PERCEPTION OF SaaS ADOPTION IN NORWEGIAN ENTERPRISES: FOCUS ON ERP

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Abstract

Despite the vast amount of research that has been conducted on enterprise resource planning (ERP) systems and Cloud/ software-as-a-service (SaaS) in isolation, few studies have explored the topic of Cloud/SaaS ERP – particularly attitudes held towards these systems. Based on an assessment of literature and the Theory of Planned Behavior, a questionnaire focusing on benefits and disadvantages of SaaS-based ERP systems was sent to IT officers in 839 Norwegian companies. Responses from 180 companies helped to shed light on attitudes towards SaaS ERP adoptions. To a certain extent, the results come inline with existing research. There were, however, a couple of noteworthy exceptions. One such was the rather surprising lack of data security concerns amongst the respondents, who ranked it to be the least of their concerns. Another surprise was that despite strong indications found in literature, the promise of lowered Total Cost of Ownership was not perceived to be ensnaring benefit. Instead, respondents viewed vendor dependency to be the least favorable trait of such systems, and accessibility to be the significantly most advantageous. A regression analysis of the results was performed to identify the level of which the various benefits and advantages affected respondents' attitudes.

Keywords: *Cloud, SaaS, ERP adoption, Norway.*

1. INTRODUCTION

The Cloud Computing paradigm has in later years emerged to become one of most prominent and exciting computing technologies in business and academia alike. Its promises of i.e. resource-efficiency, lower entry barriers, scalability and mobile-compatibility have enticed companies in all shapes and sizes to explore how Cloud Computing may benefit their business (Marston, Li, Bandyopadhyay, Zhang, & Ghalsasi, 2011). Adoption of this technology can come in many forms. Cloud computing is a broad concept, as reflected by its multi-layered architecture and concurrent service models. While the options are plentiful, the seemingly most common way for an organization to incorporate Cloud computing is by leasing web-based software applications, also known as the Software as a Service (SaaS) model. A diverse range of enterprise applications is available through the SaaS model. Within this realm, we can find everything from "light" applications like office suites, web conferencing software, and E-mail applications to more strategically oriented and complex software such as Customer Relationship Management (CRM) systems, Supply Chain Management (SCM) and Enterprise Resource Planning (ERP) systems. The latter, ERP systems, are the focus of this research. ERP, as Cloud Computing, is a highly researched topic within the field of Information Systems (IS), and has had a notable impact in the way businesses are organized. Despite the plethora of research conducted on both phenomena separately, there is a somewhat surprising scarcity of literature that assess Cloud- and SaaS-based ERP systems (Haddara & Zach, 2012).

This apparent shortage of scholarly scrutiny does by no means imply that the topic is irrelevant. In 2012, the Gartner Group predicted that by 2016, SaaS-based ERP systems would have more than the double of their revenue shares since 2011 (from 8 to 17 %) (Columbus, 2012). SaaS-based (along with subscription-based and hosted) ERP saw a 410 % growth rate in the period of 2005 – 2006, with revenues climbing from $76 million to $387 million (Jacobson, Shepherd, D'Aquila, & Carter, 2007). In a more recent study, the Gartner Group surveyed organizations' Cloud ERP adoption strategies, where a total of 47 % of the respondents claimed that they intended to transfer their core ERP systems to the cloud within 5 years – 26 % of these within the next 3

years (Columbus, 2014). The renowned research group additionally stated earlier this year that the On-premise ERP systems of today are likely to be referred to as "legacy systems" in 2016 (Kanaracus, 2014).

Overall, SaaS-based ERP is seeing a strong growth, and is likely to be a force to be reckoned with in the years to come, especially in the ERP arena (Elragal & Haddara, 2012). This justifies an assessment of organizations' beliefs and attitudes in regards to them. Being a part of the Cloud Computing paradigm, such systems have certain embedded features separating them from their On-Premise counterparts – some of which may be more desirable than others. The goal of this study is thus to explore which traits and features of such systems are deemed most (and least) desirable by organizations. This insight will be gained through surveying senior IT employees in a sample of Norwegian businesses.

The following research question servers as the main ground for this research:

- *Which benefits and disadvantages of SaaS-based ERP systems shape organizations' attitudes and perceptions toward them?*

This paper is organized as follows, section 2 presents relevant literature. The research's theoretical framework and method are provided in sections 3 and 4. Section 5 provides an overview of the findings, followed by a discussion of the results in section 6. Finally, conclusions and future research avenues are discussed in section 7.

2. RELATED LITERATURE

2.1 ERP Systems

ERP is a standard software package that provides integrated transaction processing and access to information for the multiple organizational units and multiple business functions (Haddara, 2012). These functions include financial and accounting, human resources, supply chain, and customer services. The standard in-house ERP system is based on a central database. This database gathers data from the various business functions. The database also feeds the data into modular applications supporting virtually all of the company's business activities – across functions, across business units. When new data is entered at one corner of the organization, related data in other units is then automatically updated accordingly. Most companies expect ERP to reduce their operating costs, increase process efficiency, improve customer responsiveness and provide integrated decision information (Haddara, 2012). They also want to standardize processes and learn the best practices embedded in ERP systems to ensure quality and predictability in their global business interests by reducing cycle times from order to delivery (Elragal & Haddara, 2012**)**. When organizations adopt ERP systems, they face several challenges. Some of those challenges are related to the substantial time and cost escalations, technical problems, and the degree of business process re-engineering (BPR) needed to accommodate the new system. In addition, customization and change management are also considered critical challenges during the project. No matter the size of the enterprise is, all ERP implementations require careful project management activities, committed top management, and a dedicated team. Post implementations, enterprises usually experience a "shakedown" phase, during which they face challenges at the same time as they have to adapt to the newly re-engineered processes (Elragal & Haddara, 2012). This might result in operational disruptions or decreased productivity for a period of time**.**

