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An abstract, colorful background image with swirling patterns in shades of blue, green, and orange, resembling a microscopic view of a biological structure or a digital data visualization.

Automated accounting in accounting firms

- A qualitative study on impacts and attitudes

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Abstract

The technology development within the accounting field has grown tremendously during the last years and generated great impacts to the accounting firms and led to an enormous change in how accounting consultants conducting their daily tasks. The continuous development has now entered a new phase, where automation of accounting processes is now perceived as the current major trend and it will affect the profession even more. Automated accounting may bring both positive and negative impacts to the accounting firms and their consultants, but many threats may also come to light where questions have arisen about the need of accounting consultants if the procedures are automatic. Studies on automation in various fields have been conducted over the years, but the impacts of automated accounting on accounting firm and their accounting consultants have been neglected in previous research. Moreover, since the consultants are affected as well, their attitude toward such changes and corresponding impacts are of interest to understand their stance to these changes. Thereof, the interest in how accounting firms and their consultant will be affected resulted in these two research questions:

- 1) *What are the potential impacts of automated accounting for accounting firms and their accounting consultants?*
- 2) *What are the accounting consultants' attitudes towards automated accounting?*

The purpose of this thesis is to extend the current knowledge of the potential effects and explain the phenomena of automation in the context of accounting firms and their consultants. The aim is also to extend the knowledge of the accounting consultants' attitude towards automated accounting and what they perceive as threats and opportunities. This thesis answers the research question by a qualitative method where empirical data has been collected from interviews with accounting consultants from different accounting firms in Umeå.

The findings from the empirical data shows that automated accounting may lead to a decreased need of accounting consultants if the accounting firms do not extend or diversify their services. Moreover, advisory and analytical services will dominate the industry because automation will lead to more financial misstatements, which drives the need of analytical services. To comply with these changes, the future accounting consultant needs to possess more technical knowledge. The accounting consultant assistant will most probably be replaced by IT-consultants and in the long term, all consultants will be salespersons rather than accounting consultant. Regarding the attitude, the majority of the accounting consultants are positive towards automated accounting and their impacts, even though some tend to show a negative attitude to certain impacts.

Keywords: Automated accounting, automation, accounting, accounting firm, accounting consultant

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Table of Contents

1. Introduction	1
1.1 Background	1
1.2 Problem discussion.....	4
1.3 Research question.....	6
1.4 Research purpose.....	7
1.5 Delimitations	7
2. The concepts and automation in an empirical context	8
2.1 Cloud accounting.....	8
2.2 Internet of Things in accounting.....	9
2.3 Blockchain in accounting	10
2.4 Big data in accounting.....	12
2.5 Automated accounting.....	13
3. Theoretical framework	16
3.1 Technology development	16
3.2 Theory of professions	17
3.3 Job polarization	18
3.4 Technology Acceptance Model.....	19
3.5 ABC Model	20
3.6 Path Dependency Theory	21
3.7 Summary theoretical framework	22
4. Method	24
4.1 Preconceptions and background.....	24
4.2 Research philosophy.....	24
4.2.1 Ontology	24
4.2.2 Epistemology.....	25
4.3 Research approach.....	25
4.4 Research design.....	26
4.5 Literature search.....	27
4.6 Data collection.....	28
4.6.1 Sample	28
4.6.2 Presentation of respondents	29
4.6.3 Data gathering procedure	32
4.6.4 Ethical considerations.....	33
4.7 Analysis method.....	34

4.7.1 Thematic analysis	34
4.7.2 Attitude measurement.....	35
4.8 Methodological summary	35
5. Empirical data.....	36
5.1 General information	36
5.2 The four concepts	36
5.2.1 Awareness and usage of the concepts.....	36
5.2.2 Impacts of the concepts	37
5.2.3 Attitudes towards the concepts.....	37
5.3 The current state in accounting.....	38
5.3.1 The extent of automated accounting.....	38
5.3.2 Future automated processes.....	39
5.4 Impacts and attitudes to automated accounting.....	40
5.4.1 Impacts of automated accounting.....	40
5.4.2 Attitudes towards automated accounting.....	45
6. Analysis.....	49
6.1 Themes development.....	49
6.2 Impacts of automated accounting.....	51
6.2.1 Change in tasks.....	51
6.2.2 Efficiency	53
6.2.3 Client relations	54
6.2.4 Misstatements and IT-problems	55
6.2.5 Job opportunities	56
6.2.6 Competence and education.....	57
6.2.7 Costs	58
6.3 Attitudes to automated accounting.....	59
6.3.1 Perceived usefulness.....	60
6.3.2 Perceived ease of use.....	61
6.3.3 Other factors	62
7. Conclusions	64
7.1 Overall conclusion.....	64
7.2 Contributions and socio-ethical implications	65
7.3 Limitations.....	66
7.4 Future research	67
8. Quality criterion	68
8.1 General information	68

8.2 Trustworthiness	68
8.2.1 Credibility.....	68
8.2.2 Transferability	68
8.2.3 Dependability	69
8.2.4 Confirmability	69
8.3 Authenticity.....	70
References	71
Appendix 1: Mail to participants.....	84
Appendix 2: Interview Guide	85
Appendix 3: Coding and themes of impacts.....	87
Appendix 4: Coding and themes of attitudes	88

List of Figures

<i>Figure 1: The concepts that build automation</i>	2
<i>Figure 2: Theory of Professions (Based on Brante, 2009, p. 25-28)</i>	18
<i>Figure 3: TAM (Based on Davies & Venkatesh, 2000, p. 188).....</i>	20
<i>Figure 4: ABC Model (Based on Jain, 2014, p. 6).....</i>	21
<i>Figure 5: Summary theoretical framework</i>	23
<i>Figure 6: Thematic Analysis Process (Based on Nowell et al., 2017, p. 4)</i>	35
<i>Figure 7: Summary methodological chapter.....</i>	35
<i>Figure 8: Themes of impacts</i>	49
<i>Figure 9: Themes of attitudes.....</i>	60

List of Tables

<i>Table 1: Summary of respondents</i>	32
<i>Table 2: The respondents' emphasis on themes</i>	51

1. Introduction

In this chapter, an introduction to accounting and its development in technology during the recent years in history will be presented. Concepts that are fundamental for automation in accounting are introduced and the need for research on the impacts on accounting firms is discussed. The chapter also presents the research question, purpose and limitations of the study.

1.1 Background

Accounting can be described as the method of collecting and documenting information about a firm's economic and financial situation. Accounting can be divided into two subordinated areas; external and internal accounting. External accounting involves the preparation of the financial reports to stakeholders, such as investors or suppliers, and contains information to the external parties about the firm's economic situation. Internal accounting contains transactions, analyses and reports for internal parties and focus on the information about the company's future (PwC, 2018a). Firms can decide by either conduct the accounting in-house or outsource the process to a third party, i.e. an accounting firm, (Maelah et al., 2010, p. 226-227) which has the knowledge and the specialized technology for such solutions.

The technology in accounting has been through an enormous development phase during the later years. In the 1980's, computers became available on the market and companies were able to afford the investment. To illustrate the advantage of introducing computers, there are estimates that the company Microsoft Corporation produced approximately 350,000 hard copies of their financial records to stakeholders due to the inability to store data on computers (Boggs, 1999, p. 99). Such administrative activities were common among several companies, where the distribution of the hard copies were slow and not cost efficient, which created a demand of digitalization to simplify the distribution of financial information to stakeholders (Boylan & Boylan, 2017, p. 94).

