CLOUD COMPUTING AS AN ENTRANCE FOR START-UPS INTO ERP SOLUTIONS

Master Thesis

M.Sc. Business Administration

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Management Summary

This master thesis focuses on factors impacting the decision to adopt Cloud ERP solutions among the organizational setting of start-ups. The literature argues that Cloud Computing and its service models fit the needs of smaller firms perfectly as they cannot afford high-cost structures for software implementation and need flexibility and better access to global markets (Ross & Blumenstein, 2015; Sultan, 2011). Even though start-ups are a viable business form, there is no specific research which targets start-ups and their willingness to adopt Cloud ERP solutions. This study identifies this gap and therefore contributes to the on-going academic literature by examining this sub-group. The findings regarding factors impacting the decision to adopt Cloud ERP or Cloud Computing are concentrating on SMEs. Thus, an extensive literature research was conducted to answer the central research question (*Which factors influence the adoption of Cloud-based ERP-systems in the organizational setting of start-ups?).* First, Cloud Computing and the resulting servitization of software solutions are explained, followed by a definition of (Cloud) Enterprise Resource Planning (ERP) with its benefits and drawbacks and a review of Cloud ERP adoption literature. Additionally, the context of start-ups used in this research is clarified. To determine the factors which impact the adoption decision the Technology-Organizational-Environmental (TOE) framework, which was employed by Alshamaila, Papagiannidis, and Li (2013) in their study about Cloud Computing adoption of SMEs, is most appropriate. By reviewing the literature regarding Cloud ERP and the TOE framework, propositions could be developed. This research follows a qualitative approach and data is gathered through 15 semi-structured interviews with start-ups and experts. The results show that certain factors are significant for start-ups and their Cloud ERP adoption. Therefore, it is important to understand the relative advantage (e.g. fewer costs, scalability, and location flexibility) as well as have little complexity in the ease of use and implementation along with an easy integration. The prior experience with ERP and testing the technology was also related to the decision to adopt Cloud ERP. Even though top management support was found to be important, the support of the employees is at least equally important in a start-up. Also, the industry and the market scope impacts the decision to adopt Cloud ERP. Moreover, the network effects and recommendations are significant factors influencing start-ups in their decision whereas uncertainty and competitive pressure were not found to be relevant in this organizational context. All in all, start-ups are an appropriate target group for Cloud ERP providers, and there is great potential to elaborate further on this research field.

Keywords: *SMEs, start-ups, Cloud ERP, Cloud Computing, adoption, TOE framework, adoption in small businesses, adoption in start-ups*

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List of Abbreviations

CRM	Customer Relationship Management
CPU	Central Processing Unit
ERP	Enterprise Resource Planning
GD logic	Goods Dominant Logic
HaaS	Hardware as a Service
IaaS	Infrastructure as a Service
IDT	Innovation diffusion theory
IS	Information Systems
MM	Motivational Model
MRP	Material Requirement Planning
MRP II	Manufacturing Resource Planning
NIST	American National Institute of Standards and Technology
OECD	Organization for Economic Cooperation and Development
PaaS	Platform as a Service
SaaS	Software as a Service
SD logic	Service Dominant Logic
SLA	Service Level Agreements
SME	Small and Medium Sized Enterprise
TAM	Technology Acceptance Model
TCO	Total Cost of Ownership
TOE Framework	Technology, Organization and Environment Framework
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
UTAUT	Unified Theory of Acceptance and Use of Technology

VAR	Value Added Reseller
VPN	Virtual Private Network
Y2K	Year 2000 Kilo

1. Problem Statement

The first chapter introduces the topic and points out the research objective. It also poses the main research question with its four sub-questions and underlines the significance of this investigation. Also, an outline of the thesis is given to provide guidance for the reader.

1.1. Introduction

Cloud Computing will affect the way services are "*invented, developed, deployed, scaled, updated, maintained and paid for*" (Marston, Li, Bandyopadhyay, Zhang, & Ghalsasi, 2011, p. 1). Due to this fact, Cloud Computing appears to be a disruptive innovation which leads to a new form of servitization in the whole IT industry (Baines, Lightfoot, Benedettini, & Kay, 2009; Krikos, 2011; Marston et al., 2011; Ojala, 2016; Ripsas & Tröger, 2015; Sultan, 2014b). Vandermerwe and Rada (1988) described servitization as adding value to the firm's products by additionally including services to the offering. This leads to a bundle of services combined with products, support, and knowledge (Vandermerwe & Rada, 1989). The transformation Vandermerwe (1988) focused on, shows the shift of a "*goods-dominant logic to a service dominant logic*" (Leimeister, Winkler, & Xiao, 2015, p. 2) mostly happening in the manufacturing sector. Nowadays, the IT industry switches from its fixed products such as on-site server landscape to Cloud Computing offerings on a consumption base. Moreover, the need for new software solutions demanded by customers combined with the knowledge of information systems (IS) and new features provided by Cloud Computing enables software producer (e.g. Microsoft) to create new services, introduce new business models, and offer service bundles (Ojala, 2016; Sultan, 2014b; Wen & Zhou, 2014). Additionally, new target groups such as small and medium-sized enterprises (SMEs) and sub-groups like start-ups can be addressed through Cloud Computing (Alshamaila et al., 2013; Sahandi, Alkhalil, & Opara-Martins, 2013).

1.2. Research Objectives and Questions

Literature observed that existing Cloud technologies perfectly meet the needs of SMEs as those firms require flexibility, low-cost structures, better access to global markets, and collaboration (Ross & Blumenstein, 2015; Sultan, 2011). By adopting Cloud Computing, such firms can use the advantages of the enhanced Cloud technology to react better to the changing environment and customer needs than without using new technologies (Mladenow, Fuchs, Dohmen, & Strauss, 2012). Although the adoption rate of Cloud Computing is constantly growing, concerns regarding security and privacy issues limit the trend (Bitkom Research GmbH, 2015). Thus, research tried to answer the question which additional factors play a crucial role in the Cloud Computing adoption process of SMEs. SMEs are an upcoming new target group for Cloud applications (Alshamaila et al., 2013; Gangwar, Date, & Ramaswamy, 2015; Khan & Al-Yasiri, 2016; Neves, Marta, Correia, & Neto, 2011; Sahandi et al., 2013).

There is literature providing sufficient insights into Cloud Computing adoption in general as well as particularly for SMEs. However, little research is done in the area of enterprise resource planning (ERP) systems (e.g. Al-Johani & Youssef, 2013; Grubisic, 2014; Johansson, Alajbegovic, Alexopoulo, & Desalermos, 2015; Peng & Gala, 2014; Saini, Khanna, & Peddoju, 2014; Salum & Rozan, 2015). ERP systems support organizations with central control for e.g. financial management, supply chain management, and human resource management (Al-Johani & Youssef, 2013). Small firms are interested in using ERP solutions to gain a competitive advantage but do not have time, staff or financial resources to afford huge upfront investments, which are necessary for an on-premise ERP implementation (Al-Johani & Youssef, 2013; Salum & Rozan, 2015). Due to the movement of traditional on-site ERP systems into the Cloud, ERP solutions are more flexible and affordable which is attractive for SMEs (Al-Johani & Youssef, 2013).

Other literature on Cloud-based ERP pays attention to the company size. Johansson and colleagues (2015) found that interviewees suggested splitting small and medium-sized enterprises for further research into sub-groups. Small and medium enterprises are reacting in another way to opportunities and drawbacks. "*This is not surprising, as companies consisting of 10 employees and the ones consisting of 200+ employees are likely in different situations, having very different needs as well as resources*" (Johansson et al., 2015, p. 4218). This suggestion is reasonable and points out the research gap which will be addressed in this paper. The past literature focused exclusively on the adoption of Cloud ERP among SMEs and did not investigate sup-groups such as start-ups. Moreover, start-ups have no fixed amount of employees but typically are known for their small headcount. Therefore, to contribute to the existing academic literature, this research aims to identify crucial factors to explain why start-ups adopt Cloud-based ERP systems.

Based on the problem and the research gap the following research question can be stated:

Which factors influence the adoption of Cloud-based ERP systems in the organizational setting of start-ups?

In order to answer this central research question sufficiently sub-questions are defined and have to be explained beforehand:

(1) What is servitization in the context of Cloud Computing?

The first sub-question explains the basic concept of servitization, Cloud Computing and the connection of both.

(2) What is a Cloud ERP system?

Secondly, there will be an explanation of (Cloud) ERP functionality as well as its capabilities.

(3) Which advantages and disadvantages have Cloud-based ERP solutions for small enterprises?

Thirdly, the advantages Cloud-based ERP solutions offer to small firms will be described as well as concerns regarding this new technology.

(4) Which factors are essential for the adoption of new technologies by small organizations?

Literature provides several frameworks with factors influencing the adoption of innovations in general and in particular for SMEs. After summarizing the results from the research regarding those factors, they have to be examined in the context of start-ups.

1.3. Significance of the Research

This research will be conducted in cooperation with the University of Twente and a company (in the following named VAR), which is based in the Netherlands. VAR is a medium-sized company with about 300 employees and is a value-added reseller (VAR) of Microsoft's ERP solution Dynamics AX, which recently moved to the Cloud. Hence, VAR is interested in new perspectives, especially in new target groups such as start-ups, to engage customers with the new Cloud technology provided by Microsoft. With literature claiming that Cloud Computing fits the needs of smaller firms correctly (Ross & Blumenstein, 2015), VAR wants to test whether this is also reasonable for Cloud ERP in the context of start-ups. The results of this research aim to help VAR to find out which start-ups might offer new business opportunities for them. This approach is also in line with Sultan (2014b) who argued that disruptive innovations like Cloud Computing lead to new value propositions for firms as well as adjustments and creation of markets.

Also, the adoption of start-ups is not examined in the literature before and this research opens a new aspect of Cloud ERP literature. In order to reveal new insights and challenges for Cloud ERP adoption, it is necessary to validate the already conducted conclusions of Cloud Computing (Peng & Gala, 2014). In addition to that, the theoretical technology, organization, and environment (TOE) framework is tested in a new setting which demonstrates the robustness of the model and theory behind the framework. Therefore, this research contributes on the one hand to the literature and on the other hand to practice, which enhances its significance.

1.4. Thesis Structure

This master thesis consists of six chapters which aim to answer the central research question. The first chapter focuses on the *problem statement* and gives an introduction to the topic. Also, the research objectives, the significance of the research and the outline of this academic work are provided to the reader. The *literature review* in the second chapter demonstrates how the study was planned and performed. Furthermore, the original background of servitization and its definition (chapter 2.2.1) as well as the definition of Cloud Computing (chapter 2.2.2) are described. This knowledge enables the connection of both topics and to define its relation (chapter 2.2.3). Moreover, the definition (chapter

2.3.1), the advantages (chapter 2.3.2), and disadvantages (chapter 2.3.3) of Cloud ERP systems are reviewed. With little research having been done in the field of start-ups regarding Cloud ERP, SMEs are the main focus of the literature review regarding the Cloud ERP adoption (chapter 2.4). Since start-ups are examined in this research, a definition is illustrated in chapter 2.5. The *theoretical framework* is explained in the third chapter and consists of the background of the framework (chapter 3.1) and the core concept of the innovation diffusion theory (chapter 3.2). Additionally, all variables used within the TOE framework are reviewed, and propositions are developed (chapter 3.3 and chapter 3.4). The fourth chapter provides an overview of the *methodology* which includes the research strategy and design (chapter 4.1 and 4.2), followed by remarks on the scientific quality (4.4). The fifth chapter illustrates the *results* gained from the interviews. General findings and the propositions are discussed regarding their applicability to start-ups (chapter 5.1). Also, the framework is evaluated regarding its fit into the organizational setting of start-ups (chapter 5.2). The last chapter provides a *conclusion* (chapter 6.1) as well as practical and theoretical implications (chapter 6.2) are given in order to bridge the findings to practice. Furthermore, limitations (chapter 6.3) respective to the work and further research (chapter 6.4) fields are discussed.

2. Literature Review

The second chapter gives an overview of the literature review process as well as the planning of the literature review and insights provided by the research. The chapter additionally answers the sub-questions one to three, which are stated in the first chapter.

2.1. Planning of the Literature Review

Regardless the area of research, a profound analysis and review of existing academic literature is needed in order to gain insights and guidance for the research conducted (Tranfield, Denyer, & Smart, 2003). Denyer and Tranfield (2009) as well as Wolfswinkel, Furtmueller, and Wilderom (2013) identified approaches how to do a systematic literature review. This study follows the approach of systematic literature review by Denyer and Tranfield (2009) as this concept is more and more applied in the IS literature (Wolfswinkel et al., 2013). The literature reviewing process consist of 1) defining, 2) searching, 3) selecting, 4) analyzing, and 5) report/ presenting the research (Denyer & Tranfield, 2009; Wolfswinkel et al., 2013). First, criteria for inclusion and exclusion have to be defined as well as the field of investigation and proper sources. This study is conducted in the IS and the adoption theory literature. In order to find adequate resources, several databases and predominately recent academic publications are utilized. Due to the accessibility, the databases Google Scholar and Google Books, as well as Scopus, was perused to find the needed literature. Furthermore, search terms like ‘SME adoption’, ‘start-up adoption’, ‘Cloud Computing’, ‘Cloud ERP’, ‘adoption in small businesses’, ‘Cloud in small businesses’, ‘adoption models’, ‘TOE’, and several other combinations were used to select useful papers. Throughout the search articles, titles, abstracts, and results were read as well as forward and backward citations checks were performed. This supports the selection of the

right papers while rejecting the unneeded once directly. During the analyzing stage, all necessary information was derived from the documents and categories built in order to find relations between individual groups. The categories defined and presented in this thesis are servitization in the context of Cloud Computing, Cloud ERP, Cloud ERP adoption, start-ups, and TEO framework (Wolfswinkel et al., 2013).

2.2. Servitization in the Context of Cloud Computing

The first sub-question focuses on Cloud Computing as a new form of servitization. Therefore, this section first describes the original background of servitization and its definition as well as the definition of Cloud Computing. This knowledge enables the connection of both topics and to define its relation.

2.2.1. Definition of Servitization

Literature about servitization claimed that manufacturing firms are often affected by the need of servitization as they offer physical products (Baines et al., 2009). Moreover, research stated that selling only products to the customer is not enough anymore (Grouve, 2014). Therefore, firms have to include services into their product portfolio to create a competitive advantage and understanding customer needs (Grönroos, 2015). In order to dive into the definition of servitization, it is crucial to explain what services are. Vargo and Lusch (2004) defined a service "*as the application of specialized competences (skills and knowledge), through deeds, processes, and performances for the benefit of another entity or the entity itself*" (Vargo & Lusch, 2004, p. 326). This is in line with Grönroos (2015) who argued that the process of interaction between the service provider and the customer can be determined as a service in order to solve customer's problems. Services can be easily distinguished from traditional products as they are intangible, heterogeneous (no standardization), not separable in production and usage, and there is no possibility to store services (Vargo & Lusch, 2004). Moreover, Vargo and Lusch (2008) declared the shift from a product driven (GD logic) to a more service driven society with services being introduced as the new leading logic in the economy. Therefore, they distinguish between operand resources such as raw materials and operant resources which refer to skills and knowledge. However, the service-driven logic (SD logic) does not exclude products. Goods can still be involved even though services are the key process (Vargo & Lusch, 2008).

This new paradigm of a more service-driven society was first introduced to literature by Vandermerwe and Rada (1989) as *servitization*. They argued that firms try to understand their customer's needs and therefore are "*moving from the old and outdated focus on goods or services to integrated 'bundles' or systems*" (Vandermerwe & Rada, 1989, p. 314). This was the starting point for researchers to investigate several aspects of servitization such as the definition, drivers and motives, challenges, strategies of servitization as well as case studies and success stories of firms who managed to transform from a product- to a service-driven company (Baines et al., 2009; Lightfoot, Baines, & Smart, 2013; Smith, 2013). Due to the fact, that literature investigated this phenomenon over the past

years, several contributions to the definition of Vandermerwe and Rada (1989) appeared. According to Avlonitis, Frandsen, Hsuan, and Karlsson (2014), manufacturing firms have to change their organization to a more customer-centric one in order to stay competitive and keep customers. The integration of services to the traditional products enables companies to create unique offerings for their clients and develop a deep relationship with them. Further on, the bundling of services and products can lead to higher market shares as well as larger profit margins (Avlonitis et al., 2014). This is in line with the findings of Neely (2009) who argued that selling just products is outdated and there is a movement into selling product-service systems. In addition to that Ahamed, Inohara, and Kamoshida (2013) detected that products in a bundle with services lead to higher customer satisfaction. Hence, servitization adds value to the traditional product offering of manufacturing firms. Thus, to stay competitive and to differentiate from other businesses, servitization is a suitable strategy for those companies (Ahamed et al., 2013). The study of Alvizos and Angelis (2010) indicated that servitization is more than just the bundling of services and products but elements such as support, self-service and knowledge add value to service activities as well.

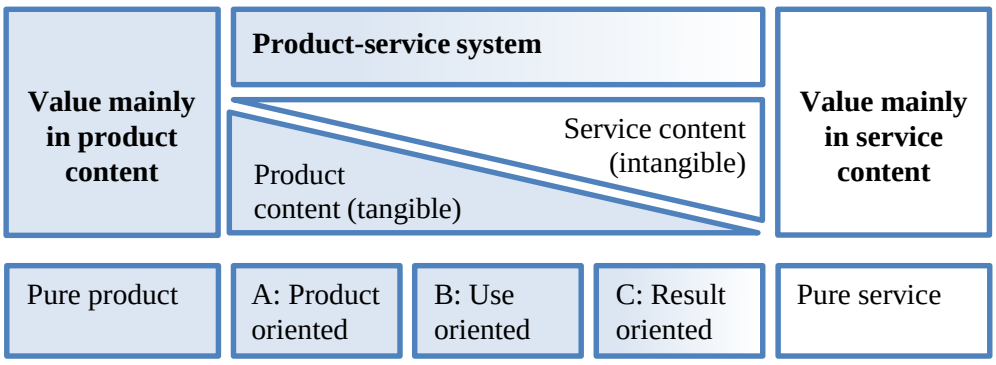
Another aspect of servitization is the distinctions of the concept between *trend* and *strategy* that was derived from literature by Alvizos and Angelis (2010). They argued that servitization can either be seen as a long-term plan which refers to strategy or service infusion can be considered as a general guidance which relates to the term trend. Furthermore, they claimed that servitization is still discussed and immature due to several concepts (e.g. providing products and services, products combined with services or products with the function of a service) by which service infusion can lead to enhanced service quotations (Alvizos & Angelis, 2010). Alvizos and Angelis (2010) even suggest that the whole idea of servitization should be reframed. Besides that, Vandermerwe and Rada (1989) argued that service companies, as well as traditional manufacturing firms, are affected by servitization due to the global and cross-industrial influences. This demonstrates the trend of servitization over all industries. Additionally, Wise and Baumgartner (1999) suggested that going down the value chain is necessary as providing only products is not sufficient enough in today's business world. Moreover, to actually create value and generate profits manufacturing firms need to rethink their business model and include services to meet customer needs (Grönroos, 2015; Wise & Baumgartner, 1999). Hence, Neely, Benedettini, and Visnjic (2011) pointed out five underlying trends of servitization in their long lasting study about the changing nature of servitizing manufacturing firms. The trends can be summarized into 1) the shift from production to offering solutions to the customer, 2) the change from output to outcome, 3) the focus on building relationships with the customer instead of having one-time transactions, 4) the establishment of a network with several partners, 5) the creation of eco-systems instead of concentrating on single elements alone in the production. These trends act as a complement to the existing offerings of manufacturing firms and do not replace traditional products (Neely et al., 2011). The literature also discusses the strategy of servitization. It describes the long-term plan to successfully transform a business from a manufacturer towards a service-driven company through

certain activities (Alvizos & Angelis, 2010). From the perspective of servitization, such activities include that firms need to create greater values and outcomes for their customers than the competition. By transforming from traditional manufacturing towards service-centric organizations, companies are enabled to gain a competitive advantage due to better product-service offerings and greater understanding of customer's needs (Ahamed et al., 2013).

As scholars claimed that there is a need to do service infusion in the manufacturing sector, Baines et al. (2009) and Lay (2014) categorized drivers of servitization. There are three primary motivations for servitization: G*rowth*, *profit*, and *innovation*. Adding value for the customer through service infusion leads to a diversification of the firm and thus fosters a competitive advantage. This, in turn, stimulates product sales as well as service sales which result in a company's growth (Baines et al., 2009; Lay, 2014). The economic driver consists mainly of increasing margins and a steady income. Mathieu (2001) claimed that commercializing services around a product could result in revenue growth which leads to higher profits. Furthermore, Baines et al. (2009) reasoned that certain industries like aerospace or automotive could charge even more for their services than for new products. The sales process starts with the product sales whereas services are needed at a later point in the cycle. Due to this countercyclical behavior of product and service sales the introduction of services contributes to a more stable income stream even though the product demand drops (Lay, 2014). Frambach, Wels-Lips, and Guendlach (1997) stated that offering more services deepens the relationship with the customer. This, in turn, enables the firm to detect customer needs. Thus, Lay (2014) argued that the gathered insights from customer demand about services foster innovation and new technology development.

As described above, scholars introduced the shift from selling only products to delivering products with services. However, literature point out that the level of service proportion can vary and thus a mix of different product-service combinations can appear (Mathieu, 2001; Tukker, 2004). Tukker (2004) classified the product-service system into three main categories, which are *product-oriented services*, *use-oriented services*, and *result-oriented services* (see Figure 1).

Figure 1: Main Categories of Product Service Systems by Tukker (2004, p. 248)



The first category (A) simply adds additional services to the traditional product offering. The services supplied by the firm are used during the consumption of the good or advice is given how to use the

product most effectively. Hence, maintenance, consultancy, and selling spare parts are further offerings (Tukker, 2004). In general, adding such services to the product contributes to the relationship between the provider and the customer (Mathieu, 2001). Secondly, user-oriented services (B) still focus on the product, but the business model changes significantly. There is no selling of the product anymore which means that the producing firm still is the owner of the goods. The services, which are offered, are leasing, sharing and pay per usage. Finally, result-oriented services (C) do not focus on a fixed product (Tukker, 2004). In fact, the provider has to reach a particular result for the customer regardless whether products from the vendor are used or not. This leads finally from the product itself to the "*service as a product*" which provides integrated and problem-solving solutions to customers (Mathieu, 2001). Besides, the research of Frambach et al. (1997) emphasized that the distinction of product service systems can be enlarged by clustering into service timing. Therefore, classifications like pre-sales product services, sale product services, and post-sale production services were introduced to literature (Frambach et al., 1997).

Scholars also investigated how firms applied the concept of servitization in practice and what kind of motives and challenges the manufacturing companies are facing. The most prominent case studies illustrated in literature are the cases of IBM Cooperation and Rolls Royce (Ahamed et al., 2013; Lightfoot et al., 2013). Both firms were founded as manufacturing companies and managed to transform to integrated solution providers. During the change process, they had to overcome challenges like restructuring and to split off parts of the organization. The mindsets of the employees had to be adjusted towards a service-oriented organization and additionally new capabilities and skills were needed. Besides, the cultural and organizational transformation the introduction of innovative business models like "*pay-as-you-use*" revolutionized the whole economy and showed that servitization matters for manufacturing firms (Ahamed et al., 2013; Lightfoot et al., 2013; Smith, 2013).

However, literature still discusses whether the financial results of servitization are beneficial or not (Neely et al., 2011). There is research claiming that operating a service-driven company is not more expensive than running a traditional production firm (Grönroos, 2015). This discussion is called the servitization paradox. Neely (2009) pointed out that even though the average servitized companies generate more sales revenue than traditional manufacturing firms, the proportion of the net profit is smaller. In line to that Gebauer, Fleisch, and Friedli (2005) observed that expanding the service business results in better services and higher costs but not in higher returns. This can be explained by the changing employee costs. The workforce that can provide consulting services is more expensive than staff working on the assembly line. Therefore, Grönroos (2015) pointed out that a service culture has to be established within the company in order to shape the firms' strategy and mission. Hence, it is important to build up a strategy to cope with servitization as just adding services is not beneficial for the company (Neely, 2009).

2.2.2. Definition of Cloud Computing

Due to the growing trend of Cloud Computing, many definitions evolved in the literature. The most prominent one is introduced by the American National Institute of Standards and Technology (NIST), which summarizes the main aspects of Cloud Computing (e.g. Gangwar et al., 2015; Marston et al., 2011; Misra & Mondal, 2011; Neves et al., 2011).

> *"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 & Grance, 2010, p. 2)

In the study of Sultan (2010), the term Cloud Computing is compared with a cluster of distributed computers, which "*provide on-demand resources and services over a networked medium*" (Sultan, 2010, p. 110) to its customers. Cloud providers usually use the internet as the needed network medium. This is in line with Ercolani (2013) who argued that the Cloud Computing phenomena evolve from virtualization, grid computing, and web services.

Following the definition by Mell and Grance (2010) Cloud Computing consists of five essential characteristics which are *broad network access*, *on-demand self-service*, *resource pooling*, *rapid elasticity* and *measured service*. On-demand self-service means that the customer is able to order services such as software or hardware without interacting with another human and the services are delivered free from device and place (Marston et al., 2011). As described by Sultan (2010), the access to the network is mostly done via the internet. Therefore, any device can be used such as mobile phones, laptops or tablets which demonstrate the adaptability of Cloud Computing. The physical and virtual resources like storage, memory or processing power can be flexible allocated by customer demand (Mell & Grance, 2010). Cloud Computing also allows a rapid and dynamic scalability to the quantity requested by the user (Mladenow et al., 2012). Due to the transparency of the services provided by Cloud Computing the customer as well as the provider can easily control and monitor all resources. The Cloud system knows how much capacity is used by the client regarding active accounts, storage or CPU (Mell & Grance, 2010).

Furthermore, literature facilitated that the term Cloud Computing was traditionally used analogically for internet based services. Hence, Cloud Computing can be distinguished in three core service models (Sharma & Keswani, 2013). According to Sahandi et al. (2013), the services Cloud Computing supplies are Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).

- *SaaS* offers a high variety of applications like enterprise applications (e.g. ERP and CRM solutions), web-based e-mail systems (e.g. Google Mail) or office tools (e.g. Google Docs) and is the most accepted Cloud service. Moreover, supplying ERP solutions in the Cloud is

seen as the most valuable movement due to the complexity of the ERP system (Peng & Gala, 2014). The customer can access the application as well as the uploaded data via the internet without installing the software on their server (Sahandi et al., 2013). The easy, centralized installation and maintenance is a well-known advantage of SaaS. As described above, the end user can access the software anytime and anywhere. Additionally, customers are enabled to share information and enhance the cross-functional communication in a safe data environment (Armbrust et al., 2010). Even though literature claims that this was already possible before the introduction of the Cloud, Salesforce.com invented the model in a new way by supplying software via the internet in the late 1990ies. Thus, Cloud Computing provides a new aspect, as it supports more applications which facilitate providers to offer their software in the Cloud (Alajbegovic, Vasileios, & Achillefs, 2013). The opportunity to scale up and down dependent on the customer's demand is another advantage provided by SaaS (Armbrust et al., 2010).