2.2 ERP in the Norwegian context

As the study assess companies based in Norway, it appears fitting to slightly elaborate on the Norwegian context and the state of ERP in Norway. Geert Hofstede, a highly renowned scholar on business and socio-cultural context, describes the Norwegian and Scandinavian business culture as being characterized by its low power distance and weak uncertainty avoidance (Hofstede, 1989). Norway is considered a technologically modern society with advanced telecommunications and an Internet penetration rate of 97.2% (CIA Factbook, 2014). Despite the significant Internet penetration and usage, it is reported that data and Internet security are generally not a large concern of the population (NorSIS, 2010). Privacy concerns have however seen somewhat of an increase in later years (Datatilsynet, 2014). As for the ERP market in Norway, the reports "Forretningssystemer 2013" by HerbertNathan & Co (2013) and "ERP-undersøkelsen 2011" (Christensen, 2011) give a solid overview of the Norwegian ERP conditions. According to a survey conducted by HerbertNathan & Co (2013), SAP has the highest market share in Norway (based on license value), with Visma at a close second and Microsoft at 3rd place. These vendors

fiercely compete over the small to medium-sized enterprises (SME) market. Norwegian businesses usually retire and replace their ERP systems every 8-10 years Also, the survey results show that the most common motivations for companies to replace their existing systems are related to replacing dated technology (61%), streamlining business processes (60%), or improving data quality (59%). In addition, close to 40 % of the ERP-adopting organizations managed to implement their systems within the scheduled time, while 58 % crossed their estimated schedules. Additionally, 36 % of businesses implementing a medium-sized ERP system experienced less benefits than initially expected. Moreover, the survey claims that the customers' satisfaction with their ERP systems varies according to the system's size. For example, medium-sized systems are generally held in highest regard with 57 % of customers expressing a high or very high level of satisfaction, 27 % of adopters of small systems had a low or very low degree of satisfaction, and 21 % of companies adopting large-scale systems expressed a similar discontent. Finally, the report suggests that SaaS- and Cloud-based ERP systems have a rapid acceptance among Norwegian enterprises. On the other hand, another survey conducted by Christensen (2011) argues that the overall percentage of the respondents' with high-very high satisfaction with their systems is ca. 75%. However, a notable degree of these respondents expressed a need for more functionality in their ERP systems than what they were currently using.

2.3 Cloud- and SaaS-based ERP

Reflective of the different Cloud Computing delivery- and service models, Cloud-based ERP may take several forms. An ERP system may for instance be deployed as hosted software, where the license is purchased but all hosting, hardware, upgrades and general maintenance are handled by either the ERP provider or external third parties (Arnesen, 2013). A new license is not necessarily required, as organizations also may migrate their existing ERP system onto a (private) cloud. The most common type of Cloud-based ERP systems are however based around the SaaS delivery model, and are occasionally referred to as EaaS (ERP-as-a-Service) (Juell-Skiese & Enquist, 2012). These are the primary focus of this research. While academic assessments are not necessarily in abundance, they are not non-existent. One relevant study surveyed 297 different German companies in order to uncover both the degree of SaaS-adoption and attitude towards adopting enterprise-oriented application types (CRM, BI, Content Management, ERP etc.) (Benlian, Hess, & Buxmann, 2009). The study uncovered that SaaS-based ERP systems are "adopted only hesitantly in the present". The authors link this to the high degree of specifity, strategic significance and adoption risks of ERP systems**.** These tendencies may however to be shifting. The Aberdeen Group has since 2006 been monitoring organizations' willingness to consider SaaS-based ERP solutions. Their assessments implies for instance that SaaS-based ERP systems are being adopted by small organizations at a rapid pace; in 2012, 26 % of respondents within the "small" organizational category had deployed SaaS ERP – a significant leap from 17 % in 2011 (Castellina, 2012). Their work indicates that companies' willingness to adopt SaaS ERP has doubled in the period from 2006 – 2013 (Castellina, 2013), and that SaaS-related concerns are generally decreasing (Castellina, 2011).

2.4 SaaS total cost of ownership: TCO

Overall cost saving is often highlighted by academics as the primary driver for adoption (Salleh, Teoh, & Chan, 2012). Numerous surveys serve as evidence for this; in Gill's survey (2011), it was ranked as #1 with 30 % of the respondents listing it as the most beneficial trait of SaaS-based ERP. It tops the "Positive Factors Influencing SaaS Decisions" in Aberdeen Group's study, with 75 % of respondents listing it (Castellina, 2011). Another study of 600 Czech organizations found it to be the strongest motivational factor for Cloud adoption (Feuerlicht, Burton, & Sebesta, 2011). A final example is Benlian & Hess' survey of 349 German IT executives, where "cost advantages" was perceived as "*the strongest and most consistent opportunity factor*" in regards to SaaS adoption (Benlian & Hess, 2011).