The ongoing development of computers during the 1990's made it possible to use software for writing and calculating, which decreased the extent of manual typing and opened new possibilities to facilitate the accounting process (Frey & Osborne, 2017, p. 257). The computerized software development increased, and the 90's and the beginning of the 21st century were periods in history when accounting software usage increased (Ryan, 2012). The intense and widened usage of computer technology in accounting did however not start until the year 2009 (Mukhametzyanov et al., 2017, p. 1233-1234). The confidence in digitalization among companies increased and became a necessity in order to improve accounting activities and to store and protect accounting data. The implementation of digital solutions in accounting were also a product of price reduction on software, Internet based programs, and the need for information access. Furthermore, the standardization of the technology and software also enhanced the mobility of workplaces, increased the speed of data gathering and boosted the storage opportunities of important data (Juribita, 2017, p. 658).

Today, accounting practitioners emphasize technological development as one of the major megatrends pending within the accounting field and the implementation is growing substantially (EY, 2015, p. 4; PwC, 2018b). A megatrend is described as an extensive pattern or movement which contributes to businesses and the impacts have a lasting influence on the businesses processes (Lancefield et al., 2015, p. 3-4). Hence, technological development in accounting is now more prominent than ever. Though technological development is a very broad concept, there is one element that is eminent. The standardization of accounting

reporting and the previous time consuming work have constituted as drivers to automation of accounting processes, also known as automated accounting, and is a growing concept in the field of accounting (Uwadiae, 2015).

Automation has already started to grow in a related profession, the auditing field, where four main concepts, as recognized by practitioners, have shown to be fundamental for automation; cloud accounting, Internet of Things (IoT), blockchain and big data (KPMG, 2017). These concepts are also starting to be recognized in the accounting field, and scholars are also emphasizing their possibilities to generate automated accounting (e.g. Dai & Vasarhelyi, 2017, p. 5-6; Dimitriu & Matei, 2014a, p. 842; Fleisch, 2010, p. 133-134; Richins et al., 2017, p. 76). Hence, this study relies on their arguments that these concepts constitute automated accounting as visualized in Figure 1, but will focus on the more holistic view of automation. The need for taking these concepts in consideration relates to that impacts generated by these concepts may also be related to impacts of automated accounting.

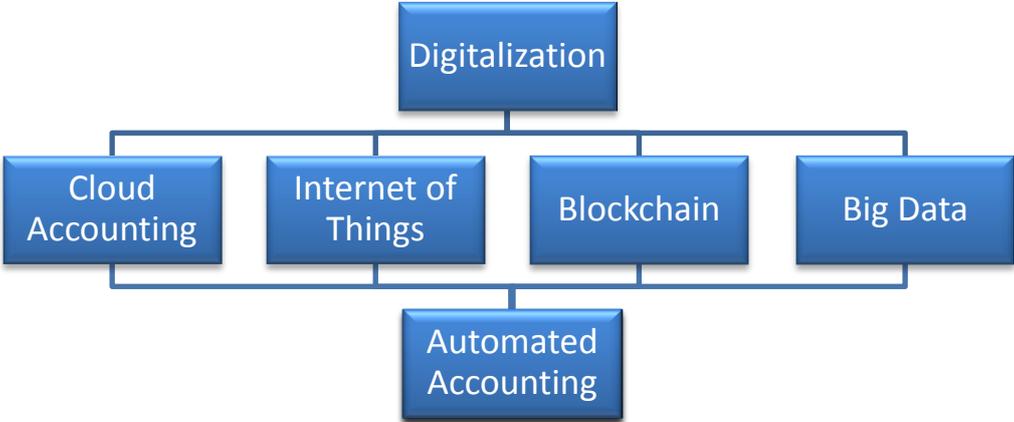


Figure 1: The concepts that build automation

To understand the concepts and their contribution to automation, a description of them is needed. The first concept, cloud accounting, is the usage of cloud services within the accounting field where accounting software is Internet based and the accounting data is stored on the cloud provider’s server. Such solutions give the possibility for all parties of the accounting process, e.g. the accounting firm and their client, to access the financial data regardless of their location (Dimitriu & Matei, 2014b, p. 238). Furthermore, cloud accounting could provide enhanced communication between systems and contribute to automated file sharing between financial systems in real time (Prichici & Ionescu, 2015, p. 491).

Second, IoT is the umbrella term of Internet connected devices, and enables a system of interconnected devices where transfer and communication of real-time data is possible (Deb, 2016). This is possible due to that all the devices are connected to Internet which enables the wireless transfer of information between each other (Garcia-Garrillo & Marin-Lopez, 2016, p. 1). With the use of IoT, accounting consultants can receive data necessary for the current recordings directly from a device into the computer, and the data gathering will be much faster (Deb, 2016).

Third, blockchain is a digital ledger on which transactions are recorded and can be viewed by all who have access. Blockchain can provide functions of automatic information such as verifications, processing, storing, and reporting, and act as a self-sufficient accounting system. Hence, it could operate as autonomous software for e.g. verification, control and fraud

prevention (Dai & Vasarhelyi, 2017, p. 13). Briefly, the blockchain system includes transactions and blocks, where a block can contain several transactions, and in turn is linked to a preceding block (Carlozo, 2017, p. 1).

Fourth and last, big data is the concept of analyzing a huge amount of structured and unstructured information with algorithms (FAR, 2016, p. 15). Big data leans on the four V's; volume, variety, velocity and veracity, and can be described as significant volume of data derived from several sources which is produced in a rapid progress. It is necessary to test the veracity of the data due to that big data originates from different sources (EY, 2018). In accounting, big data can help the bookkeeping by e.g. analyzing the invoice, find relationship with previous invoices, and propose an entry for the current recordings to be attested (FAR, 2016, p. 15).

The extent of automation can be described in three different steps. The first step is to support the already existing processes where computers assist the daily work. The second step is that automation takes over different tasks and acting as a complement. The third step means that automation is a replacement and the workers are no longer needed where the technology will be responsible for performing the tasks (FAR, 2016, p. 10). The impending third stage and the concept of automation in the accounting profession has started a debate of whether or not the profession is dying and if computers and artificial intelligence will take over the assignments. According to a study conducted by the Swedish Institute of the Accountancy Profession (FAR), the accounting profession is one of the most affected professions by the developing automatic processes, and they expect that the accounting tasks will be fully automated within the next 20 years (FAR, 2016, p. 16). This essential change in the profession have also been confirmed by Nagarajah (2016, p. 35), who substantiate the time frame and also predicts that accounting assistants are a thing of the past and only the experienced accounting consultant will survive on the market. Moreover, Frey and Osborne (2017, p. 268) studied over 700 professions, computers impact on employment, and how sensitive the employment is to automation, and found that the accounting profession is one of the 30 most vulnerable professions. Frey and Osborne (2017, p. 278) also argue that professions in the accounting area, bookkeeping and other accounting clerks will in the future be replaced by computers and advanced technology with the high probability of 98 percent. Hence, one can expect severe implications for accountants.