- *PaaS* enables the customer to develop and manage their applications, but the infrastructure and middleware such as the operating system and hardware are governed by the Cloud provider (Sahandi et al., 2013). Similarly to the SaaS model, customers using the PaaS model do not have any control over the underlying architecture. The main difference is that the client still has control over the software in use (Alajbegovic et al., 2013). The most famous examples of PaaS are the platforms made available by Microsoft (Microsoft Azure), Google (Google App Engine) and Amazon (Amazon Web Services) (Puthal, Sahoo, Mishra, & Swain, 2015).
- *IaaS* supports Cloud customers with different kinds of IT equipment such as backup and recovery as well as virtualized storage (e.g. Amazon EC2). The Cloud provider manages the Cloud infrastructure alone which means that the customer cannot control computing resources. However, the authority over the installed software and the operating system is still held by the client (Alajbegovic et al., 2013). Additionally, it offers a per-use pricing model instead of buying all resources which are in favor of SMEs (Mahara, 2013; Sahandi et al., 2013). Due to the centralized management of the infrastructure, the Cloud provider is able to give access to the latest technologies for all clients at the same time (Alajbegovic et al., 2013).

In addition to the three prominent service models, literature predicts the paradigm of "*anything and everything as a service*" in the IT industry which will develop more and more in the coming years. Hardware as a Service (HaaS) is the newest service model introduced by literature (Salum & Rozan, 2015).

Furthermore, literature distinguishes Cloud Computing in different deployment models, which are Private Cloud, Community Cloud, Public Cloud, Hybrid Cloud, and Virtual Private Cloud.

(1) The *Private Cloud* model is designed for particular usage by a single firm (Botta, de Donato, Persico, & Pescapé, 2016). That particular business is able to own, manage and control the Cloud by themselves or through external providers. Hence, this model is the most secure and reliable one as it is

similar to the traditional in-house server farms. However, the comparison with the traditional in-house server is the most mentioned issue. The advantage of lower up-front investments is eliminated by the reference to buying and hosting the server internally (Zhang, Cheng, & Boutaba, 2010).

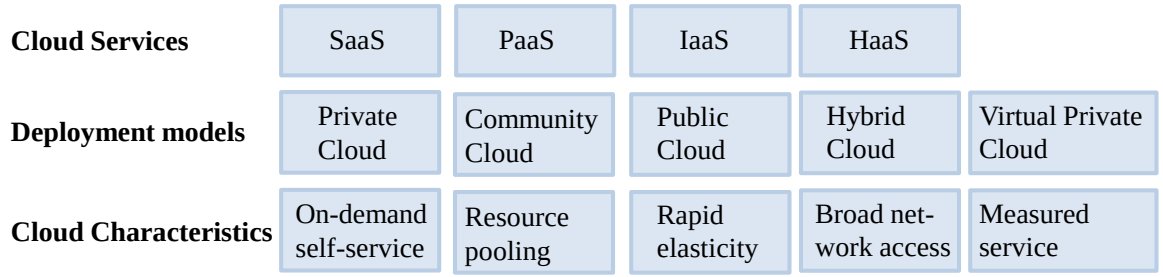
(2) The *Community Cloud* is used by a particular group of firms which have the same concerns and interests such as mission, security, requirements, and policy. The responsibility of managing the Cloud can either be done by the community or an external provider (Mell & Grance, 2010).

(3) Another deployment model is the *Public Cloud* which enables an open usage for the general public. To serve the demands of the user the provider supplies resources as services. On the one hand, the service provider can shift the risk towards the infrastructure provider and has fewer investments on infrastructure. On the other hand, the control over data and security as well as network settings lack and therefore complicate the effectiveness of the Public Cloud model in business (Zhang et al., 2010).

(4) In addition to the above-mentioned deployment models, literature explains a mixed model, the so-called *Hybrid Cloud*. It is composed of at least two Cloud models (Private, Community, or Public Cloud) in order to complement the pitfalls of the other model (Botta et al., 2016). As parts of the services are hosted in a private and the other parts run in a public environment the flexibility is higher than using just one solution. Just like the other models, the Hybrid Cloud provides benefits and pitfalls. The control and security aspects improve compared to the application of the Public Cloud. However, elaborating the correct splitting of the Public and Private Cloud needs a careful investigation to create a useful Hybrid Cloud (Zhang et al., 2010).

(5) Lastly, there is the *Virtual Private Cloud*, which is not, introduced in all research articles regarding the deployment models of Cloud Computing (e. g. Mell & Grance, 2010; Puthal et al., 2015). However, Botta et al. (2016) and Zhang et al. (2010) argued that there is a fifth model, which also reacts to the disadvantages of Public and Private Clouds. The Virtual Private Cloud is installed on top of the Public Cloud and leverages the virtual private network (VPN) technology. This, in turn, enables the service vendor to create their own security settings (e.g. firewall rules). Advantageous to the Virtual Private Cloud is that not only server and software but the network communication as well are virtualized which is necessary for most companies to employ Cloud services (Zhang et al., 2010). Figure 2 presents a holistic overview of all Cloud services, deployment models as well as the central characteristics of Cloud Computing which are discussed in the literature.

Figure 2: Overview Cloud Computing Solution



As described above, Cloud Computing offers different services (e.g. software, platform, infrastructure, and hardware), which demonstrate their focus on the service-driven management. In order to address the services adequately, Service Level Agreements (SLA) are negotiated with the clients (Zhang et al., 2010). These agreements manifest the tasks the service provider has to perform (e.g. level of security, performance, availability) (Alajbegovic et al., 2013). Puthal et al. (2015) added that significant concerns of the SLA are delays between the provider and customers. Thus, it is necessary to define a SLA immediately when firms decide to source from the Cloud.

2.2.3. Connection of Cloud Computing and Servitization

Due to the broad definition of Cloud Computing and servitization, the relationship between both subjects has to be elaborated further. The literature regarding service infusion emphasized the growing trend to shift towards more service offerings, which lead to closer customer relation (Wen & Zhou, 2014). According to Sultan (2014b), Cloud Computing appears as a new paradigm of servitization, because IT services are provisioned to a wider market by applying a new business model of morphing physical products into services. In line to that, Qing and Chun (2010) argued that Cloud Computing transformed software, hardware, and infrastructure into services which are supplied to customers over the internet. This demonstrates that due to the transition from goods into IT services, which were more expensive and complex in the past, more customers can be reached (large to small firms) (Sultan, 2014b). As introduced by Vargo and Lusch (2006) in their book about SD logic in marketing, this logic focuses on learning from and collaborating with the customer to be aware of their needs. Moreover, rather than putting the spotlight on the output as explained by Neely et al. (2011), the value is co-created with the customer (Vargo & Lusch, 2006). However, Cloud Computing is different from the regular service infusion described in the literature. The literature review of Cloud Computing demonstrates several Cloud Computing service models (see Figure 2) which show that physical products are transformed into services (Sultan, 2014b). Sultan (2014b) claims that the SD logic brought in by Vargo and Lusch (2006) is difficult to apply to Cloud Computing in general. Actually, the SD logic is co-creation-driven and defines services as a complement to products rather than eliminating the traditional product by sourcing the application into the Cloud (Sultan, 2014b). The software product is now available through the Cloud model and can be utilized flexible by the customers. This means that the service of using the software from the Cloud is in contrast to the traditional utilization of in-house solutions. The accessibility changes as well as the services provided

around the traditional software. An example is the implementation service of traditional software solutions which will change due to the Cloud usage. Hence, applying the SD logic to other settings than the traditional manufacturing service infusion leads to complications. Therefore, Sultan (2014b) pointed out that the SD logic can be criticized for being too attracted to managerial tasks and understanding value creation only in the way of co-creation with the client rather than consider new business models such as Cloud Computing (Merz, He, & Vargo, 2009; Sultan, 2014b). Also, Grönroos (2011) reviewed the SD logic by Vargo and Lusch (2008) critically in his paper about value co-creation in service logic. He argued that the term service dominant logic is confusing due to the service centric nature of this logic. Therefore, service logic would be a more appropriate name because the service acts as support to the customer. In order to perform the service logic all kind of resources even goods can be used (Grönroos, 2011).

According to Vargo and Lusch (2008), the SD logic can be mainly found in the activities of marketing as they need collaboration and partnerships. They figured out that customers are rather interested in the service skills than only in the service output. Furthermore, Vargo (2011) reacted to the criticism by claiming that the SD logic is not a theory but a way of reflecting how the economic world works. He encourages researcher to build on the SD logic in order to create new theories. In addition to that, literature criticizes the distinction of services and service by Vargo and Lusch (2008) (Grönroos, 2011; Sultan, 2014a). Within the SD logic, a service is defined as competencies such as knowledge or skills which lead to customer's benefits. According to that, a service appears to be the basic economic exchange in society (Vargo & Lusch, 2008). Services are seen as the primary business function in regards to marketing activities (Sultan, 2014a; Vargo & Lusch, 2008). As business-to-business marketing detected the need of building a network and a relationship with customers, Vargo and Lusch (2008) put this department into focus. However, Grönroos (2011) and Campbell, O'Driscoll, and Saren (2013) argue that the distinction between products (operand resources) and service (operant resources) or services is not significant within a service logic. By applying a service perspective or service logic, all types of resources can be used as a service. The service provider acts as a facilitator for the customer by supplying any kind of resources required by the customer. Thus, a service can be knowledge, skills, products or other resources which are employed to support the customer in the value creation process (Grönroos, 2011).

Although, there are pitfalls of the SD logic (Sultan, 2014a, 2014b; Vargo & Lusch, 2008), literature introduced Cloud Computing as the trigger of change in the IT industry (Ahamed et al., 2013; Leimeister et al., 2015; Sultan, 2014a, 2014b). The paradigm shift from providing only fixed assets to the customer to a consumption-based pricing model results in a collaborative process. This includes pooling of resources, skills, knowledge, and value co-creation which is, in the end, the core idea of the SD logic (Leimeister et al., 2015). According to that, IT organizations are nowadays able to sell their software, infrastructure, and hardware products as a service which is more efficient due to on-demand access via the internet. In fact, the traditional products have the same scope as the Cloud services.

However, in line with the five underlying trends classified by Neely et al. (2011), Cloud providers build service ecosystems such as the platform Microsoft Azure. This leads to a network of provider, customers and partners which are active in integrating and generating resources and outcomes (Leimeister et al., 2015). In line with the service infusion literature, this results in value creation and co-creation for the whole ecosystem (Leimeister et al., 2015; Vargo & Lusch, 2008). This shift from supplying exclusively goods to the SD logic in the IT industry establishes opportunities such as new target groups, strategic directions as well as business models and value propositions for Cloud providers. By uniting both, Cloud Computing and servitization, it can be seen that Cloud Computing represents the core idea of servitization by transforming from product to service orientation. Even though Grönroos (2011) does not discuss servitization directly, his different perspective on the service logic is an interesting contribution to the statements of Vargo and Lusch (2008). According to Vargo and Lusch (2008), a service mainly consists of skills and knowledge (operant resources) which create a benefit for the customer. It is difficult to apply this to the idea of Cloud Computing as a traditional product is provided as a service to the customer. Contrasting to that, Grönroos (2011) argues that the provider is able to support the customer with products as well as competencies. This service logic fits the transformation of a product provided as a service to the customer better than the approach of the SD logic by Vargo and Lusch (2008).

2.3. What are Cloud ERP Solutions?

The second and third sub-question focuses on the definition, the advantages, and disadvantages of Cloud ERP systems. With little research having been done in the field of start-ups regarding Cloud ERP, SMEs are the main focus of the literature review. This is the logic conclusion since start-ups are a sub-group of SMEs.

2.3.1. Definition Cloud ERP

Salum and Rozan (2015) argued that ERP systems are nowadays a standard in business activities. Traditionally, ERP solutions have been implemented and used as on-premise software packages within the firm (Johansson et al., 2015). A traditional or on-premise ERP solution just means that the system is maintained and hosted in-house (Peng & Gala, 2014). Such a solution allows organizations to plan and control all actions from a central and cross-functional point of view backed up with all data available from one data repository (Peng & Nunes, 2013). In the late 1990s, Davenport (1998) published an ERP definition which claimed that the software packages are an "*integration of all the information flowing through a company – financial and accounting information, human resource information, supply chain information, customer information*" (Davenport, 1998, p. 1). This is in line with the findings of Peng and Nunes (2013) as well as Alajbegovic et al. (2013) and Al-Johani and Youssef (2013). Likewise, Raihana (2012) argued that ERP contains the entire production line. "*It is an integrated computer-based application used to manage internal and external resources, including tangible assets, financial resources, materials, and human resources*" (Raihana, 2012, p. 77). Table 1

illustrates the main areas and tasks covered by ERP solutions (see Davenport, 1998; Jacobs & Weston, 2007; Raihana, 2012; Sharma & Keswani, 2013; Umble, Haft, & Umble, 2003).

Table 1: Main Areas and Tasks of ERP Solutions

Fields of application of ERP	Tasks of ERP
Finance	- Accountants receivable and payable - Asset management - Cash management and forecasting - Financial consolidation - Profitability analysis - Product-cost accounting
Human Resources	- Time management - Payroll - Personnel planning - Travel expenses
Supply Chain Management and Logistics	- Inventory management - Material management - Production planning - Purchasing - Shipping/routing management
Sales and Marketing	- Order management - Pricing - Sales management - Sales planning - Customer relationship management
Operations	- Project management - Document management - Reporting

Besides, the task of an ERP is to manage the information flow cross-functionally between all departments and act as an interface to the external environment of the firm. All departments are able to access the same data as the traditional on-premise ERP system is backed up with one central database (Raihana, 2012). Additionally, ERP solutions are constructed and composed of several integrated modules which are in favor for the user as they do not have to source all applications if they do not require them. This means that modules from various providers can be assembled in the way the organization needs it (Alajbegovic et al., 2013; Raihana, 2012). Moreover, this enables decision-

makers to gain a holistic overview of the business activities which in turn enhances the ability to accomplish operations more efficiently (Raihana, 2012).

The history of traditional ERP started in the 1960s and 1970s mostly in the manufacturing industry as firms began to plan their inventory with the help of software, known as the Material Requirement Planning (MRP) (Al-Johani & Youssef, 2013; Jacobs & Weston, 2007). To work with the MRP mainframe computers were needed (Al-Johani & Youssef, 2013). The MRP and its improved version the MRP II (Manufacturing Resource Planning), which was developed in the 1980s, are the predecessors of the modern ERP systems. In the mid-1970s, SAP was founded which is one of the key players in the on-premise ERP industry nowadays (Jacobs & Weston, 2007). Due to the need for a more integrated solution which could handle more than inventory management, the enhancement of the MRP II was initiated. Functionalities to manage human resources, sales, as well as logistics, finance, and project management, were included into the MRP II (Alajbegovic et al., 2013). By then most manufacturing firms used ERP systems but with this improvement, any organization was able to improve the effectiveness of the enterprise by using all information available and thus creating a competitive advantage (Umble et al., 2003). Moreover, in the 1990s, the Gartner Group first introduced the term ERP (Jacobs & Weston, 2007). Today, still all kind of enterprises use ERP systems regardless of their industry or type of organization (Raihana, 2012). In the beginning of the 1990s, SAP brought in their first ERP system to the market, which was called R/3. This ERP system can easily be differentiated from others as the client-server architecture was new. SAP R/3 was the first ERP system running on different operating systems (Jacobs & Weston, 2007). Around the year 2000 many organizations implemented ERP solutions in order to prevent and solve the year 2000 problems (Y2K) (Umble et al., 2003). In the same time period, the ERP market was formed and consolidated. By 2005 more or less just two big player, namely Oracle and SAP, were left in the market due to mergers and acquisitions of competitors (Jacobs & Weston, 2007).

Furthermore, ERP systems can be mainly characterized by two factors. Firstly, the cross-functional usage of one common and whole integrated system which leads to cost reduction of single departments. Secondly, all business units use the central database of the ERP system which in turn enables the user to access data in real time. Additionally, redundant work and wrong communication of information can be avoided. All in all, the introduction of an ERP system enhances the productivity of a firm (Alajbegovic et al., 2013; Hedman & Kalling, 2002). However, Mahara (2013) exhibited that there is a high level of commitment needed as well as huge investments, which cannot be afforded by many small firms. Consequently, in the past mostly large businesses introduced ERP (Raihana, 2012). Implementing an ERP solution also requires an immense project management effort (Mahara, 2013; Salum & Rozan, 2015). Even though ERP is a valuable innovation in the business field and the usage appears to be beneficial for any size of enterprises, smaller firms are sceptical about ERP adoption (Seethamraju, 2015). Thus, Cloud Computing helps ERP providers to offer their product to all kind of enterprises even SMEs as concerns like significant upfront investments, lack in resources and IT

expertise and time loss are reduced with using the Cloud (Salum & Rozan, 2015; Sultan, 2011). Furthermore, studies showed that the implementation of a Cloud-based ERP solution was 15% lower than the implementation and hosting of an on-site system. This can be explained by lower costs in buying, installing and maintaining Cloud-based systems (Iyer & Henderson, 2012). Likewise, the realization time can be reduced up to 70% with a Cloud-based ERP solution as the introduction is not that long compared to an on-premise system (AlBar & Hoque, 2015). In addition, Raihana (2013) explained in the article about Cloud services that "*ERP software that is deployed into a cloud environment becomes 'Cloud ERP Software'*" (Raihana, 2012, p. 78). Due to this demonstration, it is clear that Cloud ERP and traditional ERP software share the same goal as well as the same tasks. The traditional ERP solutions are used via PC or laptops while one central database runs on a server in the back-end of the firm (Hofmann, 2008). The Cloud-based ERP solution is accessible via the internet and being a SaaS application is administered by a third party. Thus, the two approaches differ in terms of accessibility and storage but not in functionality.

Previous research claims that the traditional revenue stream created through on-site ERP solutions is changing towards gaining revenue from licensing, professional services and maintenance. That is why providers who are offering SaaS applications such as Cloud ERP establish new business models in order to stay in the market (Hofmann, 2008). Nowadays, according to Raihana (2012) as well as Salum and Rozan (2015), SaaS is the most used Cloud Computing service and creates new markets in the ERP industry for smaller businesses with limited financial resources. In the case of small firms the pay-per-use model is preferred as the user pays just for the resources they need without the risk of huge investments. The flexible up and down scaling is part of the pay-per-use idea (Saini et al., 2014). As the future of the ERP is seen in the Cloud (Hofmann, 2008), it is necessary to refine its usability for smaller firms. Cloud ERP suits those firms perfectly who want to manage their system without maintaining and updating the hardware and software by themselves (Raihana, 2012). In most cases this fits SMEs.

2.3.2. Benefits of Cloud ERP Solutions

Literature regarding Cloud ERP states that the movement towards the Cloud ensures several advantages, especially for smaller firms. According to Peng and Gala (2014) organizations obtain advantages such as cost reductions and external IT support, higher performance, centralized system upgrades and mobility when adopting a Cloud-based ERP solution. As this study focuses on young enterprises, often called start-ups, it is important to illustrate benefits for those firms. The Cloud-based ERP solution offers a standardized all in one package for SMEs with real-time data access, efficient information management as well as the possibility to create or improve business processes. By moving the ERP software to a SaaS model not just larger firms can afford such a software (Seethamraju, 2015). Table 2 briefly describes benefits for ERP Cloud solutions that are mostly discussed in the literature, focusing on SMEs or small enterprises.

Table 2: Benefits of Cloud ERP

Benefit	Description	Organizational setting	References
Lower upfront cost	As no infrastructure is needed and the Cloud ERP is accessed through the internet, the cost for a Cloud ERP solution is lower than for an on-premise solution.	This is predominantly important for SMEs as those firms lack in financial resources.	Alajbegovic et al. (2013); Johansson et al. (2015); Mahara (2013); Saeed, Juell-Skielse, and Uppström (2012); Salum and Rozan (2015)
Lower total cost of ownership (TCO)	The costs of Cloud-based ERP systems are more flexible and seen as variable costs rather than fixed upfront investments. Therefore, they are experienced as lower as no investment is needed to own the Cloud service physically. By using Cloud ERP, the costs are more transparent and manageable regarding the capital flows.	Due to the lower TCO, Cloud-based ERP solutions are esteemed in favor for smaller firms. Large ventures do also gain an advantage from shifting the fixed to variable costs. However, at a certain point, the licensing costs equal the amount that would have been spent on an on-premise ERP system.	Alajbegovic et al. (2013); Johansson et al. (2015); Saeed et al. (2012); Salum and Rozan (2015); Seethamraju (2015)
Flexibility/ Mobility and Availability	Due to the web-based form of the Cloud ERP system the user can access the data from anywhere at any time, 24 hours a day. Therefore, no additional investments are needed compared to on-premise ERP systems. This increases the flexibility regarding workspace and geographic location.	The literature claims that the flexibility provided by Cloud ERP can guide firms towards possible innovations. The flexibility is especially preferred by start-ups.	Alajbegovic et al. (2013); Grubisic (2014); Mahara (2013); Marston et al. (2011); Peng and Gala (2014); Raihana (2012); Saeed et al. (2012)
Scalability	As the computing resources are managed through the Cloud	Because many SMEs intend to grow in the	Al-Johani and Youssef (2013);

	provider; it is possible to scale the needed resources in terms of user licenses easily up and down as required by the organization utilizing the Cloud ERP service. This is feasible through shared resources of the Cloud service and that is why the Cloud services are often called on-demand. By using a traditional ERP solution the up and down scalability is associated with a long implementation time.	future, this factor is of particular importance for smaller firms.	Alajbegovic et al. (2013); Johansson et al. (2015); Marston et al. (2011); Saeed et al. (2012); Salum and Rozan (2015)
System upgrades	The Cloud provider upgrades and updates the system automatically which means that the user is able to work with the latest version of the Cloud ERP systems. The updates are done without the notice of the user and without influencing the workflow of the service.	SMEs can afford the deployment of new technologies as it is done by the Cloud ERP provider. Usually, only larger firms have the financial means to update the systems regularly.	Johansson et al. (2015); Navaneethakrishnan (2013); Peng and Gala (2014); Saeed et al. (2012)
Core business focus	By using Cloud ERP firms can focus on their core activities as the Cloud provider manages all technical aspects of the solution.	Most SMEs do not have a huge IT department with the expertise to manage application like an ERP system. Hence, especially for SMEs, it is beneficial to source such activities out.	Navaneethakrishnan (2013); Saeed et al. (2012); Sharma and Keswani (2013)
New technology access	Due to the new Cloud services it is possible to source state-of-the-art technologies via the internet and the pay-as-you-use model. Provider places their continuously improved products in the Cloud	Since SMEs have limited financial resources, they benefit more than larger firms from the modern standards and	

	with up-to-date standards in technology and security.	technologies used by the Cloud ERP vendors.	
Faster system imple-mentation	The implementation of Cloud ERP systems is not as time-consuming as the installation of an in-house ERP solution.	Due to the more rapid installation of Cloud ERP systems, SMEs can focus faster on the core business and save costs.	Navaneethakrishnan (2013); Salum and Rozan (2015); Seethamraju (2015)
Low IT Manpower	There is less IT staff needed as the Cloud ERP provider maintains the system.	This is in favor for smaller firms as they typically do not have a large IT department and do not want to increase their IT investments.	Grubisic (2014); Mahara (2013); Weng and Hung (2014)

All in all, literature claims that smaller firms are able to explore the advantages provided by Cloud ERP in a better manner than larger organizations. The analysis by Johansson et al. (2015) showed that there are significant cost reductions especially for smaller firms but also for medium-sized companies. This cost advantage is not suitable for large organizations as they would need too many user licenses which are not profitable in the long run. Moreover, by means of Cloud ERP, SMEs can concentrate on the core business activities as well as take advantage of the state-of-the-art technology with a flexible pay model. This, in turn, pushes the SMEs in a better market position and enables them to be more competitive (Johansson et al., 2015).

2.3.3. Drawbacks of Cloud ERP Solutions

Still, there are drawbacks, especially for smaller firms, of Cloud-based solutions like data security and trust issues, a possible vendor reliability concern, problems to integrate the ERP Cloud into the organization and thus a potential cultural and organizational change (Peng & Gala, 2014). The main barriers debated in the literature are summarized in Table 3.

