

Determinants of Cloud Computing Adoption in Large Companies in Sweden

Seher Guldogan

Ruolin Sun

Department of Computer
and Systems Sciences

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Supervisor: Lazar Rusu
Reviewer: Paul Johannesson



Stockholm
University

Abstract

Cloud computing has gained popularity due to its ability to simplify IT infrastructure, reduce costs, and provide remote access. Among EU countries and company sizes, Sweden stands out with the highest rate of cloud computing adoption. However, there is a lack of concrete research in the literature focusing on the determinants of cloud computing adoption specifically by large companies in Sweden. Previous studies have examined cloud adoption from various perspectives, with a particular emphasis on small and medium-sized enterprises (SMEs) rather than large companies. Additionally, technology-related determinants have received more attention compared to those related to business, conceptualization, and application domains. To address this knowledge gap, this research aims to investigate the determinants of CC adoption in large companies in Sweden. The research question was formulated as follows: ***What are the determinants of cloud computing adoption in large companies in Sweden?*** Case study was selected as the research strategy, and the data was collected through semi-structured interviews and analyzed through thematic analysis. Semi-structured interviews were conducted with employees working at a large company in Sweden, who have experience in the IT and cloud computing field. The TOE framework was used to categorize the determinants as sub-themes into three themes: technology context, organization context, and environment context. In Company X, 30 determinants were found, with 20 aligning with previous literature. These included factors such as security, compatibility, scalability, top management support, and competitive pressure. Additionally, 10 new determinants were identified, including robustness, perceived usefulness, innovativeness, knowledge and training, and geographical locations/data centers. The experience and lessons learned from Company X could assist other companies to have better preparation for cloud adoption by understanding the significance of various potential determinants and underlying problems.

Keywords: *Cloud Computing, Large Companies, Determinants of Cloud Computing Adoption, Sweden, TOE framework*

Synopsis

Background

In this study, the adoption of cloud computing (CC) technology by a large company is examined, identified, and described in terms of the determinants of CC adoption. The semi-structured interviews provided a platform for the discussion of professional backgrounds, observations, opinions, and lessons learned of individuals who possess expertise in the IT and cloud computing domain. No names or titles can be disclosed because the data collection is anonymous and requires confidentiality. The review of existing literature on the topic helped to address the research topic and as well as obtain a precise background picture. The findings of this study will assist in the identification of possible factors influencing adoption from the standpoint of large companies. Additionally, it will offer valuable insights into enhancing companies' strategies for adopting cloud computing.

Problem

Previous research has primarily focused on exploring the determinants influencing cloud computing adoption among SMEs and mainly emphasized the technological determinants. Additionally, Sweden has the highest CC adoption rate in the EU and large companies in Sweden compared to SMEs have the highest percentage of CC adoption. Due to the lack of research that was done by large companies in Sweden in terms of the determinants of CC adoption with regards to socio-technical attributes, to address this knowledge gap, this research aims to investigate the determinants of CC adoption by a large company in Sweden through different perspectives.

Research Question

What are the determinants of cloud computing adoption in large companies in Sweden?

Method

The chosen research strategy is case study in a large company in Sweden. The semi-structured interviews were conducted to collect data from individuals who possess expertise in the IT and cloud computing domain. Some other publicly accessible data sources of the company are used to analyze their strategy in the cloud computing adoption journey. A thematic analysis is used to analyze the data collected.

Result

Thirty determinants were found after a thematic analysis of the data gathered from interviewees of Company X. The TOE framework was used to categorize the determinants as sub-themes into themes. They were listed into three themes: technology context, organization context, and environment context.

The ten new determinants were listed, and they are: *robustness; perceived usefulness; perceived ease of use; innovativeness and top management background; knowledge and training; the type of business/sector; organization policy, mission, and vision; industrial structure and social innovativeness; customer pressure and constraint; geographical locations/data centers*. The twenty determinants of cloud computing adoption in large companies identified that are relevant to earlier literature are as follows: security and privacy; cost-effectiveness; compatibility; complexity;

trialability; scalability and flexibility; relative advantage; uncertainty; technology readiness; trust; firm size; top management support; attitude towards innovation; organizational readiness; service level agreements; vendor support; competitive pressure; standardization of cloud technologies; government/institutional support; broadband and internet/digital infrastructure.

Discussion

Based on the interviews conducted, this study concludes that large companies can enhance their adoption of cloud computing (CC) solutions by considering determinants within the organizational and environmental context. Organizational determinants include factors such as innovativeness, and top management background; knowledge and training; and organization policy, mission, and vision. Environmental determinants encompass industrial structure and social innovativeness; customer pressure, constraint, and needs, as well as broadband and internet/digital infrastructure and geographical locations/data centers. Cloud service providers should prioritize openness with customers, addressing concerns related to benefits, security measures, protection of customer data, and privacy, particularly in public cloud services. The findings can be useful for large companies in Sweden and other countries to understand and act upon the determinants of CC adoption, while government organizations can utilize these insights to improve cloud computing adoption rates.

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List of Abbreviations

Amazon Web Services [AWS]

Cloud computing [CC]

Cloud service provider [CSP]

Continuous Integration and Continuous Delivery [CICD]

Infrastructure-as-a-Service [IaaS]

Information and communication technology [ICT]

Information technology [IT]

Information system [IS]

National Institute of Standards and Technology [NIST]

Platform as a Service [PaaS]

Participant information statement [PIS]

Software-as-a-Service [SaaS]

Small and medium-sized enterprises [SMEs]

Technology-Organization-Environment framework [the TOE framework]

1 Introduction

This chapter provides fundamental background information related to cloud computing and its adoption in the EU. Research problem, research question, and delimitations are also included in this chapter.

1.1 Background

Cloud computing

National Institute of Standards and Technology (NIST) states that “Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.” (Mell and Grance, 2011). The NIST states that a cloud computing (CC) model should include these additional five crucial components (Mell and Grance, 2011).

- On-demand self-service: Use of network resources and server time for storing, preparing, and optimizing data as needed without a service technician (Subhi et al., 2020).
- Broad network access: Services and functionality on the Internet are made available through standard access points such as cell phones, laptops, and PDAs (Diaby and Rad, 2017).
- Resource pooling: The company's computer services are paired with the assistance of talented clients. Different physical and virtual resources are dynamically assigned and reassigned to meet user needs (Bokhari et al., 2017).
- Rapid elasticity: In order to scale in and out fast, capabilities might be "elastically" provisioned and released, sometimes automatically (Almubaddel and Elmogy, 2016).
- Measured service: The configuration and use of data services depend on a variety of variables, including the required user accounts, bandwidth, and storage capacity. Users and suppliers both should report and verify information openly (Bokhari et al., 2017).

CC relates to the provision of resources such as computer hardware, software, storage, and internet infrastructures (Rashid et al., 2018). CC enables organizations to make cross-border connections and collaboration without requiring the establishment of external infrastructures like servers, data centers, and other things. Additionally, Benlian et al. (2018) found that businesses are increasingly depending on CC services and technology to enhance their business operations. Through its dependable service, CC service has gained significant attention from companies, media, and academics, as well as IT industries, to provide trouble-free network service and enhanced cost-saving methods (Shanthakumari and Malliga, 2019). As one of the computer science fields' fastest-growing technologies, CC is now a social and scientific reality (Shukur et al., 2020).

Benefits of cloud computing

Cloud computing services are increasingly popular among businesses because they are adaptable, dependable, scalable, and, in most circumstances, the most cost-effective alternative (Alkhamese and Hanafy, 2019). CC is one of the most modern digital-related technologies that can provide companies with various commercial benefits (M'rhaourh et al., 2018). Cloud services are now being used by a

variety of industries to cut expenses, expand their businesses, and even lower their carbon footprints (Stephen et al., 2019, p. 31). According to Rani et al. (2021), productivity, scalability, and security are stated as three advantages of CC. Even though this technology has undoubtedly benefited many businesses by lowering costs and fulfilling their stated goals on time, numerous issues relating to data security remain unresolved (Shanthakumari and Malliga, 2019). Despite various advantages, there are limitations to using this model in terms of service supply and the utilization of this technology as opposed to traditional in-house technologies that are physically owned and maintained on-premises (M’rhaourh et al., 2018).

Cloud computing adoption in the EU

Implementing cloud computing in a company is known as cloud adoption, it may be necessary to switch from on-premises infrastructure to the cloud or use both the cloud and on-premises infrastructure in this situation (Vairagkar, 2023). CC adoption has significantly expanded in recent years. A growing number of companies are adopting their infrastructure, and data to the cloud from their onsite premises. The rate of cloud adoption varies widely between countries. In 2018, three out of every four companies in developed economies, like Germany, used some type of CC (Pols and Vogel, 2019). According to the study’s findings, CC adoption is developing at various rates in different countries, with developed countries experiencing faster adoption (Sharma et al., 2017).

Based on the Eurostat (2022) report, over the last five years, the adoption of CC by Swedish businesses has climbed by 27 percentage points, from 48% in 2016 to 75% in 2021. Sweden is one of the EU nations leading CC adoption, along with Finland (75%), Denmark (65%), and the Netherlands (65%) (Eurostat, 2022) (Figure 1).

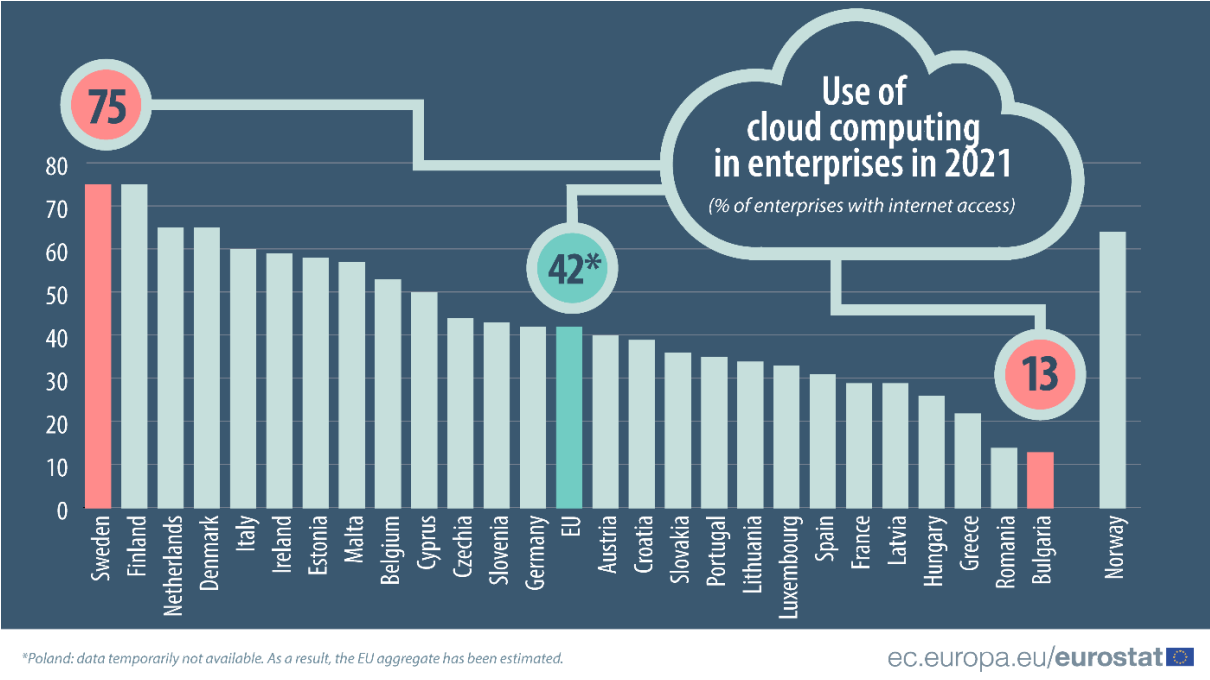


Figure 1 The Cloud Computing Adoption in the EU in 2021
 Note. From Cloud Computing Used by 42% of Enterprise, by Eurostat, 2021
 (<https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20211209-2>). Copyright 2021 by Eurostat.

The concept of determinant

Determinant, according to Cambridge dictionary, refers to something that controls or affects what

happens in a particular situation (Cambridge Dictionary, 2023). The factors or variables that influence a company's choice to adopt and utilize cloud computing services are known as cloud computing adoption determinants, these determinants can differ based on the conditions and the company's particular requirements (Abied et al., 2022). Cloud computing adoption is strongly tied to other essential issues such as obstacles, challenges, and enablers. It is noted that in the literature review, a variety of terms ranging from "challenges," "barriers," and "obstacles", "drivers," "enablers," and "determinants" or "factors" in CC adoption are investigated in this study. These concepts collectively shape the landscape of cloud computing adoption and influence organizations' decision-making processes.

1.2 Research Problem

According to Osnes et al. (2018), conducting a scientific literature review provides a comprehensive understanding of the latest research on a specific subject, enabling the identification of research gaps and suggesting potential areas of study for the future.

Companies are continuously looking for a reliable cloud-based environment that meets their needs and desires (Rani et al., 2021). Global businesses will optimally create a CC strategy to improve their utilization. Understanding the determinants of cloud computing is crucial as companies consider the adoption of CC for collaboration, content management, mobility, business process transformation, and rapid application development (Oliveira, 2014).

The use of CC services is fast rising in this new era, yet some major organizations refuse to shift their mission-critical data and applications to the cloud, due to worries about data security and privacy protection (Verma and Sharma, 2019; Shakya, 2019). Thus, finding the determinants that encourage the adoption of CC is the main goal of the adoption research. Through CC adoption, companies have identified some determinants such as a reliable and secure CC environment that fulfills their requirements (Taleb and Mohamed, 2020). According to Ramzan et al. (2018), CC analysis mainly focuses on its principles, important qualities, various exploitation models, key security-related determinants, and various services from a technological standpoint. However, there is a gap in CC research for usage in businesses that identifies the various factors to its adoption (Ramzan et al., 2018).

At the same time, according to Senyo et al. (2018), determinants related to technology have received more attention than determinants related to business, conceptualization, and application domains. It is stated that more research is urgently needed on CC from a socio-technical standpoint to address sub-themes such as regulation, trust, ethics, and pricing within the business concerns subject. The cloud adoption determinants should also be consolidated on the business determinants topic so that research and practice have a clear path forward in future research (Senyo et al., 2018).

Determinants such as compatibility and complexity, are defined under technological, organizational, and environmental contexts, however, these determinants are identified among SMEs (Wilson et al., 2015). Based on Eurostat's explanation (2016), large companies have 250 or more persons employed, while small companies have 10 to 49 persons, and companies with 50 to 249 persons are categorized as medium-sized companies. The study revealed that the adoption of CC has been investigated from a variety of perspectives and the topic of SMEs cloud adoption has received a lot of attention (Omurgonulsen et al., 2021). Future studies might also concentrate on the use of the cloud by larger companies by focusing on determinants like trust, security, and top management support that influence

adoption (Omurgonulsen et al., 2021).

Furthermore, the percentage of CC adoption in Sweden is the highest (Eurostat, 2023). Large companies in Sweden compared to SMEs have the highest percentage of CC adoption (Figure 2). Due to the lack of research that was done by large companies in Sweden in terms of the determinants of CC adoption, there is a need to investigate the determinants of CC adoption from a large company perspective in Sweden which is one of the top countries adopting and deploying cloud services most efficiently.

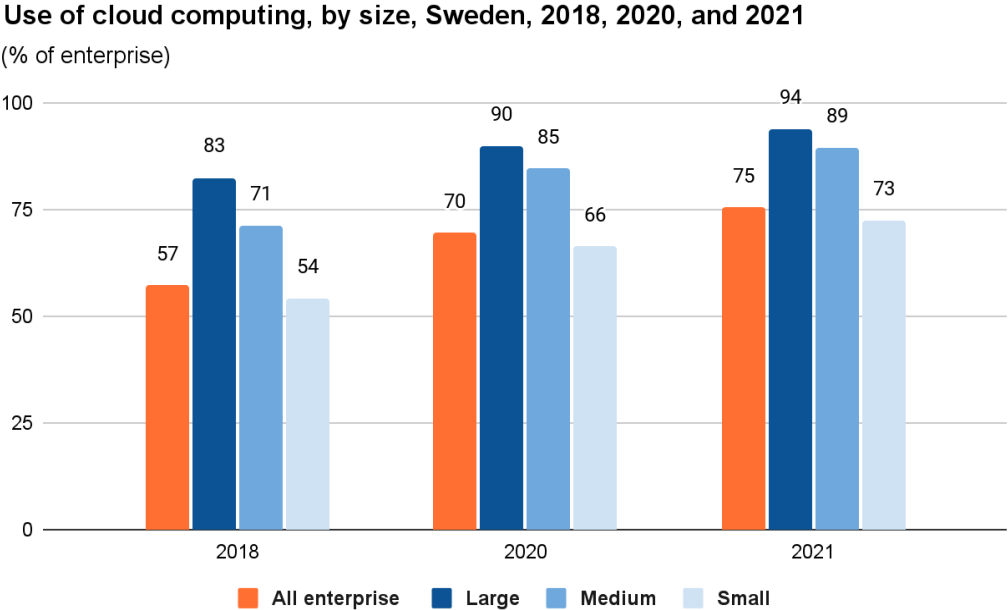


Figure 2 Use of Cloud Computing in Sweden by Company Size in 2018, 2020, and 2021
Note. From *Cloud computing services by size class of enterprise*, by Eurostat, 2023
(https://ec.europa.eu/eurostat/databrowser/view/ISOC_CICCE_USE_custom_5221835/default/table?lang=en). Copyright 2023 by Eurostat.

Therefore, the problem is that there is a lack of studies focusing on determinants for CC adoption in large companies in Sweden especially with regards to socio-technical attributes such as trust, regulations, ethics, and top management support.