The speculations between scholars and institutions of whether the accounting profession will remain on the market are inconsistent, where Swedish Foundation for Strategic Research (2014, p. 6-7) predicts that approximately 53 percent of the professions in Sweden will be affected. Professions comparable to business economist or a marketing manager run the risk of being replaced by 46 percent, which will disrupt many thousands of jobs. Hence, not all agree of the total loss of accountants. In the year 2017, the total amount of economists on the Swedish market was estimated to around 120,000 professionals (Callius, 2017), where 50,000 of them are in the risk of losing their job in the future due to the automated processes (Swedish Foundation for Strategic Research, 2014, p. 7). At the same time, the total number of economic students that are graduating every year is approximately 7,000 students (Swedish Association of Graduates in Business Administration and Economic, 2018). The automation of accounting processes can thereby have severe implications for the current practitioners and forthcoming graduating students who enter the Swedish market.

Since the computer usage increased among companies, the debate of the need of humans and their probable change in tasks has increased and many jobs are in the danger zone of being

replaced by technology. Advisory is today a coveted service, but the future with more digitalization could lead to that advisory services will decrease (FAR, 2013, p. 15, 23). This is in contrast to the predictions by Bresnahan et al. (2002, p. 344) who states that only routine tasks can be automated, because the technology available today is difficult to program for complex, cognitive work where humans still are needed to complement computers. Furthermore, Dahlberg and Carlsson (2014) stresses that the assignments will change, and analytical skills and advisory will overtake the routine tasks. This is in line with Zhang and Gu (2013, p. 143) who also emphasizes that accountants need computer skills to complement the accounting skills to enhance the quality of the profession in the future. To comply with future changes in tasks, higher education institutions needs a change to prepare the new generations for the computerized era of accounting (Güney, 2014, p. 855). One has to be aware that the technology is developing faster than the human being which will cause a replacement everywhere it is possible (FAR, 2013, p. 26).

1.2 Problem discussion

The impacts of automation have been both studied and discovered throughout the previous years in the blue collar sector, where the manufacturing industry met heavy resistance from both organized labor and unions who claimed that automation leads to a reduction in job opportunities and discharges in current employment (Hanley, 2014, p. 401). Scholars have however shown that the groups of resistance were wrong and that automation of manufacturing processes did not diminish jobs; they rather created complimentary assignments and did not lower the net employment rates (Arntz et al., 2017, p. 158-159; Autor, 2015, p. 4-5). Now when automation in accounting has become a hot topic, the accounting industry facing the same act of resistance, but yet the white collar industry and the corresponding impacts of automation have been less researched (Kepes, 2017).

Since the automation in the accounting sector is a relatively new phenomenon, it is yet to be discovered and research has started to emerge in recent years. What one do know so far is that scholars have only given a small emphasis on automation of the profession, and more focus have been on the different concepts that creates the possibility of automated accounting. Moreover, the scholars have focused on companies' in-house accounting divisions, automation in auditing, or the need of educational changes. The impacts of the automation have just started to scratch on the surface, but as mentioned, not from an accounting firm's perspective. Since automation in a holistic point of view has been given a relatively low attention in the academic world, one has to complement with the discovered impacts of the concepts named earlier to grasp the probable impacts. Therefore, a brief introduction of what have been discovered so far when it comes to the concepts in the accounting field will follow below.

First, Ionescu and Prichici (2013, p. 284-286) found several benefits for small and medium sized enterprises (SMEs) to adopt the concept of cloud accounting. They gain an enhanced quality in internal infrastructure and communication if implementing the concept, where they emphasize the mobility when their assignments can be done irrespective of location, and both data and software are available on Internet. Furthermore, they argue that the decrease in costs is significant when no IT-specialists are needed, the software on the market is relatively cheap, and IT-investments are reduced. In other words, they highlight the main benefits of cloud accounting as staff productivity, cost effectiveness and relocation of staff to instead focus on business development.

Second, the development of technology in respect of IoT has made it possible to transform important accounting data, such as invoices and customer records, into electronic data. Also,

the real time tracking of inventory has become easier due to the connection between computers and electronic devices. Hence, the data has become more available to accountants, and the current records could be made simultaneously. This solution has generated a great reduction in costs and enhanced supervision of internal activities to organizations that uses such technology (Güney, 2014, p. 854-855).

Third, the research of blockchain in accounting has started to grow. Dai and Vasarhelyi (2017, p. 9-10) argue that blockchain makes it possible to generate real time data of accounting information, such as continuing updates on payments and inventory records. They argue that blockchain could serve as an authenticator between accounting entries and transactions, which increases the difficulty of manipulating and make misstatements in the financial statements. Furthermore, instead of doing the current records based on receipts, blockchain could act as a certificate of transactions and transactions could be made autonomously, and in turn, the accounting entries could be involved in the autonomous process (Deloitte, 2016, p. 3-4).

Fourth, the implementation of big data in accounting takes the accounting profession to a new level. Through the massive data analysis which is impossible for a human to comprehend, irregularities in the current recordings can be found and assets would be easier to value, thus correctly stated in the financial statements (Warren et al., 2015, p. 402-403). These conclusions are consistent with other research made on big data in accounting (e.g. Richins et al, 2017; Vasarhelyi et al, 2015). Thereof, a part of the analytical processes made by accountants could be replaced by the computer.

There are also studies which argue for a change in educational institutions, where the need for accounting skills in companies is decreasing and employees should instead possess or complement with technological skills to comprehend with the digitization and automation (Güney, 2014, p. 855; Zhang & Gu, 2013, p. 143). Taipaleenmäki and Ikäheimo (2013, p. 342-343) takes it even further and states that technological development leads to that accounting firms will no longer be needed because of the end-users ability to conduct the bookkeeping by themselves. Similarly to other scholars, they emphasizes that companies will replace and converge the accounting division with other professions and business processes. If their predictions are correct, it could be a massive impact on the accounting firms and their employees.

A related profession to accounting is auditing. Research of the impacts generated by automation in auditing has been a field of more research. Scholars argue that automation in auditing could bring a better understanding in risk assessment (Kokina & Davenport, 2017, p. 119), time and labor reduction (Chan & Vasarhelyi, 2011, p. 155), reduced costs and increased audit quality (Manson et al., 2001, p. 127). There are however differences between accounting and auditing, which makes their work procedures not compatible. While the auditor examine, control and report on a company's financial statements and management, an accountant is doing the manual accounting entries and acting as a consultant and advisor (Swedish Companies Registration Office, 2016). Hence, they are using different process methods and could be affected differently.

The studies and findings presented above are all focusing on companies with in-house accounting, the auditing processes or the accounting profession in general. Hence, it is a clear research gap of how accounting firms are affected by the automation of accounting processes. What makes accounting firms special is that they are employing accounting consultants and offering accounting expertise to clients (FAR, 2018), where they rely on firms outsourcing

their accounting division. When companies adopt automation of bookkeeping, it could decrease the demand of accounting skills and companies are able to do the accounting themselves (Taipaleenmäki & Ikäheimo, 2013, p. 342). If automated accounting and its subsequent possibilities and advantages are discovered by firms, it could thereby affect accounting firms in terms of losses in clients. Furthermore, when accounting education and knowledge are no longer needed, firms may choose to conduct the accounting in-house. Moreover, from an accounting firm's perspective, many possibilities could arise from the automation adoption. Hence, automation could bring both advantages and disadvantages.