Table 3: Drawbacks of Cloud ERP

Drawbacks	Description	Organizational setting	References
Security and trust	Since all countries have their own standards cornering data storage and data privacy; this is	Even though ERP Cloud providers offer high standards of	Alajbegovic et al. (2013); Johansson et al. (2015); Peng

	a much-discussed issue. As long as firms are not acutely aware of the geographic location of their data they will be concerned. There are huge differences in regulations between the U.S. and the European Union. Due to this fact, users are worried as the management of the application is done by the ERP Cloud provider who might be working under a different jurisdiction than their own. It is more an issue of trust than actually a data security problem.	security that cannot be reached by SMEs, they are still little worried what happens with their data. For many SMEs, it is not easy to manage the risk of lacking in data control. However, SMEs also see the opportunity of the advanced security standards.	and Gala (2014); Saeed et al. (2012); Salum and Rozan (2015); Seethamraju (2015)
Integration difficulties and reliable provider	One drawback of Cloud ERP is the integration of in-house applications with the new ERP Cloud technology. In order to tackle this situation, a vendor with advanced skills and experience is needed to connect the systems.	The integration issue is mainly a concern of larger enterprises as most SMEs do not have such needs. However, the issue to find reliable providers is an issue all companies face.	Johansson et al. (2015); Mahara (2013); Navaneethakrishnan (2013); Peng and Gala (2014); Salum and Rozan (2015); Weng and Hung (2014)
Hidden cost	In the IT industry hidden costs is an issue. Thus, it is also a barrier for Cloud ERP adoption. Cloud providers always attract customers with cost savings. However; enterprises have to negotiate the contracts in a manner that they lead to those promised savings. This is done through SLAs.	All enterprises face this challenge. Hidden costs such as consultancy, implementation or maintenance fees can be overcome by good SLA negotiations. SMEs should be aware of those costs as the can be three to seven times the licensing costs.	Grubisic (2014); Saeed et al. (2012); Salum and Rozan (2015)

Loss of control	Due to the outsourcing of responsibility to the ERP Cloud provider firms can focus on their core business. However, this leads to a dependency on the vendor. As the Cloud provider manages the updates the firm has to follow the development with little interference opportunities. All data stored in the Cloud ERP is governed by the vendor which in some cases leads to perceived loss of power by the user.	Due to the newness of Cloud ERP solutions, not all firms, including SMES, are willing to put sensitive data into the Cloud.	Alajbegovic et al. (2013); Garverick (2014); Mahara (2013); Marston et al. (2011); Salum and Rozan (2015)
Lack of experience	Many decision-makers, as well as employees, do not have sufficient knowledge about Cloud Computing or Cloud ERP to use it properly.	For SMEs, the absence of skills and experience is one of the biggest hurdles to adopting the Cloud.	Alajbegovic et al. (2013); Salum and Rozan (2015); Yeboah-Boateng and Essandoh (2014)
Unstable performance e.g. internet	Due to the access of Cloud ERP via the web, the reliability and speed of the internet is a crucial determination for system performance. Even though some user causes much traffic due to large data amounts produced, the system still needs to work robust and in real-time. Moreover, in case the system goes down SLAs have to be arranged.	Literature argues that larger organizations are more affected by this barrier than SMEs as larger firms process more transactions. However, SMEs see a poor internet connection as a huge drawback of Cloud ERP, and they are concerned about the performance during the deployment.	Alajbegovic et al. (2013); Johansson et al. (2015); Saeed et al. (2012); Salum and Rozan (2015); Yeboah-Boateng and Essandoh (2014)

As shown above, there are several drawbacks of Cloud ERP which have to be overcome in order to implement it successfully. Nowadays, most SMEs interested in Cloud ERP are aware of the disadvantages. However, literature considers the barriers less significant for SMEs in comparison with their bigger impact on larger enterprises (Johansson et al., 2015). Literature agrees that the data security and trust issue is a huge concern in the industry (Alajbegovic et al., 2013; Saeed et al., 2012; Salum & Rozan, 2015). Yet, this drawback can easily be turned into a benefit for smaller firms as those companies can use the security standards delivered by large Cloud providers such as Microsoft. This is in favor of SMEs as they would not be able to build up such a professional firewall. Moreover, Johansson et al. (2015) argued in their study on the role of the organizational size, that SMEs are most suitable for adopting a Cloud ERP solution which is in line with the findings of other researchers (e.g. Saini et al., 2014). Even though larger firms could also gain a benefit by moving to Cloud ERP, they are more sceptical towards this technology and more resistant to it than smaller companies. Bigger and established ventures are even more concerned about security and therefore less likely to adopt Cloud ERP (Johansson et al., 2015). Additionally, researchers claim that the concerns of small firms regarding Cloud ERP can mostly be mitigated by choosing a reliable, well-known Cloud provider (Johansson et al., 2015). Another barrier of Cloud ERP is the organizational change that needs to be initiated due to the new technology. However, Cloud technologies are not the only new technology that faces this barrier, but this is a general phenomenon for cultural changes of a firm (Al-Johani & Youssef, 2013).

2.4. Cloud ERP Adoption Literature

Many scholars are claiming that the movement of in-house ERP towards the Cloud model is necessary and beneficial. According to Al-Johani and Youssef (2013), who analyzed how Cloud ERP solutions can be used in a beneficial way for SMEs, the development team cost can be reduced by 50% as well as the cost for technical support and testing efforts. However, there are no sufficient insights into the topic of Cloud ERP from academia. In addition to that, Cloud providers stress the advantages of Cloud Computing and the SaaS model with applications like ERP, whereas the drawbacks are not entirely discussed yet. This means that there is great potential to explore further drawbacks for Cloud ERP as well as testing the advertised benefits in the long-run (Peng & Gala, 2014). Therefore, Peng and Gala (2014) conducted interviews with professionals in order to find out which Cloud ERP barriers and advantages exist. The paper concluded that Cloud ERP adoption can be influenced negatively by the obstacles (e.g. data security and transparency, vendor-lock in effect, and integration problems) of this new technology and the organizational and managerial tasks which have to be handled (Peng & Gala, 2014).

So far, the literature about the adoption of Cloud ERP is limited, particularly in developing countries. There is not much research about factors influencing the introduction of Cloud ERP systems. Therefore, AlBar and Hoque (2015) conducted an empirical study of determinants of Cloud ERP adoption in Saudi Arabian firms, and Seethamraju (2015) interviewed 14 organizations in India. As

the papers by AlBar and Hoque (2015) and Seethamraju (2015) were published in the year 2015, the newness and research intensity of this topic are demonstrated. Also, Seethamraju (2015) stated the "*call for papers for SaaS related studies*" (Seethamraju, 2015, p. 475) in the study about the adoption of Cloud ERP among SMEs. He noticed a surge in this research area as more and more researchers publish papers regarding Cloud ERP adoption. However, the Cloud ERP adoption literature in the context of SMEs and the post-adoption behavior is rare. The cross-sectional field study provided the insight that Cloud ERP is best suited for SMEs as the advantages (see chapter 2.3.2) can enhance their business activities. Furthermore, the reputation of the Cloud ERP provider, as well as his willingness to support the Cloud user during and after the implementation, is important for SMEs and their adoption decision. Also, Grubisic (2014) encouraged practitioners as well as researchers to contribute to this young and dynamic topic in order to facilitate Cloud ERP research. He concluded with the statement that Cloud ERP is "*the radical solution [the] SME market is looking for*" (Grubisic, 2014, p. 73) which answers the scholars' question whether SMEs are ready to adopt Cloud ERP. Additionally, literature claims that Cloud vendors have to adopt their business model towards the pay-per-use pattern in order to stay competitive. Traditional software vendors like SAP and Oracle have problems to reach the smaller enterprises as they are large business oriented in contrast to Microsoft, Lawson Infor, Sage Group, and Epicor. However, they have to react to the changing market as SaaS applications are the future for small and large firms (Grubisic, 2014). Nowadays more and more ERP vendors customize their solutions towards the needs of smaller ventures in order to gain parts of the fast growing market segment of SMEs (Snider, da Silveira, & Balakrishnan, 2009).

All in all, one can see that the adoption literature regarding Cloud ERP needs to be further developed regarding smaller firms (Johansson et al., 2015). Many scholars have begun to discuss the barriers and motives to introduce Cloud ERP either in a smaller or larger firm setting (Garverick, 2014; Johansson et al., 2015; Mahara, 2013; Peng & Gala, 2014; Saeed et al., 2012; Salum & Rozan, 2015; Sharma & Keswani, 2013; Weng & Hung, 2014). Since academia and practice claimed that SMEs are in favor of Cloud solutions, many researchers focus on SMEs. Additionally, literature compares traditional and Cloud-based ERP models in order to find out the advantages and disadvantages of different models (Al-Johani & Youssef, 2013; Navaneethakrishnan, 2013; Raihana, 2012; Saini et al., 2014). Due to the enormous project management effort needed for such an ERP introduction critical success factors are discussed in the literature (Umble et al., 2003). Surely, this kind of research is necessary in order to detect adoption reasons. However, there are already studies exclusively characterizing the factors influencing Cloud ERP adoption (Alajbegovic et al., 2013; AlBar & Hoque, 2015; Seethamraju, 2015). In addition to that Allart (2015) not only analyzed the adoption factors of Thai SMEs but focused on the implementation strategies of Cloud ERP solutions. Looking at barriers and benefits is important but in order to analyze the factors crucial for Cloud ERP adoption by smaller firms, an adoption framework has to be used which is described in this thesis (chapter 3).

2.5. Definition of Start-ups

This thesis focuses on a sub-group of SMEs as Johansson et al. (2015) argued that it is important to split up the large and broad defined group and investigate several sub-categories of SMEs. Moreover, the study confirmed that Cloud ERP is in favor for smaller firms, in particular for start-ups (Johansson et al., 2015). The European Commission claimed that 99% of all business within the EU is done by SMEs. Therefore, they specified what SMEs are: Medium-sized companies have over 250 employees and exceed the turnover of 50 million Euros. Small enterprises have more than 50 employees and gain more than 10 million Euros in turnover per year. The last group is micro enterprises with more than 10 employees and about two million Euros turnover (European Commission, 2016). This illustrates the large range SMEs offer and is in line with the findings of Ramdani and Kawalek (2007b). In contrast to that large firms have more than 250 employees but only represent 1% of the ventures across Europe (European Commission, 2016). However, the literature review showed, most academic papers simply use the term SMEs without explaining which definition they follow.

Yet, the European Commission does not offer a description what start-ups actually are. Moreover, they do not add the years of existence to their explanation of SMEs. This is confusing when comparing start-ups to the group of micro enterprises as both are operating typically with a low number of employees. However, the term *start-up* has various definitions as well as restrictions in literature and the internet. The Bundesverband Deutsche Start-ups e.V. which is an association for start-ups in cooperation with the company KPMG Germany publishes an annual report, namely the German start-up monitor. This report characterizes what a start-up is (Ripsas & Tröger, 2015):

1. Start-ups are younger than 10 years.
2. Start-ups are highly innovative due to the technology in use and/or have an innovative business model.
3. Start-ups strive for significant growth in turnover and/or employee numbers.

According to Ripsas and Tröger (2015), a start-up has to fulfill the first determinant for sure. Besides that, at least the second or third influential factor has to be applicable in the context of the start-up. Due to this measurement, the definition of start-ups can be differentiated from the traditional foundation of business (e.g. establishing a conventional car repair shop) (Ripsas & Tröger, 2015). Therefore, the explanation of the European Commission fits better for the traditional business establishment. However, literature claimed that new ventures which surpass eight years of existence should be considered as old businesses (Brinckmann, Grichnik, & Kapsa, 2010; Miller & Camp, 1986; Miller, Wilson, & Adams, 1988; Zahra, 1996). Due to that fact, the report by Ripsas and Tröger (2015) has a broader time scale. Miller et al. (1988) explained that new ventures typically accomplished their break-even at the age of eight years. Thus, those who establish a new business do not expect actual returns but speculate on potential returns in the future. This is in line with the study of Biggadike (1979) who distinguished groups of businesses in his research. One of the business

groups is young ventures at the age of five to eight years. The next group, according to Biggadike (1979), is perceived as a mature business with established products and services. Despite that he also claimed that young ventures need about 10 to 12 years to gain equal returns than already mature firms. Moreover, Miller and Camp (1986) supported the study conducted by Biggadike (1979). Including the statement that young ventures need about 10 years to catch up with mature businesses in terms of returns, it is more comprehensible why Ripsas and Tröger (2015) set the boundary of their start-up definition broader than the literature.

Nevertheless, the quicker the young enterprise establishes a solid performance, the better (Miller et al., 1988). Hence, Ripsas and Tröger (2015) connected the term start-up with the idea of *gazelles*, which are introduced in the entrepreneurial literature as young and fast-growing firms. Yet, there is no overall conformity regarding the term gazelles in the literature (Henrekson & Johansson, 2010). According to Hölzl (2009), gazelles are SMEs in the initial years, and those firms must experience an average growth rate within a given period. Due to the fast growth rates firms are only temporary gazelles. They either become large businesses, stay with the same scope after growing that fast or fail and exit the market (Henrekson & Johansson, 2010; Hölzl, 2009). The Organization for Economic Cooperation and Development (OECD) suggested that firms younger than five years old and with a higher growth rate than 20% in employee numbers over a time frame of three years should be seen as gazelles. Additionally, the firm has to start at least with 10 employees (Ahmad, 2006). Another approach is that the sales growth has to exceed 20% per year and the base-year revenue should be around $100,000 (Henrekson & Johansson, 2010). As the literature is diversified, Henrekson and Johansson (2010) conducted a study which found out that gazelles, in general, are younger firms and that they can be any size. Furthermore, years of existence rather than the size of the venture conclude in an enormous growth. Additionally to that, gazelles are seen as more innovative than other firms as they combine several input factors to new outputs and therefore follow the process of creative destruction (Hölzl, 2009).

All in all, the orientations of start-ups as well as gazelles yield to mixed results. There is no common definition thus, for this research, it is important to set the boundary what a start-up is as this study exclusively focuses on start-ups and not on gazelles. Even though, most start-ups attended to grow in order to become a gazelle. To gain results from literature and practice start-ups are (1) younger than 8 years, (2) highly innovative with the used technology and/or have an innovative business model and (3) aim at a significant growth in turnover and/or employee numbers. Due to the lack of years of existence in the definition by the European Commission, start-ups are seen as a sub-group of SMEs. Start-ups are firms with a broad span of employee numbers and therefore a distinct group.

3. Theoretical Framework

The third chapter expands on the theoretical framework used in this thesis. Moreover, all variables used within the framework are explained and reviewed in detail with the help of previous research. This answers the fourth sub-question, which is stated in the problem statement, sufficiently. In addition to that, propositions are derived from literature.

3.1. Theoretical Background

There are smaller firms which are willing to use Cloud ERP solutions and literature is starting to find out how those firms are characterized. As mentioned above, this research focuses on the sub-group of SMEs, namely start-ups. In fact, there are several frameworks to find out which characteristics are crucial for technology adoption in general. Nowadays, IT is a central determinant of a firm's productivity and success (Alshamaila et al., 2013). Thus, it is important to find out, which factors play a role in IT adoption of a firm. Therefore, frameworks and models which cover IT adoption from a theoretical perspective are relevant (Oliveira & Martins, 2011). According to Oliveira and Martins (2011), IT adoption models are either more focused on the individual or on the firm level. However, literature reviews regarding both adoption focal points are lacking (Oliveira & Martins, 2011).

Venkatesh, Morris, Davis, and Davis (2003) tested eight different models regarding user acceptance including the theory of reasoned action (TRA), the theory of planned behavior (TPB), the motivational model (MM), the technology acceptance model (TAM), the model of PC utilization, the theory of innovation diffusion (IDT), and several combinations of the models. The result was the unified theory of acceptance and use of technology (UTAUT), which is nowadays applied in research. Despite the construction and validation of a new model, the majority of the models used and tested are on the individual level (Oliveira & Martins, 2011; Venkatesh et al., 2003). According to Venkatesh et al. (2003), most of the eight models used for the research were tested in advance with simple technologies, with participants of universities and with a biased measurement, as most studies have been conducted after the introduction of the new technology. This diminishes the credibility of those models. Nevertheless, the TAM model as well as the IDT theory are widely practiced in the information systems literature and tested with several technologies and users (Venkatesh et al., 2003). In the intra-organizational study about user acceptance of computer technology, Davis, Bagozzi, and Warshaw (1989) investigated the TAM as well as the TRA model. The perceived usefulness of the technology by the user and the perceived ease of use influenced the intention to utilize the technology, which encourages the simple but significant TAM model (Davis et al., 1989). Whereas social norms, which are a factor of the TRA model, did not show significance regarding the acceptance (Frambach & Schillewaert, 2002). Frambach and Schillewaert (2002) argued in their study about organizational innovation adoption that the research model conducted by Davis and colleagues (1989) is the most dominant. In fact, it has to be noticed that the TAM model does not include external or organizational factors.

Moreover, literature discussed the technology, organization, and environment (TOE) framework in the context of technology adoption on a firm level (Baker, 2012; Oliveira & Martins, 2011). This framework offers another research perspective on the adoption of innovation and technologies than the TAM model provides (Ramdani & Kawalek, 2007b). The center of the TOE framework consists of three pillars, namely the new technology, the organizational composition and the external environment the firm operates in (Baker, 2012). In addition, the TOE framework is mostly used along with the IDT by Rogers (1983). The five indicators of IDT explain the rate of innovation adoption and underscores the technological factors of the TOE framework (Awa, Ukoha, & Emecheta, 2015).

Due to growing complexity of technologies, such as Cloud ERP, using one model is not sufficient enough to determine essential factors influencing the adoption of innovations (Oliveira & Martins, 2011). Hence, this paper combines two interrelated theories (Baker, 2012), the TOE framework developed by Tornatzky and Fleischer (1990) and the innovation diffusion theory by Rogers (1983). Both theories are grounded and often applied in the IS literature with the focus on different technologies such as e-business, websites or in-house ERP systems (Oliveira & Martins, 2011). The TOE framework with factors of the IDT is also tested in various countries as well as cultural settings (Baker, 2012). Even though the UTAUT and TAM model are established and well-known, they focus more on the individual level of the user whereas the TOE framework in combination with the IDT includes external and internal factors. After analyzing the existing models with its benefits and shortcomings the decision was to use a combined TOE framework with factors of IDT, as seen in the study of Alshamaila et al. (2013). To detect what factors are relevant to start-ups and which kinds of start-ups are adopting Cloud ERP, it is necessary to see the big picture and not only focus on the individual founder. Surely, the perceived usefulness, as well as the perceived ease of use experienced by the entrepreneur, is essential when it comes to the adoption of new technologies within a young venture. However, by thinking outside the box and examining the organization, the technology, and the environment, more insights can be gained. Hence, the combination of the TOE framework with the factors of the IDT is most appropriate for this research.

3.2. Innovation Diffusion Theory

Rogers (1983) introduced the innovation diffusion theory (IDT) as a "*process by which an innovation is communicated through certain channels over time among the members of a social system*" (Rogers, 1983, p. 5). Moreover, he criticized in his book about the diffusion of innovations that all innovations are recognized as equal which is, according to Rogers (1983), not true. Likewise, Thong (1999) claimed that there are process and product innovations as well as incremental and radical innovations. The term innovation simply means that the concept, practice or idea is new to the adopter (Premkumar & Roberts, 1999). In the organizational context, the adopter equals the firm. According to Premkumar and Roberts (1999), literature regarding diffusion theory covers numerous fields such as the adopter's characteristics, the adoption process, and the diffusion (e.g. in terms of speed). This is in line with Ramdani and Kawalek (2007b) who argued that the innovation diffusion theory, fostered by Rogers,

presents a broad basis for IS research on adoption. However, the innovation diffusion process can either result in the introduction of new technologies or into a rejection (Ramdani & Kawalek, 2007b). In fact, the diffusion of new ideas can lead to *uncertainty* due to the existence of various alternatives and a lack of experience, which can be overcome with thorough information as well as changes within the social system (Rogers, 1983). This risk is especially high for smaller companies as those firms mostly lack experience and knowledge (Thong, 1999).

The literature distinguishes the innovation adoption decision making process in five steps: (1) knowledge that the new technology exists, (2) persuasion towards the innovation (can be positive or negative), (3) decision whether the adopter accepts or rejects the innovation, (4) implementation and usage of the innovation within the firm, (5) confirmation whether the innovation serves the needs and the expectations of the adopter (Premkumar & Roberts, 1999; Rogers, 1983). The adopters are definitely influenced by various determinants during the different phases of the decision making process. Moreover, individuals such as the champions can impact the adoption of the innovation within the firm immensely. They create awareness for the innovation and try to make resources available which support the innovation (Premkumar & Roberts, 1999).

Rogers (1983) differentiates the diffusion process by (1) innovation, (2) communication channel (how the message of a new innovation is spread, e.g. mass media), (3) time (how long the innovation adoption decision making process takes), and (4) the social systems it is placed in. Within the first cluster of innovation, Rogers (1983) defined five indicators related to the technology which explains the rate of innovation adoption:

1) *Relative advantage* is the intensity to which the new technology is perceived as better than the old one. It is important that the individuals experience the innovation as advantageous. This, in turn, leads to a faster adoption.
2) *Compatibility* is the extent of consistency with established values and experiences. The higher the compatibility of the existing norms and values the faster the adoption of an innovation will be.
3) *Complexity* is the degree to which a new technology is seen as complicated to use. New technologies which are perceived as easy to understand are faster adopted than those which require training for new skills.
4) *Trialability* is the intensity to which the innovation can be tested. Technologies which can be tested before the implementation are seen as less uncertain for the adopter.
5) *Observability* is the extent to which others can observe it. The visibility of results of the innovation makes it easier for the individuals to adopt such a new idea.

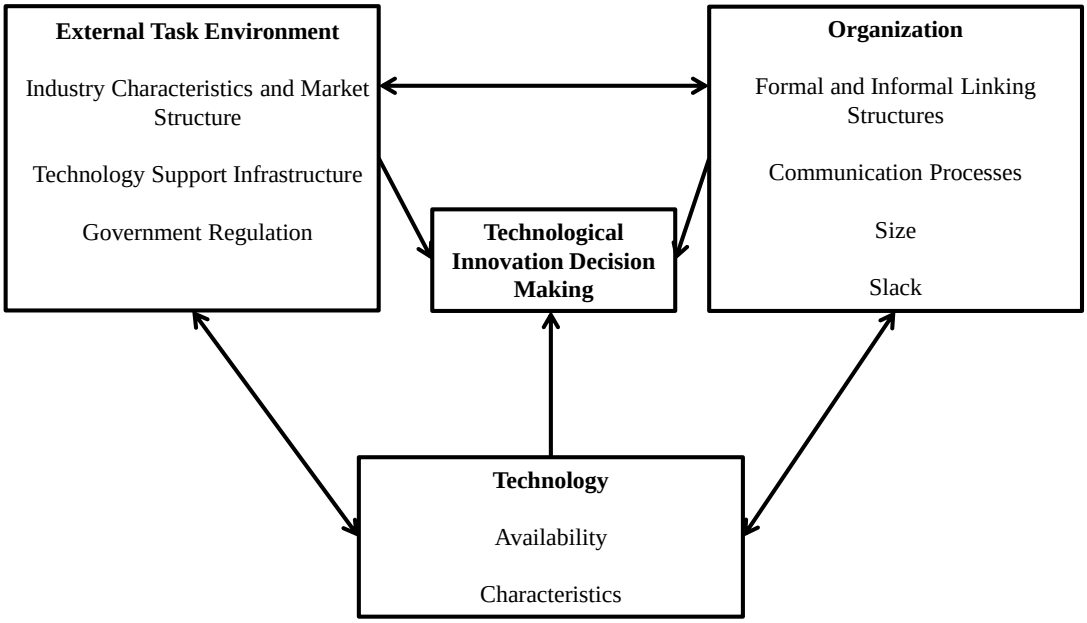
In Rogers' (1983) book, the term innovation equals the term technology as most of the examples are related to the IT industry such as PCs, hardware or software. The characteristics (relative advantage, compatibility, complexity, trialability, observability, and uncertainty) are included by several

researchers to the TOE framework. Due to the indicators, each technology can be explained individually. Additionally, the factors influencing the adoption of a certain technology are illustrated. However, the IDT provides not only the characteristics of technology adoption but clusters adopters in categories (innovators, early adopters, early majority, late majority, and laggards). The innovation diffusion theory is applied and also adapted in the IS literature. Oliveira and Martins (2011) summarized the most prominent studies based on the IDT by Rogers (1983) in their literature review about IT adoption on a firm level. Until now, the IDT was used to elaborate on the adoption of MRP, software applications, PCs, intranet, websites, in-house ERP, e-business and e-procurement (Oliveira & Martins, 2011).

3.3. TOE Framework

The TOE framework puts the firm context and its adoption of new technologies in the center of attraction. As this framework contributes to the organizational-level theory, three main pillars impact firms' decisions to adopt innovations. Therefore, the TOE framework, in its bases, is composed of the *technological*, the *organizational* as well as the *environmental* context (Baker, 2012). Ramdani and Kawalek (2007a) pointed out in their study about factors influencing the adoption of enterprise software (e.g. ERP or CRM) among SMEs that the TOE framework is used quite often in empirical research. However, it was not transparent to them which factors are the most crucial ones and which need to be included in their research. Moreover, they found out that the factors' influence differs depending on the technologies applied. Results for different technologies used for the same innovations lead to contrasting results in regard to the factors (Ramdani & Kawalek, 2007a). Hence, it is advised by literature to extend the TOE framework further and study different innovations (Chau & Tam, 1997). Due to this call for more research, many studies use the TOE framework. Consequently, this has demonstrated the vast application field of the TOE framework in several industries (e.g. manufacturing, healthcare, retail, and financial services) and different cultural settings (Europe, America, and Asia as well as developed and developing countries) (Baker, 2012). Furthermore, the adoption of several technological innovations such as e-commerce (e.g. Scupola, 2003), open systems (e.g. Chau & Tam, 1997), software (e.g. Thong, 1999), enterprise software such as ERP and CRM (e.g. Ramdani & Kawalek, 2007a), e-businesses (e.g. Zhu, Kraemer, & Xu, 2006) and electronic data interchange (e.g. Kuan & Chau, 2001) are tested. Commonly, all studies are based on the same three elements of the framework. In line with the statement of Ramdani and Kawalek (2007a), Baker (2012) also claimed that each researcher accomplished small modifications regarding the factors tested in the study. All in all, the essence of the framework remained the same, but the review of Baker (2012) emphasized that each technology or context requires unique variables. Hence, the factors used for the TOE framework depends on the innovation, the cultural setting as well as the industry and the organization (Baker, 2012). On the one hand, this can be seen as an advantage to customize the framework. On the other hand, it is hard to compare such studies. Figure 3 emphasizes the original TOE framework introduced by Tornatzky and Fleischer (1990).

Figure 3: Technology-Organization-Environment Framework



The technological factors focus on technologies within the firm and those technologies which are available outside the organization (Awa et al., 2015). The benefits perceived from an innovation and the ability to adopt the new technology plays a crucial role in the adoption process. Since not all innovations are significant to a firm. It is important to consider the characteristics of the new technology as well as the equipment and the needs of the company (Chau & Tam, 1997). The technological innovations facilitate new ways and possibilities for organizations and set at the same time boundaries of technological change of a firm. The existent technologies can affect the scope and speed of the technology which is planned to be introduced into a firm (Baker, 2012). Based on the 75-article meta-analysis conducted by Tornatzky and Klein (1982) the relationship of the innovation characteristics by Rogers (1983) and the adoption-implementation was established. Moreover, relative advantages, compatibility, and complexity showed the most significant relationship between the technological characteristic and adoption implementation (Thong, 1999; Tornatzky & Klein, 1982). This article demonstrated the connection of the IDT with the technical context of the TOE framework.

The organizational variables describe the firm in detail. They include all resources within the company as well as linkages between departments and employees, the communication process, the firm size and the availability of resources (slack of resources). Research at the organizational level and innovation adoption find several possibilities to link the organizational context to adoption. The informal and the formal linkages of departments, as well as employees, are coherent with innovation adoption (Baker, 2012; Tushman & Nadler, 1986). Besides, the structure of firms has been examined to determine a relationship to adoption. Literature identified that decentralized organizations are linked to new technology adoption (Daft & Becker, 1978). Furthermore, decentralized structures foster communication within a firm (Baker, 2012). The communication, as well as the support of the management, is a critical determinant towards an innovative organization. It is necessary to promote

the vision and strategy in order to create an innovative environment (Baker, 2012; Tushman & Nadler, 1986). The size of a firm and availability of resources (slack) are most discussed in the organizational context. On the one hand, literature claims that the higher the number of available resources, the higher the adoption rate of new technologies (Baker, 2012). On the other hand, Tornatzky and Fleischer (1990) argued that innovation can be created even without slack of resources. The link between the size of a firm and the adoption of innovation could not be constructed, even though literature found out that larger firms are more likely to adopt new technologies (Kamien & Schwartz, 1982). Hence, researcher call for a more complex measurement concerning the company size (Baker, 2012).