This research aims to investigate the determinants of CC adoption by a large company in Sweden through different perspectives. As understanding of the determinants of cloud computing adoption grows, so will opportunities for solutions. Understanding the determinants of cloud computing adoption in a large company in Sweden, and the experiences that are learned in the process of conducting a project will help companies better prepare for and manage their future cloud-based solutions.

1.3 Research Question

Focusing on the introduction and problem, the research question is as follows:

- What are the determinants of cloud computing adoption in large companies in Sweden?

1.4 Delimitations

This study is delimited by investigating the determinants of CC adoption in a large company in Sweden, despite the company having a broad geographical operational coverage. The study focuses on the phase of deciding using CC not after the usage of this technology. Moreover, this study is delimited by interviewing employees with CC and IT experience.

2 Extended Background

This chapter introduces service models and deployment models of cloud computing, as well as the opportunities and examples of cloud computing adoption in organizations. The concept of the TOE framework and the determinants of cloud computing adoption under the TOE framework are also presented in this chapter.

2.1 Cloud Computing Models

Cloud computing service models

Infrastructure as a service, platform as a service, and software as a service are three cloud computing service models defined by NIST (Haji et al., 2020).

- **Infrastructure as a service (IaaS):** Under IaaS, a fully automated package is owned and hosted by a service provider and offers users CC services along with storage and networking capabilities upon request (Mohan et al., 2017). As it is stated in the article, during 2018-2019, market sharing of service providers in IaaS was listed as follows: Amazon Elastic Compute Cloud (EC2) with 47.8%, Microsoft Azure with 15.7%, Alibaba with 7.7%, Google Compute Engine with 4%, IBM with 1.4%, Others with 23.2% (Saraswat and Tripathi, 2020). IaaS has the following characteristics according to Almubaddel and Elmogy (2016): distributed infrastructure services, dynamics permitted, variable cost, utility model price, numerous users in a resource pool, and self-service & auto-supply.
- **Platform as a Service (PaaS):** System software, or the operating system, as well as other CC resources, are made available, run, and maintained by a cloud service provider under PaaS, according to a study by Rashid and Chaturvedi (2019). It is also stated that applications can be designed, developed, and hosted using PaaS services. Furthermore, other services include teamwork, DB integration, security, integration of online services, scaling, etc. Thus, PaaS has the advantage of not managing their own hardware and software resources, which helps users not feel stressed in their work. As stated in the article, during 2018–2019, the market sharing of service providers in PaaS was listed as follows: Amazon Web Services with 34%, Microsoft Azure with 15%, Google Cloud with 8%, IBM Cloud at 8%, Oracle Cloud with 5%, and Others (Salesforce, Software-AG, etc.) with 30% (Saraswat and Tripathi, 2020).
- **Software as a service (SaaS):** The user is given the option to use provider apps that run on cloud platforms under SaaS through a web browser, according to a study by AL-Zebari et al. (2019). As it is stated in the article, during 2018-2019, the market sharing of service providers in SaaS is listed as follows: Microsoft with 17%, Salesforce with 12%, Adobe with 10%, SAP with 8.3%, and Oracle with 6%, others (Google, IBM, CIC..) with 46.7% (Saraswat and Tripathi, 2020). The cloud infrastructure, which includes the network, servers, operating systems, storage, and even particular apps, is not managed or observed by the user. Since end users can utilize and administer this software created in the cloud, SaaS focuses heavily on the end-user interface. PaaS has the following characteristics according to Almubaddel and Elmogy (2016): Users can access these applications whenever they want; SaaS providers do not host their programs on the client's premises, but instead host software on their own servers

for third parties; Through a web interface, the programs are available, delivering the functionality and associated information from just about anywhere with an internet connection.

Cloud computing deployment models

Different kinds of cloud deployment strategies have emerged in response to the demand for CC, although they are built on the same technology, the scalability, pricing, performance, and privacy of these solutions vary (Velimirovic, 2022). Private cloud, public cloud, hybrid cloud, and community cloud are the four main CC deployment models (Gai and Li, 2012). The distinguishing characteristics of cloud models can be seen in Table 1.

Table 1 Distinguish Characteristics of Cloud Models (Saraswat and Tripathi, 2020, p.301)

Attributes	Public	Private	Community	Hybrid
Scope of Service	Open for General Public and Large Industrial group: system and services are easily accessible to general public on demand	Open for licensed users, single organization: services & accessibility of cloud infrastructure is exclusively available within organization or owned persons	Open for community users that have shared concerns (mission, security, policy etc.)	Open for general public & licensed users
Owned by	Always Third Party i.e CSPs	Single organization/ lessened users	Several Organizations	Organization and Third Party(CSPs)
Size of Data Centre	~50,000 Server	~5,000 Server	~15000(Depends on number of orgns)	Less than public but more than private
Security	Low: because of it openness i.e E-mail	Very High: because of its private nature	High	Medium
Location	Off-Premise	off or on Premise	off or on Premise	Off and on Premise
Managed by	Only Third Party(CSPs)	Single organization or CSPs	Several Organizations and CSPs	Both(organization and CSPs)
Cost of Implementation	No-Initial Cost	High-Initial Cost	(Depends on number of organizations)	Medium

2.2 Cloud Computing Adoption in Organizations

Use of cloud computing services

Vu et al. (2020) investigated the technological and environmental factors of country-level CC adoption by measuring a nation's per capita CC expenditure (CCE), and Sweden is the third highest country with the CCE of 355 USD in 2015, just behind Singapore (539 USD) and Australia (372 USD). Their study indicated that legal system quality and advanced digital infrastructure are the most prominent factors influencing CC adoption in both the short term and long term (Vu et al., 2020). Also, a country with a large services sector per GDP has an advantage in the current level of CC adoption but faces problems with CC adoption growth.

Most small and large industries are already utilizing CC to meet storage, traffic, and hardware requirements, as a result, CC has a big impact on society and business (Srivastava et al., 2018). According to the study (Kaminska and Smihily, 2018), in particular, a survey of 158,000 companies in the EU-28 reveals that as of 2018, just 26% of businesses had embraced CC, an increase from 19% in 2014. It is also found that the CC adoption rate varied by industry; it was highest in the information and communications sector (64%), but it was below 25% in the manufacturing, transport and storage,

retail, and construction industries (Kaminska and Smihily, 2018). Moreover, only a small number of businesses used more sophisticated CC programs, like computer platforms for proprietary software (23%), customer relationship management software (29%), and others.

As for specific cloud services adopted in the EU, the great majority (79%) of businesses adopting cloud computing solutions to host their email systems. About two-thirds used the cloud for storing files (68%) and for office software such as word processors and spreadsheets (61%). More than half used the cloud for security software (59%). Most importantly, these enterprises also used the cloud to access more advanced end-user software applications, such as financial/accounting (48%), customer relationship management (27%), and enterprise resource planning (24%). Of the most sophisticated cloud services, over half (59%) of the enterprises using security software applications, 47% hosted the enterprise’s databases in the cloud and one-fifth (21%) used a computing platform providing a hosted environment for application development, testing or deployment (Eurostat, 2021) (Figure 3).

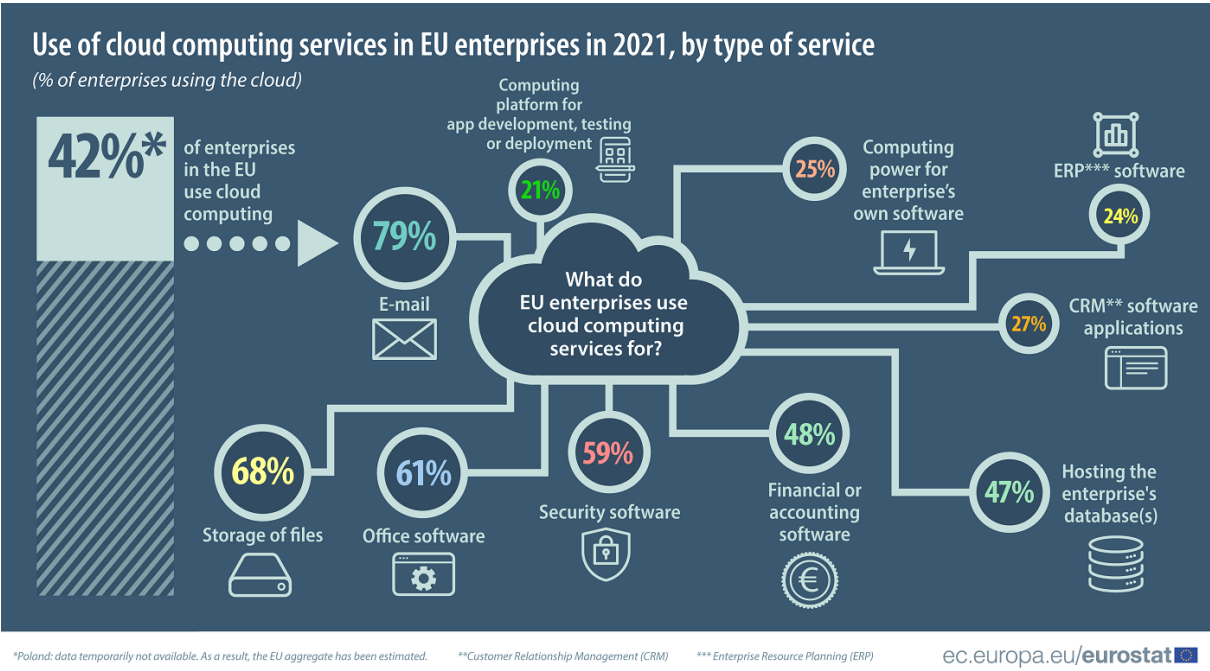


Figure 3 Use of Cloud Computing Services in EU Enterprises in 2021
 Note. From *Cloud Computing Used by 42% of Enterprise*, by Eurostat, 2021 (<https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20211209-2>). Copyright 2021 by Eurostat.

Opportunities for cloud computing adoption

Use of cloud computing has altered how companies run, offering a range of opportunities for companies of all sizes. It has given access to a variety of services and technologies while enabling companies to increase the efficiency, security, and cost-effectiveness of their operations. CC provides a new business solution by delivering resources and services via a user-pay system over the internet, allowing customers to rent information technology infrastructure, platforms, and software by locating their business applications and data storage in the cloud (Senarathna et al., 2018). The following are the main opportunities that CC provides.

- **Cost reduction:** Cloud services are cost-effective because the billing model is pay-per-use, and companies do not need to make an upfront investment in hardware and software, therefore, reducing maintenance costs (Rashid and Chaturvedi, 2019). M’rhaourh et al. (2018) also

indicated that CC enables companies to adopt ready-to-use application services through a “pay-as-you-go” model that saves cost, resources, and time.

- **Scalability:** Different companies have different IT requirements. A large company or organization would not have the same IT needs as a small business. Cloud-based services allow companies or organizations to scale up/down their business requirements easily and rapidly. When an organization requests improvement, it can easily be increased or decreased without having to invest in physical facilities or equipment (Rani et al., 2021). From the perspective of cloud providers, on the other hand, they can add new nodes and servers to the cloud with minor modifications based on the requirements (Rashid and Chaturvedi, 2019).
- **Productivity:** The use of cloud-based services can reduce the time and cost required to set up a data center. It also enables cloud providers to efficiently streamline day-to-day operations, allowing them to operate without the interference of outdated legacy systems. CC allows users to access data from all types of devices without the limitation of location or time, which is becoming necessary for the workplace (Rani et al., 2021; Rashid and Chaturvedi, 2019). According to Loukis et al. (2019), adopting SaaS had a considerable positive impact on operations and innovation, which improved business performance.
- **Application:** Due to its characteristics of resource sharing and easy management, CC can be applied in various fields. For example, 1) E-Learning. Students, faculty, and researchers can connect to their organization’s cloud and access data and information from there (Qasem et al., 2019). 2) Enterprise resource planning (ERP). When the business grows up, the management of applications, human resources, corporate finance, and transactions becomes costly and complicated. To address such issues, service providers can install ERP in the cloud (Rashid and Chaturvedi, 2019).
- **Flexibility:** The organizations can transfer the workloads to or from the cloud or different cloud systems to improve the usage of cost based on their requirements automatically. Moreover, users can autonomously change the functions of cloud services without having to consult each cloud professional (Rani, 2021). The pay-per-use model of CC also provides flexible costing options to companies, and users do not need to worry about having their own hardware and software or hiring experts to manage these resources (Rai et al., 2015; Rashid and Chaturvedi, 2019).

Examples of cloud computing adoption

CC plays different roles in different industries. For example, Bello et al. (2021) investigated the benefits of CC in the construction industry. According to their study, the economic benefits provided by CC are significant because of the low-profit margin and the lagging IT infrastructure in this industry. CC provides construction companies, especially SMEs, access to high-end computing infrastructure and applications that are affordable. Moreover, CC can offer IT resources based on the duration of a construction project with high-performance servers. The massive data storage and collaborative practices are also facilitated by CC, which improves the productivity and integration of the project team.

In higher education institutions, CC is rapidly being deployed and becoming an integral part of an institution. As higher education faces numerous issues, including an increase in student enrollment, the need for well-functioning IT infrastructures, the provision of affordable and accessible education services, and the improvement of educational quality. The characteristics of CC, such as flexibility, cost-effectiveness, and scalability, make CC adoption in higher education institutions popular (Qasem, 2019). The highly configurable nature of cloud technology, for example, forces teachers to develop a completely new teaching and learning method and context (González-Martnez et al., 2015). The

advantages of CC in collaborative working are also significant. Students and teachers can benefit from the tools provided by cloud technology, such as Google Drive, Box, and Microsoft online applications (Qasem, 2019).

Cloud computing adoption by large companies and SMEs

The study by Karunagaran et al. (2019) compared the CC adoption of large companies and SMEs in Germany. According to their study, the lack of know-how on bandwidth requirements to operate companies' IT and the lack of a performance measurement model for the cloud are the determinants of CC adoption in both large companies and SMEs. The lack of business processes, legal issues, on-premise IT, data protection, and security issues are also common barriers. As for large companies, self-service is one of the barriers, because large companies have the tradition of outsourcing some IT systems; therefore, it is difficult to configure their cloud version by themselves. Besides, organization structure and employee behavior are the barriers to CC adoption in large companies, especially when the employee team has an optimized way to do their work for a long time (Karunagaran et al., 2019). SMEs are more adaptable and inclined to implement CC due to their decentralized structure and lack of bureaucracy, whereas large firms can afford to implement CC and typically choose private clouds in line with their strategic plans due to limited resources (Ogunlolu and Rajanen, 2019).

Big companies are starting to build customized cloud networks tailored to their specific requirements, such as IBM and COFCO Coca-Cola. COFCO Coca-Cola decided to establish a private cloud platform at enterprise level and utilize cloud infrastructure to power their main ERP and CRM business systems (Cofco Coca-Cola: Private Cloud, 2017). Instead of utilizing those of common service providers, some very large companies find it profitable to provide private cloud networks (Varghese and Buyya, 2018).

2.3 The Technology Organization Environment Theory (TOE)

The TOE framework, one of the most popular theoretical frameworks used to explain technology adoption in businesses, was first developed by Tornatzky et al. (1990). According to the TOE framework, the process through which an organization adopts and implements technical innovations is affected by elements from three contexts: Technology (T) refers to organizationally relevant technologies; Organization (O) refers to the size, scope, and amount of internal spare resources; Environment (E) refers to the external environment in which an organization operates (Tornatzky et al., 1990). The TOE framework provides a comprehensive and holistic view of identifying the determinants of CC adoption. To analyze the adoption of information technology innovations, the TOE framework model is offering a framework that might be very beneficial (Oliveira and Martins, 2011). The TOE framework has been used in various research studies to investigate the adoption of CC (Hachicha and Mezghani, 2018; Martins et al., 2016).

The purpose of this study is to gather a deeper understanding of the determinants of CC adoption in a large company in Sweden. In this study, these determinants are analyzed by placing them into the TOE framework to highlight the different technological aspects such as cost, complexity, or performance, the organizational aspects such as structure, culture, and resources, and environmental aspects such as economic, political, and social when it comes to the adoption of CC in companies.

2.4 Determinants of Cloud Computing Adoption Identified in Previous Research Literature

CC has been widely adopted and utilized over the last few years. Decision-makers place a high value on CC adoption since it is crucial for enhancing a company's performance and for enabling them to improve its competitive position. With the growth of network communication, there are still some issues related to CC adoption. The determinants of CC adoption must therefore be addressed to persuade companies to adopt this technology. The determinants of CC adoption under the TOE framework are classified and presented below.

