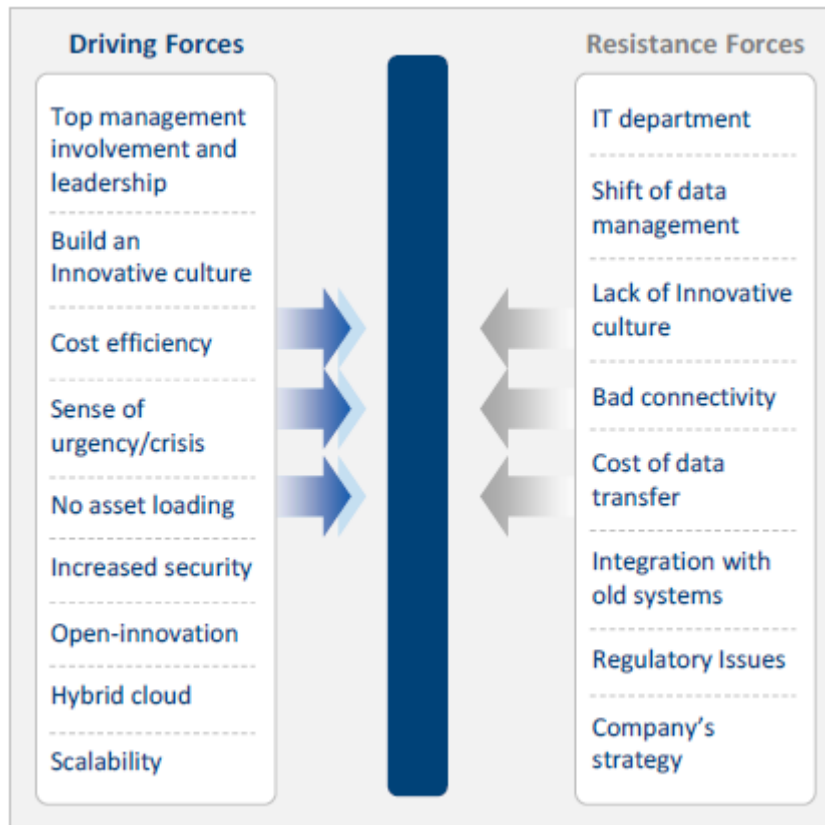


Figure 17: Forces comparison. *Source:* Produced by the author

After understanding the clash between facilitators and barriers we can, therefore, understand that the adoption of the cloud is not always easy and hidden certain pitfalls. In the majority of cases, determined the great advantages that the cloud brings, from scalability to cost efficiency, the cloud is convenient to adopt and the greatest limit to its introduction is a clash within the company or determined by a non-innovative culture. Even if there is a shift of data management to a third party, the security of the cloud is greater than can be observed within the company; integration is increasingly easy. The only problem remains the regulatory problem, which is sometimes insurmountable today, and the only way would be a relaxation of the rules and greater freedom in deciding how to manage customer or citizen data for public sector companies, but also for private companies. The achievement of a new state must, as explained above, be supported by the advantages that this state brings. If for a company such a new state, which corresponds to the adoption of the cloud in the analysis of this research, entails more disadvantages than advantages or has too high a cost compared to the advantages this change should not be made. Finally, a table summarizing the advantages and disadvantages of cloud adoption can be seen in Figure 18.

The desired state, compared with the starting point, could be made by:

Advantages	Disadvantages
✓ Cost efficiency	✓ Cost of data transfer
✓ Increased security	✓ Shift of management of data
✓ Open Innovation	✓ Less Connection security
✓ Scalability	✓ Integration problems
✓ Low rate of downtime	✓ Downtime in countries with bad infrastructures
✓ No asset loading	✓ There isn't always financial gain
✓ Modular services available	

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Figure 18: Advantages and disadvantages. *Source:* Produced by the author

6. CONCLUSIONS

In this chapter, you can find conclusions and recommendations for research projects. Readers will then be able to get an idea of the research and a summary of the draft with all the answers to the research question. In order to discuss future research plans, more avenues for extending this work would then be proposed. As underlined in the study aims, the key purpose of this work is to consider and identify cloud adoption facilitators and barriers. To do this, the researcher first proposes the core aspects of cloud computing and the definition of organizational change. IT and business development managers from 6 different Swedish firms were then interviewed, which gave the author an understanding of what are the most common barriers and how they overcome them. Furthermore, the clash between business departments and IT departments was analysed to look for a solution.