Even though technology has advantages and disadvantages, there are still social behavioral challenges which limit the full potential of automation. Hunton (2002, p. 5) argue that only studying the impacts of new technology does not provide the full perspective, but one also need to study the user's attitude and psychological stance to understand the full spectrum. Hunter (2002, p. 6) further adds that individuals adapt to business changes in different ways, where some accept the changes directly, others want to adapt but do not fully understand how to act, and some unconditionally refuse to adapt to the change. Attitudes among the users of the technological solutions have influence on the efficiency and behavioral responses are crucial for automated processes to reveal its full capability (Murtagh et al., 2015, p. 140). If the technology is not accepted by the users, i.e. the employees, the organization may not be able to implement the technology (Yang et al., 2015, p. 254). The attitudes towards technology are thereby not an obvious research gap, but rather needed to understand how technology can result in impacts on professions and organizations. Hence, it is of interest to study the attitudes among the accounting consultants and their stance towards automated accounting because if they are not willing to adapt to the new changes, automated accounting will never be useful and may not work as efficiently as intended. Furthermore, since the automation in accounting has entered the introduction phase of implementation, perceived as a field of scarce research and with the continuous discussion about job opportunities or losses, it is a very interesting area of research. The impacts need to be discovered for accounting firms to increase knowledge of their current state, future possibilities as well as the accounting consultants' attitude of the impacts.

1.3 Research question

The rapid growth of automated accounting and its corresponding subconcepts may have a huge impact of the accounting profession. The research available today focuses generally on companies with in-house accounting divisions or on auditing firms. Little is known about the potential impacts on accounting firms and their employees, which leads to the first research question:

- I. *What are the potential impacts of automated accounting for accounting firms and their accounting consultants?*

Furthermore, since the impacts of automated accounting may end up in major consequences for the employees, it is also of interest to grasp the accountants' attitude towards automated accounting and how they embrace the process of change. The attitude can by limiting the potential of automation, cause constraints and in turn have an impact on the accounting firm and slow down the adoption of automated accounting and its corresponding impacts. Hence, the second research question is:

- II. *What are the accounting consultants' attitudes towards automated accounting?*

1.4 Research purpose

Previous research have discovered benefits and disadvantages of automation in other sectors as well as started to shine a light on some of the subconcepts of automation. Previous studies have also focused on accounting divisions within firms and neglected the accounting firms. Since this field of research is nascent, the purpose of this thesis is to extend the current knowledge of the potential effects and explain the phenomena of automation in the context of accounting firms and their consultants. The need for understanding the impacts has both academic value, where we want to encourage more focus on accounting firms, and practical usefulness, where one can expect many changes in the future accounting profession and thereof a need for both employers and graduates to be aware of how the profession may change. While the impacts can have a severe implication on the accounting firm, the accounting consultants are also affected by the change in tasks and the varying demand of their capabilities. Hence, the aim is also to extend the knowledge of the accounting consultants' attitude towards automated accounting, the effects generated by automation and what they perceive as threats and opportunities. Such understanding is important to provide since it can impact the adoption of automation.

1.5 Delimitations

The focus of this study is on the accounting firms and not on companies' in-house accounting divisions or other sectors. Thereby, this study is limited to accounting firms and their accounting consultants, and where a firm offers diversified services, we have chosen to only focus on the accounting division and no other services (e.g. auditing, tax, risk advisory). Furthermore, we have chosen to conduct this study on large accounting firms because larger firms tend to adapt new technologies faster than smaller companies (Claro & Rosa, 2016, p. 346; Gopalakrishnan & Damanpour, 2000, p. 21). To grasp how the large firms are affected, we have though delimited the sample to their local offices, which we think are representing accounting firms in general due to their similarity of working processes. The local offices are still representative to accounting firms in general, where their size fulfill the requirements of a small or medium size company, which equals or have more than ten employees (Confederation of Swedish Enterprise, 2010, p. 4), which indicates an established local office with several clients. Moreover, the accounting procedures are similar within the corporate group and thereof the local offices are representing accounting firms in general as well. Since the most accounting firms in this study also are representative in other cities, we do not think the organizational impacts will be limited to the offices in this study, but the personal opinions stated by the respondents may differ to other individuals due to its subjectivity. Finally, we have also delimited the study to Swedish firms due to geographical constraints where the city Umeå is in focus.

2. The concepts and automation in an empirical context

In the following section, the concepts and automated accounting will be further explained to deepen the understanding of its functions. Previous empirical studies conducted in the light of the accounting field where impacts are discovered will be presented as well as hindrances to automation. The concepts are included since they are a part of automation, and may thereby give important perspectives of impacts that also could be associated with automation

2.1 Cloud accounting

Clouds have several functions. Instead of using one's own hardware and software, the cloud gives the possibility to access the cloud provider's facilities such as servers and software (Rajaraman, 2014, p. 242). Such services derive from an increased demand in storage, constantly updated software and increased mobility (Bojanova et al., 2013, p. 12-13). Hence, it is a way to enhance the capacity, create new or extend current capabilities without the significant investments in infrastructure, employee training or software licensing (Subashini & Kavitha, 2011, p. 1). Clouds are used in several occasions, both privately and among companies for different solutions (Bojanova et al., 2013, p. 12) but when it is used within the accounting context, it has become known as cloud accounting (Dimitriu & Matei, 2014b, p. 238).

Clouds are growing immensely in the accounting field today. The usage of cloud accounting among accounting firms has reached 51 %, an increase with 27 % since 2014, according to a study conducted in 2017 on American and Canadian companies (Robert Half International, 2017). Dimitriu and Matei (2015, p. 668-669) found three main benefits of the usage of cloud accounting. First, cloud services enable the real-time data flow and increased availability to the data for all divisions in a company. Second, clouds are cheaper than buying accounting software that needs to be installed on every computer where the software is needed and thereby leads to cost efficiency. Third, the flexibility of the clouds makes it possible to access the data independently of where one is. The user of the cloud is not bound to the office computers, which leads to increased productivity. Prichici and Ionescu (2015, p. 492) also emphasizes that data of inventory can be transmitted directly to the accounting system and documents such as invoices and receivables can be transferred directly to the computer. Such solutions reduce the manual handling which lowers costs and enhance productivity.

Marand et al. (2013, p. 2843-2844) found several advantages of using cloud accounting compared to traditional methods. As other scholars, they argue for the decrease in time, cost aspects, and increased mobility, but they also found that it enables the communication between systems that generating accounting data, enhanced storage of accounting data and continuous updates of accounting software. The increased storage possibility is also a strong argumentation by Carlsson (2017), who argues that the manual paper handling and archiving areas could be substantially reduced which are processes that generate costs. Even if the data stored in the cloud should be lost, cloud providers usually have backups that easily can be recovered, which may not be available to firms with traditional methods (Păcurari & Nechita, 2013, p. 194).

Prior research on cloud accounting has only been focusing on small companies, since bigger companies have their own IT solutions (Ionescu & Prichici, 2013, p. 284). The small companies however benefit of using clouds because there is no need of IT-specialist and major investments in technology infrastructure, hence it brings lower costs to companies with in-house accounting. Such solutions for SMEs bring enhanced quality and productivity

because resources, such as employees, instead can focus on other internal activities (Ionescu & Prichici, 2013, p. 284-285). Dimitriu and Matei (2014b, p. 239) argue that the lowered costs are the main advantage of cloud accounting, and since SMEs having less liquidity than bigger companies, they are the ones that benefits the most. The costs can also be dependent on the usage of the cloud service, where firms can decide in what extent one want to use the applications. Providers on the market offer customization of their services, and one can add or remove applications that are needed or unwanted for the going concern processes which gives cost flexibility. Applications can also be added directly to one's subscription and one can adapt to the environment and new needs rapidly (Du & Cong, 2010, p. 68).