2.5 Accessibility and collaboration

One frequently listed key benefit of Cloud Computing software is its high level of location-independent accessibility. In most cases, everything the user needs to access the application is a web browser and an Internet connection. In the current global business environment, this is a significant benefit. Businesses experience a need to lower their response time and have around-the-clock access to real-time data in order to maintain competitiveness (Castellina, 2013). Literature indicates that accessibility is perceived to be one of the top benefits of SaaS-based ERP systems. In Gill's survey, it was a close 2nd at 28 % following

TCO's 30 % (Gill, 2011). Amongst SME's in Singapore, "flexibility to access application" was the clear predominant reason to consider SaaS ERP systems (Koehler, Anandasivam, & Dan, 2010).

2.6 Security and data ownership

Security-related issues are, according to several surveys, the main concern and inhibitor of adoption for SaaS-based ERP and SaaS applications in general. In Gills' survey, a distinct majority found it to be the most negative element of SaaS ERP (Gill, 2011). Similarly, the Aberdeen group uncovered that 66 % of respondents unwilling to consider a SaaS-based ERP solution were so because of security concerns – almost twice that of its runner-up (38 %) (Castellina, 2012). In Benlian & Hess' study, both adopters and non-adopters of SaaS solutions perceived security issues to be the biggest risk (Benlian & Hess, 2011). Cloud Computing in general is subject to similar tendencies**.** In an ongoing annual IDC survey, the respondent CIOs continuously lists it as the top challenge of Cloud Computing (Feuerlicht, Burton, & Sebesta, 2011). Another survey by Shimba (2010) also consolidated security issues as the main perceived barrier to cloud adoption, while simultaneously discovering that a vendors' security practices is the main indicator of trustworthiness.

3. THEORETICAL FRAMEWORK

The topic of Cloud- and SaaS-based ERP attitudes and adoption can be viewed through a multitude of theoretical perspectives. The following sections will briefly describe some of the commonly used theoretical options available as well as a more in-depth assessment of the chosen theoretical model and reasoning behind this choice. An initial phase with this study was to discover which of the existing and established IS theories could lead as theoretical lenses for this research project. The theories could guide us to focus on the dimensions needed in developing the survey, our data collection instrument. Also the theory(ies) could aid us in understanding and interpreting the findings. Initially, several theories were investigated; however, two theories were strong candidates for adoption in this research. The first was Rogers' Diffusion of Innovations (Rogers, 1983) and Davis' Technology Acceptance Model (TAM) (Davis, 1986). When we conducted a detailed relevancy check of the TAM, we found that it has rather irrelevant core focus to our research. As this research is primarily preoccupied with cognitive processes prior to the actual system adoption/acquisition (attitudes, risk assessment, weighing benefits over disadvantages etc.), we thought that the TAM might be unfit as its primary focus is *acceptance,* as opposed to *adoption/acquisition*. It can be said that TAM focuses on a latter stage, namely after the acquisition has already taken place and is to be assimilated (accepted) into an organization or an individual's usage patterns. We also found that our concerns were echoed by Wu (2011). The works of Benlian, Hess and Buxmann (2009) assessed the topic of SaaS adoption by applying the *Theory of Reasoned Action* (TRA). TRA (fig. 1) was initially presented by Ajzen and Fishbein (1980) and was a predecessor to TAM (Davis, Bagozzi, & Warshaw, 1989). Put briefly, TRA consists of two dimensions that impact the intention to perform a specific behavior; the *Attitude towards Act or Behavior* and *Subjective Norm.* As attitudes and perceptions are of paramount importance to this research, we initially found the TRA to be promising.

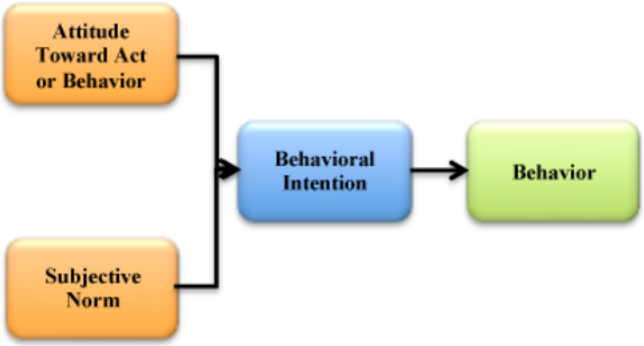

Figure 1 - The Theory of Reasoned Action. Adapted from (Ajzen & Fishbein, 1980)

On the other hand, a key limitation of TRA, however, is the lacking inclusion of factors of *behavioral control* and its embedded limitations (Chang, 1998). The absence of such contextual modifiers does essentially postulate that when an individual/entity has formed an intention to conduct a certain act or behavior, he/she/it will be free to

perform this act or behavior without restraints. Put shortly, it excludes relevant factors such as time and resources (monetary or otherwise). Ajzen (1991) acknowledged this limitation in the *Theory of Planned Behavior* (TPB), which added the *Perceived Behavioral Control* (PBC) dimension to the TRA model, which takes the above into account. While TRA has gathered significant empirical support since its inception, there is also considerable empirical evidence that implies that the addition of PBC tends to improve the "predictability of intention" (O'Keefe, 2002).