The external world a firm operates in is the environment of an organization. Those external factors can lead to opportunities as well as threats regarding the new technology (Thong, 1999). It was examined that fast growing industries are more likely to innovate than declining industries (Baker, 2012; Tornatzky & Fleischer, 1990). Thong (1999) especially valued the work of Mansfield (1968), who found evidence that competition stimulates the diffusion of innovation. In addition to that, he argued that uncertainty in markets lead to a more powerful technology push. In order to create innovation and adopt new technologies, employees with the right skills are needed as well as experienced external consultants and providers of technological services. Another variable is governmental regulations, which can either foster (e.g. subsidies) or hinder (e.g. fees) innovation within a firm (Baker, 2012).

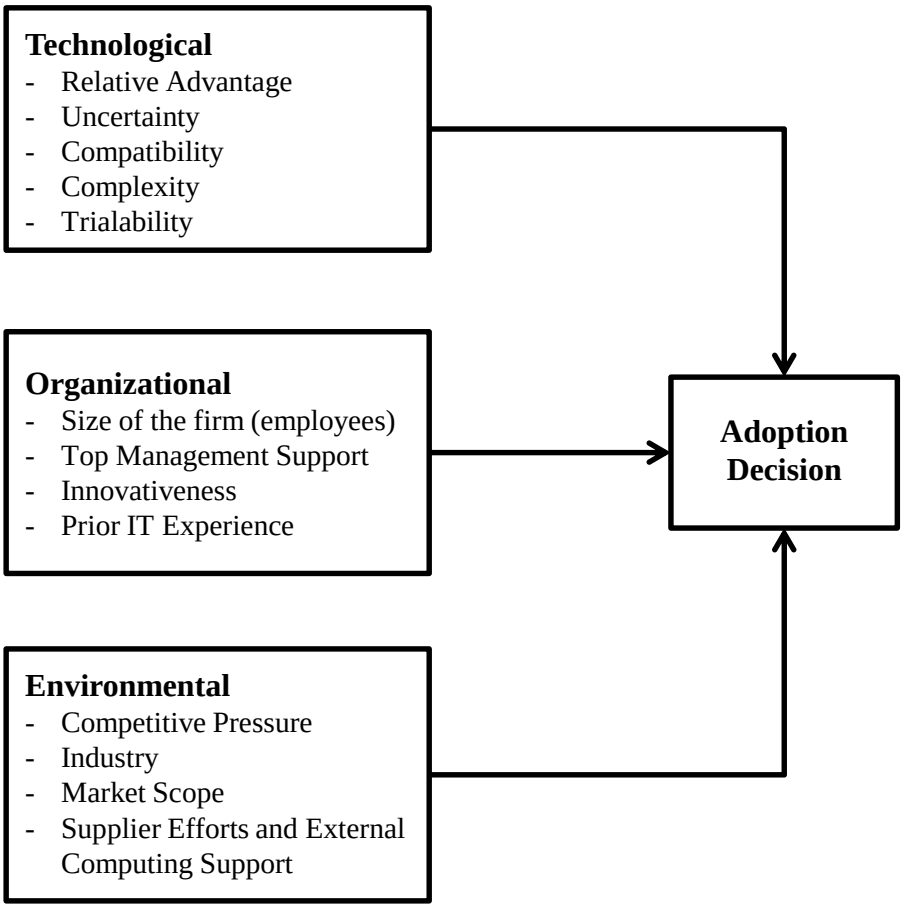
3.4. Adapted TOE Framework with Aspects of IDT

The combination of the TOE framework and the innovation characterization of the IDT fit perfectly. Thus, not only technology is playing a crucial role in the adoption intention of organizations. The organizational and environmental factors are important, too (Baker, 2012).

As stated previously (chapter 3.3), one benefit of the TEO framework is the simple replacement and adding of variables as they have to be adopted based on the technology and organizations that are investigated. Due to the fact, that start-ups are examined there is the need of including variables into the model, which consider the influence of the decision-maker. In smaller firms, the decision-maker is basically the founder or the CEO which shows the strategic relevance of the topic (Alshamaila et al., 2013). Alshamaila et al. (2013) therefore added variables such as *top management support*, as well as *prior experience* and *innovativeness of the decision-maker* into the TOE framework. This is in line with the study of Straub (2009) as he claimed that cognitive and contextual factors are crucial for the adoption of technology. Additionally to the five indicators (relative advantage, compatibility, complexity, trialability, and observability) related to the technology adoption rate introduced by Rogers (1983), the variable *uncertainty* is integrated into the TOE framework as it is discussed within the IDT. The potential risks occurring via the adoption decision of new technologies along with the emerging organizational change result in some level of uncertainty especially for smaller firms (Rogers, 1983). In order to introduce and implement Cloud-based services for SMEs, those

uncertainties have to be resolved and discussed (Alshamaila et al., 2013). However, characteristics like observability, governmental regulations, availability of technology, internal communication processes and structures are not essential for the context of Cloud adoption and are therefore excluded or rephrased (Alshamaila et al., 2013). Figure 4 demonstrates the adjusted TOE framework with the influence of IDT based on Alshamaila et al. (2013), which is the model for this study. The framework was initially tested in the context of Cloud Computing adoption in the organizational setting of SMEs in North England. As the Cloud ERP technology is a certain part of Cloud Computing and start-ups are a sub-group of SMEs, this framework established by Alshamaila et al. (2013) fits the context perfectly.

Figure 4: TOE Framework by Alshamaila et al. (2013, p. 255)



In order to make sure that the criteria of start-ups are fulfilled, for this study, control variables are included. Therefore, growth and years of existence are indirectly added into the framework. During the data gathering phase, the participants of the study are asked for the growth of the start-up they are operating in and additionally whether the start-up does not exceed the eight-year limit of young businesses. The control variable growth has various characteristics such as the growth of employee numbers or turnover. Moreover, the growth variable is important for the company VAR as they are looking for young, fast-growing enterprises to engage with and do business with.

3.4.1. Technological Factors

The technological factors describe which technologies are essential to the firm whereby it is not important whether the technology is already used by the enterprise (Baker, 2012). Therefore, the *relative advantage* perceived through the new technology, *compatibility* of the new and existing technology and *complexity* are factors, which are identified by literature and are essential for the adoption of Cloud technologies (Alshamaila et al., 2013; Gangwar et al., 2015; Sabi, Uzoka, Langmia, & Njeh, 2016).

The *relative advantage* can be explained with several parameters such as the cost benefit and security and privacy issues discovered by Salum and Rozan (2015). However, Tornatzky and Klein (1982) excellently pointed out that the relative advantage is too broad to measure why a new technology is adopted. The new technology can be perceived better than the old one due to time savings, cost savings, more profitability, or other benefits obtained. Nevertheless, Tornatzky and Klein (1982) found eleven studies which concluded that the relative advantage of new technology has a relationship with the adoption of such an innovation. Also, Thong (1999) figured out that smaller businesses which have a positive position towards the relative advantage are more likely to adopt new technologies.

Despite the relative advantage, *compatibility* and *complexity* demonstrated the highest significant relationship towards the adoption of innovation, which emphasized the results of another researcher (Tornatzky & Klein, 1982). Based on the interviews Alshamaila et al. (2013) conducted, they concluded that SMEs assume Cloud technologies are easy-to-use and simple to integrate into the company. Furthermore, in the context of smaller firms, the compatibility of the new and the old technology is even more important. The owner will only adopt innovations which are consistent with the values and beliefs of the venture (Premkumar & Roberts, 1999). In line with the compatibility variable, Cloud-based services are perceived as not complex to use and that it does not need much effort to employ Cloud services into the firm's processes (Tehrani, 2013).

Additionally, the variable *trialability* defined by Rogers (1983) and the variable *uncertainty* explained by Fuchs (2005) are added as they seem to be especially important for the adoption intention of smaller enterprises (Alshamaila et al., 2013). Uncertainty is defined as the perceived risk of adopting new technologies. Due to the lack of experience with the technology, issues like security play a crucial role in the adoption decision (Fuchs, 2005). This is also in line with the findings of Alshamaila et al. (2013), who reported that the introduction of new Cloud-based services depends on the level of uncertainty perceived through the SMEs. As Rogers (1983) explained, the uncertainty can be overcome via information and knowledge. Thus, it is important for the decision-maker to be aware of the benefits and drawbacks of such ERP Cloud services. Otherwise, the uncertainty leads to a lower level of Cloud ERP adoption (Tehrani, 2013).

Alshamaila et al. (2013) figured out that testing the new Cloud service influences the adoption decision of SMEs positively and strengthens the decision towards Cloud solutions. Also in other IS

settings (e.g. the adoption of open source software) it appears to be beneficial to try the technology beforehand in order to enhance the decision to adopt it (Dedrick & West, 2003). In the following propositions regarding the technological adoption, variables are stated, which are derived from the corresponding literature.

Proposition 1: The relative advantage positively impacts the adoption decision for Cloud-ERP among start-ups.

Proposition 2: The compatibility positively impacts the adoption decision for Cloud-ERP among start-ups.

Proposition 3: The complexity negatively impacts the adoption decision for Cloud-ERP among start-ups.

Proposition 4: The trialability positively impacts the adoption decision for Cloud-ERP among start-ups.

Proposition 5: The uncertainty negatively impacts the adoption decision for Cloud-ERP among start-ups.

3.4.2. Organizational Factors

The adoption decision is also affected by the organizational setting of a firm. The factor *firm size* is often discussed in the literature as some researchers claim that there is no relationship between innovation and the size of the company and thus request another measurement (Baker, 2012). However, additional research demonstrates that especially for start-ups it is likely to adopt Cloud services. This emphasizes the importance of organizational size in the adoption of new technologies, particularly in the Cloud environment (Alshamaila et al., 2013). By contrast with Baker (2012), Frambach and Schillewaert (2002) argued that the organizational size affects the tendency to adopt new technologies. Moreover, they claimed that there is a positive relationship between the size of a firm and the adoption of innovations. On the one hand, larger enterprises have to adopt innovations to stay competitive and on the other hand, it is claimed that smaller firms are flexible and more innovative. According to Neely (2009), the service infusion is more profitable for smaller companies than for larger ventures. This underscores the assumption that smaller firms can react better to market changes such as the new servitization paradigm of Cloud Computing in the IT industry. However, both organizational sizes have motives to adopt new technologies (Frambach & Schillewaert, 2002).

Prior experience, the *innovativeness* of the decision-maker and the *top management support* are variables investigating the human side of the organizational factor. According to Alshamaila et al. (2013), the familiarity with new technologies enhances the convenience of users but is not a direct factor which influences the decision to adopt. This is in line with Premkumar and Roberts (1999) who exposed in their study about communication technologies (e.g. e-mail and internet access) that IT

expertise is an important determinant but not significant. They argued that the adopters perceive the new technologies as easy-to-use and therefore, no external help was needed (Frambach & Schillewaert, 2002).

Moreover, literature agreed that particularly for SMEs the support of the management is essential for the adoption of new technologies as the management sends signals and shows the development direction of the firm (Ramdani & Kawalek, 2007a). Additionally, Alshamaila et al. (2013) stated that the idea to use Cloud-based services was also suggested by the IT departments of the SMEs investigated in the study. This shows that the impulse can either come from the management or the employees in smaller ventures. Still, the management support is necessary to push the innovation towards its realization (Alshamaila et al., 2013).

Likewise, the innovativeness of the decision-maker plays a significant role in the adoption intention of SMEs due to firm size (Marcati, Guido, & Peluso, 2008). In this context, innovativeness means openness to new products, approaches, and methods to solve problems and process information. The literature showed that SMEs who are innovative are more likely to adopt new technologies within the organization (Alshamaila et al., 2013). Below, the propositions based on the results of the literature review are summarized.

Proposition 6: The firm size impacts the adoption decision of Cloud-ERP among start-ups.

Proposition 7: The prior experience positively impacts the adoption decision for Cloud-ERP among start-ups.

Proposition 8: The innovativeness of a new venture positively impacts the adoption decision for Cloud-ERP among start-ups.

Proposition 9: The innovativeness of the founder impacts the adoption decision for Cloud-ERP among start-ups.

Proposition 10: The top management support positively impacts the adoption decision for Cloud-ERP among start-ups.

3.4.3. Environmental Factors

The *industry* is an important variable of the environmental factors. Literature introduced mixed results regarding the relationship between industry and the adoption of new technology. However, in the context of Cloud Computing adoption, results suggested that certain industries are more likely to introduce Cloud applications (Alshamaila et al., 2013). Moreover, the industry can be reviewed from different perspectives. On the one hand the type of industry and on the contrary the maturity. Firms in growing industries are more likely to invest in new technologies than firms in mature industries (Baker, 2012).

The results for *competitive pressure* also led to mixed conclusions. Alshamaila et al. (2013) claimed that there is no relationship between competitive pressure and the adoption of new technology for SMEs, whereas Premkumar and Roberts (1999) found out that there is a significant relationship for small firms. Competitive pressure reinforces the adoption of innovations because firms try to stay as competitive as possible (Premkumar & Roberts, 1999). Research provides insights that strong rivalry is related to innovation adoption. However, also Thong (1999) did not identify a direct effect on the adoption of IS applications in the setting of small firms. This lead to his suggestion that small businesses are not pushed towards the adoption of new technologies by competition (Thong, 1999).

Moreover, firms want to expand their business constantly. Therefore, the *market scope* of start-ups is important as they do not just stay locally. The market scope either targets regional, national or international markets. Literature suggests that firms using Cloud services reduce their costs and thus are more active on the international market. Moreover, many SMEs considered Cloud services due to the flexibility and independence in place which are used to enhance the efficiency of the venture (Alshamaila et al., 2013).

The *supplier's efforts* play a crucial role in the adoption decision of firms. The accurate communication of the vendor and his support can lead to a perceived risk reduction of the new customer, and consequently to a higher adoption intention (Frambach & Schillewaert, 2002). Also, the marketing activities hosted by suppliers have an influence on the adoption decision of SMEs. Moreover, firms can enhance their innovativeness and capabilities by learning from their supplier which in turn can lead to a faster innovation adoption. Additionally, for small enterprises, the expertise of the vendor is crucial because they do not have the experts inside the company (Alshamaila et al., 2013). In the following, the propositions regarding the environmental factors and their relationship towards the adoption intention are listed.

Proposition 11: The industry impacts the adoption decision for Cloud-ERP among start-ups.

Proposition 12: The competitive pressure impacts the adoption decision for Cloud-ERP among start-ups.

Proposition 13: The market scope impacts the adoption decision for Cloud-ERP among start-ups.

Proposition 14: The supplier's effort positively impacts the adoption decision for Cloud-ERP among start-ups.

4. Methodology

The fourth chapter provides an overview of the method selected for this study. The research strategy and design are explained, followed by reliability and validity considerations. Additionally, this chapter exposes important issues regarding the data collection technique.

4.1. Research Approach and Research Strategy

The research objective of this paper is to figure out which factors influence the adoption of Cloud ERP from a start-up perspective with the help of the TEO framework based on Alshamaila et al. (2013). Saunders, Lewis, and Thornhill (2009) distinguished, in their book about research methods, between the deductive and the inductive research approach. In order to examine whether the variables of the framework influence the adoption decision of start-ups a deductive approach was selected. The literature about research methods describes the deductive approach as a movement from theory to data whereas the inductive approach starts with data gathering and formulating the theory based on the data (Saunders et al., 2009). With the theoretical TOE framework adapted by Alshamaila et al. (2013) being used as a foundation for the methodology, it is applicable that the deductive approach is utilized for this research. Moreover, the purpose of investigating the impact of variables on start-up Cloud ERP adoption leads to an exploratory approach with parts of a descriptive research. The exploratory research is used to evaluate phenomena in a new light as well as understand problems better and obtain new insights (Saunders et al., 2009). According to Saunders et al. (2009), a descriptive study is mostly the extension or the predecessor for either an explorative or an explanatory research. Due to the objective of establishing a broad picture of the circumstances, the descriptive research fits perfectly for the literature review of this study. This thesis presents several concepts derived from the literature (e.g. the idea of servitization, the concept of Cloud Computing and ERP, and adoption models) and discusses which concepts are best suited for further research. Furthermore, the explorative component of the research aims to investigate the adoption decision of start-ups towards Cloud ERP solutions. Moreover, the framework is assessed with a new organizational setting as well as an upcoming technology.

Another aspect of planning the research is to specify the research strategy. Moreover, the research question, the objective of the study as well as the prior knowledge, personal philosophy and the vacant time for conducting the research influences the choice of the research strategy. In addition, it is noteworthy that there is not one strategy outperforming the others (Saunders et al., 2009). The survey strategy, which is commonly used for deductive research, fits this research best. This procedure is well-known and used in business and management research. Furthermore, the survey strategy can either be used for qualitative or quantitative data collection. For the purpose of differentiating the two different methods: qualitative data targets non-numerical data whereas quantitative data highlights numerical data. In regards to the quantitative approach, the survey strategy allows gathering a large amount of data with the help of questionnaires. The qualitative data can include text, audio, or video and can be collected via interviews (Longhurst, 2010; Saunders et al., 2009). This study employs a qualitative approach to gain as many new insights from the participants as possible. This is in line with the approach of Saeed et al. (2012) who argued that for exploratory research, it is necessary to use qualitative methods to understand the motives, reasons, actions, and beliefs of the participants better. This research uses the mono method for collecting the data which means that only qualitative data

from interviews is collected. Furthermore, Saunders et al. (2009) classified the time horizon into two aspects, the cross-sectional time frame, which is defined as a snapshot of time and the longitudinal time horizon, which is an investigation over an extended period. This research follows the cross-sectional approach as there are time restrictions and the interviews only show a snapshot of time in order to answer the research objective (Saunders et al., 2009).

4.2. Research Design

In general, the research design is the course of action within the research and has to be well-thought out. In order to answer the above stated central research question (*Which factors influence the adoption of Cloud-based ERP-systems in the organizational setting of start-ups?),* it is necessary to collect information about Cloud ERP and the adoption of start-ups. There has to be a measurement instrument either developed by the researcher or based on existing theory (Saunders et al., 2009). Therefore, in this study, the TOE framework based on the research of Alshamaila et al. (2013) is the guideline during the data collection. By using this framework, the organization, in this case, the start-ups are the entity of research. In order to answer the research objective, questions are deducted from the theoretical framework before the interview phase starts. Due to the flexibility of interviews as a data collection method (Alshamaila et al., 2013), it seems to be the most appropriate way in this context.

By following the descriptive approach, the sub-questions one to three are answered and the core understanding of the general conditions regarding the topic is given. The fourth sub-question introduces the explorative part of the research, as first factors stated in the literature are reviewed and then examined deeper in a new setting. Therefore, Alshamaila et al. (2013) replaced and added elements of the original TOE framework established by Tornatzky and Fleischer (1990). In order to overcome the criticism, studies have to face when they apply the TOE framework, Alshamaila et al. (2013) did not structure the questions around the TOE framework. Instead, the participants had the opportunity to discuss their own factors at the beginning. This reduces the bias as the participants are not confronted directly with the framework and had to think about their own issues. It is valuable for this study to use such tested variables. Thus, by means of the variables of the TOE framework the relation towards Cloud ERP adoption among start-ups can be reviewed and examined in detail. Also, all 14 propositions are retrieved from the study of Alshamaila et al. (2013) and then reviewed based on other profound and empirical tested IS literature. By means of several literature reviews as well as research about Cloud Computing with its services and adoption theory, it was possible to establish the framework and review the variables within a new context. First, the technology used by Alshamaila et al. (2013) was Cloud Computing in general. This study elaborates on one particular SaaS application, namely Cloud ERP. Second, the organizational context of SMEs researched by Alshamaila et al. (2013) is now examined in the light of start-ups which have not been studied before. The data needed in order to investigate the factors of the TOE framework are gathered through interviews. The findings of this study contribute to the theoretical significance of the topic by examining start-ups.

Additionally, it can help VAR to find potential new customer groups and understand the factors better which influence start-ups.

4.3. Data Collection and Data Analysis

The data collection technique of semi-structured interviews was preferred for this research. According to Saunders et al. (2009), semi-structured interviews contain a set of pre-defined questions regarding the research objectives. In order to answer the research question sufficiently new questions or the sequence of issues can be adjusted depending on the progress of the interview (Saunders et al., 2009). This ensures the flexibility and the openness that respondents can answer in their own words. Moreover, semi-structured interviews are beneficial for collecting different experiences, emotions, and opinions. This approach is often used in the context of qualitative research as it paves the way to explore all aspects provided by the literature with the respondents of the organizations (Longhurst, 2010).

In this study 11 start-ups have been interviewed which are less than eight years old, have a highly innovative business model or idea and aim at a significant increase of employees or revenue growth (Ripsas & Tröger, 2015). Additionally, four experts in the field of business development among start-ups and Cloud ERP solutions are interviewed. This adds up to a total amount of 15 interviews which is the same number of interviews Alshamaila et al. (2013) conducted. The interviewees from the start-ups are either responsible for IT or have decision-making authority (e.g. team manager, founder). Moreover, employees focusing on operational tasks and marketing are also included in this study. The respondents are selected through networking events in Berlin and accelerator programs. In addition, social networks (e.g. Facebook) which offer several start-up community groups are consulted to contact potential candidates. Furthermore, not only start-ups located in Germany are included in this study but also start-ups founded in the Netherlands. Those firms are addressed through the network of the University of Twente and the supervisor of this thesis. The interviews, which are the primary data source, are conducted either in German or English, depending on the preferences of the interviewee. To test the literature-based questions regarding their understandability and relevance one test interview was set up before the interview phase started. This was helpful in order to improve the questions and get a first impression how the respondents react. During the interview phase, the interviews were conducted either in the interviewee's office or via Skype. At the beginning the participants were asked about the start-up's background and whether they already work with an ERP system (on-premise or in the Cloud). An overview is illustrated in Table 4. After that, the perceived benefits and drawbacks of such Cloud ERP solutions are discussed and the influence of the TOE variables on the adoption intention of the start-ups. The interview guide is provided in the appendix of this work.

Table 4: Overview of Start-up Participants

Number of start-up	Position of interviewee	Industry	Size of the start-up	Years of existence	ERP existence	Intention to introduce Cloud ERP within the next year
SU1	Founder	(Online) Retail/ Trade	20-30	8	Yes	No
SU2	Founder	(Online) Education	5	1.5	No	Not applicable
SU3	Product Owner	IT (Cloud Software)	120	5	Yes	Yes
SU4	Operations	(Online) Retail/ Trade	50-60	2	No	Yes
SU5	Founder	(Online) Retail/ Trade	4	2	Yes	Yes
SU6	Team Leader	(Online) Trade/ Wholesale	600	3	No	Yes
SU7	Marketing	(Online) Retail/ Trade	115	8	Yes	Yes
SU8	Founder	IT (HR Service provider)	10-12	4	No	Yes
SU9	Founder	Automatization/ Robotic and sensor systems	5	4	No	Not applicable
SU10	Sales	Food	4	1	No	Yes
SU11	Founder	IT (HR Service Provider)	14	2	No	No

The experts are the second part of the interviewees and work closely together with start-ups. The first expert is a business developer based in the Netherlands who supports start-ups within a start-up acceleration program. Thus, he is knowledgeable as to which topics are crucial to start-ups and he is not focused on one single organization but can provide an unbiased view. Additionally, the second expert is a consultant for Salesforce.com which is a Cloud-based Customer Relationship Management tool. He was part of projects related to Cloud ERP in the organizational setting of SMEs and in particular in the context of start-ups. The last two experts are suppliers for Cloud ERP solution and work therefore closely with start-ups.

In addition to the primary data collection, secondary data is used to support this study. According to Saunders et al. (2009), secondary data is a valuable resource in order to answer the stated research questions. The secondary data can be distinguished between raw data and already disclosed work (Saunders et al., 2009). For this study, published articles, particularly literature reviews, are used to answer the sub-questions.

In order to analyze the output created by the interviews the responses are recorded and then transcribed to capture the original phrasing of the participants (Saunders et al., 2009). The participants granted permission for this procedure. If requested by the interviewee, the transcription of the interview was sent to the person for checking and adapting the answers. This approach is in line with the findings of Saunders et al. (2009) as he claimed that written and spoken words are different and many participants want to modify the grammar and words used during the interview. Due to the requested anonymity of the participants there are no transcripts provided in this thesis. Moreover, the interview data is checked against the propositions formulated to find out valuable insights regarding the framework and the adoption of start-ups. Due to the unstructured data provided by interviews, there is the need to structure the data in a way to analyze it and make sense of the responses (Saunders et al., 2009). As suggested by Saunders et al. (2009) each interview transcription is written down into a separate Microsoft Word document and saved with a consistent file name. This ensures a well-organized structure. Moreover, within each transcription of the interviews, all questions which have been asked during the particular interview are listed. It is also indicated which part is stated by the respondent or the researcher. All interviewed start-ups are abbreviated with SU followed by the particular number of the interview (1-11) (Saunders et al., 2009). Furthermore, the responses are summarized and afterward displayed in order to draw valuable conclusions out of the condensed statements. This is in line with the suggested approach of analyzing the data by Miles and Huberman (1994). The interview data is summarized in order to simplify the content. Second, to display the data a matrix is used which is created with Microsoft Excel. Each row of the matrix refers to one of the independent variables of the TOE framework (relative advantage, complexity, compatibility etc.) as well as benefits and drawbacks whereas the columns are allocated to the different start-up and experts. Consequently, the condensed statements can be filled into the correct cell which structures the huge amount of text. By means of the data display the researcher is able to analyze the findings of the interviews and draw conclusions. Moreover, comparisons of the unstructured, huge amount of data as well as the identification of patterns and relationships can be performed by the researcher (Miles & Huberman, 1994; Saunders et al., 2009). Saunders et al. (2009) perfectly outlined that the book by Miles and Huberman (1994) is a source book with a framework of data reduction, display and finally the conclusion and verification of the data. However, it is not specific and leaves free space for the researcher which is valued by this study. Due to the broad steps of the analysis there is plenty of opportunity to creatively think about how to display the data. This is necessary to explain relationships and to answer the stated research objective.

4.4. Scientific Quality

In order to interpret correctly and reduce the possibility to misunderstand the collected data, the validity, as well as reliability, are important determinants (Saunders et al., 2009). By using a qualitative approach the bias issues have to be discussed.

4.4.1. Validity

There is always the concern whether the gathered data and findings really point out what they are intended to show (Saunders et al., 2009). In this study, the relationship between the independent variables of the framework and the dependent variable of the technology adoption were tested within another study. Even though this shows that there is a causality given for this framework and its variables there are still threats to the validity. First, as opinions are asked, it is important to find out whether individual events before the interview have an influence on the response. In order to reduce this threat, the situation regarding the Cloud ERP technology is elaborated in detail during the interview. The candidates are asked which kind of technology they use and have to explain why. Consequently, negative issues related to Cloud ERP are pointed out due to the questions prepared. Moreover, as start-ups which are interested in a new technology are interviewed, the issue that the interview might pose a disadvantage to the firm is reduced to a minimum (Saunders et al., 2009). Actually, this study helps start-ups to discuss the decision towards a new solution and they are interested in how other start-ups which are facing the same problems are reacting. Due to the research snapshot of time, the potential drop-out rate is not an issue for this study (Saunders et al., 2009). However, not all start-ups know exactly whether they will adopt a Cloud ERP in the near future as it depends on the development of their venture. Nevertheless, all interviewed enterprises and experts know what the technology is and are aware of its potential benefits and shortcomings. Hence, they are all able to weight out the influence of the factors on their adoption intention.