Technology Context

- **Security and privacy:** Data security is an important factor that should always be taken into account. Even after enforcing standard steps, large companies cannot guarantee the security of data (Rani et al., 2021). Firewalls across data centers (owned by companies) protect this sensitive information in existing models. In the cloud model, service providers are primarily responsible for data security, and companies must rely on them (Rashid and Chaturvedi, 2019). To cut costs and improve efficiency, businesses want to move their data to the cloud, but security concerns make this difficult (Chang et al., 2016). Cloud security and cloud data loss are issues that concern many companies (Bommadevara et al., 2018). CC adoption has been very popular and data security will be a key differentiator in the business world (Taleb and Mohamed, 2020). According to Alkhatir et al. (2018), security and privacy have a statistically significant direct impact on SMEs' motivation to adopt cloud technology, whereas their indirect impact is on larger-sized organizations. Data privacy hinders the wide adoption of CC because consumers have real concerns if their data is being disclosed by cloud providers and then used by third parties. These concerns are usually associated with the public cloud model, especially if cloud providers are located in another country (Hujran, 2018).
- **Cost-effectiveness:** Cost-effectiveness in terms of some aspects such as cost benefits, cost efficiency, cost of bandwidth (Perceived), or cost saving /reduction, etc., are the most frequently linked to cloud computing, and 94% of the research looking into this factor found that it impacted adoption decisions (Ogunlolu and Rajanen, 2019). Chang et al. (2020) stated that the research findings support the impact costs in determining the switching costs of private cloud company information systems, and costs are still seen as a major factor even if large businesses may have greater financial resources than SMEs. While cost reduction was the key consideration for SMEs to adopt CC, on the contrary, cost reduction had a small impact on CC adoption decisions for large companies (Karunagaran et al., 2019).
- **Compatibility:** Compatibility refers to how much an innovation or new technology is recognized as harmonious with current values, past experiences, and the requirements of future adopters (Rogers, 2003, p.15). Ogunlolu and Rajanen (2019) stated that compatibility such as compatibility with existing systems, compatibility values, practices, and needs have been found in the previous studies to be one of the important factors for CC adoption. Hachicha and Mezghani (2018) and Chang et al. (2020) demonstrated that compatibility was seen as a main factor that influenced organizational benefits in CC adoption. Users' intentions to move to personal cloud storage services were examined by Chang and Hsu (2019) and the findings revealed that the usability and compatibility of technology aspects encourage users to switch. The cloud is not seen as being technologically integrated and compatible or supported by regulations by large organizations (Karunagaran et al., 2019).

- **Complexity:** Complexity is defined as “the degree to which an innovation is perceived as relatively difficult to understand and use” (Rogers, 2003, p. 257). According to earlier studies, systems' benefits are increased by their simplicity of use (Hsu and Lin, 2016). It would seem complicated to adopt the cloud when several software modules are needed. The complexity of a business's decision to switch to a private cloud enterprise information system seems to have little impact (Chang et al., 2020). Gutierrez et al. (2015) stated that it was determined that CC complexity has a negative impact on organizational attitudes that the easier it is to use and the better their job performance, the less complicated CC is to use.
- **Trialability:** “Trialability is the degree to which an innovation may be experimented with on a limited basis” (Rogers, 2003, p. 16). The trialability of cloud computing services is identified by startups that need a lot of trial and error to launch their business, thus becoming a significant advantage in this scenario (Wu and Lee, 2021). It was discovered that trialability has a beneficial impact on SMEs’ and large companies’ decisions to adopt the cloud (Karunagaran et al., 2019).
- **Relative advantage:** The concept of relative advantage originates from Roger’s DOI (Diffusion of Innovation) theory, and it is defined as “the degree to which an innovation is perceived as being better than the idea it supersedes” (Rogers, 2003, p.229). Technology that demonstrates unambiguous advantages for strategic and operational effectiveness is more likely to be adopted by businesses and organizations (Oliveira et al., 2014). The relative advantage of cloud computing could be derived from aspects like improving business communications speed, coordination efficiency among companies, communication with customers, and effective access to market information (Skafi et al., 2020).
- **Uncertainty:** Uncertainty refers to the perceived problems or risks that a company faces to adopt CC services, the lack of knowledge about CC services that could result in unpredictable results (Alshamaila et al., 2013; Mohammed et al., 2016). In cloud computing, services and resources are subject to considerable uncertainties during provisioning (Tchernykh, 2019). It was found that SMEs adoption of CC services is highly dependent on the level of uncertainty (Alshamaila et al., 2013).
- **Technology Readiness:** Technology readiness, defined as technological infrastructure and IT human resources influences new technology adoption. Technological infrastructure indicates the existing technologies and enterprise systems, which give a platform that the CC applications can be built. IT human resources provide the knowledge and skills needed to implement CC-related IT applications (Oliveira and Martins, 2010; Low et al., 2011). The decision to employ cloud computing in organizations of all sizes was positively influenced by technology readiness (Alkhater et al., 2018). Legacy systems are a hindrance to technical readiness and should be taken into account when a company decides to adopt CC (Rolland et al., 2018).
- **Trust:** When it comes to businesses adopting cloud services, trust in cloud providers and cloud technology itself is crucial (Alkhater et al., 2018). According to Alkhater et al., (2018) trust issues could result from the lack of transparency and control over data stored in the cloud. For users to adopt IT, trust is a significant requirement (Hampshire, 2017; Alkhater et al., 2018). For the adoption of CC, the trust factor has been found crucial (Kandil et al, 2018; Yu et al., 2018; Min et al., 2015).

Table 2 The Summary of Technology Context Determinants of Cloud Computing Adoption

<i>Technology Context Determinants</i>	<i>Definition</i>	<i>References</i>

Security and privacy	<p>- Security is “preservation of confidentiality, integrity, and availability of information; in addition, other properties such as authenticity, accountability, non-repudiation, and reliability can also be involved” (ISO, 2022, p.5).</p> <p>- Privacy can be understood as “the appropriate use of personal information under the circumstances” (Swire and Bermann, 2007, p.31).</p>	Rashid and Chaturvedi, 2019; Rani et al., 2021; Chang et al., 2016; Bommadevara et al., 2018; Taleb and Mohamed, 2020; Alkhater et al., 2018; Hujran, 2018
Cost-effectiveness	Cost-effectiveness in terms of some aspects such as cost benefits, cost efficiency, cost of bandwidth (Perceived), or cost saving /reduction, etc. are the most frequently linked to cloud computing (Ogunlolu and Rajanen, 2019)	Chang et al., 2020; Karunagaran et al., 2019; Ogunlolu and Rajanen, 2019
Compatibility	Compatibility refers to how much an innovation or new technology is recognized as harmonious with current values, past experiences, and the requirements of future adopters (Rogers, 2003, p.15).	Ogunlolu and Rajanen, 2019; Hachicha and Mezghani, 2018; Chang et al., 2020; Chang and Hsu, 2019; Karunagaran et al., 2019
Complexity	“The degree to which an innovation is perceived as relatively difficult to understand and use” (Rogers, 2003, p. 257).	Hsu and Lin, 2016; Chang et al., 2020; Gutierrez et al., 2015
Trialability	“Trialability is the degree to which an innovation may be experimented with on a limited basis.”(Rogers, 2003, p.16).	Wu and Lee, 2021; Karunagaran et al., 2019; Alshamaila et al., 2013
Relative advantage	“The degree to which an innovation is perceived as being better than the idea it supersedes” (Rogers, 2003, p.229)	Oliveira et al., 2014; Skafi et al., 2020
Uncertainty	Refers to the perceived problems or risks that a company faces to adopt CC services, the lack of knowledge about CC services that could result in unpredictable results (Alshamaila et al., 2013; Mohammed et al., 2016).	Alshamaila et al., 2013; Tchernykh, 2019
Technology readiness	Technology readiness, defined as technological infrastructure and IT human resources influences new technology adoption. Technological infrastructure indicates the existing technologies	Alkhater et al., 2018; Rolland et al., 2018

	and enterprise systems. IT human resources provide the knowledge and skills needed to implement CC-related IT applications (Oliveira and Martins, 2010; Low et al., 2011).	
Trust	Trust is a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another (Rousseau et al., 1998).	Alkhater et al., 2018; Kandil et al., 2018; Yu et al., 2018; Min et al., 2015

Organization Context

- **Firm size:** According to Information system experts, larger companies typically have more readily available financial resources and are therefore better able to execute innovations (Iacovou et al., 1995). Some organizational and strategic scholars contend that large companies are more inflexible, bureaucratic, unable to adapt rapidly, and have more structural reluctance to adopt innovation (Whetten, 1987). Large companies may have more financial and labor resources, which could cause firm performance differences which is the advantage a business has over its competitors as a result of adopting CC into operations and processes (Khayer et al., 2021). According to Karunagaran et al. (2019), compared to SMEs, large companies are often deterred from adopting cloud computing due to various issues such as customization, high switching costs, data protection, security, taxation, and challenges related to organizational and employee behavior.
- **Top management support:** The current findings indicate that top management support is essential for cloud adoption, however, some organizations continue to struggle with a lack of top management support for adopting cloud technology. According to Gutierrez et al., (2015), top management support indirectly impacted the adoption of cloud CC in companies in the UK (Alkhater et al., 2018). According to a study in Saudi Arabia, some companies in the private sector of Saudi Arabia have challenges with top-level support for adopting CC. Moreover, it is stated that cloud adoption is not solely based on the decision of those in the IT department, and also it requires top management support (Alkhater et al., 2018). It is stated that top management support had a significant impact on the adoption of cloud ERP (AlBar and Hoque, 2019).
- **Attitude towards innovation:** Challenges or opportunities inside an organization are affected by its employees, and adoption of innovations may be hindered by employee resistance to information technology (Sharma et al., 2020). The "ease of use" aspect, as employees preferred not to employ cloud computing in preference of keeping with tried-and-true methods that are simpler to use because they are used locally. A reasonable explanation might have to do with method complexity, uncertainty, or a lack of documentation assistance from the methods (Bergström and Lundgren, 2019).
- **Organizational readiness:** Organizational readiness is defined as “an organization’s assessment of its state of being prepared for effective production or adoption, assimilation and exploitation of digital technologies for innovation” (Lokuge et al., 2019, p.446). Organizational readiness is formed by seven sub-constructs: resource readiness, strategic readiness, cultural readiness, IT readiness, values of stakeholders, cognitive readiness, and partnership readiness (Machado et al., 2021). De Sousa Jabbour et al. (2018) and Alshamaila

et al. (2012) both indicated that organizational readiness is one of the significant factors for CC adoption.

Table 3 The Summary of Organization Context Determinants of Cloud Computing Adoption

Organization Context Determinants	Definition	References
Firm size	The size of the company (Alshamaila et al., 2013).	Iacovou et al., 1995; Whetten, 1987; Khayer et al., 2021; Karunagaran et al., 2019
Top management support	“Devoting time to the [IS] program in proportion to its cost and potential, reviewing plans, following up on results and facilitating the management problems involved with integrating ICT with the management process of the business.” (Young and Jordan, 2008).	Gutierrez et al., 2015; Alkhater et al., 2018; AlBar and Hoque, 2019
Attitude towards innovation	Employees’ attitude towards new IT technologies (Sharma et al., 2020).	Sharma et al., 2020; Bergström and Lundgren, 2019
Organizational readiness	“An organization’s assessment of its state of being prepared for effective production or adoption, assimilation and exploitation of digital technologies for innovation” (Lokuge et al., 2019, p.446).	Machado et al., 2021; De Sousa Jabbour et al., 2018; Alshamaila et al., 2012

Environment Context

- **Regulatory and compliance restrictions:** Government regulations in some European countries prohibit the physical storage of customer personal information and other sensitive information outside of the state or country. In order to comply with regulations, cloud providers must establish a data center or a storage site solely within the country. Having such infrastructure is not always feasible, and it is a significant challenge for cloud providers (Rashid and Chaturvedi, 2019). The banking industry and the public sector are not completely supported by Indonesian government regulations in adopting CC outside of Indonesia since The Republic of Indonesia must host data centers for services involving electronic transactions (Adiyasa et al., 2018). However, the regulatory force such as government regulation or government policy has a considerable impact on increased perceived benefits of company CC adoption through a more reasonable method (Hsu, 2020).
- **Service level agreement:** Customers must have guarantees from suppliers on service offerings, typically, these are provided through Service Level Agreements (SLAs) negotiated between providers and customers (Ahmed and Litchfield, 2016). The very first issue is defining SLA specifications with an appropriate level of granularity, namely the tradeoffs between expressiveness and complicatedness, so that they can cover the majority of consumer

expectations while remaining relatively simple to be weighted, verified, evaluated, and enforced by the cloud resource allocation mechanism (Dillon et al., 2010). SLA plays a significant role and has a positive impact on CC adoption (Alqarni and Barnawi, 2019). SLAs are a big, important factor in cloud computing security, according to prior studies (Ali et al., 2020). Municipalities and large companies in Sweden were examined in order to address the issue of conducting information security risk assessment on cloud solutions by Faizi et al. (2021). In this study, it is revealed that companies put a lot of effort into identifying information assets, partly because it is crucial to ascertain what data is being used by which services because there is some uncertainty over what can be kept on a cloud service. The findings also emphasized how crucial it is for cloud service providers and the companies employing them to have a clear understanding of one another and a well-written legal contract (Faizi et al., 2021).

- **Vendor support:** One of the key determinants of cloud computing adoption is vendor support. Despite the fact that large organizations have their own internal IT professionals, they still need vendor advice and support. Companies require vendor support to get dependable and up-to-date support because cloud computing is still relatively new and rapidly developing. Previous research has discovered that vendor support can assist in improving organizational benefits (Hachicha and Mezghani, 2018). Chang et al. (2020) demonstrated that vendor support enhances cloud computing switching benefits. Ogunlolu and Rajanen (2019) conducted a literature review on CC adoption in organizations and vendor trust was seen as a positive determinant in various aspects such as trust in providers, trusted brands, vendor lock-in, vendor support, vendor trust, or vendor's clients, etc.
- **Competitive pressure:** Cloud computing has become a vital component in maintaining high performance and increasing competitiveness (Baldini et al., 2017). Companies that choose not to participate in this initiative will probably be less competitive. Increased industry competition is more likely to affect how quickly a company adopts new technology, which will improve its performance (Bhardwaj et al., 2021).
- **Standardization of cloud technologies:** The standardization of cloud technology is one of the external variables impacting the adoption of CC (Ho and O'Sullivan, 2017).
- **Government/Institutional support:** Public resources that are supportive of CC adoption are among other external factors (Ilin et al., 2017). The study's findings suggest that governments are essential in encouraging the use of CC (Vu et al., 2020; Christiansen et al., 2022). The Swedish government provides a 97 percent tax rate reduction for electricity use for data centers and local government officials quickly embrace the new sector into regional developmental activities. (Vonderau, 2018). Institutional influences have a positive effect on the perceived technological characteristics of CC (Saya et al., 2010). Business transactions become more difficult and risky when institutional gaps exist in a country, which reduces global competitiveness, particularly in developing nations (Kostova and Marano, 2019). In particular, an institutional environment with a robust legal system is anticipated to increase company confidence and reduce risk perceptions associated with adopting new technology, such as CC (Hashem et al., 2015). It is stated by Vu et al. (2020), a country and its business sectors risk being locked at a degree of CC adoption that is low compared to that of its competitors globally and below its potential without prompt and effective promotion methods. Also, in order to address the additional determinants of CC adoption identified in the study, the promotion strategy should extend beyond the supply of digital infrastructure (broadband and internet)(Vu et al., 2020).
- **Broadband and internet/Digital infrastructure:** The internet providers take steps to enhance the quality of their broadband and internet services. The capacity to accommodate the rising

global demand for speed and storage space is necessary for cloud computing services (Dempsey and Kelliher, 2017.) To promote CC adoption, high-quality digital infrastructure investment should be one of the highest strategic priorities (Vu et al., 2020).

Table 4 The Summary of Environment Context Determinants of Cloud Computing Adoption

Environment Context Determinants	Definition	References
Regulatory and compliance restrictions	Governmental involvement for framing the policies with the regulatory frameworks (Oke et al., 2021).	Rashid and Chaturvedi, 2019; Adiyasa et al., 2018; Hsu, 2020
Service level agreements	Customers must have guarantees from suppliers on service offerings, typically, these are provided through Service Level Agreements (SLAs) negotiated between providers and customers (Ahmed and Litchfield, 2016).	Ahmed and Litchfield, 2018; Dillon et al., 2010; Alqarni and Barnawi, 2019; Ali et al., 2020; Faizi et al., 2021
Vendor support	Support from relative association (Stockdale and Standing, 2006).	Hachicha and Mezghani, 2018; Chang et al., 2020; Ogunlolu and Rajanen, 2019
Competitive pressure	The level of pressure from competitors in the same sector (Alshamalia et. al, 2013).	Baldini et al., 2017
Standardization of cloud technologies	“Standards help provide evaluated scientific and engineering information in the form of publications, electronic databases, terminology, and test and measurement methods for describing, quantifying, and evaluating product attributes” (Tassey, 2000, p.4).	Ho and O’Sullivan, 2017
Government/Institutional support	Policy, incentives, and actions established by the government (Dahnil et. al, 2014).	Ilin et al., 2017; Vonderau, 2018; Saya et al., 2010; Kostova and Marano, 2019; Hashem et al., 2015; Vu et al., 2020; Christiansen et al., 2022
Broadband and internet/Digital infrastructure	The term "digital infrastructure" refers to any electronic and non-electronic assets that are used for delivering broadband services to users (Amaglobeli et al., 2023).	Dempsey and Kelliher, 2017; Vu et al., 2020

3 Research Methodology

This chapter justifies the chosen research strategy, data collection method, and data analysis method and describes how they were applied during this study. Ethical considerations are also covered in this chapter.

3.1 Choice of Research Method

3.1.1 Research strategy

A research strategy is a comprehensive plan for conducting a research study and provides guidance to researchers in how to plan, execute, and monitor the study (Johannesson and Perjons, 2014, p.39). It also provides support on a high level, but it needs to be complemented with research methods that can guide the research work on a detailed level. According to Denscombe (2014), several strategies are appropriate for researchers' needs, including surveys, case studies, phenomenology, ethnography, action research, and mixed methods. Numerous research strategies were looked into, though not all were obviously appropriate for the circumstances. There is no “good” or “poor”, or “correct” or “wrong” research strategy, but it is preferable to consider the approaches in light of their applicability and relevance to our work (Denscombe, 2014).