The risks of using clouds perceived by companies are mainly related to security. In a study conducted by Quinn and Cleary (2014, p. 39), 53 percent of the companies interviewed recognized cloud accounting as a security risk. Hence, the safety of the accounting data is of a big concern to companies, where they are afraid of losing the data. As well, they argue that clouds are too dependent on Internet and if losing the Internet connection, the accounting process will be interrupted (Dimitriu & Matei, 2015, p. 669). Other security risks are computer hacking, unauthorized entries and less control over the accounting data (Dimitriu & Matei, 2014b, p. 239-240). Furthermore, if the providers of the cloud going into bankruptcy, it could do severe damage to the firm, both in loss of data and disruption of business processes and there is a strong demand in how to encounter such problems both from a judicial and business aspect (Du & Cong, 2010, p. 68). Ionescu and Prichici (2013, p. 284) also stresses the risk of losing the accounting data stored in clouds, but argue that the providers of the clouds are continuously developing new, safer services which will delimit the risks.

2.2 Internet of Things in accounting

Even though IoT has existed as a concept for many years, there is yet no common definition of the phenomena. Wortmann and Flüchter (2015, p. 221) defines IoT as the infrastructure of information that enables advanced services by connecting units through communication technologies. Atzori et al. (2010, p. 2787) define it as the wireless communication between objects which enables the interaction between the units to reach a common goal, which also correspond to Adams (2017, p. 15). While the above scholars' definitions are relatively broad, some emphasis will also be given to the definition by Krotov (2017, p. 833) who adds the perspective of interaction between the physical environment, i.e. between humans and the technical environment, such as hardware, software, data, platforms and technical standards. Typically, all units with an Internet connection which generates any kind of data, such as telephones, cameras and manufacturing machines, are considered as an IoT device (PwC, 2015, p. 1) and there are estimates that there will be approximately 50 billion of IoT devices in year 2020 (Weinberg et al., 2015, p. 616). IoT is perceived as the most important developed technology in recent years to the business industry, where it enhancing the whole value chain, changing the business processes, companies' strategies and strengthen competencies independently of the company's industry (Lee & Lee, 2015, p. 431).

The usage of IoT in accounting derives from the need for connectivity with other business processes to ease the financial accounting process (Cao & Zhu, 2012, p. 741-72). Through the IoT, the information can be delivered between the devices in a secure, safe and trustworthy manner (Mishra et al., 2016, p. 1332). The connectivity could be used for analyzing and tracking the various processes such as manufacturing, inventory and human resources (Cao & Zhu, 2012, p. 741-72). With the use of IoT, one can generate real time data which can keep the financial statements up to date. One could monitor inventory, stocks, and other valuable transaction information that need to be accounted for in the financial statements (O'Leary,

2013, p. 61). With this technology, the need for the accountants to do the manual entries decreases and will result in less working time and allow the accountant to focus on other working tasks (Qiu, 2016, p. 15). The IoT technology might also detect deviations or mistakes that can occur which a human being would not be able to detect (Alarcon & Staut, 2017, p. 3). The real time data approach in accounting are also emphasized by Murphy (2015) who argues that the whole process of gathering and transmitting data between client and accounting firms will enter a new era.

Furthermore, the advisory services will become even more important and will increase by implementing the technology (Alarcon & Staut, 2017, p 3-4). The implementation of the IoT technology will also bring the positive effect in terms of better control over the activities, but also improve the access to the accounting system for both the accounting firm and their customer, which enables one to reach the accounting information from everywhere. Hence, that will result in increased flexibility due to both parties are not tied to a specific environment (Borgia, 2014, p. 10; Mishra et al., 2016, p. 1335).

IoT does not only contribute with advantages. According to Information Systems Audit and Control Association (2015, p. 9), also known as ISACA, new technology on the market usually result in an increased risk. IoT is though a complex technology because of its voluminous system (Borgia, 2014, p. 11; ISACA, 2015, p. 9). Adams (2017, p. 15) argue that, because of the complexity, consequences may arise in form of lack of information security when the data is being transmitted from the single devices to the big network of IoT. Therefore, in order to succeed with the implementation of the technology, technical challenges and obstacles to introduce it in the business have to be considered and solved (Borgia, 2014, p. 3). ISACA (2015, p. 4) also assert that there are several risks that may occur when implementing the technology and therefore must be considered in the early stage. They arguing that devices connected to a network with a constant connection to the Internet are exposed to new type of risks, and the risk of attacks are higher comparable to the past. This is also in line with Borgia's (2014, p. 22) arguments, who stresses that there is an increased risk of attacks if the system or the software is not working correctly or is not robust enough. Security is therefore the main challenge that deeply has to be considered when implementing and using IoT. The focus is on how to secure the data in order to prevent that people from outside get access to the information, but also to ensure that the system is stable and well-functioning (Borgia, 2017, p. 22). However, according to a survey made by ISACA in 2014, the results showed that the participants believe, even if there might be risks about implementing the new technology, the benefits of IoT will be equally or even higher (ISACA, 2015, p. 7).

2.3 Blockchain in accounting

Blockchain was originally developed when Bitcoin entered the market, and can be explained as a digitized ledger which contains an infrastructure of transactions where no financial intermediaries are involved. The technology has now reached other industries, such as the banking sector, trading and insurances (Dai & Vasarhelyi, 2017, p. 5). The blockchain system is constructed as a chain of blocks, where each block is a composition of several transactions. Each block has a connection to additional blocks, forming a huge set of data and transactions. Every block also has a unique timestamp, a digital fingerprint and a link to previous blocks for ensuring its safety and integrity (Nofer et al., 2017, p. 184). The system is decentralized which means that all parties involved (called nodes) in a transaction have access to the blockchain, which allows them to read, verify, update and publish new transactions in the

blocks. The blockchain system can also verify that the payer has sufficient funds for completing the transaction (Dai & Vasarhelyi, 2017, p. 6).

Fraud causes big amounts of losses every year and an information system which can reduce or prevent fraud is necessary in order to protect all the important information that is saved in a company's systems. Blockchain has the possibility to provide a secure information system within the accounting field, when all the nodes jointly are controlling the verifications. Since the nodes are connected to each other, all verifications can be controlled which makes it more difficult to manipulate information. When a transaction is made and confirmed, the corresponding entries will be irrevocable and noticeable for the participants in the blockchain (Dai et al., 2017, p. 12). Dai et al. (2017, p. 12) and Rechtman (2017, p. 15) argue that, by implementing the blockchain technology into the accounting information systems, it makes it possible to lower the risk of fraud through a safe and secure database. It brings the advantage that every transaction can be controlled and seen directly after being performed (Dai et al., 2017, p. 13). Hence, the function of the technology is to attain better and more reliable information (Rechtman, 2017, p. 15).