4.4.2. Reliability

Another issue concerning the research is whether the collected data is processed with the right techniques, which lead to constant findings (Saunders et al., 2009). There are several threats regarding the reliability. One part of this is the issue of subjectivity. The subjectivity error describes that participants can react differently to questions due to varying timeframes (Saunders et al., 2009). For start-ups that are dealing with the decision of adopting a new technology it is not crucial in which timeframe the interviews take place. Even in the case that they choose not to accept Cloud ERP it is valuable to explain the reasoning for that. A second threat is the bias of the participants who are influenced by the opinion of their boss. This is also not applicable for the organizational setting of this study due to the flat hierarchies of the ventures examined. Moreover, there is a mix of founders or employees and experts among the interviewees. In order to reduce the observer errors as well as the observer bias, all interviews are conducted by the same researcher in the same interview style. In addition to that the interviews had some level of structure which helps to make sure that all issues are covered in each interview thus, reduces the threat of reliability (Saunders et al., 2009).

4.4.3. Bias and other Pitfalls of Interviews

Due to the fact that interviews are the most applied data gathering method in qualitative research, it is surprising that most researchers take it for granted. Myers and Newman (2007) detected that most academic publications in the IS literature which use interviews as a data collection technique only list the number of interviews and the explanation of the interviewee's background. However, there are problems and pitfalls regarding the interview method which are discussed by Myers and Newman (2007). In addition, Saunders et al. (2009) elaborated on the bias which might affect the interview quality. The interviewer bias can occur due to the non-verbal and verbal behavior of the researcher which in turn influences the answers of the interviewee. It is possible that the interviewer tries to affect the participant with his or her beliefs while the questions are asked. Moreover, the bias can occur due to misinterpretation of the responses (Saunders et al., 2009). In order to overcome these observer bias problems, Myers and Newman (2007) suggested that the researcher has to position himself at the beginning of each interview. Furthermore, it is important to minimize the social dissonance by behave adequately in terms of using the right language and dressing appropriately. In addition to that, the researcher should be aware of the need of various opinions as this is a definite benefit of qualitative research. In regard to that, the elite bias should be prevented by asking not only the elite of an organization. Therefore, this study focuses on founders, (IT) employees as well as experts who are interviewed in order to create a broad variety of opinions and experiences.

However, participating in interviews is time-consuming and therefore many candidates reject an involvement (Saunders et al., 2009). In order to overcome this, the interviews were held in the offices of the participants or via Skype to reduce time spent traveling to the interview location. Moreover, the researcher tried to keep the pre-defined interview outline short to focus on relevant topics rather than unrelated subjects during the interviews. Another issue is the ambiguity of words. Sometimes the participants do not understand what is meant by a question (Myers & Newman, 2007). For that reason, the research of this study explained questions twice if necessary and had a back-up of examples. Also frequently discussed is the generalizability of the results conducted from interview data (Saunders et al., 2009). Even though validity is not an issue due to the questions and the in-depth and different interviews, those findings are not statistically generalizable for the whole population (Saunders et al., 2009).

5. Results

The fifth chapter illustrates the results gained from the interviews conducted for this thesis. All relevant variables are reviewed with the background knowledge gained from the interviewees. Moreover, the propositions suggested in the third chapter are discussed regarding their applicability to start-ups. Additionally, the framework itself is evaluated in regard to its fit into the organizational setting of start-ups.

5.1. Findings and Discussion of the Interviews

Due to the categorization of the TOE framework the analysis of the interviews is also split up into three parts (technology, organization and environment). The results show which factors influence the decision to adopt a Cloud-based ERP system among start-ups.

5.1.1. Technology Factors

Understanding and identifying the *relative advantage* is very critical for the interviewees in order to adopt Cloud ERP in their business. The relative advantage they perceive offers a broad range of indicators which drive start-ups to introduce such a solution. However, the aspect of saving costs due to the introduction of a Cloud-based ERP was named by most of the participants which is in line with the findings of Tornatzky and Klein (1982). Start-ups usually start from scratch with manual routines as they are small and try to get into the market. At the beginning new ventures try to do as much as possible on their own in order to save costs. However, at a certain point, when the start-up grows faster and faster this is not efficient anymore (SU7). SU11 claimed that the usage of too many manual processes and routines (e.g. filling out several excel spreadsheets) is not sufficient anymore and results in a huge loss of time. Another aspect of growing extremely fast is that the implementation of certain processes and structures are lacking. SU6 experienced this rapid growth and expects a raise in efficiency by introducing Cloud ERP as new processes will guide the employees in a structured way through the daily routine. Furthermore, factors like flexibility in scaling the user numbers up and down as well as location independence are issues resulting in an advantage for start-ups. As start-ups do not have their own IT department with profound experience, it is also appreciated that the Cloud provider maintains the Cloud ERP solution with all its updates and hardware issues (SU5). By submitting the ERP tasks to the Cloud provider it is possible to exclusively focus on the start-up's core business and on its growth (E3). Therefore, "*as long as you see the advantage, you have to go for the change*", said SU1. This underscores that the relative advantage has to be understood so that it positively impacts the adoption decision of start-ups. However, E1 claimed that still many start-ups do not know which benefits can be provided by Cloud ERP.

The *compatibility* of new technologies is also an important issue for start-ups even though they are not equipped with a lot of infrastructure like larger organizations. According to SU3, they do not introduce technologies which do not fit to the existing ones. This is in line with the findings of Premkumar and Roberts (1999) and also supported by SU6 and SU7. The interviewees argued that at the beginning it is easier to replace systems but at a certain point in the business' lifecycle the systems are set and thus the Cloud ERP has to correspond with those systems without errors. Start-ups see the integration of different systems critical as no one wants to work with several interfaces which lead to data chaos (SU4). The result is contrary to the findings of Alshamaila et al. (2013) who claimed that SMEs perceive Cloud technologies as easy to integrate in the firm's infrastructure. In addition to that E3 argued that the availability of the systems is crucial for start-ups as customers are less patient with start-ups than with established companies. Hence, correct interfaces and integration of systems are

essential for the daily business of start-ups. Thus, compatibility impacts the adoption decision of Cloud ERP positively. However, the migration and implementation of Cloud ERP is also a significant factor influencing start-ups in their adoption decision. It is necessary to have a fast and easy migration to the Cloud ERP as the start-ups have no resources for the movement, no time for long-lasting implementation projects and also no financial backup to do it with external consultants (SU10). Therefore, the flexible and easy migration of Cloud ERP impacts the decision towards such a system.

While introducing a new solution, there is always *complexity* as the employees have to get used to the new technology (SU1). Start-ups call for solutions which are very straightforward to understand, easy to use and simplify processes. The simpler the Cloud ERP the better the usage and the updates of data sets (SU3). If a start-up thinks the Cloud ERP is too complicated they will never buy it as they have no resources to analyze the system and train the workforce (E2). At the beginning start-ups need to cover the basic functions and therefore a simple tool is preferred (SU11). Moreover, traditional ERP is known for its long implementation projects and the usage by larger organizations. In contrast to that start-ups expect flexible and modern solutions as they have to react quickly to changing environments and have no time to focus on other aspects than their core business. Hence, finding the right solution is crucial for start-ups and their intention to adopt Cloud ERP. Moreover, Alshamaila et al. (2013) deducted that SMEs assume that Cloud in general is easy-to-use. This is also in line with the responses of the interviewees. Cloud ERP is perceived as being easier to use than the traditional on-premise ERP. However, participants with a deeper understanding of Cloud technology and modern software development explained that it is the implementation of Cloud Computing which is easier rather than the ERP solution itself. Thus, the factor implementation time and complexity is essential for smaller firms due to a lack of resources and time.

The *trialability* of Cloud ERP is very important for start-ups as it is a first step towards a new way of handling the business. It is comparable to buying a new car. Nobody would buy it without trying it beforehand (E3). Thus, by not offering a test possibility many start-ups will reject the solution right from the start (SU2). In order to provide test phases, several Cloud ERP providers allow a registration for free. This is called the ‘freemium model’. The amount of users that can use the solution is then restricted or there is a certain timeframe which can be used to test the Cloud ERP solution for free (E3, E4). However, testing a Cloud ERP is very complex due to the necessity of building up own processes and data in the system (SU3, SU7). The effort of inserting all data into the Cloud ERP system is perceived as very high due to the risk of rejecting the solution after the test period (SU10). SU3 claimed even that it is not possible to test the Cloud ERP as the user either has to put much effort in the set up or there is solely the possibility to check the functionalities based on an empty database which is not helpful. Therefore, E3 underscores the importance of Cloud ERP providers in order to support start-ups to cope with the challenge of selecting the right solution. It is necessary to test and try solutions to find the best fit but the effort has to be mentioned and is high for start-ups. Moreover, SU7 and SU9 pointed out that it is important to have references and recommendations. By talking to

other start-ups, new ventures want to find out which weak points exist and how the implementation went (SU9).

According to the literature *uncertainty* can influence the decision to introduce Cloud solutions negatively. E1 argued that for start-ups the factor uncertainty is not relevant – "*they are not afraid of Cloud Computing at all*" (E1). SU3 also explained that there is no alternative to Cloud ERP as a start-up's growth results in more complexity of processes which in turn leads to the need for a solution like Cloud ERP. The data security and privacy issues are an important factor for start-ups but they don't perceive it as a negative influence on their adoption decision. They rely on SLAs and the reputation of the provider (SU4, SU7). Moreover, start-ups trust their provider due to the business relationship they have with the supplier (SU4). In addition, the time loss which occurs when start-ups introduce a system that does not suit their need perfectly is a risk (SU9). However, start-ups have a higher risk tolerance than larger firms (SU8, SU10). Therefore, in a start-up all aspects of the daily business are more risky than for established companies but new ventures are used to react to such risks (SU11). Moreover, start-ups are willing to take that chance to push their venture forward. Thus, they are more open to Cloud technologies and don't relate to the factor uncertainty when it comes to the intention to introduce Cloud ERP (SU6).

5.1.2. Organizational Factors

The literature found out that the factor *firm size* led to mixed results. Most start-ups see that there is a relationship between company size and the intention to adopt a Cloud ERP. By asking more precisely, other aspects like resource allocation, the industry or the structure of the firm are related to the adoption. SU8 explained that the size of a business plays a role regarding the decision whether start-ups introduce a Cloud-based or traditional ERP solution. As start-ups are usually lacking extensive financial resources as well as time and employees who can analyze the functionalities of new systems, there is no other possibility than choosing the Cloud ERP (SU3). Generally, the interviewees stated that Cloud ERP suits the needs of start-ups perfectly and is even a bigger topic for smaller firms than for larger companies due to the scalability and costs (SU5). The technology is also fitting larger firm's needs. However, by applying Cloud ERP in larger businesses, there are more barriers and decision-making levels than in the context of start-ups (SU5, E2). E1 and E4 suggested that start-ups need to consist of at least 10 to 15 people in order to even think about the introduction of a Cloud ERP solution. SU7 and SU9 claim that at this point systems are needed as there is more collaboration necessary and unstructured processes start to be inefficient and cost too much money which can be saved with the help of a Cloud ERP system. Thus, in line with the literature there are two main opinions regarding the impact of firm size on the adoption of Cloud ERP.

The *prior experience* was specified by the respondents as prior knowledge or experience with ERP. Having expertise in the field of Cloud or IT in general was not important for the start-ups which were interviewed (SU6, E1). Actually, SU3 decided to introduce a Cloud ERP solution without having prior

knowledge in the ERP field or without having experts regarding the particular solution they took. This is in line with the statement of E2 and E3 who declared that many start-ups are managed by non-IT people. They think that those people want easy solutions and do not care which solution it is. However, knowing the advantages of ERP is stated as a factor which influences the decision to adopt Cloud ERP. SU2 explained that the co-founder of the start-up has experience with project management tools and worked already with ERP solutions. At this point in their business they do not need Cloud ERP but they aim to introduce it as soon as possible. Another aspect is that a certain degree of understanding is necessary in order to negotiate with Cloud providers (SU1). If someone worked once with ERP then it is more likely to figure out whether there is a need for a Cloud ERP solution (SU8). In fact, the experience with ERP leads to the ability to compare solutions better and find out which fits the best (SU6). According to SU10 not only the own ERP experience impacts the adoption of Cloud ERP but also recommendations gathered from other start-ups.

The factor innovativeness is separated into two aspects: *Innovativeness of the start-up* and *innovativeness of the founder*. Both factors could not be supported by the interviewees. Innovativeness of the firm leads to the utilization of new technologies and needs more collaboration. Thus, E3 concluded that systems like Cloud ERP are necessary for innovative start-ups in order to handle communication challenges. SU4 and SU6 argued that the innovativeness of a start-up influences its adoption intentions of Cloud ERP, but it was noticed by the interviewer that it is rather the industry affecting the adoption. They referred to technology-driven start-ups and e-commerce start-ups and claimed that those are more attracted to Cloud ERP. Contrary to that, SU10 clarified that most technology-driven start-ups do not need a Cloud ERP in the first place due to their offered products. Actually, those start-ups create software products which are intangible. Therefore, the processes which have to be built up in the Cloud ERP system are very simple and small. It is not the utilization of Cloud ERP which distinguishes innovative start-ups but the business model they apply (SU11). Thus, E4 correctly pointed out that the business model of a start-up is important not the degree of innovativeness. This is in line with the definition of a start-up given by Ripsas and Tröger (2015). Although it is not widespread, there is also the possibility to utilize a self-implemented ERP which does not mean that the start-up is not innovative. By examining the term innovativeness deeper, SU9 stated that "*the moment you decide to implement an ERP you have to accept that you will be less creative because you have to follow certain rules in a system*." Thus, in line with E1, it may be concluded that everyone can use a Cloud ERP regardless the degree of innovativeness. In regard to the innovativeness of the founder, SU9 argued that the Cloud ERP solution is more about managing than innovativeness. Also, SU9 and SU3 think that founders who introduced a Cloud ERP would have been innovative 10 years ago. Nowadays, this decision is common and everyone is using Cloud services especially in the start-up sector. As start-ups are mostly young and modern ventures, they expect state-of-the-art technologies which are proofed and robust, but it does not mean that it is innovative to use Cloud ERP (SU10). Another perspective, SU11 elaborated on, is that start-up founders should be seen

as entrepreneurs who are creative. Managers are more process-driven which contrasts the creativity of entrepreneurs. Therefore, innovativeness of the start-up's founder does not fit Cloud ERP adoption. However, SU2 and E1 related innovativeness of the founder with his/her knowledge about Cloud ERP. In fact, they think the decision-maker is innovative due to the knowledge and the openness towards the Cloud ERP system.

Top management support is another factor influencing the adoption of Cloud ERP among start-ups. On the one hand, the founder has to show the benefits of the Cloud ERP solution to its employees to convince them to use the new solution (SU2). There are always employees who have not worked with such a system yet. Thus, it is important to demonstrate the improvements for the daily business. On the other hand, a start-up operates differently than a large organization due to the flat hierarchies and the family-like environment (SU2, SU6, SU7, SU8, and SU9). Also, SU3 and SU6 added that the suggestion to introduce Cloud ERP was given by the employees. It is hard for the founder or the management team to know which solution is the most beneficial for certain processes. The staff which executes the processes knows the pain points of the daily routine and thus most ideas are pushed by the team (SU11). This is how it works in a start-up as all employees and the founder are working for the idea together as a team. That is why SU8 does not see the relationship between top management and the adoption of Cloud ERP. However, the founder has to be committed to all decisions. Ultimately, the founder has to discuss all decisions with the shareholders and investors. Therefore, according to SU9 a "*good story*" is needed in order to get the support and funds. The support of the founder is critical for the start-up as it shows the vision and direction of the venture. But it is worth mentioning that in start-ups are consisting of a mixture of the top management support and ideas as well as support from the employees.

5.1.3. Environmental Factors

The factor *industry* was already introduced in regard to the factor of innovativeness. Almost all interviewees approved to the proposition that the industry of a start-up impacts its decision to adopt Cloud ERP. SU3 mentioned that start-ups who are supplying products such as SaaS applications need out-of-the-box processes due to the product served as a service. Cloud ERP provides the opportunity to build up those procedures quickly. Additionally, to the new SaaS-specific processes, industry-specific legal regulations can be built up with the system (E3). In contrast, one can also claim that finding the right solution is more important than the industry a start-up operates in (SU5). The main point about the industry is whether the start-ups buy or supply tangible products (e.g. E1, SU8, and SU11). In that regard, the industry (e.g. design, architecture, production) does not matter as long as the venture has to manage the supply chain of its goods (E2). E4 added that start-ups in the retail/e-commerce or restaurant business need to have a Cloud ERP in order to cope with the inventory and ordering processes. This is in line with SU9 who argued that if a start-up has a web shop, then an ERP is needed. SU11 is a start-up selling a software solution in the HR industry. Yet, they do not need a Cloud ERP because the processes are not complex enough and there is no inventory which can be

managed with the Cloud ERP. This was also stated by E1. Start-ups focusing on software do not have the urgent need to introduce a Cloud ERP solution in the first place. For start-ups located in Berlin, the information exchange among the start-ups is also a crucial factor in finding the right solution. Due to the great exchange, the start-ups located in Berlin equal each other regardless of the industry. The geographical location of start-ups might also influence their adoption decision (SU10). Consequently, product-oriented start-ups or start-ups in the retail business think about the introduction of Cloud ERP earlier (SU8).

The interviewees did not relate *competitive pressure* to the adoption of Cloud ERP among start-ups. According to SU3, it is hard to see a relationship between the factor competitive pressure and ERP adoption. In general, start-ups focus on delivering an excellent product or service. Cloud ERP systems help to automatize the business routines which in turn lead to a stabilization of the start-up (SU10). With the help of Cloud ERP start-ups can concentrate on the core business which is a significant advantage, E2 experienced. Start-ups perform cost calculations at the beginning as Cloud ERP is a tool which aims to save costs and create more efficient processes (SU3, SU6, and E3). After the cost calculation, start-ups review the usability of particular Cloud ERP systems in order to find the adequate one (SU3). At the end, it is apparent that the decision to adopt a Cloud ERP solution is more intrinsic than initiated by the competition (E3, SU3). In fact, start-ups communicate with other start-ups in order to exchange information about certain solutions such as the introduction of a Cloud-based ERP system (SU2, SU7). This is rather collaboration than competitive behavior. Start-ups share their insights with other start-ups in order to explore their network and gain valuable insights and discounts due to contacts (SU7). Thus, the typical competitive pressure is not applicable in the context of start-ups and Cloud ERP.

The *market scope* a start-up possesses is perceived as a reason to introduce a Cloud ERP (SU4). According to SU4, start-ups who want to grow internationally are more willing to adopt Cloud ERP than those firms who are satisfied with their actual market scope. By means of Cloud ERP home office, mobility and access from different locations (24/7 access) are provided efficiently to the user. As most start-ups aim to grow rapidly, these advantages of Cloud ERP are valuable for them (SU5, E2). By expanding the business the complexity of the start-up increases. In fact, the start-up cannot handle the processes manually anymore and needs a Cloud ERP solution (SU10). By just operating locally or nationally the processes are not as complex as in an international context (SU11). This is in line with SU7's background. They started with a self-implemented ERP tool but due to the internationalization of the start-up the system is not able to handle the data amount anymore. Thus, they need a Cloud ERP. SU7 concluded that the need occurred because of the expanded market scope. The Cloud ERP also supports international regulations such as tax laws (SU1). Another reason to introduce Cloud ERP in an international setting is that the set-up of the system is faster than in-house solutions even though it is cross-national (SU6). It is necessary to define the market scope as SU8 perceived all of Europe as a market and focuses on creating more efficient processes no matter

whether those processes operate nationally or internationally. The transaction volumes are also an aspect of market scope (SU9). Trading large amounts on national markets might lead to a need of Cloud ERP on a national level.

The factor *supplier's effort* consists of several aspects which are discussed during the interviews. In general, the participants see a relationship between supplier's effort and the adoption of Cloud ERP. SU1 and SU2 explained that the communication with the developer team is important in order to give input regarding the solution. As the start-ups use the Cloud ERP they detect improvement potential. The Cloud ERP providers who are open to such exchanges are candidates for long-lasting partnerships which are critical for start-ups and vendors (SU3). Events which are hosted by the Cloud ERP providers are welcomed in this case. SU1 was invited to a customer event for the biggest clients. There it was possible to talk directly with the developer. This effort of the supplier was valued by SU1 and improved the relationship between the start-up and the provider. In contrast to large organizations, most start-ups do not have experts or an internal IT department within the company and thus need external help in order to introduce Cloud ERP (SU4, SU5). However, this is always a question of costs especially for ventures that started recently (SU3, SU4). Providing workshops for free at the beginning might help start-ups to gain knowledge which in turn leads to a possible growth of the start-up and to follow-up projects for the provider (SU3, SU4, and SU5). Those events are just valuable if the start-up actually aims to introduce such a solution (SU 11). SU8 claimed that for start-ups with no experience it is important to have a partner who explains the benefits and drawbacks of a Cloud ERP (SU9, SU10). The consultancy should really focus on benefits, concerns and best practices instead of only aiming to sell the product (SU10). This knowledge provided by the ERP Cloud provider impacts the adoption decision of start-ups (SU8). In fact, E3 pointed out that most established Cloud ERP providers are excellent in hosting events and trainings (for free or paid). Since start-ups operate fast, they expect this from their providers as well. Thus, the support of a Cloud ERP provider is more important than the events. By reacting appropriately and fast to the issues of the start-up, the provider contributes positively to the relationship (SU8, E3). Another aspect are recommendations and references of other start-ups utilizing Cloud ERP (SU7, SU9, SU11, and E2). By talking to other start-ups, it is possible to experience the phases they went through including the ups and downs. This helps in order to find out whether the solution also fits the needs of the start-up (SU9). The well-known providers know that the start-up scene is connected, especially in Berlin. Therefore, they try to use those network effects similarly to start-ups who use it to exchange information (E2). SU6 argued that at the beginning, if a Cloud provider is not well-known, it is even more important to be active in the market in order to approach start-ups. In general, SU6 thinks that start-ups are rather open to contacts with not established providers than larger firms.

Additionally to events and workshops, the respondents came up with several ideas how Cloud ERP providers can approach the start-ups in order to provide valuable insights for them. SU5 claimed that a non-technical comparison between in-house and Cloud-based ERP solutions with respect to benefits

and drawbacks as well as transparent cost structures would help to enhance the understanding. In order to decrease barriers to participate in such events, SU6 suggested web-based informational events. Those events are informal and not tied to one place and the start-ups can easily access them online. E2 pointed out that many start-ups are working together with incubators and investors. They get a certain toolkit to start with after the venture was founded. There are incubators that provide even whole solution packages for their start-ups. Thus, it is beneficial for providers to connect with incubators/ investors and offer right contract conditions to those start-ups within the program. The potential growth of those start-ups results in a win-win situation for all parties.

5.2. Evaluation of the TOE Framework in respect to Cloud ERP and Start-ups

All in all, the insights retrieved from the interviews show that there are many aspects driving start-ups to introduce a Cloud-based ERP system. However, by applying the TOE initially in this organizational setting it was noticed that not all factors are crucial. Table 5 demonstrates an overview of findings in regard to the support of the propositions (chapter 3.4.1–3.4.3).

Table 5: Overview of Findings

Factor of TOE framework	Findings for proposition	Evident found in interviews
Relative advantage	Supported	SU1-SU11, E1-E4
Compatibility	Supported	SU2-SU11, E1-E4
Complexity	Supported	SU2, SU3, SU5-SU7, SU9-SU11, E2, E4
Trialability	Supported	SU1, SU2, SU4-SU11, E1-E4
Uncertainty	Not Supported	SU2-SU11, E1-E4
Firm size	Not Supported	SU1, SU3-SU6, SU8-SU10, E3
Prior experience	Supported	SU1, SU2, SU4-SU11, E1, E2
Innovativeness of the start-up	Not supported	SU2, SU3, SU5, SU7-SU11, E1, E4
Innovativeness of the decision-maker/ founder	Not supported	SU3-SU5, SU7-SU11, E4
Top management support	Supported	SU1-SU7, SU9-SU11, E1, E3, E4
Industry	Supported	SU1-SU4, SU6-SU11, E3, E4
Competitive pressure	Not Supported	SU2-SU11, E1-E4
Market scope	Supported	SU1-SU7, SU10,SU11, E2, E3
Supplier's effort	Supported	SU1-SU11, E2-E4

Moreover, certain variables used for the Cloud Computing technology in the study by Alshamaila et al. (2013) are too broad for Cloud ERP and start-ups. Therefore, certain factors have to be presented more precisely in order to fit better to start-ups or to the Cloud ERP technology. In addition to that new factors emerged while talking to the start-ups and experts which should be included into the framework.

In regard to the technology factors, the relative advantage is too broad. SU1 pointed out that each venture perceives different benefits and thus various advantages recognized through Cloud ERP can occur. This is in line with the literature that claimed that the factor of relative advantages is too broad (Tornatzky & Klein, 1982). Moreover, the respondents reacted confused to the question whether the relative advantages impacts their adoption decision of Cloud ERP. For them it was clear that the technology has to be beneficial to introduce it. In order to get more valuable insights it is necessary to split this factor up into more specific factors such as scalability, cost reduction, flexibility, maintenance by the provider, transparent processes, and focus on core business. These different advantages were named by the respondents. The factors compatibility and complexity were found to be relevant for the interviewees. In order to specify these factors, it is crucial to elaborate on integration and migration of the Cloud ERP in regard to compatibility. Complexity can be reviewed in terms of the ease of use and the implementation complexity (SU8). This separation might contribute to more valuable insights in regard to the adoption of Cloud ERP. The factor of uncertainty is not relevant in the organizational setting of start-ups. The respondents agreed that all aspects of daily business are more risky for a start-up than for an established company. But start-ups have a risk-taking philosophy and are used to react to risks (SU11, E3). Furthermore, young ventures start with Cloud services from the beginning of their venture which show that they are attracted to this technology (E1-E4). Although, security is always a discussion point, start-ups trust their provider and arrange SLAs in order to clarify data specific questions (SU4, SU7). Due to the usage of Cloud services such as Google for Work the data is in the Cloud anyway and therefore start-ups are more open to Cloud ERP.