6.1 Main Research question

After completing the search, it was then also possible to answer what was the main research question:

“What are the organizational barriers and facilitators to cloud adoption within a company?”

This question was largely answered in the data analysis and as it was possible to observe, the answer to this question is related to various aspects related to barriers such as IT department, culture, problems of integration with the ecosystem and old IT infrastructure. On the other hand, the facilitators that push for its adoption, are for example the action of top management, the construction of an innovative culture, moments of crisis, etc. That said, it is also important to consider, as we saw during the research, that it is also important to have goals and therefore the desired state to be achieved, which must have beneficial effects for the company from an economic point of view. The advantages of the cloud, even if this cannot be said with certainty for every company, are greater than the disadvantages after its adoption. The advantages are in fact relative to the scalability of the service, flexibility, greater security and the possible modularity that it entails. While for the disadvantages we can observe a higher cost in terms of data transfer and connection problems without excellent connection infrastructure in a country. In this research then the main points have been touched and answered finding the right companies for the purpose.

The conclusion to this research work is therefore to have a framework to understand what are the barriers that can be encountered during a process of adoption of this new technology and how to choose the best services for a company. This can be done by observing and comparing the various advantages and disadvantages that the research has found and that characterize the state reached after the change you choose to pursue. All this must therefore be balanced with the costs of change and the effort to change what prevents the adoption of this technology.

6.2. The research outcomes

As far as research is concerned, it was carried out following the strategy described in the chapter on methodology. The research has achieved its objective of answering the research question, however, it would have been even more effective probably to obtain financial or quantitative results from the research. In the research, however, the hoped-for results were achieved and a starting point was given to companies wishing to adopt cloud. Even though the research is focused on the cloud, it could also give ideas for the use of new technologies.

As far as the research itself is concerned, it would probably have been important to have more interviews, which, however, have been limited by the geopolitical and working situation of this period. The research in fact, although sufficient, could perhaps have given new points of view on the subject. In fact, this could have brought new points of view to the work, which could also have provided inspiration for new research in this field.

6.3 Theoretical contribution

This study contributes to the research field of technological Innovation inside companies. It is focused on how to adopt technology and what are the challenges to overcome to adopt cloud. It depicted some differences to the literature found, indeed there are more and different barriers and facilitators compared to those found in the literature. Research, therefore, lays the foundations for future research in relation to the adoption of new technologies and the organisational barriers that must be overcome in order to introduce them. Specifically, research has focused on the description (G.C. Kane et al., 2016) of digital transformation and its five main elements explained. In this way, it was possible to start from a framework and a consolidated basis found in the literature review and then compare it with the reality of the companies found in the Gothenburg area. The research and analysis carried out can now refer to certain limits and problems and possible solutions that can be provided by providers in order to improve their results in the sale of cloud services or by the companies themselves that can overcome the barriers to the adoption of this technology in a simpler way. In fact, it has been possible to observe from the interviews that many companies want to implement this technology but are confronted with great resistance to change and the same has been observed by providers who often fail to explain the reasons for the resistance to the adoption of the cloud by their potential customers. The research, therefore, as well as giving theoretical cues from practical ideas for companies, both for providers and potential customers who face such resistance. Providers because they can choose the target companies to sell different services and how to help them adopt the new technology easily. Basically, how to offer the right service to the target companies (like an innovative one and with the right people for example). Businesses to be able to adopt the new technology by overcoming organizational barriers or limitations, the external barriers that limit their adoption. It can, therefore, be useful to be able to adopt the new technology more simply.

6.4 Managerial Recommendations

The research shows many barriers and facilitators that could limit or help companies to adopt cloud services. This thesis has been planned in order to make aware companies on what are the organizational elements that can help or limit the adoption of cloud services. In particular, there are some elements that providers and consumers should know in order to better choose their target companies.

For providers it is important that advertising campaigns are targeted, providers should choose those companies that are most likely to accept the offers and services offered for sale by assessing their initial condition with regard to the organizational and external elements that were identified during the research. These are, for example, the corporate culture, the strategy of the companies and their structure as well as the laws that may prevent their actual adoption, for example for some public sector companies. Providers could, if they want to expand or conquer new market shares, focus on new service packages or propose hybrid services between cloud and private servers in order to facilitate the sale and expand the number of companies that can be part of their target.