In the blockchain, all data and documents are placed in a digital system (Fanning & Centers, 2016, p. 56). The technology can approve the sending of invoices between the parties and also pay them. Since the invoices are digitized, there will be no missing invoices and instead of sending the invoice by mail, it will be shared with the other party in real time. Through a so called smart contract, which is a digital contract where blockchain can verify the provisions and confirm the activity when the provisions are fulfilled (Dai et al., 2017, p. 13), the other party can automatically pay the invoice instead of doing it manually (Alarcon & Ng, 2018, p. 3). The digitalization of the documents also extends the scope of application and makes it possible to use it in several different purposes. The transformation to a digital document gives all parties in the chain increased access to the information, which leads to increased trust and higher quality (Fanning & Centers, 2016, p. 56). Blockchain has therefore the ability to prevent that data is changed or even deleted (Dai et al., 2017, p. 12). Furthermore, when implementing blockchain technology, the process of confirming the transactions can be reduced. Usually, the transactions and the balances must be controlled and attested in order to make sure that they are correct. Blockchain alone makes it possible to approve the performed transactions and state them as valid which would save costs as well as time for both the company and the accounting firm (Alarcon & Ng, 2018, p. 3; Brandon, 2016, p. 39-40).

The implementation of this technology can also bring negative effects. Skepticism is existing regarding that blockchain technology is not realistic, not fully developed and that standards not yet existing. Sceptics also argue that there are not enough tools available to control the system and ensure that it works as intended which may lead to a lack of reliability (Alarcon & Ng, 2018, p. 2). The lack of standards are consistent with the arguments by Yeoh (2017, p. 199-200), who emphasizes the distrust in the technology, where it is in general associated with criminal activities and bitcoin scandals, and the real potential in businesses processes are yet to be accepted by the community.

There are several obstacles existing that may lead to difficulties to use the technology. According to Partida (2018, p. 52), the main problem to usage refers to finding skilled people in order to understand and use the technology where the system is more complex compared to systems that currently being used. Thereof, it may become a problem to find people with the right expertise and skills needed in order to manage the system. Adopting the new technology will also be a cost for the company. The proper technology is required which may result in

financial concerns. An investment in this technology may be expensive, and if too costly, it will become a problem to adopt it (Partida, 2018, p. 53).

2.4 Big data in accounting

Big data is the huge amount of data, which is so significant in size that it is impossible to analyze it manually or with traditional accounting software. Another factor is that big data consist of both structured and unstructured data which also creates a problem in the analysis process when using the traditional software (Warren et al., 2015, p. 398). Structured data can be explained as tabulated data, which is perceived of humans as organized and includes a searchable function for different data types. On the other hand, unstructured data is recognized as data that is not possible to categorize in a spreadsheet and includes soft data, e.g. videos, social media and oral conversations, which also representing approximately 90 % of all data generated today (Syed et al., 2013, p. 2446). As mentioned in the introduction, big data is characterized by the four V's; volume, variety, velocity and veracity which stands for the extreme amount of data, a great variation in data types, a rapid speed in data generation and the trustworthiness of the data (Syed et al., 2013, p. 2447). Big data has now entered the financial and accounting sector (Warren et al., 2015, p. 398) and is considered as the next evolution of the accounting practice (Janvrin & Watson, 2017, p. 4).

The financial records are currently consisting of numerical verifications for verifying an economic event in the business, like receipts or invoices. With the use of big data, Warren et al. (2015, p. 398-399) found that soft data could be used as a verification as well. Such soft data could be videos or audio to support the economic event and could also be used in the management accounting process. They also find that such soft data would increase transparency in terms of valuing assets, where it would give a more comprehensive and qualitative view of the asset's condition, which can be controlled in an easier manner by e.g. auditors and other stakeholders (Warren et al., 2015, p. 402).

Since machines are generating perpetual data, previous systems have not been able to analyze them in the same extent as big data analytics. Big data analytics software would be able to use the generated data in a more comprehensive way, where e.g. inventory and work-in-process inventory could provide real time data and continuous updates of the financial statements (Vasarhelyi et al., 2015, p. 385). The real time data generation is also emphasized by Bhimani and Willcocks (2014, p. 479) who adds the increased possibility of up to date analysis and decision making, and that manual collection of data is no longer useful when the machines can gather the necessary financial data for the current recordings themselves.

But even though the manual collection of data and accounting entries would be automated, Richins et al. (2017, p. 74) argue that the need for accountants would not diminish. The introduction of big data in the accounting profession would instead increase the demand for accountants, where they have the knowledge of interpret and conduct analyses of financial data. Such knowledge is necessary to possess when the enormous amount of data is generated. Accountants are the ones who understand the businesses and already used to work with data, which would still make them necessary in the accounting role.

As with all technologies there are also risks with the big data concept. Privacy issues and cyber security are the main problems, where an insecure system of the big data can lead to unauthorized and unethical usage of the data generated (Payne, 2014, p. 492). If one do not have control over one's databases, the integrity is diminished and hackers may overcome the company's classified data (Adams, 2017, p. 12). Another negative aspect of big data relates to

quantity, quality and accessibility. Companies could have difficulties to manage the amount of data that is increasing exponentially for every process within the company. As well, it could be difficult to value the data that is generated and know which data that is useful. One also needs to possess the knowledge of how to extract the important data and information that is generated, which could be a problem for many companies. If failing on all these aspects, the financial statements would see a loss in quality, or even a worse scenario would be litigations due to insufficient confidence in the economic verifications (Warren et al., 2015, p. 404).

Furthermore, with the increased use of big data in accounting, Griffin and Wright (2015, p. 379) stress that the accounting profession needs more skills to comply with the technological change. They argue that the slow transition and adjustment to technology is mostly due to the academics and educators, which do not have the curriculums for preparing the students for the new environment. To work with big data, the accountant needs a better understanding of how to analyze and use databases and in particularly how to use big data analytics instruments.

2.5 Automated accounting

As stated in the introduction, automated accounting is possible when cloud accounting, IoT, blockchain and big data is integrated in the accounting process (Dai & Vasarhelyi, 2017, p. 5-6; Dimitriu & Matei, 2014a, p. 842; Fleisch, 2010, p. 133-134; KPMG, 2017; Richins et al., 2017, p. 76). When the concepts are implemented in various extents, they create the possibility of computerized reading, analysis, and transfer of data necessary for the accounting process. When they also are properly cooperating, there is an opportunity to reduce the manual entries by humans and one can confide solely in the technology to do the accounting entries (Uwadiae, 2015). Today, accounting software suppliers are raising their awareness of the automation's possibilities as well as the demand for automated processes. In the year 2015, approximately all suppliers included in a survey, and which are acting on the Swedish market, already had or were in the development process of integrating automation in their products (Sjöström, 2015, p.24).

The need of automated accounting is due to the current account distribution which is not entirely easy. A common time consuming process within accounting firms is manual accounting and also the gathering of data necessary for the account distribution, which needs to be collected from several different processes and divisions. Such time constraints result in that financial statements are given to the decision makers too late, and the data has become outdated. A solution to such problems could be automated accounting (Drum & Pulvermacher, 2016, p. 181). Furthermore, the everlasting external pressures, i.e. from clients, such as cost reduction demands, goal settings and service differentiation are also factors that drives the use of automated accounting processes (Wilson & Sangster, 1992, p. 68). Automated accounting could satisfy such demands, where it is common that accounting firms are charging their clients per hour, and with less hours laid on the accounting process, the service may become cheaper (Ohlsson, 2015, p. 17). Such impacts could lead to an increase in clients for the accounting firms.