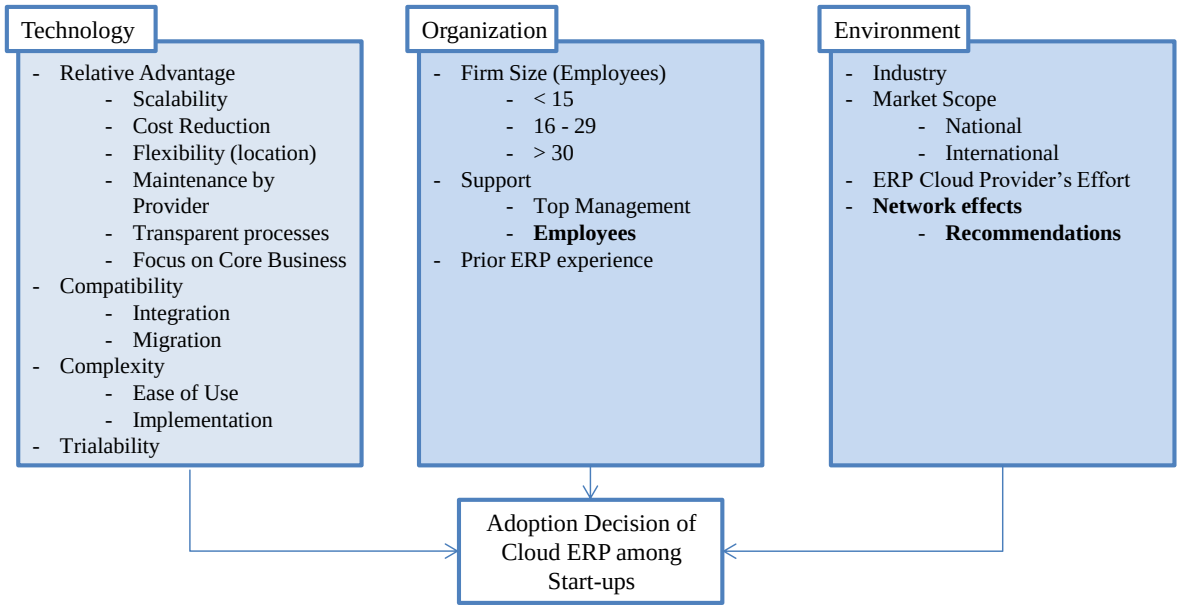
Since start-ups are examined the organizational factors need to be aligned as well. The factor firm size of the start-ups led to mixed assumptions whether there is an impact on the adoption of Cloud ERP. In general, the respondents stated that for smaller firms Cloud ERP suits perfectly, which was also pointed out in the literature. Due to the responses it is noteworthy that there is also a distinction between start-ups in terms of the organizational size. Therefore, the factor firm size needs to be split up (e.g. less than 15 employees, 16 to 29 employees, and more than 30 employees). This suggestion is made due to the comment that the need of a Cloud ERP would occur with the headcount of approximately 15 employees (E1, E4). As discussed in chapter 5.1.2 the factor innovativeness was not related to the adoption of Cloud ERP. Therefore, in the context of start-ups, this variable should be excluded of the TOE framework. The support provided by the management was an important factor for start-ups. However, the suggestion of introducing a Cloud ERP was also pushed by the employees. Thus, in a start-up the workforce impacts the decision to introduce a Cloud ERP as well. This issue

therefore has to be included into the TOE framework. Another alignment is the factor of prior IT experience. SU6 even revealed that prior IT experience is not relevant in this context. As explained in 5.1.3, it is more the experience with ERP than Cloud knowledge (E1). Most start-ups work with Cloud services but they are not experts in regard to ERP systems. In fact, all respondents relate the factor IT experience more to the knowledge with ERP. Thus, the variable should be named differently in order to prevent misunderstandings.

Due to the internal challenges start-ups have to face at the beginning, the competitive pressure is not applicable in the organizational setting of start-ups. The introduction of Cloud ERP is more influenced by costs reduction and enhancing efficiency of processes. Moreover, in terms of the environmental factors industry and market scope it is necessary to split those variables up. The interviewees claimed that primary retail start-ups, those ventures with products and a supply chain need a Cloud-based ERP. By asking the participants directly which industry (e.g. retail, production, health, design) is related to the adoption of Cloud ERP additional insights can be revealed. Additionally to the Cloud ERP provider's effort another factor occurred during the interviews. Network effects and recommendations of other start-ups play a crucial role in the decision to introduce a Cloud ERP among start-ups. Especially in start-up hubs like Berlin, there are events and a continuous information exchange. The recommendations help start-ups to solve occurring problems with the experiences of other ventures. Start-ups which already introduced a Cloud ERP serve as references.

As a result of the interviews conducted and the corresponding literature, the TOE framework was developed further in regard to those factors which are crucial for start-ups and their Cloud ERP adoption. Figure 5 illustrates the adjusted TOE framework which is not tested yet.

Figure 5: Aligned TOE Framework



6. Conclusion and Discussion

The last chapter provides a conclusion regarding all issues discussed beforehand. Moreover, practical and theoretical implications are given in order to bridge the findings to practice. Furthermore, limitations respective to the work as well as further research fields are discussed.

6.1. Conclusion

Without any doubt the movement from on-premise ERP applications to Cloud-based ERP systems is favorable for start-ups. This positive trend of Cloud ERP adoption among start-ups was also stated by E2. In the past, small businesses could not afford ERP systems due to the long-lasting implementation time and the huge up-front investments. Nowadays, already half of the Cloud implementation projects from E2 are done for start-ups which illustrate an increasing trend. By elaborating first on the movement of on-premise to Cloud-based ERP solution it is demonstrated that the service infusion can lead to new markets and new value created for the start-ups by the Cloud ERP provider (Sultan, 2014b). The servitization of Cloud Computing therefore results in many application fields such as Cloud ERP, Cloud CRM and Cloud Enterprise Software. Cloud ERP in particular is one case of servitization due to the shift from on-premise ERP solutions to the supply via the internet as a service bundle. As start-ups want to focus on their core business and do not want to build up a whole IT department they are open to Cloud ERP solutions. Due to the service infusion, the ERP functionality stays the same in the Cloud. Still, Cloud ERP pursues the goal of establishing an integrated information flow within the whole firm (Davenport, 1998). The advantages (chapter 2.3.2) and disadvantages (chapter 2.3.3) stated in the literature are in line with those perceived by the interviewees. Cloud ERP advantages such as no hardware dependency, less costs of the pay-per-use model than with an in-house solution and also the maintenance fulfilled by the Cloud ERP provider are valued by the start-ups. Additionally, the scalability, flexibility and location independence are important determinants for start-ups in order to adopt Cloud ERP. However, the factor data security is discussed with mixed results as shown in previous research. On the one hand start-ups like SU1 and the experts argue that data security is better in the Cloud due to the resources and manpower invested by the Cloud provider. On the other hand, there is the gut feeling that data security and privacy is an issue (SU8, SU9). Thus, start-ups have to arrange SLAs and define security measurements to overcome the security issue and trust the provider (SU4, SU7, and SU9). Other drawbacks which have to be discussed before start-ups introduce a Cloud-based ERP system are the dependency on the internet connection, vendor lock-in effects, and potential system breakdowns. Due to the risk-taking attitude of start-ups, they accept those pitfalls and agree on contracts with the Cloud ERP providers as they want to grow and push their business forward.

By examining specifically the factors which influence the decision to adopt Cloud ERP systems among start-ups, it is noteworthy that start-ups first need to understand the relative advantage which they can perceive through the introduction of Cloud ERP. Start-ups are different than regular or established businesses and react ad hoc when they experience huge pain points in terms of delays or

loss of money. Then a Cloud-based ERP solution is needed in order to build up the processes more efficiently (SU11). In that regard, it is necessary to have certain knowledge of ERP and its application fields as well as benefits and drawbacks. Thus, experience is an important factor in order to adopt a Cloud ERP. However, this experience can also be gathered through information exchange with other start-ups. This indicates that the network a start-up has might influence its decision as to which and whether an ERP is introduced. The important factor of recommendations demonstrates that it is rather an exchange impacting the decision to adopt a Cloud ERP solution than the competitive pressure in the environment. Moreover, in the organizational setting of start-ups it is common to establish a Cloud ERP system due to the suggestion of employees. Ideas are discussed in the whole team and whoever has the best idea brings it up (SU6). Top management support is undoubtedly important for the start-ups as the management still has to push the idea and pitch it to the investors. Nevertheless, due to the flat hierarchies and the family-like atmosphere the factor of employee suggestions seems to be relevant to start-ups' adoption decision as well. Thus, the support of the employees impacts the intention to adopt a Cloud ERP. Due to this research it is not possible to cluster the start-ups into categories which are more likely to adopt Cloud ERP solutions. However, start-ups in the retail industry, as well as e-commerce in general and product-driven ventures, are deemed to be most appropriate to implement Cloud ERP already at an early stage. Start-ups only focusing on software development stated that they will also need it at a certain point in their venture but not right at the beginning.

All in all, the main factors found in this study that impact the adoption decision of Cloud ERP among start-ups are: relative advantage, compatibility, complexity, trialability, top management support, prior experience, industry, market scope, and supplier's effort. In contrast to the study of Alshamaila et al. (2013) the factor uncertainty is not relevant in this context. Additionally, competitive pressure is also not found to be significant. However, new factors such as support through employees and networking effects emerged in the interview process.

6.2. Theoretical and Practical Implications

This research adds to both, theoretical and practical implications. On the one hand, the research gap concerning the Cloud ERP adoption of start-ups is investigated. Moreover, new insights regarding the adoption literature are gathered as the TOE framework is used in the organizational setting of start-ups. Due to the interviews profound insights could be revealed and an adjustment of the TOE framework used by Alshamaila et al. (2013) was conducted. It is demonstrated that start-ups react differently to the adoption of Cloud ERP than SMEs. Since start-ups' behavior is different new factors such as network effects can be added to the Cloud ERP adoption research among start-ups. Further research can now build on these findings and test the elements defined within this thesis on a quantitative base. Consequently, the investigation of start-ups in regard to the adoption intention of Cloud ERP solutions opens up a new research field in the IS literature. Once again the TOE framework was used in order to explain adoption of technology. This underlines that the TOE

framework is a well-known instrument which is changeable with regard to the technology and organizational context.

On the other hand, the practical insights are essential for firms, which want to develop new target groups for their offerings. As already mentioned, Cloud Computing enables businesses to create new services such as Cloud ERP solutions (Sultan, 2014b). Due to the increasing demand of smaller firms, those Cloud ERP providers are interested in characteristics of start-ups, which want to use their services. Hence, this research is a great starting point for Cloud ERP vendors and their partner firms such as VAR to get an overview of the factors which are crucial for start-ups in order to introduce a Cloud-based ERP solution. Notably, the factor supplier's effort offers great potential to get an impression which activities are important for start-ups. The interviewees also shared first ideas how Cloud ERP providers or partners can approach them. This is a very valuable result for providers as the insights from potential customers can help to improve the marketing and sales activities. By means of this study, the importance of the sub-group of start-ups is demonstrated. Practitioners can use the findings to elaborate on a strategy to approach start-ups. Since this sub-group reacts differently than larger firms, it is necessary to be aware of it and adopt towards customer needs.

In regard to VAR, who wanted to find out whether start-ups are a reasonable target group for Cloud ERP, it is advisable to investigate further into the start-up businesses. This study showed that, in line with the literature, start-ups are interested in Cloud ERP as long as they understand the advantages which can be drawn from the solution. Since start-ups do not have the expertise in Cloud ERP, partnerships are needed. It is important to generate an overview for start-ups regarding Cloud ERP and in-house solutions (SU5). The comparison between the two models has to include benefits and drawbacks as well as a transparent list of costs that enables the start-ups to understand which ERP solution fits the best. By providing such a service for start-ups mutual trust can be established between provider and start-up. In addition it is not only the purpose of selling the Cloud ERP solution but also to convince the start-up to use the best fitting solution. VAR is a value-added reseller of Microsoft's Cloud ERP solution which is in favor for the firm as start-ups check the offerings of the big player in the market at first (SU4, SU4). Additionally, VAR should address start-ups aiming to expand the business internationally. Start-ups are also aware of compatibility, complexity and trialability. Therefore, VAR needs to develop a strategy how to provide the possibility to test the Cloud ERP for start-ups. By explaining and offering support for the integration and migration, VAR can position themselves favorably. Another finding for VAR is that start-ups operating in the retail/e-commerce and production industry might be more interested in Cloud ERP than those start-ups working in the field of software development. However, at a certain point those start-ups also need help to manage their processes. An idea which arose during the interviews was that it would be very beneficial for VAR to start cooperating with incubators in order to get in contact with start-ups and build up relationships with them (E2). By providing special contract conditions and support for those venture within the incubator program it is easier to connect to start-ups and to strengthen the reputation.

Consequently, the potential growth of the young ventures results in a win-win situation for VAR and the start-ups

6.3. Limitations

As explained below, this research has also some limitations. In order to answer the research objective 15 interviews were conducted. The interviewees are mainly from Germany due to better access to the start-up scene in Berlin than in the Netherlands. Thus, it is not possible to compare responses from the two countries. Providing cross-national results is very valuable in order to contribute to the on-going literature but not possible with the gathered data set. Another issue with utilizing interviews as data collection method is the bias which is explained in chapter 4.4.3. Due to a mixed data sample, questions derived from the TOE framework and literature research about how to successfully conduct interviews, this limitation could be reduced. On the one hand, interview data provides valuable insights into the different perspectives of the start-up. It would have been difficult to find out new factors with a simple survey. On the other hand, the results conducted in this research cannot be generalized due to the small data sample. Furthermore, the adjusted TOE framework was not tested yet. Also is was not possible to find out whether those start-ups having a Cloud ERP react differently to the questions than those who do not have a Cloud ERP. This investigation is feasible with a quantitative survey approach and should be conducted in a next step. As literature claims that the TOE framework can be recreated easily, it is also challenging to compare the framework. There is not much literature in the field of Cloud ERP adoption with the TOE framework. Therefore, TOE frameworks which focus on different technologies and organizational settings had to be used. However, the fit with Cloud Computing and Cloud ERP was perfect. By researching the questioned start-ups in more detail, it is striking that the headcounts vary tremendously. At the beginning, it was assumed that most start-ups have a rather small firm size. Yet, one of the start-ups even had 600 employees which represents a medium-sized company in terms of employees. Nevertheless, the factors of a start-up defended in chapter 2.5 are still given. This variation of headcount can also indicate that the start-ups are in different stages of their lifecycle which is also applicable in the years of existence. Further, it can be argued that various stages indicate diverse needs of the venture. Therefore, examining similar headcounts or years of experience would have also contributed to this research.

6.4. Further Research

There are several connecting points in order to contribute to the on-going IS literature. The literature only connected Cloud Computing in general with the phenomenon of servitization. Yet, there is a lot more to investigate in further research such as additional SaaS applications as well as PaaS and IaaS cases which could be elaborated in the light of servitization. It might be interesting to compare the different service models of Cloud Computing in order to find out whether there are differences in regard to the adoption decision of start-ups. This is in line with Seethamraju (2015) who indicated that conducting cross-national studies will lead to more insights and sharpening of the theory. In the context of start-ups it would be beneficial to compare start-up hubs like Berlin with other hubs such as

Amsterdam or London to elaborate whether there are differences in the adoption intention of Cloud ERP. The respondents of the study claimed that recommendations of other start-ups play a crucial role in the decision towards a Cloud-based ERP. Thus, examining start-ups from hubs such as Berlin and start-ups not located in one of the start-up centers will also result in valuable insights regarding the adoption intention of start-ups. By comparing the start-ups located in hubs with those not belonging to hubs, the network effects addressed in the interviews can be analyzed. According to AlBar and Hoque (2015), Cloud ERP is not well-known and adopted in developing countries. Therefore, comparing the adoption intentions of start-ups in developed and developing countries is a very interesting cross-national study. Another aspect of this research is the benefits and drawbacks of Cloud ERP which are discussed in literature sufficiently. These advantages and disadvantages offer great potential for further research as results for the long-run are lacking. Peng and Gala (2014) also indicated that such an investigation would be extremely valuable. By examining how the advantages of Cloud ERP will affect the business of start-ups in terms of costs and growth in the long-run, there is potential to find out which factors play a significant role over a given period of time. This research adjusted the TOE framework utilized by Alshamaila et al. (2013) in regard to start-ups and Cloud ERP: Due to the usage of interviews as a data collection method only 15 participants are asked. Thus, further research should elaborate on the adjusted TOE framework while following a quantitative approach in order to generalize results and find additional relationships.

Appendix

A: Interview Guide (English)

Firm Background:

1) Can you tell me more about your firm's background?
    a. Month/years of
    b. Number of employees
    c. Main industry you are operating in (e.g. Manufacturing, IT, Design/Fashion, Retail, Services, Financial sector, health care, food, transportation)
    d. Maturity of the industry
    e. Markets you are serving (local/ national/ international)
    f. Growth rate within the last six month/ last year in terms of employment growth/ revenue growth/ investment growth
2) Do you use Cloud Computing within your business?
3) What kind of Cloud solution do you use and for which purpose do you use this solution (e.g. Email, CRM, ERP, Data storage, CPU usage)?
4) Do you use Cloud ERP/traditional ERP/no ERP?
5) Benefits and drawbacks:
    a. What are the main benefits of Cloud ERP you perceive (e.g. total cost of ownership, availability, scalability, flexibility, security)?
    b. What are the main drawbacks you perceive regarding Cloud ERP (e.g. data privacy and security, vendor lock-in, hidden costs)?
6) Which Drivers led to the introduction of (Cloud) ERP in your firm? If you have not decided to introduce Cloud ERP, at which point are you considering to introduce Cloud ERP in the future? If not, why?

TOE Framework specific questions:

Technology

7) Do you think there is an impact of relative advantage (the degree to which the new technology is perceived as better than the old one) on the adoption of ERP Cloud among start-ups? Why?
8) Is there an impact of uncertainty (perceived risk of adopting the new technology) on the adoption of ERP Cloud among start-ups? Why?
9) Do you think compatibility (the extent of consistency with established values and experiences) of the existing technology with the new technology influences the adoption decision of start-ups? Why?
10) Is there an impact of complexity (the degree to which a new technology is seen as complicated to use) of the technology regarding the adoption decision of start-ups? Why?

11) Do you think the possibility to try Cloud ERP out influences the adopt decision of start-ups? Why?

Organization

12) Is the firm size important in the decision to adopt ERP-Cloud? Why?
13) Does top management support influence the ERP Cloud adoption decision of start-ups? Why?
14) What is the impact of innovativeness on the adoption of ERP-Cloud? Do you think firms which use Cloud ERP are led by an innovative decision-maker? Why?
15) Do you think prior IT experience (in the Cloud field) impacts the decision to adopt ERP-Cloud among start-ups? Why?

Environment

16) Do you think competitive pressure influences the decision to adopt Cloud-ERP among start-ups? Why?
17) Do you think industry and market scope (local/ international/ expansion) influence the decision to adopt Cloud ERP? Why?
18) Do you think that supplier's effort and the external computing support (e.g. partners, vendors, supplier, and external computing support) influence the decision to adopt Cloud ERP among start-ups? Why?
19) Are there any other factors influencing the decision to adopt new innovation in particular Cloud ERP? Why?

B: Paper Outline

Abstract

The literature argues that Cloud Computing fit the needs of smaller firms perfectly as they cannot afford high-cost structures for software implementation (Ross & Blumenstein, 2015). Even though start-ups are a viable business form, there is no specific research which targets start-ups and their willingness to adopt Cloud ERP solutions. To determine the factors which impact the adoption decision of start-ups the Technology-Organizational-Environmental (TOE) framework, which was employed in the context of SMEs and Cloud Computing, is used (Alshamaila et al., 2013). This research follows a qualitative approach and data is gathered through 15 semi-structured interviews with start-ups and experts. The results show that it is important to understand the relative advantage, have little complexity in the ease of use and implementation along with an easy integration. The prior experience with ERP, the industry, market scope and testing the technology was also related to the decision to adopt Cloud ERP. Even though top management support was found to be relevant, the support of employees is at least equally important in a start-up. Also, the network effects and recommendations are key factors influencing start-ups in their decision whereas uncertainty and competitive pressure were not found to be essential in this context.

Keywords: *SMEs, start-ups, Cloud ERP, Cloud Computing, adoption, TOE framework, adoption in small businesses, adoption in start-ups*

1. Introduction

Cloud Computing will affect the way services are "*invented, developed, deployed, scaled, updated, maintained and paid for*" (Marston et al., 2011, p. 1). Due to this fact, Cloud Computing appears to be a disruptive innovation which leads to a new form of servitization in the whole IT industry (Ojala, 2016). Vandermerwe and Rada (1988) described servitization as adding value to the firm's products by additionally including services to the offering. This leads to a bundle of services combined with products, support, and knowledge. The transformation Vandermerwe (1988) focused on, shows the shift of a "*goods-dominant logic to a service dominant logic*" (Leimeister et al., 2015, p. 2). Nowadays, the IT industry switches from fixed products such as in-house servers to Cloud Computing offerings on a consumption base. Cloud Computing enables software producer to create new service bundles and introduces new business models (Ojala, 2016). Also, target groups such as small and medium-sized enterprises (SMEs) and start-ups can be addressed through Cloud Computing (Sahandi et al., 2013).

Literature observed that Cloud technologies perfectly meet the needs of SMEs as those firms require low-cost structures, better access to global markets, and collaboration (Sultan, 2011). By adopting Cloud Computing, companies can use the advantages of the Cloud technology to react better to the changing environment, and customer needs (Mladenow et al., 2012). Although the adoption rate of Cloud Computing is constantly growing, concerns regarding security and privacy issues limit the trend

(Bitkom Research GmbH, 2015). Thus, research tried to find out which additional factors play a crucial role in the Cloud Computing adoption process of SMEs (Neves et al., 2011). There is literature providing enough insights into Cloud Computing adoption in general and particularly for SMEs. However, little research is done in the area of enterprise resource planning (ERP) systems (e.g. Al-Johani & Youssef, 2013; Peng & Gala, 2014; Saini et al., 2014). Small firms are interested in using ERP solutions to gain a competitive advantage but do not have sufficient resources to afford huge upfront investments, which are necessary for an on-premise ERP implementation (Al-Johani & Youssef, 2013). Due to the movement of in-house ERP systems into the Cloud, ERP solutions are more flexible and affordable which is attractive for SMEs (Al-Johani & Youssef, 2013).

Other literature on Cloud-based ERP pays attention to the company size. Johansson et al. (2015) suggested splitting small and medium-sized enterprises for further research into sub-groups. Due to the range of employee numbers, small and medium enterprises are reacting in another way to opportunities as well as drawbacks and have different needs (Johansson et al., 2015). This demonstrates the research gab as the past literature focused only on the adoption of Cloud ERP among SMEs. Therefore, this study aims to identify factors which are impacting the decision to adopt Cloud ERP among start-ups. Based on that, the following research question can be stated: ***Which factors influence the adoption of Cloud-based ERP systems in the organizational setting of start-ups?***

To answer the research question, fist a literature review regarding servitization in the context of Cloud Computing, as well as a definition of (Cloud) ERP with its benefits and drawbacks is performed. In addition, a definition of start-ups is given. Secondly, the theoretical framework (TOE) is explained and propositions are stated. Following the methodology the findings regarding the propositions are discussed and the theoretical model is evaluated in the context of start-ups and Cloud ERP. Finally, a conclusion is presented. Moreover, this study is conducted in cooperation with a Dutch company who want to test whether Cloud ERP in the context of start-ups might offer new business opportunities. Yet, the adoption decision of start-ups is not examined with the TOE framework. Therefore, this research contributes on the one hand to the literature and on the other hand to practice, which enhances its significance.

2. Literature Review

Servitization in the Context of Cloud Computing

Definition of Servitization

Selling only products to the customer is not enough anymore, especially manufacturing firms have to include services into their product portfolio to create a competitive advantage (Grönroos, 2015). This new paradigm of a more service-driven society was first introduced by Vandermerwe and Rada (1989) as *servitization*. They argued that firms try to understand their customer's needs and therefore are "*moving from the old and outdated focus on goods or services to integrated 'bundles' or systems*"

(Vandermerwe & Rada, 1989, p. 314). The bundling of services and products enables vendors to create unique offerings for their clients, can lead to higher market shares and higher customer satisfaction (Avlonitis et al., 2014). This indicates that servitization is more than the bundling of services and products but elements such as support, self-service and knowledge add value to service activities as well (Alvizos & Angelis, 2010). Services can be easily distinguished from traditional products as they are intangible, heterogeneous, not separable in production and usage, and there is no possibility to store services (Vargo & Lusch, 2004). Moreover, Vargo and Lusch (2008) declared the shift from a goods dominated logic (GD logic) to a service driven society (SD logic) with services as the leading logic. Furthermore, servitization is still discussed and immature due to several concepts by which service infusion can lead to enhanced service quotations (Alvizos & Angelis, 2010). Besides that, Vandermerwe and Rada (1989) argued that all kind of companies are affected by servitization due to global influences. Also, Wise and Baumgartner (1999) suggested that going down the value chain is necessary as providing only products is not sufficient in today's business world. Moreover, Neely et al. (2011) pointed out five underlying trends of servitization: 1) the shift from production to offering solutions, 2) the change from output to outcome, 3) the focus on building relationships with the client instead of having one-time transactions, 4) the establishment of a partner network, and 5) the creation of eco-systems instead of concentrating on single elements in the production. These trends act as a complement to the existing offerings and do not replace products (Neely et al., 2011). Also, the level of service proportion can vary and thus a mix of different product-service combinations can appear (*product-oriented services* (e.g. maintenance), *use-oriented services* (e.g. leasing and pay per use), and *result-oriented services* (e.g. integrated solutions) (Mathieu, 2001)).

Definition of Cloud Computing

Due to the growing trend of Cloud Computing, many definitions evolved in the literature. The most prominent one is introduced by the American National Institute of Standards and Technology (NIST): *"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 & Grance, 2010, p. 2). Following this definition Cloud Computing consists of five essential characteristics which are *broad network access, on-demand self-service* (delivery free from device and place (Marston et al., 2011)), *resource pooling*, *rapid elasticity* and *measured service*. The access to the network is mostly done via the internet. Cloud Computing can be distinguished in three service models (Sharma & Keswani, 2013):

- *Software as a Service (SaaS)* offers a high variety of applications and is the most accepted Cloud service. The customer can access the application and the data via the internet anytime and anywhere without installing the software on their server (Sahandi et al., 2013). Additionally, customers are enabled to share information and enhance the cross-functional communication in a

safe data environment. The opportunity to scale up and down dependent on the client's demand, as well as the centralized installation, and maintenance are advantages provided by SaaS (Armbrust et al., 2010).

- *Platform as a Service (PaaS)* enables the customer to develop and manage their software, but the infrastructure and middleware (e.g. operating system and hardware) are governed by the Cloud provider (Sahandi et al., 2013). Examples are the platforms Microsoft Azure, Google App Engine and Amazon Web Services (Puthal et al., 2015).
- *Infrastructure as a Service (IaaS)* supports Cloud customers with state-of-the-art IT equipment (e.g. backup and recovery). The Cloud provider manages the Cloud infrastructure. Thus, the client cannot control computing resources but has the authority over the software and the operating system (Alajbegovic et al., 2013).