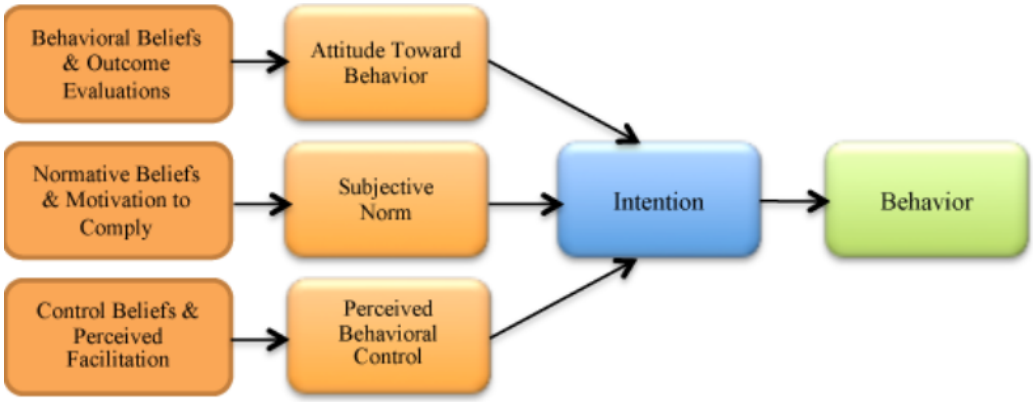

Figure 2 - The Theory of Planned Behavior. Adapted from (Mathieson, 1991)

3.1 Components of the Theory of Planned Behavior

- **Attitude toward behavior (ATT)**
  Attitude towards a given behavior derives from the strength of the beliefs that the behavior will produce a given outcome, as well as the evaluation of these outcomes in a positive/negative-scale (Francis, et al., 2004). By measuring the salient beliefs, researchers can assess what underlying cognitive evaluations that form the attitude towards a given behavior (Ajzen, 2002). The ATT construct has generally been considered to have a strong relationship with actual behavior (O'Keefe, 2002), and serves thus as a strong predictor for behavioral intention. The salient beliefs will in this case the perceived benefits and disadvantages of the Cloud/SaaS ERP systems.
- **Subjective Norm (SN)**
  Subjective Norm is found in both TRA and TPB. Montano and Kasprzyk (2008) explain that SN is defined by a person's "normative beliefs, that is, whether important referent individuals approve or disapprove of performing the behavior, weighted by his or her motivation to comply with those referents" (Montano & Kasprzyk, 2008). As such, it is theorized that the expectations and opinions of important people will have a significant impact on the actual shaping of a behavioral intention. Lenience in favor of a given action/behavior translates into a positive SN, while lenience against means that there is a negative SN. SN is, as the other constructs, a perceived one, and is according to Montano & Kasprzyk related to the phenomena called "social pressure". The significance has SN towards BI tends to vary significantly, but it is consistently found to be a factor (Chau & Hu, 2001).
- **Perceived Behavioral Control (PBC)**
  The PBC dimension is a cognitive assessment of the degree of which the act or behavior actually can be performed with the assets, resources and opportunities (i.e. time and money) available within the context in question (Ajzen, 1985). These beliefs can be based on prior experience with the behavior in question, but is likely to be influenced by second-hand information (Harrison, Mykytyn, & Riemenschneider, 1997). PBC has been proven to be considerably stronger predictor on the actual Behavior Intention when the degree of control is perceived to be low as opposed to in situations with a perceived high level of control (Madden, Ellen, & Ajzen, 1992).

3.2 Hypotheses

Based on our literature review and the theories discussed in this paper, the following hypotheses were made in regard to the survey results. **H1**: Total Cost of Ownership (TCO) will be perceived as the most significant benefit, and will be a significant predictor on attitude. **H2**: Security issues will be perceived as the most significant disadvantage, and will be a significant predictor on attitude. **H3**: Accessibility will

be perceived as a significant benefit, and will be a significant predictor on attitude.

4. METHOD

As previously mentioned, the primary aim of this research is to assess the attitudes and perceptions of Norwegian companies in regards to Cloud- and SaaS-based ERP systems, with a strong emphasis on benefits and disadvantages. It thus seemed rational to choose survey as a data collection method, and to craft a questionnaire that would be sent to a sample of the population.

4.1 Crafting the questionnaire / Pilot study

The questionnaire was made via the online survey creation tool SurveyMonkey (www.surveymonkey.com)**.** The survey was designed with a question logic that targets respondents that have previous experiences with ERP implementations. The reason for this was that to avoid skewed results due to a lack of interest or experience in the subject matter**.** Overall, the questionnaire design and the wording of the statements were strongly influenced by TPB guidelines, (Ajzen, 1991; Ajzen, 2002; Francis, et al., 2004) as well as the surveys of Chau & Hu (2001). Microsoft Excel was used for the data analysis.

4.1.1 Measures

Respondents were assessed in accordance with constructs of the TPB model, namely the beliefs that form Attitude, Subjective Norm, Perceived Behavior Control, and Intention. Demographic data was also acquired, including company size, length of career, company industry, current ERP installation type etc. Respondents currently using ERP systems were asked to evaluate these in terms of satisfaction, mission-criticality and whether they were outdated. Furthermore, respondents were also asked to rate their own perceived knowledge on ERP and Cloud computing technology. A primary focus was on the salient beliefs (benefits and disadvantages) that form Attitude as this was to be the main subject of analysis. Using a 10-point Likert scale, they were asked to state their level of agreement (1 = strongly disagree, 10 = strongly agree) or perceived probability (1 = Low perceived probability, 10 = High perceived probability) with statements that represented beliefs. Probability was used for SN and PBC-related statements.