Unfortunately, there is a lack of empirical studies on how automation affects the accounting firms and their accounting consultants. From a positive point of view, practitioners perceive that automated accounting has a great impact on the efficiency of the accounting process. Accountants who do the manual entries cannot even be compared to automation because of its much faster working process and increased efficiency. Computers would be able to do the accountants' tasks much faster, in other words it creates enhanced productivity (Uwadiae, 2015). When accountants no longer need to do the manual entries, they can instead redirect

their focus to the analysis of the statements and financial issues where accounting expertise is a necessity to solve. Such analyses will increase the quality of the financial statements which also means an increased reliability (Lupasc et al., 2012, p. 582). If everything is working correctly and the concepts are designed in accordance with international accounting standards, accounting errors would be diminished since humans no longer intervene in the process, hence the financial statements would be more reliable than they are now and be more credible (Uwadiae, 2015).

Automated accounting does not only provide positive effects. From a microeconomic point of view, Wilson and Sanger (1992, p. 71-72) found five main constraints to automated processes within the accounting field, which are still valid (Nyang'au et al., 2015, p. 1549). The first is the financial aspects, where technology investments are not considered priority. Second, the implementation of technology in the current processes is facing resistance from both the organizations and their employees. Third, there is a lack of skills among the employees to handle the new technology as well as lack of maintenance knowledge connected to the developing technology. Fourth, organizations lack policies of how to use the new implemented technology and fifth, there is a difficulty to find software and hardware that are suitable for one's processes. The technology development, and the increase of suppliers on the market, may have decreased such obstacles. One does no longer need the funds or the technological skill because the suppliers offer such services packaged in their products. As well, when the computer does everything in the accounting process, the knowledge of bookkeeping is no longer needed for firms. This can lead to that firms do their accounting themselves and accounting firms would lose clients (Taipaleenmäki & Ikäheimo, 2013, p. 342).

While automation is entering the field of accounting, there are also some other hindrances on a macroeconomic level which needs to be solved to prevent unnecessary duplications of tasks. One aspect is the Swedish laws, which are lagging behind when it comes to digitization in accounting. The first step to automation is to digitize the physical documents in order to make the computer read the data. The concepts are also facilitating the infrastructure between client and accounting firm, when the documents can be sent and stored on Internet. According to Swedish law, accounting data that are received in physical form need to be stored in its original form. One can thereby not digitize the document and dispose the original document (Bokföringsnämnden, 2013, p. 64; Jönsson, 2017) which is in contrast to other Nordic countries, such as Norway and Finland, where such procedures are possible (Bildstein-Hagberg, 2017, p. 7). Another problem related to storage, is that the Swedish law prevents companies' to store accounting data abroad, which creates a problem when the cloud providers' databases are localized in another country, hence it is an out-of-date law that need to be solved (Marténg, 2016; Marténg, 2017). This prevents the purpose of using clouds in terms of storage and infrastructure and may cause judicial problems.

Furthermore, scholars are also stressing the knowledge gap among accountants as a constraint. Higher educational institutions need to introduce accounting technology in the syllabus to keep students aware of the technology available as well as adapt to the new trends. The lack of it could lead to a knowledge gap and students will not get the proper skills needed for the future accounting profession (Güney, 2014, p. 855). Such remarks are also emphasized by Pincus et al. (2017, p. 7) who also adds that digital technology is a necessity for preparing students for the new accounting profession but higher education adapts too slow in relation to the environmental change.

Finally, there are also constraints to automated accounting related to the construction of the software. Alpar and Winkelsträter (2014, p. 2267) argue that automated accounting can generate high quality outputs, but predetermined rules in the program are needed. If they are absent and humans need to be involved in an assessment process, one can expect a decrease in accounting quality. Related to the involvement of humans in the accounting process, several articles about automated accounting and the diminishing of job opportunities are published in recent Swedish newspapers (e.g. Pechter, 2017; Suni, 2017). Scholars do not fully comply with such arguments and argue that humans can never be replaced by computers, because computers are not yet developed enough to do qualitative procedures such as analyses and associated interpretations (Sun & Lu, 2017, p. 1-2). The processes that are possible to automate within the accounting are procedures based on routines, such as the bookkeeping, but cognitive tasks still need the involvement of accountants (Bresnahan et al., 2002, p. 344; Greenman, 2017, p. 1453). Hence, there will still be a demand of accountants in the future, but the question is in what extent they are needed.

3. Theoretical framework

This chapter will present the development in technology to increase the knowledge of how new technology is introduced and accepted. Furthermore, theories of importance to explain attitudes towards automation in accounting will be explained. The theories in this chapter and the empirical findings presented in chapter 2 will be used in the analysis of the empirical data gathered for this study.

3.1 Technology development

Since the introduction of technology in the society, it has incrementally increased in usage in multiple situations, but to understand how technology is developing and how it is implemented in organizations, one has to define what technology is. According to Rogers (2010, p. 12) technology development is characterized as an innovation, which is defined as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption”. An innovation also creates value to the user, and provides new advantages compared to how previous processes has been conducted and is commonly measured in economic terms, but also in social status, convenience and satisfaction (Rogers, 2010, p. 15). Innovations are categorized differently depending on the influence on the economy. First, an innovation can be evolutionary which is a continuous and incremental improvement of existing technology and processes. Second, an innovation can be revolutionary, which is defined as a radical change where new technology or processes are implemented (Minakov et al., 2015, p. 307). Revolutionary innovations are known as disruptive innovations where a paradigm shift is made on the market (Assink, 2006, p. 217) but the technology itself does not necessarily be completely new, but rather disrupt the way of working (Gobble, 2016, p. 66), which fits the concept of automation and its implementation in accounting.

The innovation advances on the market by diffusion, which is when the innovation is communicated through different channels over a certain time period to individuals in a society (Rogers, 2010, p. 5). Peres et al. (2010, p. 95) argue that the diffusion of disruptive technology follows an s-curve over time, where the introduction phase is followed by commercialization of the technology, and finally a slowdown where it is replaced by new technology. The disruptive technology has thereby a different lifecycle than an evolutionary innovation, which follows a linear diffusion over time (Assink, 2006, p. 218). Assink (2006, p. 227) argues for several main factors which affect the length of the different stages in the s-curve when organizations adopt innovations. Firms are rigid and do not want to adopt risky, new innovations and they are tenacious about their current process and do not want to change, which affect the introduction phase. Furthermore, attitude, motivation and lack of creativity may stall the commercialization (Assink, 2006, p. 227-228) and internal capabilities, infrastructure and difficulties in incorporating the technology into the working process also affects the curve (Assink, 2006, p. 228).

As stressed in the introduction, the accounting profession will see a full implementation of automation within the next 20 years (FAR, 2016, p. 16; Nagarajah, 2016, p. 35). Whilst automation is not seen as a completely new innovation, the relative long time frame for full implementation in the accounting profession can be explained. The implementation of new technology in firms may be characterized by inertia where disruptive technology is initially not seen as standard performance and the new technology may also be inferior to established processes (Yu & Hang, 2010, p. 436-437). It is also probable that firms wait for competitors to introduce new technology to see if they are adequate and valuable (Gilbert & Bower, 2002, p. 97) because disruptive innovations tend to, in their initial phases, generate lower profits

than the current process (Gilbert & Bower, 2002, p.101). It is though a necessity for firms to comply with the environmental changes and technology developments. Firms need to ensure that they meet the future demands by their clients and also attract new clients in the future environment, where new demands may rise. If firms do not look forward and show unawareness of the external changes, they become limited to the current environment and will most probably fail and be outperformed when new innovations occur (Turner, 2004, p. 16).