Also, literature predicts the paradigm of "*anything and everything as a service*" in the IT industry which will further develop in the coming years. Furthermore, literature distinguishes Cloud Computing in deployment models: (1) The *Private Cloud* model is designed for the usage by a single firm which is able to manage the Cloud by themselves or through external providers (Botta et al., 2016). (2) The *Community Cloud* is used by a particular group of firms which have the same concerns and interests such as mission, security, requirements, and policy (Mell & Grance, 2010). (3) The *Public Cloud* enables an open usage for the general public with resources supplied as services by the provider. (4) The mixed model, the *Hybrid Cloud*, is composed of at least two Cloud models (Private, Community, or Public) to complement the pitfalls of the other model (Botta et al., 2016).

To address the Cloud Computing services adequately, Service Level Agreements (SLA) are negotiated with the clients that manifest the tasks of the service provider (Zhang et al., 2010).

Connection of Cloud Computing and Servitization

Cloud Computing appears as a new paradigm of servitization, because IT services are provide to a wider market by applying a new business model of morphing physical products into services (Sultan, 2014b). Vargo and Lusch (2006) introduced the SD logic which focuses on learning from and collaborating with the client. Sultan (2014b) claims that the SD logic brought in by Vargo and Lusch (2006) is too difficult to apply to Cloud Computing. Therefore, the SD logic can be criticized for being too attracted to managerial tasks and understanding value creation only in the way of client co-creation rather than consider new business models such as Cloud Computing (Sultan, 2014b). Also, Grönroos (2011) critically added that to perform the service logic, all kind of resources even goods can be used (Grönroos, 2011). Within the SD logic, a service is defined as competencies (e.g. knowledge or skills) which lead to customer's benefits. Services are seen as the primary business function in regards to marketing activities (Vargo & Lusch, 2008). However, Grönroos (2011) argue that the distinction between products and service or services is not significant within a service logic. Thus, a service can

be knowledge, skills, products or other resources which are employed to support the customer in its value creation process (Grönroos, 2011).

Regarding Cloud ERP, the paradigm shift from providing only fixed assets to a consumption-based pricing model results in a collaborative process. This includes skills, knowledge, and value co-creation which is, in the end, the core idea of the SD logic (Leimeister et al., 2015). In line with the five underlying trends by Neely et al. (2011), Cloud providers build service ecosystems such as the platform Microsoft Azure. This leads to a network of provider, customers and partners which are active in integrating and generating resources and outcomes. This results in value creation and co-creation for the whole ecosystem (Leimeister et al., 2015). This shift from supplying exclusively goods to the SD logic in the IT industry establishes opportunities such as new target groups, strategic directions as well as business models and value propositions for Cloud providers. By uniting Cloud Computing and servitization, it can be seen that Cloud Computing represents the core idea of servitization by transforming from product to service orientation. However, within the SD logic a service is defined as skills and knowledge which is difficult to apply to the idea of Cloud Computing as a traditional product is provided as a service. Contrasting to that, Grönroos (2011) argues that the provider is able to support the client with products and competencies. This service logic fits the concept of Cloud Computing better than the SD logic (Vargo & Lusch, 2008).

What are Cloud ERP Solutions?

Definition Cloud ERP

ERP solutions allow organizations to plan and control all actions from a central point of view backed up with all data available from one data repository (Peng & Nunes, 2013). Davenport (1998) published an ERP definition which claimed that the software packages are an "*integration of all the information flowing through a company – financial and accounting information, human resource information, supply chain information, customer information*" (Davenport, 1998, p. 1). Also, Raihana (2012) argued that ERP contains the entire production line. The main application fields are Finance (e.g. accountants' receivable and payable), Human Resources (e.g. time management and personnel planning), Supply Chain Management and Logistics (e.g. inventory and production planning), Sales and Marketing (e.g. pricing and CRM), and Operations (e.g. project management) (Davenport, 1998; Sharma & Keswani, 2013).

ERP solutions are composed of several integrated modules which are in favor for the user as they do not have to source all applications if they do not require them. Also, modules from various providers can be assembled regarding customer's needs (Alajbegovic et al., 2013). Due to the cross-functional usage of one integrated system, there is a cost reduction of single departments, real-time data access, and redundant work can be avoided. However, Mahara (2013) exhibited that there is a high level of commitment, an immense project management effort and huge investments needed, which cannot be afforded by many small firms. Consequently, in the past mostly large businesses introduced ERP

(Raihana, 2012). Cloud Computing helps ERP providers to offer their product to all kind of enterprises (Salum & Rozan, 2015), as "*ERP software that is deployed into a cloud environment becomes 'Cloud ERP Software'"* (Raihana, 2012, p. 78). Moreover, the traditional revenue stream created through on-site ERP solutions is changing towards gaining revenue from licensing, consultancy, and maintenance. Small firms prefer the pay-per-use model as the user pays just for the resources they need without the risk of huge investments. The flexible up and down scaling is part of the pay-per-use idea (Saini et al., 2014). Cloud ERP suits those firms perfectly who want to manage their system without maintaining and updating the hardware and software by themselves (Raihana, 2012). In most cases, this fits SMEs.

Benefits and Drawbacks of Cloud ERP Solutions

Literature regarding Cloud ERP states that the movement towards the Cloud ensures several advantages, especially for smaller firms. The most prominent benefits for small firms discussed in the literature are: *low upfront cost* (no buying of infrastructure), *lower total cost of ownership* (Cloud ERP costs are variable costs), *flexibility and availability* (access anywhere at any time), *scalability* (up and down scaling), *system upgrades* (automatic system upgrades and updates), *focus on core business*, *new technology access*, *faster system implementation*, and *low IT manpower* (see Al-Johani & Youssef, 2013; Alajbegovic et al., 2013; Peng & Gala, 2014; Saeed et al., 2012; Salum & Rozan, 2015; Seethamraju, 2015; Sharma & Keswani, 2013). Smaller firms are able to explore the advantages provided by Cloud ERP in a better manner than larger organizations. There are significant cost reductions especially for smaller firms but also for medium-sized companies. This cost advantage is not suitable for large organizations as they would need too many user licenses which are not profitable in the long run (Johansson et al., 2015).

Still, there are drawbacks, especially for smaller firms, of Cloud-based solutions like data security and trust issues, a possible vendor reliability and lock-in concern, problems to integrate the ERP Cloud into the organization, loss of data control, and thus a potential cultural and organizational change (Johansson et al., 2015; Peng & Gala, 2014; Saeed et al., 2012; Salum & Rozan, 2015; Weng & Hung, 2014). Also, hidden cost such as consultancy, implementation or maintenance fees are a problem in the IT industry and can be overcome by SLA negotiations (Grubisic, 2014). In particular, for smaller firms the lack of experience regarding Cloud Computing or (Cloud) ERP and the potential unstable performance of the Cloud service result also in disadvantages of Cloud ERP solutions (Salum & Rozan, 2015). Nowadays, most SMEs interested in Cloud ERP are aware of the weaknesses. However, literature considers that the barriers are less significant for SMEs than for larger ventures (Johansson et al., 2015). Yet, the drawback of security can easily be turned into a benefit for smaller firms as SMEs would not be able to build up such a professional IT firewall. The concerns of small firms regarding Cloud ERP can mostly be mitigated by choosing a well-known Cloud provider (Johansson et al., 2015). Moreover, literature agrees that that SMEs are most suitable for adopting Cloud ERP solutions (e.g. Saini et al., 2014).

Cloud ERP Adoption Literature

Many scholars are claiming that the movement of in-house ERP towards the Cloud model is necessary and beneficial. However, Cloud providers stress the advantages of Cloud Computing, whereas the drawbacks are not entirely discussed yet. Therefore, Peng and Gala (2014) concluded that Cloud ERP adoption can be influenced negatively by the obstacles (e.g. data security and integration problems). So far, the literature about the adoption of Cloud ERP is limited, particularly in developing countries. It is also claimed that Cloud ERP is "*the radical solution [the] SME market is looking for*" (Grubisic, 2014, p. 73). However, the Cloud ERP adoption literature in the context of SMEs stated that Cloud ERP is best suited for SMEs as the advantages can enhance their business activities. Furthermore, the reputation of the Cloud ERP provider and the support during and after the implementation is important for SMEs. Additionally, Cloud vendors have to adopt their business model towards the pay-per-use pattern to react to the changing market as SaaS applications are the future for small and large firms (Grubisic, 2014). Nowadays ERP vendors customize their solutions towards the needs of smaller ventures to gain parts of the fast growing market segment of SMEs (Snider et al., 2009).

All in all, one can see that the adoption literature regarding Cloud ERP needs to be further developed regarding start-ups (Johansson et al., 2015). Many scholars have begun to discuss the barriers and motives to introduce Cloud ERP either in a small or large firm setting (e.g. Mahara, 2013; Peng & Gala, 2014; Saeed et al., 2012; Salum & Rozan, 2015; Sharma & Keswani, 2013). Since academia and practice claims that SMEs are in favor of Cloud solutions, many researchers focus on SMEs. Additionally, literature compares traditional and Cloud-based ERP models to find out the advantages and disadvantages of different models (Al-Johani & Youssef, 2013; Navaneethakrishnan, 2013; Raihana, 2012; Saini et al., 2014). However, there are already studies exclusively characterizing the factors influencing Cloud ERP adoption (Alajbegovic et al., 2013; AlBar & Hoque, 2015; Seethamraju, 2015).

Definition of Start-ups

The European Commission (2016) claimed that 99% of all business within the EU is done by SMEs and specified what SMEs are: Medium-sized companies (employees < 250 and turnover < 50 Mio Euros), Small enterprises (employees < 50 employees and turnover < 10 Mio Euros), and micro enterprises (employees < 10 employees and about two Mio Euros turnover). Yet, the European Commission does not offer a description of *start-ups* and does not add the years of existence to their explanation of SMEs. This is confusing when comparing start-ups to micro enterprises as both are operating typically with a low headcount.

The German start-up association publishes a report, which characterizes what a start-up is: 1) start-ups are younger than 10 years, 2) start-ups are highly innovative due to the technology in use and/or have an innovative business model, and 3) start-ups aim for significant growth in turnover and/or employee numbers (Ripsas & Tröger, 2015). A start-up has to fulfill the first determinant for sure and

additionally at least the second or third factor which differentiate start-ups from traditional founded businesses (Ripsas & Tröger, 2015). However, literature claimed that new ventures which surpass eight years of existence should be considered as old businesses (Miller et al., 1988). Including the statement that young ventures need about 10 years to catch up with mature businesses regarding returns, it is more comprehensible why Ripsas and Tröger (2015) set the boundary of their start-up definition broader than the literature. The term start-up is also connected with the idea of *gazelles*, which are introduced in the entrepreneurial literature as young and fast-growing firms. Yet, there is no overall conformity regarding the term gazelles in the literature (Henrekson & Johansson, 2010). According to Hölzl (2009), gazelles are young SMEs which experience a temporary average growth rate within a given period. They either become large businesses, stay with the same scope after growing or fail and exit the market (Henrekson & Johansson, 2010). As the literature is diversified, Henrekson and Johansson (2010) found out that gazelles are younger firms and that they can be any size.

This study focuses only on start-ups and not on gazelles. Therefore, start-ups are (1) younger than 8 years, (2) highly innovative with the used technology and/or have an innovative business model and (3) aim at a significant growth in turnover and/or employee numbers. Due to the lack of definition by the European Commission, start-ups are seen as a sub-group of SMEs with a varying headcount.

3. Theoretical Framework and Propositions

Theoretical Background

With the help of several frameworks regarding technology adoption literature starts to find out how small firms which are willing to use Cloud ERP can be characterized. Nowadays, IT is a central determinant of a firm's productivity and success (Alshamaila et al., 2013). Therefore, models which cover IT adoption from a theoretical perspective are relevant. IT adoption models are either more focused on the individual or on the firm level. However, literature reviews regarding both adoption focal points are lacking (Oliveira & Martins, 2011). The research discusses the technology, organization, and environment (TOE) framework in the context of technology adoption on a firm level. The center of the TOE framework consists of three pillars, the new technology, the organization and the external environment the firm operates in (Baker, 2012). The framework is mostly used along with the technology indicators of IDT by Rogers (1983) (Awa et al., 2015). Due to growing complexity of technologies, such as Cloud ERP, using one model is not sufficient enough to determine essential factors influencing the adoption of innovations (Oliveira & Martins, 2011). Hence, this paper combines two interrelated theories (Baker, 2012), the TOE framework developed by Tornatzky and Fleischer (1990) and the innovation diffusion theory by Rogers (1983).

Innovation Diffusion Theory

Rogers (1983) introduced the innovation diffusion theory (IDT) as a "*process by which an innovation is communicated through certain channels over time among the members of a social system*" (Rogers, 1983, p. 5). The term innovation just means that the concept, practice or idea is new to the adopter (Premkumar & Roberts, 1999). In the organizational context, the adopter equals the firm. The innovation diffusion process can either result in the introduction of new technologies or into a rejection (Ramdani & Kawalek, 2007b). In fact, the diffusion of new ideas can lead to *uncertainty* due to the existence of various alternatives and a lack of experience, which can be overcome with thorough information as well as changes within the social system (Rogers, 1983). This risk is especially high for smaller companies as those firms mostly lack experience and knowledge (Thong, 1999).

Rogers (1983) differentiates the diffusion process by (1) innovation, (2) communication channel (e.g. mass media), (3) time (duration of the innovation adoption process), and (4) the social systems it is placed in. Within the first cluster of innovation, Rogers (1983) defined indicators related to the technology which explains the rate of innovation adoption:

1) *Relative advantage* is the intensity to which the new technology is perceived as better than the old one. It is important that the individuals experience the innovation as advantageous. This, in turn, leads to a faster adoption.
2) *Compatibility* is the extent of consistency with established values and experiences. The higher the compatibility of the existing norms and values the faster the adoption of an innovation will be.
3) *Complexity* is the intensity to which a new technology is seen as complicated to use. New technologies which are perceived as easy to understand are faster adopted than those which require training for new skills.
4) *Trialability* is the intensity to which the innovation can be tested. Technologies which can be tested before the implementation are seen as less uncertain for the adopter.
5) *Observability* is the extent to which others can observe it. The visibility of results of the innovation makes it easier for the individuals to adopt such a new idea.

In Rogers' (1983) book, the term innovation equals the term technology as most of the examples are related to the IT industry. The characteristics (relative advantage, compatibility, complexity, trialability, observability, and uncertainty) are included by several researchers to the TOE framework in order to explain the technologies individually. Until now, the IDT was used to elaborate on the adoption of software applications, PCs, intranet, websites, in-house ERP, e-business and e-procurement (Oliveira & Martins, 2011).

TOE Framework

Ramdani and Kawalek (2007a) pointed out that the TOE framework is used quite often in empirical research. However, it was not transparent to them which factors are the most crucial ones and which

need to be included in their research. Moreover, they found out that the factors' influence differs depending on the technologies applied. Hence, it is advised by literature to extend the TOE framework further and study different innovations (Chau & Tam, 1997). This has demonstrated the vast application field of the TOE framework in several industries (e.g. manufacturing, retail, and financial services) and different cultural settings (Europe, America, and Asia) (Baker, 2012). Furthermore, the adoption of several technological innovations such as e-commerce, open systems (e.g. Chau & Tam, 1997), software (e.g. Thong, 1999), enterprise software such as ERP (e.g. Ramdani & Kawalek, 2007a), and e-businesses are tested. Commonly, all studies are based on the same three elements of the framework but each researcher accomplished modifications regarding the factors tested in the study (Baker, 2012; Ramdani & Kawalek, 2007a).

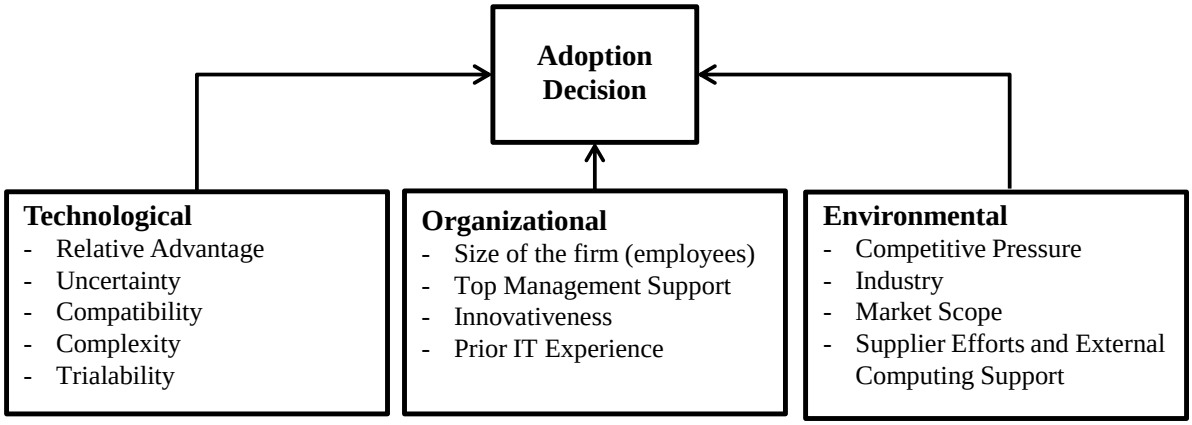
The *technological* factors focus on technologies which are available within and outside the organization (Awa et al., 2015). The benefits perceived from an innovation and the ability to adopt the new technology plays a key role in the adoption process. It is important to consider the characteristics of the new technology and the needs of the company (Chau & Tam, 1997). Based on the 75-article meta-analysis conducted by Tornatzky and Klein (1982) the relationship of the innovation characteristics by Rogers (1983) and the adoption-implementation was established. Thus, the connection of the TOE framework and the IDT theory is demonstrated. The *organizational* variables describe the firm in detail. It includes all resources within the company as well as linkages between departments, the communication process, the firm size and the availability of resources (slack of resources). In the organizational context, the firm size and availability of resources (slack) are most discussed. Literature claims that the higher the number of available resources, the higher the adoption rate of new technologies (Baker, 2012). Contrary, Tornatzky and Fleischer (1990) argued that innovation can be created even without slack of resources. The link between the size of a firm and the adoption of innovation could not be constructed, even though literature found out that larger firms are more likely to adopt new technologies (Kamien & Schwartz, 1982). Hence, researcher call for a more complex measurement concerning the company size (Baker, 2012). Concerning the *environmental* factors, it was examined that fast growing industries are more likely to innovate than declining industries (Tornatzky & Fleischer, 1990). Thong (1999) valued the work of Mansfield (1968), who found evidence that competition stimulates the diffusion of innovation. In addition, he argued that uncertainty in markets lead to a powerful technology push. Another variable is governmental regulations, which can either foster (e.g. subsidies) or hinder (e.g. fees) firm's innovation (Baker, 2012).

Adapted TOE Framework with Aspects of IDT

One benefit of the TEO framework is the simple replacement and adding of variables regarding the technology and organizations. Due to the fact, that start-ups are examined there is the need to adjust the original model. In smaller firms, the decision-maker is basically the founder which shows the

strategic relevance of the topic (Alshamaila et al., 2013). Alshamaila et al. (2013) therefore added variables such as *top management support*, *prior experience*, and *innovativeness of the decision-maker* into the TOE framework. Additionally, the technology indicators (relative advantage, compatibility, complexity, trialability, and observability) and the variable *uncertainty* are integrated into the model. The potential risks occurring via the adoption decision of new technologies along with the emerging organizational change result in some level of uncertainty especially for smaller firms (Rogers, 1983). Those uncertainties concerning the implementation of Cloud ERP among SMEs have to be discussed (Alshamaila et al., 2013). However, characteristics like observability, governmental regulations, availability of technology, internal communication processes and structures are not essential for the context of Cloud adoption and are therefore excluded (Alshamaila et al., 2013). Figure 1 demonstrates the adjusted TOE framework in the context of SMEs and Cloud Computing based on Alshamaila et al. (2013), which is the model for this study.

Figure 1: TOE Framework by Alshamaila et al. (2013, p. 255)



The control variables growth and years of existence are added into the framework to make sure that the criteria of start-ups are fulfilled. During the data gathering phase, the participants are asked for the growth of the start-up they are operating in and additionally whether the start-up does not exceed the eight-year limit of young businesses.

Technological Factors

Tornatzky and Klein (1982) pointed out that the *relative advantage* is too broad to measure why technology is adopted. The new technology can be perceived as superior to the old one due to time savings, cost savings, more profitability, or other benefits obtained. Nevertheless, Tornatzky and Klein (1982) concluded that the relative advantage has a relationship with the adoption of innovations. Also, smaller businesses which have a positive position towards the relative advantage are more likely to adopt new technologies (Thong, 1999).

Proposition 1: The relative advantage positively impacts the adoption decision for Cloud-ERP among start-ups.

Despite the relative advantage, *compatibility* and *complexity* demonstrated the highest significant relationship towards the adoption of innovation (Tornatzky & Klein, 1982). SMEs assume Cloud technologies are easy-to-use and straightforward to integrate (Alshamaila et al., 2013). In the context of smaller firms, the owner will only adopt innovations which are consistent with the values and beliefs of the venture. This enhances the importance of compatibility (Premkumar & Roberts, 1999). In line to that, Cloud-based services are perceived as not complex to use and that there is less effort needed to employ Cloud services (Tehrani, 2013).

Proposition 2: The compatibility positively impacts the adoption decision for Cloud-ERP among start-ups.

Proposition 3: The complexity negatively impacts the adoption decision for Cloud-ERP among start-ups.

Uncertainty is defined as the perceived risk of adopting new technologies. Due to the lack of experience with the technology, issues like security play a role in the adoption decision (Fuchs, 2005). Alshamaila et al. (2013) added that the introduction of Cloud-based services depends on the level of uncertainty perceived through the SMEs. As Rogers (1983) explained, the uncertainty can be overcome via information and knowledge. Thus, it is important for the decision-maker to be aware of the benefits and drawbacks of such ERP Cloud services.

Testing the new Cloud service influences the adoption decision of SMEs positively and strengthens the decision towards Cloud solutions. Also, in other settings it appears to be beneficial to try the technology beforehand in order to enhance the decision to adopt it (Dedrick & West, 2003).

Proposition 4: The trialability positively impacts the adoption decision for Cloud-ERP among start-ups.

Proposition 5: The uncertainty negatively impacts the adoption decision for Cloud-ERP among start-ups.

Organizational Factors

The factor *firm size* is often discussed as some researchers claim that there is no relationship between innovation and the size of the company and thus request another measurement (Baker, 2012). However, additional research demonstrates that especially for start-ups it is likely to adopt Cloud services. This emphasizes the importance of organizational size in the adoption of new technologies, particularly in the Cloud environment (Alshamaila et al., 2013). By contrasting with Baker (2012), Frambach and Schillewaert (2002) claimed that there is a positive relationship between the size of a firm and the adoption of innovations. *Proposition 6: The firm size impacts the adoption decision of Cloud-ERP among start-ups.*

According to Alshamaila et al. (2013) and Premkumar and Roberts (1999), the familiarity with new technologies enhances the convenience of users but is not a direct factor which influences the decision to adopt.

Proposition 7: The prior experience positively impacts the adoption decision for Cloud-ERP among start-ups.

Moreover, literature agreed that the *support of the management* is essential for SMEs regarding technology adoption as the management sends signals and shows the direction of the firm (Ramdani & Kawalek, 2007a). Additionally, Alshamaila et al. (2013) stated that the idea to use Cloud-based services was also suggested by the IT departments of the SMEs. This shows that the impulse can either come from the management or the employees in smaller ventures. Likewise, the innovativeness of the decision-maker plays a significant role in the adoption intention of SMEs due to firm size (Marcati et al., 2008). In this context, innovativeness means openness to new products, approaches, and methods to solve problems and process information. The literature showed that SMEs who are innovative are more likely to adopt new technologies within the organization (Alshamaila et al., 2013).

Proposition 8: The top management support positively impacts the adoption decision for Cloud-ERP among start-ups.

Proposition 9: The innovativeness of a new venture positively impacts the adoption decision for Cloud-ERP among start-ups.

Proposition 10: The innovativeness of the founder impacts the adoption decision for Cloud-ERP among start-ups.

Environmental Factors

There are mixed results regarding the relationship between *industry* and the adoption of new technology. However, results suggested that certain industries are more likely to introduce Cloud applications (Alshamaila et al., 2013). Also, firms in growing industries are more likely to invest in new technologies than firms in mature industries (Baker, 2012).

Proposition 11: The industry impacts the adoption decision for Cloud-ERP among start-ups.

The results for *competitive pressure* also led to mixed conclusions. Alshamaila et al. (2013) claimed that there is no relationship between competitive pressure and the adoption of new technology for SMEs, whereas Premkumar and Roberts (1999) found out that there is a significant relationship for small firms. Research provides insights that intense rivalry is related to innovation adoption. However, Thong (1999) did not identify a direct effect on the adoption of IS applications in the setting of small firms. This lead to his suggestion that small ventures are not pushed towards technology adoption by competition (Thong, 1999).

Proposition 12: The competitive pressure impacts the adoption decision for Cloud-ERP among start-ups.

The *market scope* either targets regional, national or international markets. Literature suggests that firms using Cloud services reduce their costs and thus are more active on international markets. Many SMEs considered Cloud services due to the flexibility and independence in place which are used to enhance the efficiency of the venture (Alshamaila et al., 2013).

Proposition 13: The market scope impacts the adoption decision for Cloud-ERP among start-ups.

The *supplier's efforts* play a crucial role in the adoption decision of firms. The accurate communication of the vendor and his support can lead to a perceived risk reduction of the new customer, and consequently to a higher adoption intention (Frambach & Schillewaert, 2002). Also, the marketing activities hosted by suppliers have an influence on the adoption decision of SMEs. Firms can enhance their innovativeness and capabilities by learning from their supplier which in turn can lead to a faster innovation adoption. Additionally, for small enterprises, the expertise of the vendor is crucial because they do not have the experts inside the company (Alshamaila et al., 2013).

Proposition 14: The supplier's effort positively impacts the adoption decision for Cloud-ERP among start-ups.

4. Methodology

Research Strategy and Design

The research objective is to figure out which factors influence the adoption of Cloud ERP from a start-up perspective with the help of the TEO framework based on Alshamaila et al. (2013). To examine whether the variables of the framework influence the adoption decision of start-ups a deductive approach was selected. Moreover, the purpose of investigating the impact of variables on start-up adoption leads to an exploratory approach with parts of a descriptive research. The descriptive research fits perfectly for the literature review of this study, whereas the explorative component aims to demonstrate a relationship between the factors of the TOE framework. Furthermore, the survey strategy, which is commonly used in business and management research, fits this research best. This study employs a qualitative approach to gain as many new insights from the participants as possible. Also, Saeed et al. (2012) argued that for exploratory research, it is necessary to use qualitative methods to understand the motives, reasons, actions, and beliefs of the participants better. This research only collects qualitative interview data (mono method) and performs the cross-sectional approach as there are time restrictions and the interviews only show a snapshot of time (Saunders et al., 2009). By following the descriptive approach, the core understanding of the general conditions regarding the topic is given and a profound literature review is performed. The explorative part of the research is shown through in-depth investigation of the propositions and variables in the new setting of start-ups by using semi-structured interviews. Alshamaila et al. (2013) replaced and added elements of the original TOE framework established by Tornatzky and Fleischer (1990) and tested the variables. Also, all 14 propositions are retrieved from the study of Alshamaila et al. (2013) and then reviewed based on other profound IS literature.