For this study, in order to investigate and identify the determinants of CC adoption in a large company in Sweden, **case study** was chosen as the most appropriate research strategy. As stated by researchers (Vu et al., 2020; Hashem et al., 2015; Khajeh-Hosseini et al., 2010), researchers may obtain an in-depth understanding of the factors, challenges, or determinants related to cloud computing adoption by investigating specific examples and making use of a variety of data gathering techniques. A case study focuses on one example of a phenomenon to be investigated and offers a sufficient, in-depth description and insight into that example. Case study provides the chance to look into enough detail to unearth the complexity of a scenario since it explores things in-depth. It assists in learning how the various components interact, making it more comprehensive than concentrating on individual variables. Case study also gives researchers the chance to look into many different kinds and sources of data (Johannesson and Perjons, 2014, p.45). A professionally written case study about a company tells a true story that most researchers can relate to (Myers, 2019). A typical example in the social sciences can be a person, a firm, a department within an organization, a project, an information technology system, or a rule (Johannesson and Perjons, 2014, p.45). Furthermore, through studying previous literature, we found that most of the relevant studies have used case study as the research strategy.

The Survey, phenomenology, and ethnography are the alternative strategies, as they don't serve the intended purpose of our study. They are not suitable for our study because our goal is to explore the experiences of our participants and develop a deep understanding of their perspectives. These strategies do not provide the necessary depth of understanding. **Surveys** perform best when researchers want factual information: what they do, what they think, and who they are. However,

surveys have some drawbacks, such as focusing on data more than issues, problems, or theories, lacking detail or depth on the topic being investigated, and a low response rate (Denscombe, 2014). **Phenomenology** is a research strategy that focuses on people's perceptions, experiences, feelings, and emotions (Johannesson and Perjons, 2014, p.51). Phenomenology strategy seeks to describe and understand people's lived experiences in order to provide insights into the problem under investigation. However, phenomenology lacks scientific rigor, is associated with description and no analysis, and focuses on the mundane features of life (Denscombe, 2014). Therefore, phenomenology is not a good selection for this study, because it focuses too much on an individual's feelings and perceptions, which cannot provide objective and scientific results to some extent. **Ethnography** is about describing people or cultures. The research process requires researchers to stay in one place for a long period of time and try to live as a resident. Within the IT area, ethnography is suitable for studying the everyday work of programmers and the development of information systems (Johannesson and Perjons, 2014, p.46). The ethnography research strategy also has some limitations and drawbacks. A major concern is that researchers can never be objective, and they usually interpret based on their own culture and background. Another drawback is that the results of the ethnographic study can easily become interesting stories but not provide analytical insights (Johannesson and Perjons, 2014, p.46). Therefore, ethnography is not suitable for this study because researchers are not able to work in this company to collect data.

3.1.2 Data collection methods

For any empirical research study, collecting data about the phenomenon under investigation is a key activity. The common data collection methods are questionnaires, interviews, focus groups, observation studies, and document studies (Johannesson and Perjons, 2014, p.55). In these research methodologies, several sources of evidence are utilized, with the evidence often coming from interviews and recordings (Myers, 2019). **Interview** is the method of data collection that will be used in this study, which involves a series of steps in which interviewers prepare questions to ask interviewees (Willis, 2012). Research interviews emphasize self-reports, that is focusing on "what people say they do, what they say they believe, and what opinions they say they have" (Denscombe, 2014). There are usually two main types of interviews, structured interviews and semi-structured interviews (Brinkmann, 2014). According to Brinkmann (2014), structured interviews involve the process in which interviewers ask questions strictly based on the questionnaire, while in **semi-structured** interviews, interviewees can go beyond the questionnaire or structure as long as the conversation remains within the subject area of the research. In this study, to get a better understanding of the determinants of CC adoption in a large company in Sweden, **semi-structured** interviews will be used during the data collection processes.

Alternative data collection methods are **questionnaire, focus group, and observation**, but they are not suitable for this study. **Questionnaire** is typically used to collect straightforward, brief, and unambiguous information (Johannesson and Perjons, 2014, p.55). In this study, questionnaire, as a data collection method, is rejected due to the limited time, resources, low response rate, and difficulty reaching a large number of respondents who have knowledge of CC adoption. Another disadvantage of questionnaires is that obtaining a high response rate can be difficult (Johannesson and Perjons, 2014, p.56). **Focus group** is a data collection method in which a group of participants discuss a specific topic (Johannesson and Perjons, 2014, p.58). This data collection method is inappropriate for this study since the results obtained from focus groups are often highly dependent on the interpretation and analysis of researchers. Additionally, during the session, strong or powerful participants may have an influence on other participants. Therefore, focus groups might not be useful for understanding the

opinions of every participant (Johannesson and Perjons, 2014, p.58). **Observation** indicates that researchers directly observe phenomena (Johannesson and Perjons, 2014, p.59). But observation is not suitable for this study, because researchers are unable to observe participants' daily work. Also, this method highly relied on the researchers' competence and experiences (Johannesson and Perjons, 2014, p.56).

The literature review was used for additional data collection from published documents, such as research papers. It involves selecting the relevant public or unpublished documents that provide information, thoughts, and proof relating to the subject from a particular angle (Young, 2017). Several academic web databases, including the ACM Digital Library, Google Scholar, and IEEE Explore, were examined to analyze this study project. The goal was to obtain a precise background picture that could encompass all the essential elements of the determinants of CC adoption in a large company in Sweden.

3.1.3 Data sampling

Sampling refers to the process of selecting a subset of items from a defined population for inclusion in a study. Individuals are the most common sampling unit in social and behavioral research, but sampling units can also be groups, events, or places (Guest et al., 2013, p.41). The most common sampling methods used in qualitative research are purposive sampling, quota sampling, and snowball sampling (Mack et al., 2005). In **purposive sampling**, a participant is one whose characteristics are defined for a purpose that is relevant to the study (Andrade, 2021). **Quota sampling** is considered a type of purposive sampling, but researchers decide how many people with characteristics to include as participants (Mack et al., 2005). **Snowball sampling**, also known as chain referral sampling, participants who have already been in contact with the researcher use their social networks to suggest other persons who might be able to participate in or contribute to the study (Mack et al., 2005). In this study, **snowball sampling method** was used because the most efficient way to find participants was through LinkedIn and researchers' private connections. Furthermore, the **purposive sampling method** was also used according to the purpose of this study. The participants were carefully chosen using purposive sampling technique to ensure the representation of employees with sufficient experience and knowledge in the fields of cloud computing and IT. For this reason, the case study involved interviewing relevant employees from Company X, which meets the criteria set by Eurostat for a large company. Furthermore, the selected participants possess expertise in cloud computing, cloud architecture, cloud development, cloud software engineering, cloud migration, DevOps, data science, data engineering, and AI.

3.1.4 Data analysis methods

Qualitative data analysis is mainly about analyzing talk and text, and there are several data analysis methods. **Content analysis** can be used with writing, sounds, or pictures. It is a method of quantifying the contents of the text. The idea is to categorize text elements and then calculate the frequencies of the elements in each category (Denscombe, 2014). But, the content analysis only addresses individual units, not the relationships of units, thus it is not suitable for studying complex topics (Johannesson and Perjons, 2014, p.65). **Grounded theory** method is typically used for analyzing interview transcripts, and it involves an in-depth investigation of the text and a gradual process of coding and sorting the data. The purpose of grounded theory is to generate concepts and theories that capture the underlying meaning of data (Denscombe, 2014). Apart from these, **discourse analysis** is also used for analyzing qualitative data. Unlike content analysis, discourse analysis aims at digging into the implicit

and hidden meanings; that is, the text never objectively represents the real world but plays a part in creating and maintaining the world. However, discourse analysis is highly dependent on the researcher's capabilities (Johannesson and Perjons, 2014, p.66).

Thematic analysis is the most suitable data analysis method for this study. **Thematic analysis** is a method for identifying, analyzing, and reporting patterns within collected data (Braun and Clarke, 2006). It illustrates which themes are important in the description of the phenomenon under study. The result of a thematic analysis should highlight the most significant perspective present in the dataset (Joffe, 2011). Thematic analysis, according to Nowell et al. (2017), displays several advantages. Thematic analysis is highly flexible and can be modified to meet the needs of many studies. For new researchers, thematic analysis is easy to understand and quick to learn. Thematic analysis is also useful for summarizing key features of a large data set because it forces the researcher to handle the data in a well-structured manner, resulting in a clear and organized final report (King, 2004).

3.2 Application of Method

3.2.1 Application of case study

This study investigates the determinants of CC in large companies in Sweden. The case study was conducted by interviewing relevant employees from Company X, which meets the large company standards defined by Eurostat. According to their agreement, the company and participants have decided to remain anonymous. Based on the information from the company's website, cloud software, and services play an important role in the company's portfolio, and the main services are business and operations support systems, cloud core, cognitive network solutions, network management, network management services, and transform business. For example, the traditional business support systems and operational support systems are siloed and fragmented, to support successful service evolution, a pre-integrated suite of products and solutions work together cohesively, tightly integrated end to end, yet loosely coupled for the benefits of modularity. Cloud core is another important cloud service of Company X. It establishes reliable connectivity, voice, video, and web communication, determines the quality of service, and enforces it through policy. In short, it is the business enabler of mobile broadband and IoT networks for consumers and companies. Apart from these, Company X also provides cloud infrastructure architecture that delivers its services through various models, for example, IaaS, PaaS, and SaaS.

3.2.2 Data collection

Most of the participants in this study have experience in working on the cloud and cloud migration. To collect more details on cloud computing adoption in company X, we also interviewed IT personnel who provided relevant information. The interview questions were sent in advance to the interviewees. Seven interviewees have been reached through the snowball sampling method and purposive sampling method, and all the interviews have been conducted through Zoom. Interviewee 1 was reached through LinkedIn, and interviewee 2 and interview 3 were reached through researchers' private connection. Interviewee 4 and interviewee 5 were introduced by interviewee 2. Interviewee 6 and interviewee 7 were introduced by interviewee 1. Among the participants, interviewee 2 and interviewee 3 have management experience. The information of interviewees is displayed in Table 5. During the interviews, one researcher asked the questions and one researcher shared the screen to make sure the interviewer and interviewee knew the details of each question. After interview 6, researchers noticed

that the same responses started coming out repeatedly; for example, interviewee 5 and interviewee 6 both stated that cost is not that important when adopting cloud computing. Achieving saturation may differ based on the number of interviews taken. When performing a case study, data saturation is often thought to be accomplished when no new findings or themes appear (Fusch and Ness, 2015; Guest et al., 2006). According to Guest et al (2006), depending on the population sample size, data saturation can be achieved in as few as six interviews. Since we reached data saturation after doing seven interviews, conducting additional interviews was no longer needed.

To achieve data triangulation for this study, different sources of data were used. Undoubtedly, incorporating triangulation, which involves using multiple sources of data, will significantly enhance the reliability of the findings (Stavros and Westberg, 2009). Data was mainly collected through interviews. Interviews are one approach for reaching data saturation in a study (Fusch and Ness, 2015). As mentioned earlier, a literature review was also used for additional data collection from research papers. Apart from these, researchers also collected some useful information from Company X's website, such as product introductions, businesses, and services, news, and trends.

Table 5 Interview Information

Participants	Participant's Title	Time Duration	Years of Experience in CC	Years of Experience in IT	Interview Date
Interviewee 1	Cloud developer	43 min.	3	3	22.03.2023
Interviewee 2	Data science engineering manager	45 min.	6	20	01.04.2023
Interviewee 3	Product owner	40 min.	2	20	03.04.2023
Interviewee 4	Data scientist	45 min.	7	20	13.04.2023
Interviewee 5	Data scientist	40 min.	5	10	19.04.2023
Interviewee 6	Radio algorithm developer	40 min.	1	1,5	19.04.2023
Interviewee 7	Software developer	38 min.	1	2	19.04.2023

3.2.3 Data analysis procedure

In this study, the data collected through interviews were analyzed using **thematic analysis** method, which focuses on understanding and interpreting meaningful patterns in qualitative data. For assessing qualitative data, thematic analysis is one of the most widely used methods and a very adaptable strategy that may deliver rich and detailed data, consequently (Nowell et al., 2017). In this study, audio recordings of the Zoom meeting interviews were saved. The recorded interviews were converted automatically into written documents by using iFlytek transcription software tools, and the transcripts were edited by correcting unclear or missing audio lines by listening to the recordings. The thematic

analysis was finally done to find themes or patterns in the data that were relevant or captivating. The data analysis example through thematic analysis can be seen in Table 6.

There are mainly six phases of thematic analysis.

- Researchers are required to familiarize the data. Researchers need to immerse themselves in the data and understand the depth and breadth of the content. This process usually involves “repeated reading” or transcription of verbal data to text.
- The second step is generating initial codes. According to Saldana (2015), code symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data. Thus, the process of coding is part of the analysis in which you organize your data into meaningful groups. In thematic analysis, this step involves highlighting sections of our text, usually phrases or sentences, and coming up with shorthand labels or “codes” to describe the content (Caulfield, 2021).
- The third step is searching and generating themes after all data have been initially coded and collected. This process involves identifying patterns among codes and coming up with themes. Themes are generally broader than codes. Most of the time, researchers should combine several codes into a single theme.
- The fourth step is reviewing themes, which also indicates the process of refinement of those themes. For example, some themes are not themes, and others might collapse into each other. This phase involves two levels of reviewing and refining. In level one, researchers should review the data extracts for each theme and consider whether these themes could form a coherent pattern. Level two is the process of considering the validity of individual themes in relation to the data set. To sum up, in this phase, researchers should split, combine, discard, or create new themes if necessary.
- The fifth step is defining and naming the themes. Researchers should identify the essence of each theme and determine what aspects of the data each theme captures, and this step usually involves going back to collated data extracts for each theme. By the end of this step, researchers should be able to define those themes.
- The final step is producing the report. The purpose of the report is to transfer the complex data into some content that is meaningful to readers and present the merit and validity of this research (Braun and Clarke, 2006).

Table 6 Data Analysis Example Through Thematic Analysis

Codes	Sub-theme	Theme
<p>“ I think that firm size is definitely a determinant. It is the determinant that affects the duration of the CC transformation. So if it is a startup, it is faster and easier. But a large company has different procedures. It's gonna take more time. And also, a little bit is the mindset of the company's transformation and adaption of new technologies.” (Interviewee 2)</p> <p>“With the firm size of a big company, it is hard to organize the company to achieve this, to make these cloud-native publications real. Because it's a big party</p>	Firm size	Organization context

<p>and it is not so easy to move compared with some startups. In such a company, you have to be organized and distribute the awareness, and the information in a good way to all the other units.” (Interviewee 3)</p> <p>“In my opinion CC adoption of small firms would be more successful in this way because I feel like they are fully cloud computing. They don't have any real machines in there.” (Interviewee 1)</p>		
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3.3 Research Ethics

For qualitative research, research ethics should be considered throughout the whole process. According to Orb et al. (2001), the research process creates tension between the aims of discovering generalizations and the rights of participants to maintain privacy. The difficulties in qualitative research can be alleviated by awareness and use of well-established ethical principles, which are autonomy, beneficence, and justice. (1) Autonomy. According to Capron (1989), he considered that respect for people is the recognition of participants’ rights, such as the right to be informed about the study, the right to freely decide whether to join a study, and the right to withdraw at any time without penalty. In a qualitative study, this principle is achieved by informed consent. (2) Beneficence. This ethical principle indicates doing good for others and preventing harm. For example, if researchers are maintaining the principle of beneficence, the use of pseudonyms should be considered. (3) Justice. This principle refers to equality and fairness. One of the crucial and distinctive features of this principle is avoiding exploitation and abuse of participants (Orb, 2001). As Johannesson and Perjons (2014) highlight that researchers must find a compromise between the following principles and the prospective advantages of a research effort. “Protect the Interests of Participants, Ensure That Participation Is Voluntary and Based on Informed Consent, Operate Openly and Honestly, and Comply with Laws” are stated as four principles. In this study, participation was entirely voluntary and offered the option to withdraw at any moment, and also the consent form was sent to the participants before the interviews. No conflicts of interest existed as well. The use of offensive or other negative language was avoided during the interviews. It took into account the identity and privacy of the respondents. The interviewer didn't ask any personal questions or for any other information.

4 Results and Analysis

In this chapter, the outcomes of the study carried out on the gathered information are disclosed. This research investigates and characterizes the determinants of CC adoption in a large company in Sweden. 30 determinants as sub-themes were found after thematic analysis of the data gathered from interviewees of Company X. The TOE framework was used to categorize the sub-themes into themes. They were listed into three themes: technology context, organization context, and environment context.

4.1 Thematic Map

The 10 new sub-themes were listed, and they are: *robustness; perceived usefulness; perceived ease of use; innovativeness and top management background; knowledge and training; the type of business/sector; organization policy, mission, and vision; industrial structure and social innovativeness; customer pressure and constraint; geographical locations/data centers*. The 20 sub-themes of CC adoption in a large company in Sweden that are relevant to earlier literature are as follows: security and privacy; cost-effectiveness; compatibility; complexity; scalability and flexibility; trialability; relative advantage; uncertainty; technology readiness; trust; firm size; top management support; attitude towards innovation; organizational readiness; service level agreements; vendor support; competitive pressure; standardization of cloud technologies; government/institutional support; broadband and internet/digital infrastructure.