4.1.2 Pilot study

In accordance with TPB guidelines provided by Ajzen (1991; 2002), a pilot study was assembled to test the questionnaire. Several measures were made to gather respondents to the pilot study. A request was posted on two relevant Norwegian groups on LinkedIn, namely "Forretningssystemer Norge" (Business systems Norway) and "DND Den Norske Dataforeningen" (The Norwegian Computer society). The posts briefly explained the goals of the study, as well as the reason for posting (gathering feedback). Respondents evaluated it as "Very Good", "Good" or "OK". One respondent commented *"I think that you properly assess important matters, so the questionnaire appears as relevant"*. There were, however, some reoccurring comments that illuminated potential rooms for improvement. One example was the respondents' reaction to the inclusion of an "unpleasant – pleasant" measurement scale. According to the literature, the evaluation that makes up Attitude tends to have two sub-components, the first being an assessment of the risk-benefit of the behavior, while the other is more experientially oriented and deals with the (un)pleasantness of performing the behavior. While the literature recommends the inclusion of both sub-components in the questionnaire (Ajzen, 2002; Francis, et al., 2004), we had doubts as to whether it would be natural in this particular questionnaire. When the reviewers also deemed it to be somewhat misplaced, it was removed from the questionnaire. Another valuable observation made by multiple respondents was the lack of specificity in regards to Cloud computing. One respondent aptly commented: *"The definition of Cloud is vague, I interpret the intention of this study to primarily cover SaaS-based systems from third party providers, but I am in doubt whether it also is meant to cover systems (open source or licensed) operated internally on a virtualized platform (PaaS)?"*. As a result of these remarks, later iterations of the questionnaire explicitly stated that its focus was on Cloud-based ERP systems within the SaaS realm. The pilot testers more or less unanimously found the benefits and risks in the survey to be highly relevant and representative of reality. Some respondents found the questions to be somewhat similar at times. While the overall semantics and wording was approved by the respondents, some implied that the amount of text – and general content – could benefit from being somewhat shortened. Measures were thus taken to improve this in the final questionnaire.

4.2 Gathering respondents

The survey targets senior IT staff (CIOs, CTOs, IT directors etc.) in Norwegian businesses. According to Statistics Norway / SSB, there was 526 703 businesses in Norway at the beginning of 2014, whereof 82.3 % had 0 – 4 employees (Statistisk Sentralbyrå, 2014). Companies within this range were regarded as being too small to be preoccupied with ERP systems. The remaining 17.7 % were regarded to be an eligible population for assessment. But, seeing how the population totaled to 93 194, it was apparent that a significant degree of sampling had to be done. Two different sampling techniques were applied; one non-probabilistic, convenient (Oates, 2006) and the other one probabilistic combining the systematic and stratified approach (Oates, 2006). The overarching goal of both was to ensure that the sample consisted of relevant respondents. In the case of the non-probabilistic technique, the Wikipedia[1] entry for "Norwegian companies" was used to get an overview of companies. For the probabilistic technique, the company database/search engine www.purehelp.no was used for respondent acquisition. Each address along with company name (and, if a direct contact, title) were saved in an Excel worksheet.

4.3 Sample size and contact

The process described above resulted in a list of 886 companies. Of these, 25 either were listed twice or had (according to their website) their corporate headquarters outside of Norway. Another 22 had erroneous mail addresses listed, resulting in delivery failure upon sending the questionnaire. The total size of the population sample was thus 839. 767 of these were contacted via email, while the remaining 72 were approached through contact forms on their company website. A week after the initial mail was sent, reminder e-mail was sent to respondents listed with an e-mail address. This excluded those who had (1) responded to the initial contact, (2) explicitly confirmed that they had answered the questionnaire or forwarded it internally, (3) provided contact information at the end of the questionnaire, and (4) explicitly confirmed that they would not complete the survey. In total, 485 reminder e-mails were sent.

4.4 Response rate

The first outreach resulted in 177 survey participants. After the reminder e-mail was sent, an additional 60 respondents (an increase of 33.89 %) answered the questionnaire. The total number of unfiltered respondents was thus 237, giving a response rate of 28.24 %. Five days after the reminder e-mail was sent, the respondent data was exported from SurveyMonkey. The export excluded participants that had not completed the questionnaire in its entirety, so the findings are based on the answers of 180 respondents – 20.31 % of the total sample.

5. FINDINGS

5.1 General demographics

Of the 180 respondents, certain industries were significantly more represented than others. The largest segments were Industry & Production (31 %), Construction (17 %), and Other (15 %). Respondents placing themselves in the "Other" segment consisted of a wide variety of different industries, including "Oil and Gas", "Real Estate" and "Research & Development". The sample had a relatively balanced distribution of small, medium, and large companies. The most predominant size ranges were 101-500 employees (28.3 %) and 21-50 employees (26.1 %). Respondents were overall well experienced and generally well educated. They perceived themselves as more knowledgeable about ERP systems than Cloud Computing. The majority of the respondents (42.8%) have a career that spans between 21 to 30 years in IT. In addition, ca. 81% of the respondents had a university education.

5.2 ERP usage and intention

The degree of ERP adoption was relatively high in the sample. 86 % of the respondents in the final sample were currently using an ERP system. 56.1 % have had ERP installations for more than 10 years. On-Premise installations were quite predominant among the current systems, counting for 67.7 % of the installation**.** Organizations currently using SaaS-based ERP tend to be in the lower part of the spectrum in regards to size, with a modest 14.8 % having more than 100 employees. Adopters' industry domain did a certain extent reflect the overall sample; with a notably higher degree of diffusion in the construction industry and a somewhat lower

[1] http://no.wikipedia.org/wiki/Kategori:Norske_selskaper

representation in the retail domain. Respondents view their systems as quite mission-critical**.** Correlation analyses was done in regards to Company Size (CS), Company Installation Type (CIT/CIT2- CIT2 excludes Hybrid/Hosted solutions), as well as amongst the answers themselves. Correlation analyses uncovered (a rather unsurprising) link between satisfaction with system and system age as presented in table 1.
With regards to intention, 53 % of respondents are either currently using a SaaS-based ERP system or see themselves doing so within the coming 10 years. 27 % expressed uncertainty, while 17 % were quite convinced that they would never acquire such a system.