Data Collection and Data Analysis

Semi-structured interviews are beneficial for collecting experiences, emotions, and opinions and therefore used as the data collection technique. This approach is often used in the context of qualitative research as it paves the way to explore all aspects, ensures the flexibility and the openness that respondents can answer in their own words (Longhurst, 2010). Due to the fact that interviews are the most applied data gathering method in qualitative research, it is surprising that most researchers take it for granted. There are pitfalls regarding the interview method which are discussed by Myers and Newman (2007) and carefully reviewed in this study to overcome such issues.

In this study 15 interviews with start-ups and experts are conducted. The interviewees from the start-ups perform different positions (e.g. founder, team leader, product owner, sales, marketing, and operations). Also, the size of the start-up varies (from 2 till 600 employees) as well as the industry (e.g. (online) retail, IT, education, HR, and automatization) and the years of existence (from 1 till 8 years). The experts work closely together with start-ups in terms of business development support for start-ups, consultancy or suppliers for Cloud ERP solutions. The respondents are selected through networking events, accelerator programs, and social networks (e.g. Facebook). Furthermore, not only start-ups located in Germany are included but also start-ups founded in the Netherlands. The interviews, which are the primary data source, are conducted via Skype or in the participant's office either in German or English. To test the literature-based questions regarding their understandability and relevance one test interview was simulated. At the beginning the participants were asked about the start-up's background and whether they already work with an ERP system (on-premise or in the Cloud). After that, the perceived benefits and drawbacks of such Cloud ERP solutions are discussed and the influence of the TOE variables on the adoption intention of the start-ups.

To analyze the output created by the interviews the responses are recorded with the permission of the participants and then transcribed (Saunders et al., 2009). Moreover, the interview data is checked against the propositions formulated to find out valuable insights regarding the framework and the adoption of start-ups. Due to the unstructured data provided by interviews, there is the need to structure and summarize the data in order to simplify and analyze the content (Saunders et al., 2009). To display the data a matrix is used. Each row of the matrix refers to one of the independent variables of the TOE framework as well as benefits and drawbacks whereas the columns are allocated to the different start-up and experts. Consequently, the condensed statements can be filled into the correct cell which structures the huge amount of text. By means of the structure, the researcher can analyze the findings and draw conclusions (Miles & Huberman, 1994).

Validity and Reliability

There is always the concern whether the gathered data and conclusions point out what they are intended to show (Saunders et al., 2009). First, as opinions are asked, it is important to find out whether individual events before the interview have an influence on the response. In order to reduce

this threat, the situation regarding the Cloud ERP technology is elaborated in detail during the interview. Consequently, negative issues related to Cloud ERP are pointed out due to the questions prepared. Moreover, as start-ups which are interested in a new technology are interviewed, the issue that the interview might pose a disadvantage to the firm is reduced to a minimum (Saunders et al., 2009). However, not all start-ups know exactly whether they will adopt a Cloud ERP in the near future as it depends on the development of their venture.

An issue concerning reliability is whether the collected data is processed with the right techniques, which lead to constant findings (Saunders et al., 2009). First, the subjectivity error describes that participants can react differently to questions due to varying timeframes. For start-ups that are dealing with the decision of adopting a new technology, the timeframe is not relevant. A second threat is the bias of the participants who are influenced by the opinion of their boss. This is also not applicable for the organizational setting of this study due to the flat hierarchies of the ventures examined (Saunders et al., 2009).

5. Results

Findings and Discussion of the Interviews

Technology Factors

Understanding the *relative advantage* is critical as it offers many indicators which drive start-ups to introduce Cloud ERP. Start-ups usually start from scratch with manual routines to save costs and to get into the market. At a certain point, when the start-up is growing fast, this is not efficient anymore (SU7) and the implementation of certain processes are lacking which should be overcome with Cloud ERP (SU6). Furthermore, factors like flexibility in scaling the user numbers up and down and location independence are issues resulting in an advantage for start-ups. It is also appreciated that the Cloud provider maintains the Cloud ERP solution (SU5). By submitting the ERP tasks to the Cloud provider it is possible to focus on the start-up's core business and on its growth (E3). Therefore, the relative advantage has to be understood so that it positively impacts the adoption decision of start-ups. However, still many start-ups do not know which benefits can be provided by Cloud ERP (E1).

The *compatibility* of new technologies is also an important issue for start-ups. Start-ups do not introduce technologies which do not fit to the existing ones (SU3). The interviewees argued that at the beginning it is easier to replace systems but at some point in the business' lifecycle the systems are set and thus the Cloud ERP has to correspond with those systems without errors. Start-ups see the integration of different systems critical as no one wants to work with several interfaces which lead to data chaos (SU4). The result is contrary to the findings of Alshamaila et al. (2013) who claimed that SMEs perceive Cloud technologies as easy to integrate in the firm's infrastructure. In addition to that E3 argued that the availability of the systems is crucial for start-ups as customers are less patient with start-ups than with established companies. Thus, compatibility impacts the adoption decision of Cloud

ERP positively. However, it is also necessary to have a fast and easy migration to the Cloud ERP as the start-ups have no resources for long-lasting implementation projects (SU10).

While introducing a new solution, there is always *complexity* (SU1). Nevertheless, start-ups call for solutions which are simplify processes and easy to use. If a start-up thinks the Cloud ERP is too complicated they will never introduce it (E2). At the beginning start-ups need to cover the basic functions and therefore a simple tool is preferred (SU11). Moreover, start-ups expect flexible and modern solutions as they have to react quickly to changing environments and have no time to focus on other aspects than their core business. Hence, finding the right solution is crucial for start-ups and their intention to adopt Cloud ERP. Similarly to the findings of Alshamaila et al. (2013), start-ups perceive Cloud ERP as being easier to use than the on-premise ERP. However, participants with a deeper understanding of Cloud technology and software development explained that it is the implementation of Cloud Computing which is easier rather than the ERP solution itself. Thus, the factor implementation time and complexity is essential for smaller firms due to a lack of resources and time.

The *trialability* of Cloud ERP is also relevant for start-ups as it is a first step towards a new solution. By not offering a test possibility many start-ups will reject the solution right from the start (SU2). In order to provide test phases, several Cloud ERP providers allow a registration for free. This is called the 'freemium model'. The amount of users that can use the solution is then restricted or there is a certain timeframe which can be used to test the Cloud ERP solution for free (E3, E4). However, testing a Cloud ERP is very complex due to the necessity of building up own processes and data in the system (SU3, SU7). The effort of inserting all data into the Cloud ERP system is perceived as very high due to the risk of rejecting the solution after the test period (SU10). SU3 claimed even that it is not possible to test the Cloud ERP as the user either has to put much effort in the set up or there is solely the possibility to check the functionalities based on an empty database. Therefore, Cloud ERP providers are necessary to support start-ups in identifying and selecting the right solution (E3). By taking recommendations and references into account, new ventures want to find out which weak points exist and how the implementation went (SU7, SU9).

According to the literature, *uncertainty* can influence the decision to introduce Cloud solutions negatively. E1 argued that the factor uncertainty is not relevant for start-ups – "*they are not afraid of Cloud Computing at all*" (E1). There is no alternative to Cloud ERP as a start-up's growth results in more complexity of processes which in turn leads to the need for a solution like Cloud ERP (SU3). The data security and privacy issues are an important factor, but start-ups do not perceive it as a negative influence on their adoption decision. They rely on SLAs and the reputation of the provider (SU4, SU7). Moreover, the time loss which occurs when the solution does not suit the needs is a risk (SU9). However, start-ups have a higher risk tolerance than larger firms (SU8, SU10) as all aspects of the daily business are riskier than for established companies (SU11). Moreover, start-ups are willing to take that chance and risk to push their venture forward. Thus, they are more open to Cloud technologies (SU6).

Organizational Factors

The factor *firm size* led to mixed results in the literature. Most start-ups see that there is a relationship between company size and the intention to adopt a Cloud ERP. By asking more precisely, other aspects such as resource allocation, the industry or the structure of the firm are related to the adoption. SU8 explained that the size of a business plays a role regarding the decision whether start-ups introduce a Cloud-based or traditional ERP solution. As start-ups are usually lacking financial resources, time and employees who can analyze the functionalities of new systems, there is no other possibility than choosing the Cloud ERP (SU3). Generally, the interviewees stated that Cloud ERP suits the needs of start-ups perfectly and is even a bigger topic for smaller firms than for larger companies (SU5). By applying Cloud ERP in larger businesses, there are more barriers and decision-making levels than in the context of start-ups (SU5, E2). E1 and E4 suggested that start-ups need to consist of at least 10 to 15 people to even think about the introduction of a Cloud ERP solution. At this point, systems are required due to more collaboration necessity and unstructured processes start to be inefficient and costly which can be solved with the help of Cloud ERP (SU7, SU9).

The *prior experience* was specified by the respondents as prior knowledge or experience with ERP. Having expertise in the field of Cloud or IT, in general, was not important (SU6, E1). Actually, SU3 decided to introduce Cloud ERP without having prior knowledge or experts in the ERP field. However, knowing the advantages of ERP is stated as a factor which influences the decision to adopt Cloud ERP. SU2 explained that due to the experience of the co-founder they aim to introduce Cloud ERP as soon as possible. Also, a certain degree of understanding is necessary to negotiate with Cloud providers (SU1). If someone worked once with ERP, then there is a better ability to compare solutions and to figure out whether there is a need for a Cloud ERP solution (SU8, SU6). The recommendations gathered from other start-ups also impact the adoption decision (SU10).

The factor innovativeness is separated into two aspects: *Innovativeness of the start-up* and *innovativeness of the founder*. Both factors could not be supported by the interviewees. E3 concluded that systems like Cloud ERP are necessary for innovative start-ups to handle communication challenges. It was noticed that it is rather the industry affecting the adoption than the innovativeness of a start-up (SU4, SU6). They referred to technology-driven start-ups and e-commerce start-ups and claimed that those are more attracted to Cloud ERP. Contrary to that, SU10 clarified that most technology-driven start-ups do not need a Cloud ERP in the first place due to their intangible products. It is not the utilization of Cloud ERP which distinguishes innovative start-ups but the business model they apply (SU11). E4 correctly pointed out that the business model of a start-up is important not the degree of innovativeness. SU9 even stated that "*the moment you decide to implement an ERP you have to accept that you will be less creative because you have to follow certain rules in a system."* Thus, it may be concluded that everyone can use a Cloud ERP regardless the degree of innovativeness (E1). Regarding the innovativeness of the founder, the Cloud ERP solution is more about managing than innovativeness (SU9). Founders who introduced a Cloud ERP would have been innovative 10 years

ago (SU3, SU9). Nowadays, this decision is common and everyone is using Cloud services especially in the start-up sector. Start-ups expect modern technologies which are proofed, but it does not mean that it is innovative to use Cloud ERP (SU10). Another perspective is that start-up founders should be seen as entrepreneurs who are creative rather than managers who are more process-driven (SU11). Therefore, innovativeness of the start-up's founder does not fit Cloud ERP adoption. However, SU2 and E1 think the decision-maker is innovative due to the knowledge and the openness towards the Cloud ERP system.

Top management support is another factor influencing the adoption of Cloud ERP among start-ups. The founder has to show the benefits and improvements of the Cloud ERP solution to its employees to convince them to use the new solution (SU2). Contrary, a start-up operates differently than a large organization due to the flat hierarchies and the family-like environment (SU6, SU7, SU8, and SU9). Also, SU3 and SU6 added that the suggestion to introduce Cloud ERP was given by the employees. It is hard for the founder to know which solution is the most beneficial for certain processes. The staff which executes the processes knows the pain points of the daily routine and thus most ideas are pushed by the team (SU11). In a start-up as all employees and the founder are working for the idea together as a team. That is why SU8 does not see the relationship between top management and the adoption of Cloud ERP. Ultimately, the founder has to commit to all decisions and discuss them with the shareholders and investors. Therefore, according to SU9 a "*good story*" is needed to get the support and funds. The support of the founder is critical as he/she shows the vision and direction of the venture. However, start-ups are consisting of a mixture of the top management support and ideas as well as support from the employees.

Environmental Factors

Almost all interviewees approved to the proposition that the *industry* of a start-up impacts its decision to adopt Cloud ERP. Start-ups that supply new products or approaches need out-of-the-box processes due to the innovate product they have. This can be provided through Cloud ERP quickly. The main point about the industry is whether the start-ups buy or supply tangible products (e.g. E1, SU8). In that regard, the industry (e.g. design, architecture, production) does not matter as long as the venture has to manage the supply chain of its goods (E2). E4 added that start-ups in the retail/e-commerce or restaurant business need to have a Cloud ERP to cope with the inventory and ordering processes. This is in line with SU9 who argued that if a start-up has a web shop, then an ERP is needed. Start-ups focusing on software do not have the urgent need to introduce a Cloud ERP solution in the first place (SU11). For start-ups located in Berlin, the information exchange among the start-ups is also a crucial factor in finding the right solution. Due to the exchange, the start-ups located in Berlin equal each other regardless of the industry. The geographical location of start-ups might also influence their adoption decision (SU10). Consequently, product-oriented start-ups or start-ups in the retail business think about the introduction of Cloud ERP earlier (SU8).

The *Competitive pressure* was not related to the adoption of Cloud ERP among start-ups. Cloud ERP systems help to automatize the business routines which in turn lead to a stabilization of the start-up and core business concentration (SU10, E2). In order to find the right solution which saves costs and create more efficient processes, start-ups perform cost calculations and review the usability of the particular Cloud ERP solution (SU3, SU6). Thus, it is apparent that the decision to adopt a Cloud ERP is more intrinsic than initiated by the competition (E3, SU3). In fact, start-ups communicate with other start-ups to exchange information about solutions (e.g. Cloud ERP), to explore their network and gain valuable insights (SU2, SU7). This is rather collaboration than competitive behavior.

The *market scope* a start-up possesses is perceived as a reason to introduce a Cloud ERP. Start-ups who want to grow internationally are more willing to adopt Cloud ERP than those firms who are satisfied with their actual market scope (SU4). By expanding the business, the complexity of the start-up increases. In fact, the start-up cannot handle the processes manually anymore and needs a Cloud ERP solution (SU10). Due to market expansion SU7 was not able to manage the data amount anymore with the self-implemented ERP tool. Thus, the need of a Cloud ERP occurred. Another reason to introduce Cloud ERP in an international setting is that the set-up of the system is faster than in-house solutions even though it is cross-national (SU6). The transaction volumes are also an aspect of market scope (SU9). Trading large amounts on national markets might lead to a need of Cloud ERP on a national level.

The participants see a relationship between *supplier's effort* and the adoption of Cloud ERP. As the start-ups use the Cloud ERP, they detect improvement potential. Cloud ERP providers who are open to communication and feedback to improve the solution are candidates for long-lasting partnerships which are critical for start-ups and vendors (SU1, SU3). In contrast to large organizations, most start-ups do not have experts within the company and thus need external help to introduce Cloud ERP (SU4, SU5). However, this is always a question of costs especially for start-ups (SU3, SU4). Providing workshops for free at the beginning might help start-ups to gain knowledge which in turn leads to a possible growth of the venture and follow-up projects for the provider (SU3, SU4). Those events are just valuable if the start-up actually aims to introduce Cloud ERP (SU 11). For start-ups with no experience, it is important to have a partner who explains the benefits and drawbacks of a Cloud ERP (SU9, SU10). The consultancy should focus on benefits, concerns and best practices instead of only aiming to sell the product (SU10). This knowledge provided by the ERP Cloud provider impacts the adoption decision of start-ups (SU8). Since start-ups operate fast, they expect this from their providers as well. Thus, the support of a Cloud ERP provider is more important than the events. Other aspects are recommendations and references of other start-ups utilizing Cloud ERP (SU7, SU9, and E2). By talking to other start-ups, it is possible to experience the phases they went through including the ups and downs which help to find out whether the solution also fits (SU9). SU6 argued that at the beginning if a Cloud provider is not well-known, it is even more important to be active in the market in order to approach start-ups. In general, start-ups are rather open to contacts with not established providers than larger firms (SU6). Additionally, the respondents came up with several ideas how

Cloud ERP providers can approach the start-ups to provide valuable insights for them. SU5 claimed that a non-technical comparison between in-house and Cloud-based ERP solutions on benefits and drawbacks as well as transparent cost structures would help to enhance the understanding. Also, SU6 suggested informal web-based informational events as they are location independent and it can be easily accessed online. E2 pointed out that many start-ups are working together with incubators and investors. Some incubators provide toolkits to the start-ups. Thus, it is beneficial for providers to connect with incubators and offer special contract conditions to those start-ups within the program. The potential growth of those start-ups results in a win-win situation for all parties.

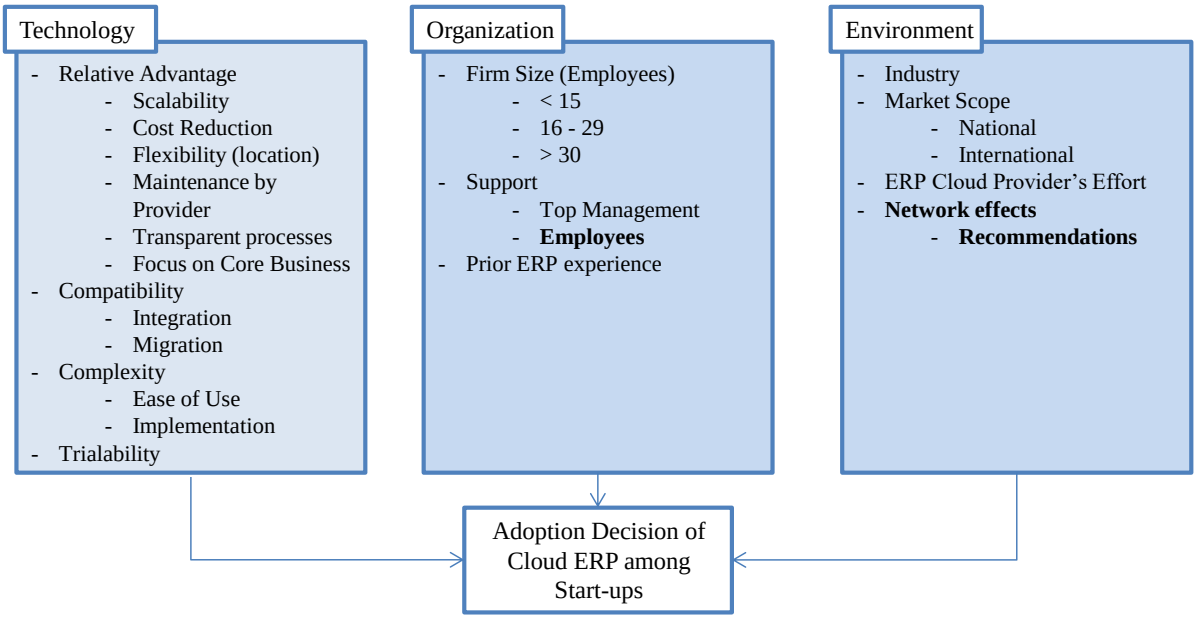
Evaluation of the TOE Framework in respect to Cloud ERP and Start-ups

The insights retrieved from the interviews show that there are many aspects driving start-ups to introduce a Cloud-based ERP system. However, by applying the TOE initially in this organizational setting, it was noticed that not all factors are crucial and new factors emerged.

In regard to the technology factors, the relative advantage is too broad which is in line with the literature (Tornatzky & Klein, 1982). Since each venture perceives different benefits through Cloud ERP, it is more valuable to split this factor up into scalability, cost reduction, flexibility, maintenance by the provider, transparent processes, and focus on core business. To specify compatibility, it is crucial to elaborate on integration and migration of the Cloud ERP. Complexity can be reviewed in terms of the ease of use and the implementation complexity (SU8). Since start-ups have a risk-taking philosophy (SU11, E3), the factor uncertainty is not relevant in the organizational setting of start-ups. Although security is always a discussion point, start-ups trust their provider and arrange SLAs to clarify data specific questions (SU4, SU7). Due to the usage of Cloud services such as Google for Work, the data is in the Cloud anyway and therefore start-ups are more open to Cloud ERP. The organizational factors need to be aligned as well. The factor company size of the start-ups led to mixed assumptions whether there is an impact on the adoption of Cloud ERP. Due to the responses the factor firm size needs to be split up (e.g. less than 15 employees, 16 to 29 employees, and more than 30 employees). This suggestion is made due to the comment that the need of a Cloud ERP would occur with the headcount of approximately 15 employees (E1, E4). Since the factor innovativeness was not related to the adoption of Cloud ERP, this variable should be excluded in this context. The issue that the workforce impacts the decision to introduce a Cloud ERP as well has to be included into the TOE framework. The variable prior IT experience should be named differently due to the relation to knowledge regarding ERP rather than IT or Cloud Computing. Due to the internal challenges start-ups have to face at the beginning, the competitive pressure is not applicable in this organizational setting and thus needs to be excluded from the framework. The interviewees claimed that primary retail start-ups, ventures with products and a supply chain need a Cloud-based ERP. By asking the participants directly which industry (e.g. retail) is related to the adoption of Cloud ERP additional insights can be revealed. Additionally to the Cloud ERP provider's effort, network effects and recommendations of

other start-ups play a crucial role in the decision to introduce a Cloud ERP among start-ups. As a result, the TOE framework was developed further in regard to those factors which are crucial for start-ups and their Cloud ERP adoption (Figure 2).

Figure 2: Aligned TOE Framework



6. Conclusion and Discussion

Conclusion

Without any doubt, there is a positive trend of Cloud ERP adoption among start-ups. Nowadays, already half of the Cloud implementation projects from E2 are done for start-ups. By elaborating first on the movement of on-premise to Cloud-based ERP solution, it is demonstrated that the service infusion can lead to new markets and new value created for the start-ups by the Cloud ERP provider (Sultan, 2014b). As start-ups want to focus on their core business and do not want to build up a whole IT department, they are open to Cloud ERP solutions. The advantages and disadvantages stated in the literature are in line with those perceived by the interviewees. Additionally to cost reduction and hardware independence, the scalability, flexibility and location independence are important determinants for start-ups to adopt Cloud ERP. However, data security is discussed with mixed results. Data security is better in the Cloud due to the resources and manpower invested by the Cloud provider (SU1), but there is still the gut feeling that data security and privacy is an issue (SU8, SU9). Thus, start-ups have to arrange SLAs to overcome the security issue and trust the provider (SU4, SU7, and SU9). Due to the risk-taking attitude of start-ups, they accept those pitfalls and agree on contracts with the Cloud ERP providers as they intend to grow.

Also, it is noteworthy that start-ups first need to understand the relative advantage which can be perceived through the introduction of Cloud ERP. Start-ups are different than established businesses and react ad hoc when they experience huge pain points concerning delays or loss of money. Then a Cloud-based ERP solution is needed to build up the processes more efficiently (SU11). In that regard,

it is necessary to have certain knowledge of ERP as well as benefits and drawbacks. Thus, the experience is essential and can also be gathered through information exchange with other start-ups. This indicates that the network a start-up has might influence its decision as to which and whether an ERP is introduced. The important factor of recommendations demonstrates that it is rather an exchange impacting the decision to adopt a Cloud ERP solution than the competitive pressure. Moreover, in the organizational setting of start-ups, it is common to establish a Cloud ERP system due to the suggestion of employees. Top management support is undoubtedly necessary for the start-ups as the management still has to push the idea and pitch it to the investors. Nevertheless, due to the flat hierarchies and the family-like atmosphere the factor of employee suggestions seems to be relevant to start-ups' adoption decision as well. Due to this research, it is not possible to cluster the start-ups regarding their likelihood to adopt Cloud ERP solutions. However, start-ups in the retail and e-commerce industry as well as product-driven ventures, are deemed to be most appropriate to implement Cloud ERP already at an early stage. Most start-ups only focusing on software development will need it at a later point in their venture.

All in all, the main factors found in this study that impact the adoption decision of Cloud ERP among start-ups are: relative advantage, compatibility, complexity, trialability, top management support, prior experience, industry, market scope, and supplier's effort. In contrast to the study of Alshamaila et al. (2013) the factor uncertainty is not relevant in this context. Also, competitive pressure is also not found to be significant. However, new factors such as support through employees and networking effects emerged in the interview process.

Theoretical and Practical Implications

This research adds to both, theoretical and practical implications. New insights regarding the adoption literature are gathered as the TOE framework is used in the organizational setting of start-ups. Due to the interviews profound insights could be revealed and an adjustment of the TOE framework employed by Alshamaila et al. (2013) was conducted. It is demonstrated that start-ups react differently to the adoption of Cloud ERP than SMEs. Consequently, the investigation of start-ups in regard to the adoption intention of Cloud ERP solutions opens up a new research field in the IS literature.

Due to the increasing demand of smaller firms, Cloud ERP providers are interested in characteristics of start-ups, which want to use their services. Hence, this research is a great starting point for practitioners (e.g. vendors and their partners) to get an overview of the factors which are crucial for start-ups. Notably, the factor supplier's effort offers great potential to get an impression which activities are important for start-ups. This is very valuable for providers as the insights from potential customers can help to improve the marketing and sales activities. Since start-ups react differently than larger firms, it is necessary to be aware of it, elaborate on a strategy, and adopt towards customer needs.

Limitations and Further Research

Regarding the limitations, it is not possible to provide cross-national results as the access to interviewees was better in Germany than in the Netherlands. Although interview data provides valuable insights about start-ups, the results of this research cannot be generalized due to the small data sample. Therefore, the adjusted TOE framework about start-ups and Cloud ERP should be tested by following a quantitative approach to generalize results and find new relationships. By researching the questioned start-ups, it is striking that the headcounts vary tremendously. It was assumed that most start-ups have a rather small firm size. This variation of headcount might indicate different stages of lifecycle which is also applicable in the years of existence and results in diverse needs of the venture. Therefore, examining similar headcounts or years of experience would have contributed to this study.

Yet, there is a lot more to investigate in further research such as additional SaaS applications as well as PaaS and IaaS cases which could be elaborated in the light of servitization. In the context of start-ups, it would be beneficial to compare start-up hubs like Berlin with other hubs such as Amsterdam or London to elaborate whether there are differences in the adoption intention of Cloud ERP. Another great potential for further research would be to examine the benefits and drawbacks on the long-run.

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