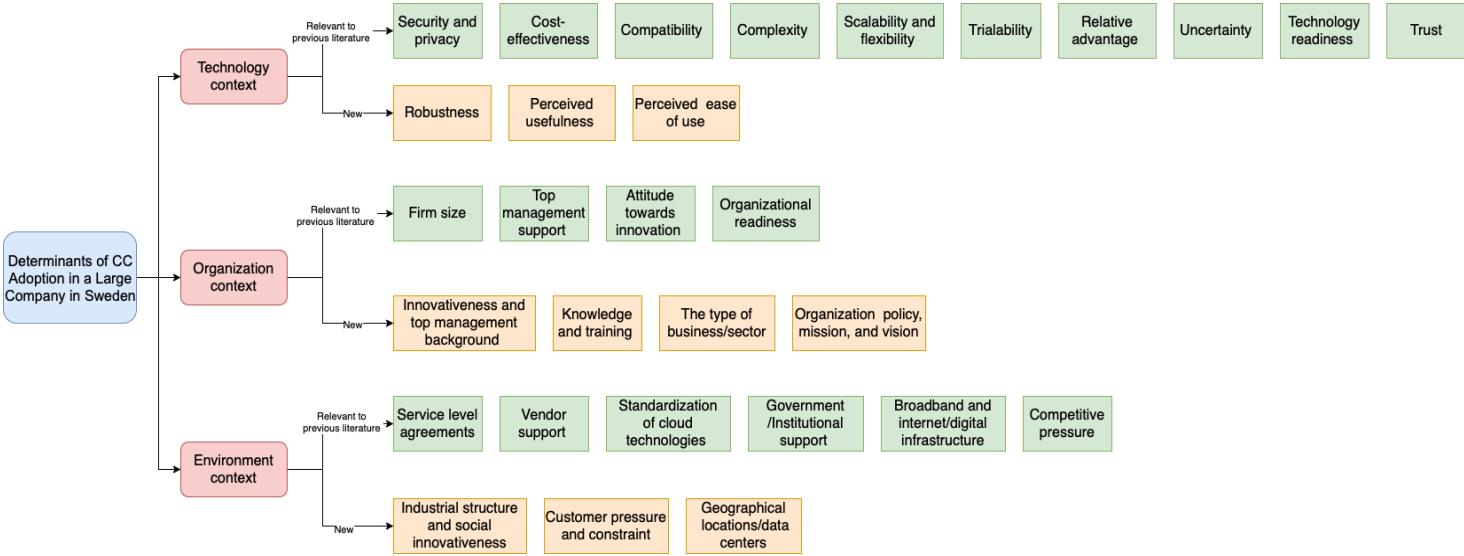


Figure 4 Thematic Map of Themes and Sub-themes Identified in Company X Regarding Cloud Computing Adoption

The themes and sub-themes found are illustrated in Figure 4. The themes have been marked with the color pink, and the sub-themes that are relevant to earlier literature are highlighted in green, additionally, new sub-themes have been colored orange. All the identified sub-themes of cloud computing adoption in a large company in Sweden are presented in the next sections.

4.2 Technology Context

4.2.1 Security and privacy

Almost all the interviewees have mentioned that security and privacy are important issues when it comes to CC adoption in their company. Interviewee 1 stated that Company X is mainly using private cloud currently, and she thinks the reasons behind this are related to security issues. She also believes security is the most important thing in Company X.

Interviewee 2 indicated that *“We’ve been developing everything on prime or private clusters so far. From a security and privacy perspective, basically, you can handle all the firewalls and all the security stuff by yourself, take care of yourself. But when it comes to the public cloud, you are relying on either AWS, Azure, or Google, and you need to make sure that they have the security that your industry is asking for.”*

Interviewee 4 stated that *“Security and privacy are the main concerns for Company X because we are working with customer’s data and client’s data, so we should be very careful with that. Privacy and security are very important.”*

Interviewee 5 added, *“Security and privacy are important, I would say.”*

Interviewee 6 agreed that Company X is using private clouds due to security and privacy issues, and he did not believe Company X will deploy too much public cloud because their customers are not willing to provide too much data to them.

4.2.2 Cost-effectiveness

Interviewees expressed different opinions about cost-effectiveness. Only one interviewee believed that if cloud computing could reduce some costs, then it would be a determinant. Interviewee 1 stated that *“From my point of view, I think cost reduction is critical.”*

However, interviewee 2 expressed some complicated opinions about cost, and he believed the cost was related to many aspects. He added, *“Cost reduction is a little bit dependent on the project type of the stuff you deliver. For instance, there might be cases where your private cloud becomes costly because you need people to maintain it. You need to have a budget for that. But let’s say you are using CC everyday, then it’s cheaper and easier to use your private setup. Cost is really dependent on what you want to do, how you want to do it, and the available resources in your company.”*

Interviewee 3 and interviewee 5 both expressed uncertainty about the cost-effectiveness or cost reduction. Interviewee 3 stated that *“I’m not sure if it reduces cost at the moment, and we have a lot of features that we have to develop, so making the product ready for the cloud brings in a lot of extra*

costs. *There is a margin, we will spend more and more money to some point, and then it might reduce the cost. But currently, I see that it is something that increases the cost.*” Interviewee 5 added that *“This thing about cost reduction is a bit controversial. It’s still not clear whether there is less cost in going to the public cloud in the beginning because you don’t have to buy servers. But if you have a big application and you’re running it for 3 or 4 years, maybe it’s cheaper to actually have an on-premises cloud instead of a public cloud. So, it is not clear whether there is a long-term cost reduction.”*

Interviewee 4 and interviewee 6 expressed disagreement about cost-effectiveness. Interviewee 4 stated that *“I guess cost is not the main one.”* Interviewee 6 discussed that *“For cloud computing, it is more software related. I think the cost will not be that important. I’m focusing on hardware. Hardware will cost much more than software. For hardware development, we will consider cost as the first factor. But for cloud computing, I don’t think it (cost) will be considered as a very important factor.”*

4.2.3 Compatibility

Compatibility was mentioned by interviewees. Interviewee 2 stated that *“Whatever you produce, you need to be compatible with your previous work as your legacy work needs to be handled. That means you may need to change some of your routines or services to be compatible with these clouds, and when it comes to different clouds, you need different settings depending on what you use on those platforms.”*

Interviewee 5 stated that *“I have not seen any instance where compatibility was a reason why we did not move to the cloud because we have been using a very robust or flexible software stack already.”*

Interviewee 6 believed that compatibility is a very important factor for all technologies, not just cloud computing.

4.2.4 Complexity

On the whole, six interviewees discussed complexity. Interviewee 1 and interviewee 4 believed that if cloud computing is very complex, then it might be a drawback and people would have less courage to adopt it. Interviewee 6 added that *“Complexity is also important, the simpler the structure, the better.”*

Interviewee 5 believed that working on the cloud was more complicated than working on a local machine. *“Working on the cloud and the workflow are more complex than just writing code on your local machine...You have to think about a lot of other things behind the scenes. When you’re working on the cloud, there are a lot of background services and microservices, and when you are setting it up and running, it actually requires a bit more effort and more complexity.”* He stated.

4.2.5 Scalability and flexibility

Four interviewees have discussed scalability and flexibility, and they both indicated scalability and flexibility are important when adopting cloud computing. Interviewee 3 believed that the most important thing could be flexibility, and added, *“When you have the product in the cloud, you become very flexible. Your product can be a puzzle piece. So, cloud computing brings a lot of flexibility. I think flexibility is the greatest strength of CC.”*

Interviewee 2 discussed that *“Scalability, that’s really a game-changing thing. That may be the main thing because you have basically unlimited resources that you can use. So, this gives you scalability*

and flexibility.” Interviewee 4 also indicated that scalability is an important issue that they would consider.

Interviewee 5 added that *“I would say the main reason for adopting CC is productivity and flexibility...You can scale up and scale down as you want. That’s quite important. So, flexibility and scalability are important.”*

4.2.6 Robustness

According to interviewee 4 and interviewee 5, robustness is a determinant of cloud computing adoption. Interviewee 4 stated that *“I guess you also have something related to robustness. This might be another determinant...We basically want to make sure that is working if they deploy our software. It doesn't fail, for instance, it shouldn't face any other memory issue or some other issue related to the cloud. We want to have a kind of steady performance for our service... but by robustness, it's a kind of environment where basically we are sure that continuously we get our products, services, or software up and running. There is no issue with that, I don't know, like a memory usage, or a shortage of memory or some other issue related to the hardware.”*

Interviewee 5 explained that *“It is robust and quite scalable. So it has a lot of advantages. So I really like using the cloud... Robustness, absolutely. There are a lot of issues with these local clusters going down and not being made properly. Whereas these public clouds are maintained much better. So, yes, robustness is also important.”*

4.2.7 Trialability

Overall, the interviewees agreed that trialability is not a determinant of cloud computing adoption in Company X. According to their observations, many businesses decide to adopt cloud services based on different factors, such as security, privacy, or trust.

Interviewee 2 discussed that *“Trialability is important in some instances, although it is not always important. Trialability can also cost money and take a lot of time. A business might not have the funds available to invest in a trial period.”*

Interviewee 3 stated that *“Trialability comes later on, and as you proceed and you deploy your products, and native applications, then you realize that there are some cost issues.”*

Interviewee 5 highlighted, *“Is that on an experimental, limited basis? I don't see that trialability is specifically relevant to the cloud. So trialability is important in some sense. You want to try it. However, I don't know if moving to the cloud makes it easier or more difficult. I don't see a big difference.”*

Interviewee 6 added that *“I think it is not so important.”*

4.2.8 Relative advantage

The relative advantages of adopting cloud computing at Company X were viewed as a factor overall. There was general agreement that cloud computing has many advantages for remaining competitive in the sector, including accessibility, better collaboration, and making wise choices by considering their needs.

Interviewee 1 stated that *“I think that complexity and also relative advantage related to the business are important determinants, because if it doesn't have any advantage, why do we do the cloud-native adoption?”*

Interviewee 2 stated that *“Relative advantage is an essential component when considering cloud computing adoption. Companies can make wise choices about cloud computing solutions based on their needs by acknowledging their advantages as well as drawbacks.”*

Interviewee 5 stated that *“This relative advantage determinant can be important. Maybe we can see the difference in some sense, I would say because one benefit of the cloud is that we can scale up quite fast, which means we can compare with baselines in a better way. So we can have more metrics about this relative advantage. So especially in projects where we want to see whether you're making good progress, maybe it's good to be on the cloud because you can have baselines. You can compare them automatically using some Continuous Integration and Continuous Delivery (CICD) information or something. Yeah, so it's not a direct determining factor, but it is something that impacts whether you would move to that cloud or not.”*

Interviewee 6 stated that *“Relative advantage is important, especially for being competitive in the sector.”*

4.2.9 Uncertainty

Based on the interviewees, some of them indicated that various uncertainties, including the difficulty of evaluating the effectiveness of cloud solutions' offerings, may make it difficult for large businesses to use cloud computing. However, it is noted that despite some ambiguities, most people are open to using cloud technology and are generally aware of its benefits. Also, the significance of recognizing and managing uncertainty is underlined when making decisions for future development in cloud computing adoption.

Interviewee 2 explained, *“Yeah, definitely! So we are not fully sure. For instance, there are different offerings, obviously those public cloud services. But I mean, we don't know which one of them really fits well; they claim that they all work well. But that needs to be tested. And from both a theoretical and practical perspective. So there is some uncertainty. For instance, we are running different activities to basically get more used to these platforms and better understand the calls and the effectiveness of offerings.”* Interviewees 3 and 4 noted that uncertainty is also important to consider before adopting an innovation.

Interviewee 5 highlighted that although there are some uncertainties, cloud computing solutions are generally seen as useful. He added *“It would be something that would seem important. But I think there's a general awareness that cloud technologies are useful. So there is not so much uncertainty, and then there is a chance to move to the cloud. Almost everybody says, ‘Let's move to them.’ I'm not in a situation where somebody says, ‘We don't know the cloud, so let's not move to it.’”*

Interviewee 6 added, *“Yeah, uncertainty is also important when we make a decision for future development. We must determine what uncertainties we will face.”*

4.2.10 Technology readiness

According to interviewee 3, technology readiness is a determinant of cloud computing adoption, particularly at the beginning of the transition. She stated that *“The importance, I think, changes over*

time when you first switch to cloud computing, trust, and technology readiness might be more important at first.”

Interviewee 5 agreed that technology readiness is critical and stated that infrastructure and personnel requirements for development must also be considered to support the company's cloud computing needs. He added, *“It's also very important. For development, we need infrastructure and people. So this is a factor that needs to be considered.”*

4.2.11 Trust

The majority of the interviewees emphasized the importance of trust that serves as the cornerstone of a successful cloud adoption strategy. Interviewee 1 stated that *“I guess you can say trust, such as trust to cloud computing, trust to the supplier, especially managers, they trust that cloud computing is the future, then it will affect cloud computing adoption.”*

Interviewee 2 explained that *“This is not just technical people buying this, right? Administrative people and executive teams are investing in those technologies, so they need to have some feeling and trust may be to those cloud providers and cloud computing solutions or operations at some point.”*

Interviewee 3 mentioned that *“I think, changes over time when you first switch to cloud computing, it might be more important at first, because you must be sure that the customer trusts the cloud and they really want it. You have to be ready for it.”*

Interviewee 4 underlined that *“I guess trust is also related to security and privacy, right? There should be some reasons, for instance, why Amazon Web Services (AWS) now has the highest market share compared to others. In terms of price, AWS is not a cheaper option. However, it currently has the majority of the market share. Trust is one of them.”*

Interviewee 5 added that *“People like to learn and move to the cloud. Trust is also a big determinant when it comes to cloud computing adoption, right?”*

Interviewee 6 emphasized that *“Trusting cloud computing services or the security of the system that will be designed is really important. When you trust someone, you can have good communication. And when you trust the technology, you can implement it in a very efficient way. This is the basis. This is the basis for developing cloud computing.”*

Interviewee 7 summarized that *“When people get familiar with technology such as cloud computing solutions and trust it. In the end, they will eventually fully use it. So trust issues are a big issue related to adopting cloud computing.”*

4.2.12 Perceived usefulness

Information technology (IT) professionals use the phrase “perceived usefulness” to describe how much a person thinks employing a certain technology will increase their overall effectiveness or job performance. Overall, interviewees mentioned that they would be able to accomplish their job duties more effectively by adopting or employing cloud computing technology.

Interviewee 1 mentioned that *“From my point of view, it is quite easy for, at least as a development aspect because it's easier for me to deploy a lot of things before you have to set up a lot of things in your local environment.....and then if you want to do a new version, then you have to update all the*

things. But now, with cloud computing, you can just have a bunch of virtual machines on the cloud platform.”

Interviewee 2 highlighted that *“The productivity and availability of applications on the cloud. So those are basically to increase your productivity. Right? So if you provide different applications, the pipelines, and the products on the cloud that help you to create business value. That is excellent for your projects, right?”*

Interview 3 noted that *“I can say that cloud computing adoption brings in the speed, and quickness of delivery of products...We want a one-time microservice that all of them use, or we want only one when the operations and management module is used by all the products. And you can do it by cloud in a very efficient manner... As I said, since this transformation is so new, this is a benefit that we have started to observe.”*

Interviewee 5 explained that *“It has a lot of advantages. So I really like using the cloud...It is easier to collaborate as well, because earlier, when we were not using the cloud, we were using only Gitlab. For example, it is limited in terms of collaboration. You can only collaborate on tons of code. But when you're on the cloud, a lot of people can look at the executed applications. They can look at the logs of that application. They can work on maintaining it together. So collaboration is, I think, also important.”*

4.2.13 Perceived ease of use

According to interviewees 1 and 4, cloud computing solutions will probably be easy to use, which will increase the likelihood that employees will adopt them. Interviewee 1 highlighted that *“From my point of view, it is quite easy for me, at least as a development aspect, because it's easier for me to deploy a lot of things before you have to set up a lot of things in your local environment.”*

Interviewee 4 added, *“Based on my previous experience, not in this company, but in another company. We selected Google, for instance, because it was easy to play with the Google Cloud, and in terms of deploying services.”*

4.3 Organization Context

4.3.1 Firm size

The majority of the interviewees emphasized that the adoption of cloud computing can generally be impacted by the size of the company and generally agreed that firm size affects the duration of the transformation process, decision-making time, organization, efficiency, cost, and priorities. They mentioned that larger businesses may have greater cash and resources to engage in cloud technology, but they may also face more difficult integration with current systems integration and data security challenges, and also with more complex structures, which take longer to organize and distribute awareness. On the other hand, despite having fewer resources, smaller businesses may be more adaptable and able to implement cloud technologies more quickly.

Interviewee 1 stated that *“And yes, about the firm size. I think it is quite relevant because if you are a big company, then if you want to move to cloud computing, for sure, it will cost you more. And I feel like it is maybe 3 or 4 times more than a small-size firm.”*

Interviewee 2 noted that “ *I think that firm size is definitely a determinant. It is the determinant that affects the duration of the CC transformation. So if it is a startup, it is faster and easier. But a large company has different procedures. It's gonna take more time. And also, a little bit is the mindset of the company's transformation and adaption of new technologies.* ”

Interviewee 3 highlighted that “ *With the firm size of a big company, it is hard to organize the company to achieve this, to make these cloud-native publications real. Because it's a big party and it is not so easy to move compared with some startups. In such a company, you have to be organized and distribute the awareness, and the information in a good way to all the other units.* ”

According to interviewee 4, the decision time of adopting cloud computing solutions is affected by the firm size, he stated that “ *The firm size affects the decision time as well. I mean the decision is taking pretty fast for a small-size company. This transition, from the traditional system to the new one, it's quite fast. But in a big company like company X, as I mentioned, we have been discussing this issue to move to a public cloud for the last 2 years, for instance.* ”

Interviewee 5 added “ *I think firm size is very important. I think smaller firms probably don't worry about clouds so much.* ”

Interviewee 6 discussed complexity and efficiency issues related to firm size, he explained that “ *If the firm size becomes larger, and then your organization becomes more complicated, then the product delivery efficiency will be lower. But if you have a simpler organization, and you have more people then the working efficiency will improve a lot.* ”

Interviewee 7 stated that “ *large companies mostly prioritize data security and privacy issues than the smaller ones when it comes to adopting cloud computing solutions. So it is a crucial determinant. I can say that start-ups implement the technology faster and easier.* ”

4.3.2 Top management support

Overall, the interviewees provided their opinions on the importance of top management support in cloud computing adoption. Top management must have a clear understanding of the technology and its benefits to the organization particularly when they guide present and future decisions and strategies in terms of making the necessary investment decisions, allocating resources, and organizational culture to support cloud adoption.