Element	***μ***	***σ***	***CORR: CS***	***CORR: CIT***	***CORR: CIT2***	***CORR: ORCI1***	***CORR: ORCI2***	***CORR: ORCI3***
ORCI1: Satisfaction	6,91	1,539	-0,031	0,032	0,047	-	-0,441	0,260
ORCI2: Outdated	4,61	2,959	0,127	0,108	0,137	-	-	-0,001
ORCI3: Value creation	8,79	1,848	0,012	0,225	0,229	-	-	-

Table 1. Opinions regarding current installation

5.3 Perceived benefits

Respondents found Accessibility and Scalability to be the most significant benefits, with a mean score of 7,71 and 7,04 respectively. In order to identify the extent of the response distribution, standard deviation (σ) was calculated. Correlation analyses was performed based on CS, CIT/CIT2, Perceived Knowledge on ERP (PKERP), and Cloud computing/SaaS (PKCS), Intention (I), and Attitude (ATT)**.** The correlation presented in table 2 reveals that adopters, both present and future generally rate benefits slightly higher than their non-adopting counterparts. There is a strong overall correlation between high rating of benefits and a positive attitude towards SaaS ERP. While lower TCO was not ranked particularly high score-wise, it has a notable correlation with the Attitude construct. Other variables with notable attitude correlations are lower start-up costs, scalability and strategic flexibility, and easier internal collaboration and data sharing.

Element	***μ***	***σ***	***CORR: CS***	***CORR: CIT***	***CORR: CIT2***	***CORR: PKERP***	***CORR: PKCS***	***CORR: I***	***CORR: ATT***
PB1: Lower TCO	5,68	2,056	0,062	-0,119	-0,126	0,147	0,083	-0,134	**0,403**
PB2: Lower demand for internal competency	6,36	2,350	-0,111	-0,204	-0,201	-0,071	0,031	-0,192	0,297
PB3: Lower maintenance and upgrade costs	6,42	2,278	0,043	-0,149	-0,146	0,049	0,200	-0,183	**0,321**
PB4: Lower start-up costs	6,32	2,191	0,009	0,036	0,046	0,096	0,261	0,035	0,141
PB5: Accessibility anytime, anywhere from numerous devices	7,71	2,135	-0,222	-0,248	-0,237	0,062	-0,024	**-0,324**	**0,368**
PB6: Environmentally	5,47	2,214	-0,009	-0,166	-0,167	-0,095	-0,041	-0,119	**0,334**

friendly									
PB7: Scalability and strategic flexibility	7,04	2,199	-0,036	-0,162	-0,135	0,059	0,126	-0,161	**0,473**
PB8: Easier internal collaboration and data-sharing	6,04	2,508	-0,232	**-0,317**	**-0,328**	-0,017	-0,056	-0,284	**0,412**

Table 2. Perceived benefits of Cloud/SaaS-based ERP systems

5.4 Perceived disadvantages

Respondents found vendor dependency to be the most negative aspect of Cloud/SaaS ERP systems, with a mean score of 7,04. In addition, the respondents identified lack of customization options as the second largest issue with a mean score of 6,84 (see table 3). In order to identify the spread of the response distribution, standard deviation (σ) was also calculated. Reminiscent to the case of perceived benefits, there was an overall slight correlation between non-adopters and skeptics in regard to how they evaluate the disadvantages. Respondents with an On-Premise installation or a limited degree of adoption intention appear to view the different disadvantages more severely. Correlation analyses uncover that while PD7 has a low mean score, it has a relatively significant correlation with ATT. PD2 and PD3 were also found to have notable correlation.

Element	***μ***	***σ***	***CORR: CS***	***CORR: CIT***	***CORR: CIT2***	***CORR: PKERP***	***CORR: PKCS***	***CORR: I***	***CORR: ATT***
PD1: Lack of standards	5,64	2,003	0,110	0,299	**0,336**	0,083	0,162	0,128	-0,158
PD2: Data ownership and control	6,53	2,588	0,019	**0**,288	**0,326**	-0,028	0,069	0,236	**-0,334**
PD3: Lack of customization	6,84	2,355	0,236	0,393	**0,449**	0,176	0,227	0,296	**-0,452**
PD4: Service downtime	5,76	2,440	-0,072	0,106	0,137	0,057	0,016	0,085	-0,248
PD5: Bankrupt service provider	6,54	2,214	0,038	0,160	0,183	0,060	0,076	0,071	-0,196
PD6: Vendor dependency	7,04	2,169	-0,061	-0,062	-0,064	0,042	0,042	-0,077	-0,171
PD7: Security issues	4,87	2,361	0,100	0,262	**0,301**	0,057	0,011	0,195	**-0,304**

Table 3. Perceived disadvantages of Cloud/SaaS-based ERP systems

5.5 Attitude

In section 3, it was explained that the Attitude dimension of TPB is largely based upon the salient beliefs (in this case, the perceived benefits and disadvantages) held by the respondents. As seen above, the correlation between these beliefs and the ATT variable is generally quite high, and goes a long way in validating these claims. Furthermore, ATT has a significant correlation with Intention, which further consolidates the relationships described in TPB literature, as presented in table 4.