For companies that want to take the path of change and have an IT infrastructure that is no longer obsolete, but agile and the ability to implement services that were previously only possible for large companies, it will be important to focus on facilitating this change. This, as has been unveiled during the research, is possible thanks to the facilitators who make adoption easier. Facilitators, counterbalanced by barriers, are therefore important, but the economic effort to be made in the event of change must be assessed. Therefore, the preparation of companies for change remains important and they have to build a corporate culture ready for change, develop the right skills in their employees and manage the organizational structure making it more flexible and flatter.

6.5 Avenues for Future Research

Future research could focus their attention on possible financial and quantitative aspects, which have not been identified in this research. It would be very interesting to add to what was found here a quantitative side in order to have a complete model and framework on the cloud to provide a possible company with all the necessary information, from qualitative to quantitative, regarding the adoption of the cloud and its implementation and usage costs compared to internal IT resources. Indeed, it is possible to see, that in this research there are a lot of findings about disadvantages, advantages and barriers and facilitators but there are less concerning a truly quantitative analysis of them. An analysis of these aspects could then give companies a definitive point of view that would lead to a greater awareness of companies towards the adoption of the cloud and a way to quantify mathematically and financially the expenses that would be faced in this case, leaving nothing to chance. This could have been added to the analysis, but interviewing in this period has become difficult than what programmed. Some research in this aspect and finding other barriers that are

missing in this research could be useful for the companies that want to change the way data and computing are made in their companies and reduce costs about that. It will therefore be possible and interesting to be able to deal with the subject of the study from other points of view, for example, by analysing the customers' point of view and the market point of view and observing what the future developments of this technology and its economic impact will be.

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APPENDIX

INTERVIEW GUIDE

FIRST PART – INTERVIEW INTRODUCTION AND UNDERSTANDING OF INTERVIEWEE ENVIRONMENT

- What is your role in company X?
- What is the core business of “Company X” about?
- What is the size of your company?
- Do you use cloud services inside your company?
- What are the types of cloud service that you use?
- What are the advantages and disadvantages of cloud for your perspective? From a technical point of view for example?

SECOND PART – IN-DEPTH RESEARCH QUESTIONS

- What do you think are the barriers to cloud introduction?
- What do you think are the facilitators to its introduction? (elements that help to its introduction)
- Do you think people training could be difficult or expensive?
- Do you think that there are some corporate culture barriers?
- Do you think that corporate strategy and structure can matter in cloud introduction too?
- Do you think that cloud services have a high level of security or there are still some problems with this?

THIRD PART – EXTRA QUESTIONS

- Financially speaking do you think that there are advantages?
- How much the scalability of cloud matter?
- What is the best cloud service?
- What are the elements that a company should have to innovate nowadays?
- What do you think about data nowadays?
- The shift to the cloud could be limited because of the shift in data management to the provider?
- What is the main risk for you to adopt cloud services?
- Do you use some countermeasures to prevent slowdown of connection problems?
- In the end, then, do you have some important improvement thanks to this introduction?

Barriers found	IBM	CASTELLUM	BYBRICK	ATEA	GBG ENERGY	ERICSSON
IT department	Yes	Yes			Yes	
The shift in Data management	Yes		Yes	Yes	Yes	
Lack of innovative culture				Yes		
Bad connectivity	Yes					
Costs of data transfer			Yes			
Integration with old systems			Yes			Yes
Regulatory issues				Yes	Yes	
Alignment of stakeholders' decisions						Yes
Company's Strategy Barrier		Yes				

Table 4: Barriers to the adoption. *Source:* Produced by the author

Facilitators found	IBM	CASTELLUM	BYBRICK	ATEA	GBG ENERGY	ERICSSON
Easy implementation of new services	Yes					
Scalability	Yes	Yes	Yes			Yes
Cost efficiency	Yes	Yes	Yes	Yes		Yes
Top Management involvement and leadership	Yes	Yes				Yes
Build Innovative culture		Yes				
Implement more services		Yes				
No asset loading			Yes	Yes		
Sense of urgency			Yes			
Chose country to store data				Yes		
Increased security				Yes		Yes
No down-time				Yes		
Open Innovation				Yes		
Hybrid cloud					Yes	

Table 5: Facilitators to the adoption. *Source:* Produced by the author