Interviewee 2 stated that “ *But there's definitely top management support, and buying the technology is needed because that's the investment and it's a big investment.* ”

Interviewee 3 explained that “ *The leaders and the top management should be visionary. And they must understand that cloud computing is needed. If they don't really understand this, then the company cannot develop itself in that section. So the most important thing is that the top management is aware of the future of cloud computing. We are all going in that direction.* ”

Interviewee 4 highlighted that “ *So it's mainly related to management, right? So I guess the company policy, for instance, might be an issue. I mean, that's also very important. Traditional managers, for instance, have been working in a company for quite a long time; maybe they are not ready to, or maybe they don't believe in these things. It is not easy to convince them to move to the cloud. And they can say that they can manage everything with the current system or platform. Why should they move* ”

there? There are some issues, so it's not easy; it depends. If you have a new, fresh management manager, it's probably easy to convince them to adopt cloud computing solutions.”

Interviewee 5 highlighted that *“You could innovate without having cloud management support, but it can be both good and bad. So management might not know the details of the kind of software development that goes on or what the skill levels are. So if the management pushes for the cloud without really understanding the application, then it might actually be a bad thing. Yeah, so support is good, but it's double-edged. So there has to be input from the management and the workers and employees.”*

Interviewee 6 added *“This is a very important thing since the managers are the people that decide for the future development. So that support is of vital importance.”*

4.3.3 Innovativeness and top management background

Most of the interviewees emphasized that the top management’s background has an impact on the organization’s overall decisions and strategies, and the innovativeness of the top management also plays an important role in the adoption of CC decisions in an organization. They added personal innovativeness in ICT (information and communications technology) and the IT knowledge of the top management, which are important factors in the technological advancement of the organization. It is essential for top management to have a clear understanding of the technology and its benefits to the organization.

Interviewee 4 stated that *“But I guess they will also consider the company policies, right? So they need to look at different factors as well. So that's the reason that they might be a bit slow in making decisions, for instance, we had the same problem in Company X, during the last 2 or 3 years. I mean, they have been discussing, and are still not sure if we can move to this cloud, for instance, Google or other cloud platforms.”*

Interviewee 5 discussed that *“So management might not know the details of the kind of software development that goes on or what the skill levels are. So if the management pushes for the cloud without really understanding the application, then it might actually be a bad thing.”*

Interviewee 6 commented that *“It might be easier to implement and try cloud computing solutions when you have managers who have technological backgrounds.”*

Interviewee 7 added, *“Yeah, it is definitely important, at the leadership, and management levels, they put forward future strategies for adopting new technology, such as cloud computing solutions. I think more emphasis should be put on the organizational context. Yes, like how things should be organized—not just how to hire more people, but how to assign tasks to people, how the management makes decisions, and then assign tasks to the employees. That is the most important thing.”*

4.3.4 Knowledge and training

The employees’ awareness of certain areas, such as advantages, obstacles, and how to implement cloud computing in their businesses, is referred to as their knowledge and training. Most of the interviewees indicated that “knowledge and training” plays a crucial role in adopting cloud computing solutions efficiently.

Interviewee 1 added that *“Maybe internal training programs or internal workshops or dissemination meetings that can be useful for the rest of the company to understand what offerings are. That will definitely help this transformation.”*

Interviewee 2 stated that *“For the engineers, there was no cloud before, and all the engineers had to learn about it. They have to change their competence and knowledge now, they have to change their thinking style. You’re used to a single operating system. Now we have this microservice architect picture, and this is something completely new.”*

Interviewee 3 discussed that *“Management should be a bridge between business requests and technical requests...Technology is changing a lot, so it's not possible for a manager to know that area in a deep, detailed manner, but a manager can have an overall knowledge of this technique, technology, and the cloud. He can tell her about the main things that she should know...”*

Interviewee 4 explained that *“I guess that education would be one of the main factors here, especially for the manager because they need to make a decision. So if they understand the situation and the technology quite well, I mean the limitations, because they need to feel secure in terms of privacy and security, which is very important for them.”*

Interviewee 5 commented, *“But my feeling is that just having training on the cloud might help people become aware of the benefits and drawbacks of the cloud and be able to assess these determinants in a better way.”*

4.3.5 The type of business/sector

Some of the interviewees shared their perspectives on the type of business/sector factors that influence the adoption of cloud computing in a large organization. They argued that depending on the particular advantages and drawbacks offered by the industry that the organization operates in, its approach to adopting CC may change.

Interviewee 4 added *“I guess the type of business is also important. Some businesses, for instance, companies working with advertising data, can easily go for Google Cloud Platforms, and most prefer Google. Because Google, its main activity is advertising, right? So they are involved with Google all the time. So it makes sense for their businesses”*

Interviewee 2 added *“In our sector, there are strict policies and rules for how and where you can keep this data and how... We will be definitely developing services and products on those public platforms. But again, an important thing might be that this is a bit of a journey. We're still in the transformation phase in our industry. Maybe there are some other industries such as financial or retail services that have managed to adopt CC in a faster way since they have different standards and policies. But this is still an ongoing process.”*

Interviewee 7 added *“Technical companies try new technologies easier and quicker. So it depends on what type of business they are doing.”*

4.3.6 Organization policy, mission, and vision

Some of the interviewees discussed different statements about cloud computing adoption within their organizations in terms of the company’s policy, mission, or vision. Interviewee 2 stated that *“It's also a little bit related to organization mission, for instance, Company X is trying to have this mindset shift*

to help our customers and operators for this transformation.” He also highlighted that in that regard, Company X prioritizes the use of technology, particularly cloud-based technology, and even between large companies, that varies.

Interviewee 3 added, *“But the business aspect is also important because there are two forces playing at that point when you shift to cloud. You either do it due to technical needs from top to bottom, or you do it from business or customer pressure that I talked about. There are two forces, and the two forces might not be at the same time. They might not be pulling you in the same direction. And companies that are driven in the correct direction, will succeed in the end. A manager should know both on balance. The leaders and the top management should be visionary, and they must really understand that cloud computing is needed.”*

Interviewee 4 explained that *“We are still in transition mode, so that should be taken care of by the managers or the higher layer in the company. So that’s the biggest challenge that we’ve had so far... So I guess the company policy, for instance, might be an issue. For instance, let’s assume a cloud provider is also a competitor to Company X. Even though they are providing the best service in the cloud, maybe we are not willing to go for that because they are our competitor. I guess so I would say it’s mainly related to the company policies. That’s the most important.”*

Interviewee 5 highlighted that *“I guess Company X has dealt with cloud computing in a quite mature way. I would say we had this excellent research cloud where we were trying to set up on-premises clusters. Then we have partnerships with AWS, Azure, or Google Cloud Platform (GCP), all three big providers, so that we don’t get stuck with something. So from Company X’s point of view, I can see that we have been quite sensible in moving to the cloud. You have not jumped onto it by throwing everything away, we have a very structured step-by-step approach to plug in.”*

4.3.7 Attitude towards innovation

Interviewee 1, interviewee 2, and interviewee 6 believed that employees' attitude towards innovation influences the adoption of new technologies. Interviewee 2 indicated that *“A little bit is the mindset of the company’s transformation and adaption of new technologies.”* Interviewee 6 added that *“It’s important, but not as important as the management supports.”*

Interviewee 3 believed that the employees' attitude towards innovation is important, especially the attitude of leaders and top management. *“The leaders and the top management should be visionary, and they must really understand that cloud computing is needed.”* Interviewee 4 also indicated that *“Employees of their company, especially in the tech area, are completely supporting moving to the cloud.”* However, interviewee 5 added that *“I wouldn’t put too much attitude towards innovation because that is not fully linked with the cloud.”*

4.3.8 Organizational readiness

Some of the interviewees noted that organizational readiness is a factor related to CC adoption. Interviewee 2, interviewee 5, and interviewee 6 explained that organizational readiness is important from different perspectives. Interviewee 2 discussed that *“If it is a defense company, maybe it’s not super ready for cloud computing. Companies, like Company X, in our sector, prioritize using technology a lot in that sense, especially cloud-based technologies. That is different even between large-cap companies.”*

Interviewee 5 also believed that it is important to be prepared and know what you are doing before taking this step of moving to the cloud because of its complexity. Besides, interviewee 5 expressed some concerns about working habits. *“What I can see from my position in Company X, the main challenge is that people are not used to cloud technologies. People are used to downloading and developing on their laptops and working on it, but working on the cloud requires a different skill set.”*

Interviewee 3 added, *“Yeah, organizational readiness might be important, however, whether the organization is ready or not, if the customer pressure is there, they must do it.”*

4.4 Environment Context

4.4.1 Industrial structure and social innovativeness

Most of the interviewees have discussed the industrial characteristics of Sweden. Interviewee 1 mentioned that Sweden has more software companies than other European countries. *“Sweden has a lot of software companies, I think that’s the reason why Sweden has the highest CC adoption rate. Germany or other countries have more car companies, mechanical companies. They cannot move to the cloud easily, but in Sweden, we have Spotify, we have Company X. I think it’s easier for us to move to the cloud.”* Interviewee 1 stated.

Interviewee 3, interviewee 4, and interviewee 7 also mentioned that Sweden has a lot of start-ups compared to other European countries, therefore Sweden has a good innovation atmosphere. Interviewee 3 discussed that *“I observed there are a lot of start-up companies or middle companies, and I also observed Sweden has a good innovation climate, and it has a lot of funding for start-up companies. These start-ups also shift the trend in Sweden. They cooperate with big companies, they have a lot of projects going on, and I think this affects the cloud adoption a lot. If we only have Company X or Volvo in Sweden, they couldn’t adopt it. But, these start-ups, the projects that they run with other organizations, make people more aware of the need for cloud computing.”*

Interviewee 4 added that *“It might be something related to Sweden itself in terms of the culture. Basically, Sweden is one of the technology hubs in Europe. In Sweden, we have a lot of start-ups. I guess Sweden has the highest rate in Europe, per capita.”*

Moreover, interviewee 6 talked about the establishment of smart cities in Sweden, which results in better Internet usage to support IoTs. *“Sweden is using a lot of smart terminals, and it’s like a smart city. So, the number of these devices is increasing a lot in Sweden. That’s why Sweden has a very high adoption of CC. Besides, Sweden is also developing vertical-to-vertical communication, you also need a high adoption of CC.”* He discussed it.

4.4.2 Service level agreements (SLAs)

Most of the interviewees mentioned that the agreements between companies and cloud service providers require a lot of considerations, especially when they are related to data. Interviewee 3 indicated that *“Service level agreements are important, these are the things that come from top to bottom.”*

Interviewee 4 also emphasized that service level agreements were very important, and he mentioned there was a discussion between Company X and Google about the details of cloud services. *“SLAs are*

one of the important ones. There has been a discussion with Google about whether they can provide this type of service or feature, something like that.” He stated.

Interviewee 5 discussed the SLAs between Company X and their customers, and he believed the SLAs with cloud service providers must be important as well. *“We do have SLAs with mobile network operators, and I'm sure there are expectations on how the data is handled and how long it can be used. We are in a special situation because we don't own the data. We handle a lot of data, which is owned by our customers, so we have to be very careful about SLAs.”*

4.4.3 Vendor support

Overall, most of the interviewees believed the support provided by service providers is important when adopting CC. Interviewee 5 discussed that *“Support is quite important because we have partnerships with AWS, Azure, or Google Cloud Platforms (GCP). We interact with them very closely so that we know the latest trends. When a particular issue happens, we contact AWS, Azure or GCP. If cloud providers cannot offer help, then we probably wouldn't have a big relationship with them because we are such a big organization.”*

Interviewee 2 added that *“That's important, but I think all three big players are doing great. From that perspective, that's no different, but it's super important to get their support.”* Interview 1, interviewee 3, and interviewee 4 also expressed a similar opinion. *“Sometimes we need 24 hours support, if something happens, we need to resolve it very quickly. So, that means we need to have good support from the cloud provider.”* Interview 4 indicated.

4.4.4 Customer pressure, constraint, and needs

Some of the interviewees discussed the importance of customer pressure and constraints in the adoption of cloud services by a large company. Interviewee 2 mentioned the need for educating customers, while interviewees 3 and 4 emphasized the impact of customer demand and constraints on a company's decision to adopt cloud services.

Interviewee 2 stated that *“Depending on our customers' needs, we will be developing and deploying software on public clouds... And also, if our customers decide which cluster will be working on, for instance, if they are a little bit lagging, maybe we will provide some education for them... Another thing, Company X is trying to have this mindset shift and help customers to do this transformation. If customers say we're not going to the cloud in the near future, there's nothing we can do.”*

Interviewee 3 discussed that *“But in our company, I observe that this awareness mostly came from the customer side. So if the customers asked for cloud services then we are doing it. The market, I think, pushes you toward that way... So I think one factor that can be added here is customer pressure. So I think that's the most important thing. For a big company that already has some customers, they don't want to lose the customers that they have and they want to bring in new customers.”*

Interviewee 4 highlighted that *“It depends on the scenarios. Sometimes it's customer requirements. They want to do some type of analysis or add some features. But sometimes we want to make our product more advanced. So we suggest we can add this type of feature to the product. And then once we get the approval from the customer, we would develop them... And also sometimes you have some constraints from your customers. They don't want to move their data to one specific cloud, for instance. So this type of constraint also comes from your clients sometimes.”*

Interviewee 6 commented on customer pressure and constraints and argued that although they want to deploy public models, customers are not willing to provide too much data for them since customers want to maintain control as well as security issues. He added, *“If we want to develop some public deployment model, maybe, we will make one for our customers. But for that part, since they are not willing to provide too much data for us. This is maybe a business secret. So, I don't think our company may deploy public models.”*

4.4.5 Standardization of cloud technologies

This factor is not seen as necessary by most of the interviewees. Interviewee 3 stated that *“There are some factors, technical factors, that determine how we design our cloud products.”*

The interviewee 5 summarized that *“I would say it is not super important. Cloud technologies might be standardized, but we are the users of this technology. So, we are not super interested in what is standardized and what is not standardized, as long as we get good service from this cloud provider.”*

4.4.6 Government/Institutional support

Some interviewees agreed that support from institutions and the government is essential for businesses to successfully adopt cloud computing in terms of tax deductions, cooperation between companies and the government, and also CC-related workshops or seminars.

Interviewee 2 noted that *“Government/institutions support is really important, I think there's some tax reductions or support to improve better cloud transformation in different countries. That is always some way of supporting the company's costs. There are conferences, workshops, and summits happening in a company, also in the city, in Sweden. These are open to all. Maybe some people really get curious about what's happening, and what this transformation means. Definitely, these all have different levels of positive effects in this journey for sure.”*

Interviewee 3 indicated that *“About government/institutional support. I think, in Sweden, we have a lot of support here. Sweden is mostly fed from the automobile industry and telecommunication industry. There are also some advertisements to attract people to Sweden... There are also some tax benefits when it comes to adopting new technologies.”*

Interviewee 1 and interviewee 4 mentioned green energy related to technology adoption. interviewee 4 added *“Institution supports have more effect, I guess. But governmental support? it might be something related to green energy. These things might be a policy.”*

Interviewee 5 highlighted that *“What I think is that we should get more cooperation between the company and the government. That's very important. The regulations that the government sets usually impact the company a lot.”*

4.4.7 Broadband and internet/digital infrastructure

All the interviewees emphasized that the adoption of cloud computing in every business depends heavily on broadband and digital infrastructure.

Interviewee 2 stated that *“It's definitely a crucial one. Because whatever you do on the cloud you need to have a proper and fast connection for sure.”*

Interviewee 5 noted that *“It's almost to be taken for granted that you will have good digital infrastructure. So it's not something to even think about. But behind the scenes, I think it is an important determinant. We are thinking about the cloud because we have such a good internet.”*

Interviewee 6 explained that *“This is a basis, I think usually what is limiting cloud computing is the hardware or the digital infrastructure. You can develop better software algorithms, but sometimes usually the limitation is the hardware part or the infrastructure.”*

4.4.8 Geographical Locations/Data Centers

Some of the interviewees emphasized the importance of having data centers located in certain geographical areas in terms of quick access to data, or the regulatory benefits of having data centers located near customers or premises to minimize data transfer.

Interviewee 1 explained that *“I think it would affect a little bit if considering the time of getting data. Absolutely, if you have data centers inside your country, then you have some cloud computing centers. It's quite fast, because I know in the cloud computing area, they also have edge computing. It is basically that you have something like a data center, it's gonna be very easy to get access to.”*

Interviewee 2 stated that *“It is important to have data centers that are close to either customers or your premises. So it has both, it can really make your life easier from a regulatory perspective. If you don't have any data center in Europe, and then you have customers that are asking you to keep their data in Europe. So there is no way to do it on the public cloud, right?”*

Interviewee 3 said that *“Yeah, this is something that could be investigated, but I think it should have some positive effect. I know that there is a data center in Sweden. I think that's important because you don't want to put all your valuable data outside Sweden. It's good that we have one here.”*

Interviewee 5 highlighted that *“Geographical locations/data centers are important. I think that ties to the first regulatory compliance because we do want data centers to be in certain locations to be able to serve the network operators in those locations because the data should not go around so much. So having those data centers in geographical locations is important.”*

4.4.9 Competitive pressure

Some interviewees have mentioned the pressure from competitors because every company needs to know what is happening within the industry. Interviewee 1 and interviewee 2 both indicated that if their competitors are doing something new or using some new technologies, they will feel lagging and need to look into this new technology and explore more.

5 Discussion

In this chapter, the results will be discussed, and the determinants identified in previous literature will be compared with the findings from Company X.

5.1 Discussion of the Results

Technology Context

Thirteen sub-themes have been identified under technology context, of which robustness, perceived usefulness, and perceived ease of use are labeled as new determinants.