Element	*μ*	*σ*	*CORR: CS*	*CORR: CIT*	*CORR: CIT2*	*CORR: PKERP*	*CORR: PKCS*	*CORR: I*	*CORR: ORCI1*	*CORR: ORCI2*
Attitude towards adoption	5,62	2,238	-0,241	**-0,502**	**-0,508**	-0,052	0,147	**-0,524**	-0,027	-0,158

Table 4. Attitude towards adoption

5.6 Subjective Norms and Perceived Behavioral Control

While not a central part of this particular study, respondents were nevertheless surveyed in terms of SN and PBC. Several correlation scores serves as indicators that the described relationships between TPB constructs (SN -> I, PBC -> I) are valid also here. The results are shown in table 5 below.

Element	*M*	*σ*	*CORR: CS*	*CORR: CIT*	*CORR: CIT2*	*CORR: I*
SN1: Decisions are highly affected on significant others' opinions	6,80	2,158	-0,046	-0,207	-0,195	-0,288
SN2: Expert opinion on Cloud technology is heeded	5,59	2,147	-0,047	-0,310	-0,262	-0,386
SN3: Significant others are in favor of adoption	4,98	2,512	-0,223	-0,500	-0,522	-0,534
SN4: Significant others are positive to cloud technology	5,79	2,390	-0,092	-0,315	-0,369	-0,363
PBC1: The adoption is to a large extent the respondent's decision	5,77	2,736	-0,131	-0,111	-0,136	-0,213
PBC2: The company has the necessary resources for adoption	5,99	2,602	0,052	-0,273	-0,283	-0,321

Table 5. Perceived subjective norms & perceived behavioral control

5.7 Regression analysis

To uncover which salient beliefs that hold the highest predictive impact on attitude towards SaaS-based ERP systems, a regression analysis was applied. Cartman (2011) recommends limiting regression analyses to variables with a certain correlation. In this case the benefits and disadvantages with a sufficiently strong correlation with ATT were PB1 (0,40), PB3 (0,32), PB5 (0,36), PB6 (0,33), PB7 (0,47), PB8 (0,41), PD2 (-0,33), PD3 (-0,45), and PD7 (-0,30). These were subject to a regression analysis with ATT as the dependent variable (Y). The analyses was conducted on three different segments of the sample, 1) the total sample, 2) current adopters of SaaS ERP, and 3) On-Premise ERP adopters.

Dep. variables: Total Sample	*Observations*	*f*	*R*	*R^2*	*SE*	*t*	*Coeff.*	*Sig.(P)*
PB1	179	878,17	.40	.16	2.04	5,8610	0.44	0.000***
PB3	179	878,17	.32	.10	2.11	4,5224	0.31	0.000***
PB5	179	878,17	.37	.14	2.07	5,2702	0.38	0.000***
PB6	179	878.17	.33	.11	2.10	4,7240	0.34	0.000***
PB7	179	878.17	.47	.22	1.96	7,1513	0.48	0.000***

PB8	179	878.17	.41	.17	2.03	6,0245	0.37	0.000***
PD2	178	876.25	.33	.11	2.10	-4,7109	-0.29	0.000***
PD3	178	878.02	.45	.20	1.99	-6,7260	-0.43	0.000***
PD7	177	871.26	.30	.09	2.12	-4,2481	-0.29	0.000***
Adopters								
PB1	26	66.15	.60	.36	1.33	3,6706	0.43	0.001**
PB3	26	66.15	.45	.20	1.48	2,4572	0.29	0.022*
PB5	26	66.15	.48	.23	1.46	2,6588	0.48	0.014*
PB6	26	66.15	.44	.20	1.49	2,4317	0.32	0.023*
PB7	26	66.15	.58	.33	1.36	3,4538	0.45	0.002**
PB8	26	66.15	.35	.12	1.55	1,8502	0.27	0.077
PD2	25	65.76	.31	.10	1.61	-1,5674	-0.19	0.131
PD3	26	66.15	.23	.005	1.61	-1,1737	-0.16	0.252
PD7	26	66.15	.14	.002	1.64	-0,7107	-0.11	0.484
Non-adopters								
PB1	105	446.06	.33	.11	1.96	3,6066	0.34	0.000***
PB3	105	446.06	.19	.04	2.04	1,9371	0.17	0.055
PB5	105	446.06	.33	.11	1.96	3,6059	0.30	0.000***
PB6	105	446.06	.24	.06	2.02	2,5199	0.23	0.013*
PB7	105	446.06	.46	.21	1.85	5.2812	0.40	0.000***
PB8	106	446.06	.19	.04	2.04	1.9699	0.16	0.052
PD2	105	446.06	.17	.03	2.05	-1.7589	-0.15	0.082
PD3	104	444.46	.43	.19	1.88	-4.8364	-0.43	0.000***
PD7	104	442.99	.19	.04	2.05	-1.9617	-0.17	0.053

Table 6. Regression analysis

The P-values indicate a good model fit on all the dependent variables when measuring the total sample. The significance values differ more when reviewing adopters and Non-adopters. For the total sample as well as non-adopters, the dependent variables with the highest predictive values are PB1, PB7 PB8 and PD3. For adopters, PB1 and PB7 are highest; along with PB5 which has a lower model fit.

Based on our regression analysis and the findings presented above, the following section presents the supported and unsupported hypotheses:

H1: Total Cost of Ownership (TCO) will be perceived as the most significant benefit- *Not supported,* and will be a significant predictor on attitude- *Supported* .