Security and privacy is considered as a determinant when it comes to CC adoption because company X is a large company that involves many customer's data and client's data so they always pay attention to security and privacy issues. Moreover, due to the security and privacy issues, Company X is deploying a private cloud currently because they can handle all the firewalls and security stuff by themselves, and cloud providers may not be able to meet their security requirements. Previous studies also indicate security and privacy issues concerning many companies. According to Alkhater et al. (2018), security and privacy have a direct impact on SMEs' motivation to adopt cloud, whereas their indirect impact is on larger-sized companies. **Scalability and flexibility** also influence CC adoption in Company X. Interviewees believed that the scalability of CC provides them with unlimited resources and allows them to scale up and scale down based on business requirements. This also provides them flexibility. Besides, when they have a product on the cloud, the product can be a part of other software or services, which is very flexible. **Relative advantage** is identified as a determinant as well, which has a positive impact on CC adoption. Relative advantage refers to "the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003, p.229). The relative advantages discussed by interviewees include better collaboration, remaining competitive in the sector, accessibility, and making wiser decisions. Almost all the interviewees indicated that it is necessary to recognize the advantages and the shortcomings of CC before transferring to the cloud or making decisions about CC solutions. Previous research expressed similar findings, when technology has a clear advantage in providing effectiveness, at the same time, its benefits exceed current practices, it is more likely to be adopted (Oliveira et al., 2014). **Technology readiness** is identified as a determinant in Company X, which also has a positive impact on CC adoption. A company must consider the infrastructure and personnel for supporting cloud computing needs. According to Alkhater et al. (2018), the decision to adopt CC of all sizes companies was positively influenced by technology readiness. **Trust** is another determinant that serves as the basis of CC adoption according to interviewees. Trust not only indicates trust in cloud computing, and trust in cloud computing solutions but also stands for trust in cloud service suppliers. Trust in the CC of administrative and executive teams was also highlighted. Only if the management has trust in cloud computing, then the company would make the decision of switching to the cloud. Trust is necessary for adopting IT, and trust is crucial for adopting CC; previous studies have similar results (Hampshire, 2017; Alkhater et al., 2018; Kandil et al, 2018; Yu et al., 2018; Min et al., 2015). **Complexity** is defined as "the degree to which an innovation is perceived as relatively difficult to understand and use" (Rogers, 2003, p. 257). Hsu and

Lin (2016) indicated that the system's benefits are enhanced by the simplicity of use. According to interviewees, if cloud computing is very complex, then people would have less courage to adopt it. Besides, the complexity of working on cloud was emphasized by one of the interviewees because users have to think about the background services and microservices, thus it required more consideration when adopting CC. **Compatibility** refers to how much an innovation or new technology is recognized as harmonious with current values, past experiences, and the requirements of future adopters (Rogers, 2003, p.15). According to interviewees, they believed compatibility is a determinant because legacy work needs to be handled on the cloud, and they have to change settings or services to be compatible with different clouds. But, another interviewee indicated they have been using a very robust and flexible software stack already, so compatibility was not considered as a necessary factor. **Uncertainty** is the perceived problems or risks that a company faces to adopt CC services (Alshamaila et al., 2013). Most of the interviewees underlined that recognizing and managing uncertainties is necessary when making decisions for CC adoption, especially for those public cloud services.

Some of the interviewees emphasized **cost-effectiveness**, and **trialability** as determinants towards CC adoption in Company X, but other interviewees stated contrasting opinions, believing it to be unnecessary. **Cost-effectiveness**, in terms of CC adoption, relates to cost benefits, cost efficiency, and cost reduction (Ogunlolu and Rajanen, 2019). Some of the interviewees expressed doubts about cost-effectiveness because they were not sure cloud computing is cost-saving. If a company uses a private cloud, it might be costly because it brings a lot of extra costs, such as human resources and hardware. But, if a company uses cloud computing everyday for 3 or 4 years, it might be cheaper. Furthermore, interviewee with hardware development background believed cost is not a determinant for cloud computing adoption at all. Based on previous studies, cost has been seen as a major factor no matter the company size based on Chang et al. (2020), but Karunagaran et al. (2019) indicated cost reduction had a small impact on CC adoption for large companies. **Trialability** is defined as the “degree to which an innovation may be experimented with on a limited basis” (Rogers, 2003, p.16). Trialability is considered as unnecessary by some interviewees in Company X because it costs money and time, and most companies do not have the budget to invest in a trial period. Besides, experiments before adoption may not make moving to the cloud easier. This result contradicts Karunagaran et al. (2019), who indicated trialability has a beneficial impact on both SMEs’ and large companies’ decisions to adopt the cloud.

Robustness, perceived usefulness, and perceived ease of use were identified as new determinants of CC adoption under the technology theme. **Robustness**, in software engineering, is the ability of a computer system to cope with errors during execution and cope with erroneous input (IEEE, 1995). Overall, robustness of cloud computing has a positive impact on its adoption because users are searching for steady performance of their services. If the cloud platform is robust, users will have a clear expectation that they can get their products, services, or software up and running continuously, and they will not worry too much about memory issues or hardware issues. **Perceived usefulness and perceived ease of use** are constructs of the Technology Acceptance Model (TAM). According to Davis (1989), perceived usefulness is defined as the “the degree to which a person believes that using a particular system would enhance his or her job performance” (p.320); perceived ease of use refers to “the degree to which a person believes that using a particular system would be free of effort” (p.320). Technology acceptance is a three-stage process, system design features trigger cognitive responses (perceived usefulness and perceived ease of use), which in turn form the intention or attitude toward using technology, influencing use behavior (Davis, 1989). Among the interviewees, almost all of them have mentioned that CC provides various benefits for working, such as enhancing working efficiency and productivity, reducing settings on local machines, quickness of delivery of products, and easiness

of collaboration. At the same time, interviewees also recognized that working on the cloud is easy for them. To sum up, in Company X, perceived usefulness and perceived ease of use have a positive impact on CC adoption.

Organization Context

According to the organization theme, in the context of cloud adoption, the organization theme is divided into eight sub-themes, including *firm size*, *top management support*; *attitude towards innovation*, *organizational readiness* whereas *innovativeness and top management background*; *knowledge and training*, *the type of business/sector*, *organization policy*, *mission*, and *vision*, which are highlighted as new determinants.

All of the interviewees considered *firm size* as a determinant. Interviewees stated that the benefits and drawbacks of adoption vary depending on firm size. Moreover, larger businesses, while having more resources, may encounter additional integration and security challenges, leading to a lengthier transformation process. Smaller businesses may have fewer resources but can implement cloud technologies more quickly due to their adaptability. Large companies face multiple challenges such as customization, high switching costs, data protection, security, and organizational issues that hinder them from adopting cloud computing compared to SMEs, according to Karunagaran et al. (2019). It has been defined during the interviews that *top management support* is a determinant. A clear understanding of the technology and its benefits to the organization must be had by top management, particularly when present and future decisions and strategies are being guided in terms of making necessary investment decisions, allocating resources, and changing organizational culture to support cloud adoption. In the previous research, Alkhatir et al. (2018) and AlBar and Hoque (2019) highlighted, the adoption of the cloud requires top management support. The majority of the interviewees in this study identify *innovativeness and the top management's background* as new and determinant in the adoption of cloud computing. When the top management possesses a clear understanding of the technology and its benefits to the organization, their personal innovativeness and IT knowledge positively impact the overall decisions and strategies of the organization towards technological advancement. ICT adoption in the company may be influenced by owners'/managers' ICT competence and innovativeness, according to different research studies (Setiowati et al., 2015). Moreover, according to research, the differences in a company's ability to innovate can be attributed to the background characteristics of its managers; additionally, when managers are strongly committed to innovation, they tend to have a positive impact on the company's overall performance, making strategic decisions, and shaping the direction of the organization (Wang and Dass, 2017).

The vast majority of those interviewed emphasized the importance of *knowledge and training* in the adoption of cloud computing as a new determinant. The findings reveal that internal training programs, workshops, and dissemination meetings are useful in helping the company understand CC's offerings, limitations, and transformation process to make good decisions for the company. Thus, it enables employees and managers to update their knowledge, and skills to adapt to the CC technology. According to Molino et al. (2020), the outcomes show the importance of giving all employees access to knowledge and training opportunities to support digital transformation without hindering employee engagement. According to the majority of the interviewees, *the type of business/sector* is a new determinant in the adoption of cloud computing since the adoption of CC depends on the needs, standards, and policies of different industries. A recent study by Cheng (2018) revealed that cloud computing has significantly facilitated the processing of data, making it more prevalent in the transportation, automotive equipment, metals, and machinery sectors, in comparison to the wood/paper and publishing sectors.

Overall, the interviewees highlighted that the adoption of cloud computing (CC) is influenced by **organizational policies, mission, and vision**, as this new determinant can impact the decision-making process. It is crucial for leaders and top management to have a visionary mindset and comprehend the significance of cloud computing. With the organization's objectives and requirements in mind, the cloud adoption process is initiated and must align with the company's mission (ConvergeOne, 2022). In their study on the adoption of mobile cloud computing, Carreiro and Oliveira (2019) discovered a positive relationship between a company's intention to embrace innovation and its vision of transformational leadership. Some of the interviewees considered **attitude towards innovation** as a determining factor in the adoption of cloud computing. Employees have an impact on organizational challenges and opportunities, and the adoption of innovations may be hindered by employee resistance to information technology (Sharma et al., 2020). **Organizational readiness** is emphasized as a determinant in cloud computing adoption by some interviewees, but another two interviewees expressed different opinions, they believed that it is not a must. However, as De Sousa Jabbour et al. (2018) and Alshamaila et al. (2012) both indicated, organizational readiness is one of the significant factors for CC adoption.

Environment Context

Industrial structure and social innovativeness was identified as a new determinant under the environment context theme, which has a beneficial impact on CC adoption. This sub-theme consists of three aspects. First, Sweden has more software companies than other European countries. Software companies, compared with car companies and mechanical companies, are easier to move their services or products to the cloud. Second, Sweden has a good innovation atmosphere, thus it has a lot of start-up companies and middle companies. These start-ups cooperate with large companies, so it affects cloud adoption to a significant extent. Third, the development of smart cities in Sweden results in the increase of smart terminals to support IoTs. The increase in these devices facilitates Internet usage, thus promoting CC adoption in Sweden. **Customer toward, constraint, and needs** is another new determinant. Company X offers IaaS and SaaS, so they are much more related to customers. In Company X, the awareness of adopting CC mainly came from the customer side. If a customer asked for cloud services, they would develop it, because the company wants to keep their old customers and attract new customers. The opposite is also true, constraints, like not moving customer's data to the public cloud, also affect CC adoption. Besides, for company X, educating customers about cloud transformation could aid in ensuring the customer's willingness to have their personal data stored on the cloud, which is essential for adoption.

Service level agreements (SLAs) and vendor support were considered as determinants that have a positive impact on CC adoption. SLAs discuss the service details between providers and customers (Ahmed and Litchfield, 2016). For Company X, the agreements with cloud providers are critical and decisive. Details, like how the data is handled and how long the cloud can be used, must be considered and discussed before adopting it. **Vendor support** indicates support from cloud providers. Previous studies have discovered that vendor support can improve organizational benefits, and it was seen as a positive determinant (Hachicha and Mezghani, 2018; Ogunlolu and Rajanen, 2019). In this study, vendor support was identified as a positive determinant as well. Good support from cloud providers is critical, especially when the issues need to be fixed quickly. If cloud providers cannot offer help, Company X would not have a close relationship with them. Also, a good relationship with cloud providers allows Company X to know the latest trends. **Standardization of cloud technologies** is unimportant, interviewees only care about the benefits this innovation can provide.

According to interviewees, **government and institutional support** is considered a determinant for large companies to efficiently implement cloud computing, in terms of some aspects such as tax deduction, cloud computing workshops/seminars, collaboration between companies and the government, or green CC solutions. It is also highlighted that Sweden provides significant support for technology adoption, including tax deductions and recruitment marketing. According to the conclusions of the study, government support plays an essential role in encouraging the usage of CC (Vu et al., 2020; Christiansen et al., 2022). Hashem et al. (2015) suggest that having a strong legal system in the institutional environment can enhance the confidence of companies and lower the perceived risks associated with the adoption of new technology, such as CC. According to Vonderau's (2018) research, the Swedish government offers a 97% tax rate reduction for electricity used by data centers, and local government officials have promptly included this sector in regional development activities. According to interviewees, the adoption of cloud computing in companies heavily depends on **bandwidth and digital infrastructure** as a determinant. Additionally, a fast and reliable internet connection and good digital infrastructure must be granted otherwise the hardware or digital infrastructure can be seen as a limiting problem. As Vu et al. (2020) stated in the previous literature, investing in high-quality digital infrastructure should be a top strategic priority to promote the adoption of cloud computing. Dempsey and Kelliher (2017) also emphasized that the capacity to accommodate the rising global demand for speed and storage space is necessary for cloud computing services.

Geographical Locations/Data centers is a new determinant defined from the data collected in this study. The geographic areas that host the cloud service provider's data centers are commonly referred to as regions (Peterson et al., 2011). The importance of having data centers in certain geographic locations for quick access to data or the regulatory advantages of having data centers close to customers or locations to reduce data transfer has been highlighted by interviewees. The Nordic Council of Ministers issued a report titled "Data Center Opportunities in the Nordics" that outlines that the Nordic region is seen as geographically very attractive (Christensen et al., 2018). According to the article, Microsoft's Sweden data centers are now able to host cloud operations for companies of all sizes and sectors, and the EU Data Boundary for the Microsoft Cloud, which enables customers to process and store their data in the EU, will benefit customers through Microsoft's investment (Microsoft News Centre Europe, 2021). This study has identified **competitive pressure** as another determinant, as interviewees emphasized the necessity of competing with other market players. Previous research has established cloud computing as a pivotal component in sustaining high performance and enhancing competitiveness (Baldini et al., 2017). Bhardwaj et al. (2021) further noted that intensified industry competition significantly influences the adoption rate of new technologies by companies.

6 Conclusion

This chapter summarizes the study's findings and discusses their ethical and societal consequences, originality and significance, research quality, limitations, and directions for future research.

6.1 Conclusion

There is a lack of concrete research in the literature focusing on the determinants of cloud computing adoption specifically by large companies in Sweden. Previous studies have examined cloud adoption from various perspectives, with a particular emphasis on small and medium-sized enterprises (SMEs). Additionally, technology-related determinants have received more attention compared to those related to business, conceptualization, and application domains. The purpose of this study is to investigate the determinants of CC adoption by a large company in Sweden through different perspectives. One research question was chosen as the focus of the investigation to fulfill this goal: *What are the determinants of cloud computing adoption in large companies in Sweden?* The review of relevant and previous literature was used to approach the goal of delivering an answer to the research question, outlining the concept of cloud computing, and the determinants of cloud computing adoption. Different technology adoption theories were identified, however, the TOE framework developed by Tornatzky et al. (1990) has been determined to be the best appropriate for this study. The TOE framework has been used in various research studies to investigate the adoption of CC (Hachicha and Mezghani, 2018; Martins et al., 2016). Case study was selected as the research strategy, and the data was collected through semi-structured interviews and analyzed through thematic analysis. Semi-structured interviews were conducted with employees working at a large company in Sweden, who have experience in the IT and cloud computing field. Determinants of cloud computing adoption by large companies relating to previous studies as well as new ones were discovered as a result of this study. The 10 new determinants are *robustness; perceived usefulness; perceived ease of use; innovativeness and top management background; knowledge and training; the type of business/sector; organization policy, mission, and vision; industrial structure and social innovativeness; customer pressure and constraint; geographical locations/data centers.*

Based on the findings from the interviews, this study concludes that large companies can enhance their adoption of cloud computing (CC) solutions by taking into account determinants within the organizational context, such as innovativeness and top management background; knowledge and training; and organization policy, mission, and vision. Additionally, determinants within the environmental context, including industrial structure and social innovativeness; customer pressure, constraint, and needs; broadband and internet/digital infrastructure; and geographical locations/data centers, should be considered. In order to facilitate the adoption of CC solutions, cloud service providers should prioritize openness with their customers. This can be achieved by providing detailed explanations of the benefits, security measures, and protection of customer data associated with public cloud services. It is particularly important to address security and privacy concerns, as this study reveals a preference for private clouds over public cloud services due to these concerns. By addressing

these issues, cloud service providers can instill confidence and encourage the adoption of public cloud services among large companies.

Large companies in Sweden could also use the results to assist in their comprehension of the determinants of cloud computing adoption and how they relate to them. Companies based in other countries might also use the results of this study to better understand the factors of CC adoption at the country level and to take the proper actions that can be taken by government organizations towards improving cloud computing adoption rates.

Table 7 displays the determinants of cloud computing adoption in Company X. Determinants that are relevant to previous literature are highlighted in green, new determinants are highlighted in orange.

Table 7 Determinants of Cloud Computing Adoption in Company X, in Sweden

Themes	Identified determinants
Technology context	Security and privacy
	Cost-effectiveness
	Compatibility
	Complexity
	Scalability and flexibility
	Robustness
	Trialability
	Relative advantage
	Uncertainty
	Technology readiness
	Trust
	Perceived usefulness
	Perceived ease of use
Organization context	Firm size
	Top management support
	Innovativeness and top management background
	Knowledge and training
	The type of business/sector
	Organization policy, mission, and vision

	Attitude towards innovation
	Organizational readiness
Environment context	Industrial structure and social innovativeness
	Service level agreements(SLAs)
	Vendor support
	Customer pressure, constraint, and needs
	Standardization of cloud technologies
	Government/institutional support
	Broadband and internet/digital infrastructure
	Geographical locations/data centers
	Competitive pressure

To sum up, the determinants of cloud computing are complicated and relate to various aspects, including technology, organization, and environment. Since companies from different industries may have unique requirements and needs for cloud computing, it is very critical to identify which determinants are the most decisive ones for their business. This study is expected to give insights to large companies in their CC adoption journey.