H2: Security issues will be perceived as the most significant disadvantage and will be a significant predictor on attitude- *Not supported* .
H3: Accessibility will be perceived as a significant benefit and will be a significant predictor on attitude- *Supported*.

6. Discussion

Apart from a few notable exceptions, the findings are relatively congruent with existing literature. The high ranking of scalability/strategic flexibility, as well as the concerns regarding vendor dependency and limited tailoring capabilities goes a long way in echoing the tendencies found in the assessed literature. The regression analysis uncovered that Scalability and Easier collaboration were both benefits with a relatively significant predictive qualities towards attitude, while vendor dependency is a negative trait with a similar impact. One exceptional finding was related to the TCO element. In contrast to the initial assumption, respondents did not consider lower TCO to be a particularly strong benefit of Cloud and SaaS-based ERP. No segmented group of respondents viewed it as such; in fact, it was predominantly found in the lower case of the spectrum both in the overall sample as well as the segmented sub-samples**.** As found in literature, subscription fees for both modules and users may in the long run turn out to be quite costly, and cost-efficiency is overall highly context- and size-sensitive (Arnesen, 2013). Survey respondents might be quite aware of this and thus evaluate TCO lower as a result. TCO does however appear to have a relatively strong predictive value in terms of attitude across all segments. The low weighting of TCO might be partly explained by the presence of other cost-oriented benefits such as those related to upgrade, maintenance, and implementation affect the rankings. These are central elements of the total lowered TCO, and it is possible that a fusion of all cost-related benefits into one variable would receive a different response. Another unexpected outcome was in regards to data security. The issue of data security was by no mean a key concern of the respondents, as both the total sample and all segmented sub-samples rated it to be the least significant disadvantage (except respondents from the IT & Tech industry, who weighted it 2nd last). Nor did it hold any particular predictive power on attitude. This is quite contradictive to the general tendencies found in Cloud/SaaS literature. It does, however, fit Juell-Skiese and Enquist's (2012) claim that security has become less of an issue in latter times. Moreover, it is possible that the low concerns in regards to security are of a socio-cultural character. The study was conducted in Norway, a country whose population generally has a rather lax attitude towards data security concerns (Datatilsynet, 2014). A somewhat more generalizable and arguably probable explanation is the rising degree of pervasiveness of Cloud technology and services. People's daily interactions with everything from online social networks to banking services might reduce their concerns towards the data security aspect of web-based applications. Although vendors may rejoice over the reported lack of concerns in regards to data security, it should not inspire to a loosening of efforts on this field.
Accessibility was believed to be among the significant benefits and as a significant predictor of attitude. This turned out to be somewhat of an understatement, as Accessibility was - with a significant lead - perceived to be the most compelling benefit. The perceived importance of accessibility may be fairly intensified by certain current technology trends. The emergence of portable computing devices such as laptops, smartphones and tablets has had a tremendous impact on both society and corporate life (Pitt, Berthon, & Robson, 2011). In 2013, 73 % and 61 % of the Norwegian population had access to smartphones and tablets, respectively (Statistisk Sentralbyrå, 2014). Businesses and organizations are not unaffected by this phenomenon; the advent of concepts such as BYOD (Bring Your Own Device) and the staggering growth of use of gadgets in enterprise contexts serve as a proof (Harris, Ives, & Junglas, 2012). In such a mobility-driven work environment, it seems uncontroversial to think that instant and location-independent access to the ERP system is a significant boon. This is reflected in an extensive ERP survey conducted by Bo Hjort Christensen, who uncovered that 63,5 % of respondents did either somewhat or entirely agree that a modern ERP system should be able to offer services on smartphones and tablets (Christensen, 2011).
Despite the hardships associated with On-Premise ERP implementations, respondents did not view the less expensive and exhaustive process of Cloud- and SaaS ERP implementation to be a particularly significant benefit. This could indicate that the same challenges of intra-organizational adaptation to the new system (Elragal & Haddara, 2012), very much apply to SaaS ERP as well, and that they weigh heavier than monetary benefits. It is also interesting to note that this benefit is ranked lower by current SaaS ERP adopters than On-Premise users and future adopters. We might be witnessing a dissonance between expectations and reality on this particular aspect.

7. CONCLUSIONS AND FUTURE RESEARCH AVENUES

While Cloud and SaaS-based ERP systems are enjoy a growing diffusion and are predicted to have a bright future, they have hardly been subject to extensive empirical research. The finding in this study expands our knowledge on IT professionals' beliefs and attitudes towards them. These findings might prove to be highly valuable for Cloud and SaaS ERP vendors – both present and future – as they give insights into what their target audience perceive as their biggest strengths and shortcomings. Their promise of accessibility and their scalable nature were found to be the systems' most alluring characteristics. At the same time, there were concerns about their inherent ability to make clients more dependent on the systems' vendors, as well as their limited customization abilities compared to On-Premise ERP solutions. In contrast to the common sentiment expressed in previously conducted studies, the subject of data security concerns was not perceived as a major issue – at all. It is possible that the results from this study, especially the seemingly increased attraction of system accessibility and the decline of security concerns, can be explained by certain current technological trends. Replicated versions of this survey could be conducted in different countries and contexts in order to uncover if these findings echo in a broader social context. Should these results be representative of the zeitgeist amongst the world's IT professionals, Cloud- and SaaS-based ERP may have overcome a significant obstacle for adoption – security concerns - and thus reached a major milestone in terms of maturity. The future might be bright indeed.

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