6.2 Ethical and Societal Consequences

In this study, ethical concerns were considered throughout the whole research process. All the participants were informed of the research purpose, research background, and researchers' identities by a consent form, and they were informed their participation was completely voluntary and offered the option to withdraw at any moment. No offensive or negative language was used during the interviews, and participants were free to answer any question. The company's name and interviewees' names were kept anonymous throughout the whole thesis.

Cloud computing brings various benefits to companies and businesses, and the CC adoption rate has been increasing over the years among all sizes of companies in the EU. Sweden, as a leading country in deploying cloud services, the percentage of CC adoption in large companies is the second highest in the EU. This study has investigated the determinants of CC adoption under the TOE framework by conducting a case study in one of the representative Swedish companies. Thus, the experience and lessons learned from Company X will assist other companies to have a better preparation for cloud transformation or cloud migration by understanding the importance of various potential determinants and underlying problems. Moreover, this study will assist cloud computing practitioners to understand the development status of CC in Sweden from multiple perspectives.

6.3 Originality and Significance

6.3.1 Implication for theory

TOE is an organization-level theory developed in 1990, and it represents how the firm context influences the adoption and implementation of innovations (Baker, 2011). To investigate the determinants of CC adoption in large companies in Sweden, the TOE framework was used to guide the research study and categorize sub-themes into three themes that are defined according to TOE. TOE has proven comprehensive enough to capture cloud computing adoption since 20 determinants are relevant to previous studies. However, new determinants under each theme may prove to be of increasing importance as users' needs change over time and cloud computing technology becomes more advanced. For example, robustness as a new determinant reflects users' expectations for the steady performance of cloud computing platforms because products or services developed on the cloud become more and more complicated. Moreover, perceived usefulness and perceived ease of use are constructs of TAM, but they reflect interviewees' opinions regarding working productivity in an efficient way. Therefore, the original TOE may incorporate the new determinants identified in this study to provide a more holistic analysis regarding what influences new technology adoption.

6.3.2 Implications for practice

The results of this study reflect users' opinions and requirements regarding cloud computing. For example, "**knowledge and training**" as a newly identified determinant represents that Company X has not provided enough workshops or tutorials to cloud-related personnel and IT personnel, and it also indicates that when adopting new technology, companies should prepare related training or hiring professional tutors to help people get familiar with it. Additionally, "**innovativeness and top management background**" and "**organization policy, mission, and vision**" as newly identified determinants play a strategic role in terms of the company's overall performance, making strategic decisions, and shaping the direction of the organization when it comes to CC adoption. It is essential to work with a top management team that prioritizes innovativeness and articulates the organization's policy, mission, and vision in a clear and detailed manner. "**Customer pressure, constraints, and needs**" as a new determinant serves to either motivate or hinder the adoption of CC solutions, depending on the customer's perspective. Therefore, obtaining a comprehensive understanding of customer needs, constraints, and the underlying factors driving customer pressure would greatly facilitate the successful implementation of CC solutions. The successful adoption of CC solutions is highly dependent on the availability and quality of **broadband and internet/digital infrastructure**. Therefore, companies must carefully consider this determinant before embracing CC, as neglecting it can pose significant obstacles. As highlighted in, "**geographical locations/data centers**" as a new determinant, having **data centers** in certain geographic locations close to customers assists companies' CC adoption by enabling quick access to companies' data, assisting businesses in utilizing the dynamic range of possibilities offered by cloud services, and offering regulatory advantages such as storing their data within EU boundaries. Moreover, large companies still have concerns when it comes to transitioning to public clouds. It is crucial for these companies to receive comprehensive explanations from cloud service providers regarding the advantages, security measures, and protection of customer data associated with public cloud services.

6.4 Research Quality

Validity in research requires the researcher to be able to demonstrate that the data are appropriate and accurate (Denscombe, 2014). Data collection and selection must follow the best standards to demonstrate the scope of validity. To ensure consistency and minimize interviewer bias, a semi-structured interview method was chosen. Seven interviews were conducted with employees with knowledge and work experience on the investigated subject. Ongoing validation of the data collected by the researcher throughout the study of the investigation is an important indicator. So, voice recording was undertaken during the interview. The collected data was transcribed and edited carefully. The participants were again contacted if there were any lingering questions. Reliability of results throughout the data processing process, the participant responses were continuously compared across several interviews. In addition to that, the responses provided by different participants addressing the same issues were used, and a single participant's responses were also checked in the literature.

Reliability, according to Silverman (2017, p.638), can be characterized as a degree of consistency with which examples are assigned to the same category by different observers, and for reliability to be assessed, the scientific researcher must document the process and show that categories have been utilized consistently. Thematic analysis, a technique used in this study to comprehend and interpret important patterns in qualitative data, was used to examine the interview data. Written documents were generated automatically from the recorded interviews. To uncover themes or patterns in the data that were interesting or compelling, the thematic analysis was eventually completed.

Generalizability is defined as the degree to which the findings can be generalized from the study sample to the entire population (Polit & Hungler, 1991, p.645). In this research, due to the limitation of time and resources, case study has been conducted only in one company, thus the generalizability may have been impaired. Besides, the diversity of participants' positions may also affect the generalizability. However, Company X is one of the representative companies in deploying cloud computing in Sweden, thus the findings of this study can be replicated in other large companies in Sweden with similar contexts.

Objectivity refers to the lack of bias in the research study (Denscombe, 2010, p.298). In this study, participants were connected without any preference, and most of them were reached through recommendation. The data was collected mainly from interviewees with cloud computing experience. Relevant information was also collected from the literature and the company's website to formulate interview questions. During the interviews, researchers did not lead or influence interviewees to formulate their answers. The collected data was transcribed and coded according to the recordings without modification.

6.5 Limitations and Future Research

Due to time constraints, the selection of just one case study represents the limitation of this study and some valuable cloud computing adoption determinants may not have been properly researched in the study. The study's limitations include its limited sample size and its narrow geographic focus on Sweden. The study was conducted within a large company, focusing on the general adoption of cloud computing (CC) in a specific cultural context, rather than specific service models like IaaS, PaaS, and SaaS. Thus, these limitations might hinder the generalizability of the findings to other large companies. Since the results have been specific to Company X in terms of organizational setup and

sector, the results can vary depending on the type of industry or organization settings. Virtual meetings between the interviewers and the interviewees were another limitation; in-person interviews might have allowed for a more in-depth exchange of information. The data collection, analysis, and interpretation of the results in this study may have been impacted since there was a limitation on access to the company's official internal records, which could be useful for compensating for any weakness in the gathered data. Although there are some limitations, this study contributes to the existing literature on cloud computing adoption by providing insights into the determinants within the context of a large company in Sweden.

Future research could explore the inclusion of a larger group of participants, including top-level managers, to gather a more comprehensive understanding of the determinants influencing the adoption of cloud computing. Additionally, conducting a more detailed study with a larger sample size across multiple large companies could provide valuable insights through other research strategies, such as surveys. This future research could also consider geographic focus and sector boundaries, allowing for a more nuanced analysis of how these factors vary across different regions and industries. Furthermore, future research could delve into specific service models within cloud computing, such as IaaS, PaaS, and SaaS. Examining the determinants of CC adoption associated with these distinct service models would provide a broader understanding. Besides, future study could focus on the importance of each determinant thus providing more detailed insights.

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Appendix A – Consent Form

Informed Consent Form

Title: A Qualitative Research on Determinants of Cloud Computing Adoption in a large company in Sweden

Investigator: Ruolin Sun(ruolinsun950@gmail.com), Seher Guldogan(seherguldogan@gmail.com)

Department: Department of Computer and Systems Sciences at Stockholm University Master in Strategic Information System Management

Purpose of the study: The purpose of this research is to highlight the determinants that a large company in Sweden takes into consideration with the adoption of cloud computing. Understanding the determinants of cloud computing adoption, and the experiences that are learned in the process of conducting a project will help companies better prepare for and manage their future cloud-based solutions.

-I voluntarily agree to participate in this research study.

-I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without any consequences of any kind.

-I understand that I can withdraw permission to use data from my interview within two weeks after the interview, in which case the material will be deleted.

-I have had the purpose and nature of the study explained to me in writing and I have had the opportunity to ask questions about the study.

-I understand that participation involves...[outline briefly in simple terms what participation in your research will involve].

-I agree to my interview being audio-recorded.

-I understand that all information I provide for this study will be treated confidentially.

-I understand that in any report on the results of this research my identity will remain anonymous. This will be done by changing my name and disguising any details of my interview which may reveal my identity or the identity of people I speak about.

Name of Participation:

Date:

Signature:

Appendix B – Interview Questions

Interview Questions	Motivation
<p>Introduction Questions</p> <ul style="list-style-type: none"> • What is your position in your company? And in which department? • How many years of work experience do you have in this field? • What do you think about using cloud computing? 	<p>Understanding the interviewees’ backgrounds and experiences will allow us to put a relationship with CC adoption in a mature and understandable way.</p>
<p>Cloud Computing Questions in General</p> <ul style="list-style-type: none"> • Which type of CC service models does your company offer/uses (IaaS, PaaS, SaaS)? How do you determine the type of services? • What type of deployment model do you have or plan to have in your organization or projects (private or public)? • In regards to benefits, which factors are critical for CC adoption (such as cost reduction, scalability, productivity, flexibility, application)? • What do you think are the most critical challenges that you encounter in adopting CC in different phases? 	<p>Understanding the aspects of how CC service/deployments, and the different factors/challenges/determinants/benefits that impacted the CC adoption are an important area to investigate.</p>
<p>Determinants of Cloud Computing Adoption Under Technological Context</p> <ul style="list-style-type: none"> • Which technological determinants are important in CC adoption? (Such as <i>Security and privacy, compatibility, cost-effectiveness, complexity, trialability, relative advantage, uncertainty, Technology Readiness, and trust</i>) • Is there anything that can be done to improve the impact of determinants/factors in this context? 	<p>Understanding the different factors/challenges/determinants that impacted the CC adoption is an important area to explore especially under technological-TOE framework</p>
<p>Determinants of Cloud Computing Adoption Under Organizational Context</p> <ul style="list-style-type: none"> • Which organizational factors/determinants are important in CC adoption? (<i>Such as firm size, attitude towards innovation, top management support, and organizational readiness</i>) • Is there anything that can be done to improve the impact of determinants/factors in this context? 	<p>Understanding different factors/challenges/determinants that impacted the CC adoption is an important area to explore especially within</p>

<ul style="list-style-type: none"> • Do you recognize any support when adopting cloud computing services? What are the general procedures when adopting new technology? Is there any strategy before adopting CC? • Do you have cloud professionals in your company? How many of them? When you come across some problems related to CC, do you ask cloud professionals for help? 	<p>organizational- TOE framework</p>
<p>Determinants of Cloud Computing Adoption Under Environmental Context</p> <ul style="list-style-type: none"> • Which environmental factors/determinants are important in the adoption of CC? (Such as <i>regulatory and compliance restrictions, service level agreements, Vendor support, Competitive pressure, Standardization of cloud technologies and compliance policy, Government/Institutional support, Broadband and internet/Digital infrastructure, Geographical Locations/Data centers</i>) • Do you know any policies/legislations/government procedures that are related to cloud computing? • When you have cloud computing problems that internal professionals cannot solve, can you find support from the service provider? Do you think support from the service provider is necessary or useful? • Is there anything that can be done to improve the impact of determinants/factors in this context? 	<p>Understanding different factors/challenges/determinants that impacted the CC adoption is an important area to explore especially within the environmental- TOE framework.</p>
<p>General Questions</p> <ul style="list-style-type: none"> • Sweden has the highest CC adoption rate in the EU? What are the reasons behind that? What is your opinion? (Data centers, government support, internet usage?) • Is there anything important to mention about CC technologies or adoption in your organization? 	<p>Allowing the interviewees to express anything that was important to note.</p>

Appendix C – Reflection Document by Seher Guldogan

How does your study correspond to the goals of the thesis course? Why? Focus on the goals that were achieved especially well and those that were not well achieved.

The primary objective of the thesis course was to gather a deeper understanding of the determinants of CC adoption in a large company in Sweden. This thesis effectively fulfills this purpose by conducting independent research, analyzing relevant papers, books, and other materials, and conducting semi-structured interviews that were required to answer the research question. However, due to the time limitation of this study, one case study was carried out with a limited sample size and a narrow geographic focus by considering only one industry. We hoped to collect data from a larger group of participants, including top-level managers, and carry out a more detailed study with a larger sample size and multiple large companies, considering geographic focus, and sector boundaries. Moreover, we could not achieve in-person interviews since the participant had a working hybrid style.

How did the planning of your study work? What could you have done better?

We did effective time planning by setting an achievable schedule that was broken down into smaller milestones and keeping it. Within the given timeframe, a relevant topic, research background, research gaps, and research question were established through a comprehensive literature review. Research methodology and data collection were chosen to answer the research question. We got assistance from peers or colleagues to improve our work. Proper data analysis techniques were decided by aligning them with the research question. Moreover, we established good communication with our thesis supervisor to receive valuable feedback. In these phases, my colleague and I collaborated continuously, and we divided the tasks equally. We communicated regularly via mail, Zoom meetings, or text messages. It would have been better if face-to-face meetings with my colleague could have been done to get better communication.

How does the thesis work relate to your education? Which courses and areas have been most relevant for your thesis work?

I study in Strategic Information Systems Management. In this education the significance of adopting digital technologies to companies such as adopting cloud computing technologies has been emphasized in various courses that I have taken. Moreover, some courses guided us on how to conduct scientific research for a master thesis in a proper way. As a result these courses have been most relevant for our thesis work; Management of Global IT resources (MGIT), Scientific Communication and Research Methodology (FMVEK), Risk Management (RIMA), Systems Theory, Organizations and IT (SYSTOIT), and Research Methodology for Computer and System Sciences (MMII).

How valuable is the thesis for your future work and/or studies?

The thesis would hold significant value for my future work, particularly since I have prior experience as a business analyst. Cloud computing is becoming increasingly significant in the business sector, and understanding its adoption determinants is critical for professionals in a variety of roles. That drives large firms' use of cloud computing. This information will be useful in my future job because it will allow me to study and assess the feasibility, advantages, and challenges of cloud adoption projects. I would get insight into the aspects that drive decision-making processes in terms of companies' adopting digital technologies.

How satisfied are you with your thesis work and its results? Why?

I'm pleased with the progress of my thesis. I appreciate my partner and my effective teamwork, as our collaboration and communication have been strong, resulting in the successful completion of our objectives. Furthermore, our supervisor has played an important role in our research's achievement by providing valuable feedback and direction. We also obtained assistance from interviewees at the case study firm in Sweden, who supplied us with critical information for understanding the determinants driving large companies' adoption of cloud computing.

Appendix D – Reflection Document by Ruolin Sun

How does your study correspond to the goals of the thesis course? Why? Focus on the goals that were achieved especially well and those that were not well achieved.

This study aims to investigate the determinants of cloud computing adoption in large companies in Sweden. This thesis has corresponded with the goals of the thesis course by formulating research questions, selecting appropriate research strategy and methods, analyzing data, and discussing the findings. The whole process gave researchers a detailed idea of how to conduct a research study. Besides, by writing this thesis, I have gained some knowledge of cloud computing, and I also learned about the current situation of cloud computing in Europe. However, due to the time and resources limitation, the study only investigated one company in Sweden with limited interviewees. Moreover, the lack of research experience and cloud computing knowledge may also influence the quality of interview questions and interviews.

How did the planning of your study work? What could you have done better?

At the beginning of writing the thesis, my partner and I have made a clear schedule to control the progress. Based on the template and previous thesis, we have made the outline of our thesis, and the tasks were evenly distributed. Since both of us have the same goal, this is finishing the thesis on time and quality, so we have not argued anything about the task distribution. At the same time, our supervisor has provided detailed and valuable suggestions and comments that guided our research towards a correct direction. Especially when formulating the research problem and research question, Dr.Rusu's comments helped us sort out our minds.

As for the study, it would be better if we could conduct interviews in person. Although online interviews were convenient, sometimes it is difficult for researchers to catch the underlying meaning of their words. Besides, due to the poor quality of voice recording, correcting transcripts has taken up a lot of time.

How does the thesis work relate to your education? Which courses and areas have been most relevant for your thesis work?

As a student of Strategic Information System Management with no IT background previously, I have learned the knowledge of IT resources management, database, data warehouse, ERP and business process modeling. These courses helped me establish an idea of how IT can help business and companies.

Moreover, the research methodology courses, such as Scientific Communication and Research Methodology (FMVEK) and Research Methodology for Computer and System Sciences (MMII) provide the idea and method of how to conduct a research study in the computer and system science field. Management of Global IT resources (MGIT), Systems Theory, Organizations and IT (SYSTOIT) provide the knowledge of IT and management. These courses have been most relevant to this thesis work.

How valuable is the thesis for your future work and/or studies?

Before writing this thesis, I had already developed some interests about cloud computing, but it is such a big concept and I am confused about how to start properly. By conducting this research study and writing this thesis, the concept of cloud computing is gradually clear and I learned there are a lot of cloud-based solutions and services that are used by companies. Therefore, I am planning to learn the fundamental concepts and skills of Azure or Google Cloud Platforms combining my interests in data.

How satisfied are you with your thesis work and its results? Why?

I am satisfied with our thesis work. However, as mentioned earlier, the thesis still has room for improvements. For example, case studies should be conducted in more companies, interviewees should have more experience in cloud migration, case study companies should be in various sectors, so the results could be more generic and accurate.