The technological change may disrupt the accounting firms' processes and technological development continues to evolve within the accounting profession. Such change may have significant impacts on the accounting firm and these changes have also led to arguments that the profession will become different in the future and change the demand and expectations of accountants (Gould, 2017). Concurrently, the discussion is ongoing in various papers, forums and newspapers whether accountant as a profession is dying or not due to automation. Thereof, to see how the technological change may impact the profession, there is a need of defining what constitute a profession.

3.2 Theory of professions

To understand what defines a profession, Brante's (2009) theory of professions will be used, which consists of eight categories. First, higher education is needed, though one have to bear in mind that some professions no longer demands an education and this perspective is decreasing in significance (Brante, 2009, p. 25-26). Furthermore, abstract knowledge is needed, where a profession must possess a unique knowledge to transmit to the public and be able to find existing problem areas and create new ones. The knowledge cannot be too abstract, where a balanced level between practical and abstract knowledge is necessary to expand one's competence and confidence from the society (Brante, 2009, p. 26). There must also be some kind of uncertainty in the society with a demand from an expert to resolve something perceived as a problem. Moreover, a profession is characterized by autonomy, where an independency to own decisions must be included (Brante, 2009, p. 27). Trust in the practitioner's integrity and importance is also necessary. The confidence in the practitioner may come from both external and internal factors, such as the society or co-workers (Brante, 2009, p. 27-28). Another factor is some sort of organizational structure, either composed by individual initiatives or by initiatives from governmental institutions. Additionally, when all practitioners within the area of competence have the knowledge of doing the same tasks, interchangeability exists. The allocation of work should not be differentiated among the co-workers and several people should be able to do the same task. Finally, to be acknowledged as a profession, there must be a knowledge conveyance, which means that a profession must be able to conduct their skills and knowledge on something which is demanded by the society (Brante, 2009, p. 28). A summary of the theory of professions is illustrated in Figure 2.

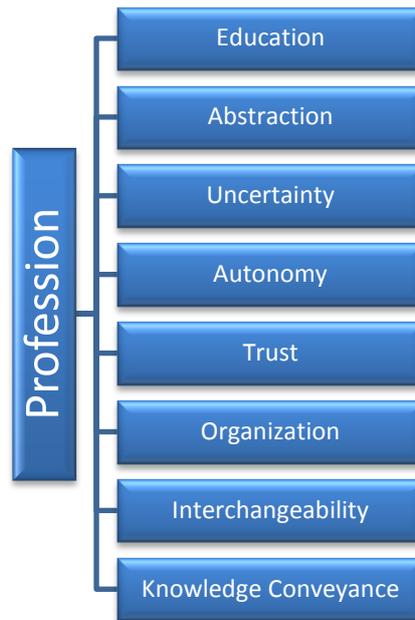


Figure 2: Theory of Professions (Based on Brante, 2009, p. 25-28)

The purpose of using this theory is to be able to deconstruct the definition of a profession and analyze what part of the accounting profession that can be automated. Thereof, we may be able to analyze what parts of the accounting firm's employees that can be substituted or not and whether the profession is at stake as debated in media. Furthermore, as argued above, a certain education is needed to constitute a profession. Such educational aspects, as well as salary level, are important because the introduction of technology in organizations may have different effects depending on such factors. The phenomena when technology affects the employees with a certain educational and salary level is called job polarization.

3.3 Job polarization

The digitization and automation of professions has led to a phenomenon called job polarization. Autor (2015, p. 12) described the market as a construction of three categories of professions, the cognitive professions that needs high education and normally have high incomes, and on the other hand, the manual handled and service emphasized occupations that are characterized by low education and low salary. The third category is the profession in between these positions, characterized by routine tasks, average income and an education level in the middle of the two positions. The cognitive occupations are difficult to substitute with computers, as well as the occupations with complete manual handling, while the routine tasks can be performed more efficient by technology (Shim & Yang, 2018, p. 144). Job polarization arise when the automation of routine tasks increases, which leads to an increased demand in cognitive professions and increased employment in low education professions due to the middle category is pushed out from the market. Hence, the middle educated and waged professions are the most affected by automation and that is where the accountants are positioned (Goos & Manning, 2007, p. 118).

This push out effect by automation could lead to a decrease in the number of employees needed when the computer doing all the accounting. The economists will no longer be used in the routine task and instead be pushed into other activities, such as analytical and advisory services where they could enhance processes related to managerial control and decision making (Granlund & Malmi, 2002, p. 314). Such change also affects what one can require

from the consultants, where Frey and Osborne (2017, p. 265) argue that employers now want staff with higher educational and cognitive skills. Inexperienced economists can thereby have problem to enter the market, and accountants with less cognitive skills can be replaced by computers.

The use of automated accounting may has several impacts on the accounting firm and the accounting consultants as described in the above theories and in the empirical chapter. The efficiency of automated accounting may however be dependent on the attitudes among the users (Murtagh et al., 2015, p. 140). Thereof, theories about acceptance of technology, attitude and dependency of past actions will be explained in a theoretical point of view.

3.4 Technology Acceptance Model

The Technology Acceptance Model (TAM) was developed in 1986 and aims to explain individuals' acceptance and beliefs towards new technology (Davies et al., 1989, p. 985) and is still a widely used model in recent research (e.g. Abroud et al., 2015; Bach et al., 2016; Priyadarshinee et al., 2017). TAM relies on two factors that are affecting individuals' attitude toward new technology, namely perceived usefulness and perceived ease of use. Perceived usefulness is described as the degree which individuals think the new system will increase one's performance, and perceived ease of use is defined as the degree which the individuals believe that using the system will be free from effort (Davies et al., 1989, p. 985).

Davies and Venkatesh (2000, p. 187) later extended the perspective perceived usefulness, where several social impacts were added; subjective norms, voluntariness and image. The concept of subjective norms is adopted from Fishbein and Ajzen's (1975, p. 302) study and is explained as an individual's belief about how surrounding people thinks whether or not the individual should do the behavior in question. In other words, social pressure is affecting an individual's choice to perform or not perform a certain behavior and such pressure can motivate a person to take actions that are not favorable to themselves (Davies & Venkatesh, 2000, p. 187). Attitude towards technology can also be affected by voluntariness, which is explained as if the usage is mandatory or compulsory (Davies & Venkatesh, 2000, p. 188). Finally, image can affect the attitude to technology where the individual can perceive increased social status in the individual's social environment by using technology (Davies & Venkatesh, 2000, p. 189).

In the extended model, the factors job relevance, quality output and result demonstrability were also added because they were perceived as having affections on the acceptance. Job relevance is described as a person's belief that the technology is suitable for one's tasks and that it will enhance the working process, and quality output is the belief in how well the technology executes the tasks. The last factor, result demonstrability, is stressed as individuals will show more acceptance to technology if the relationship between using the technology and its perks and usefulness are clear and visible (Davies & Venkatesh, 2000, p. 191-192). The model is illustrated in Figure 3.

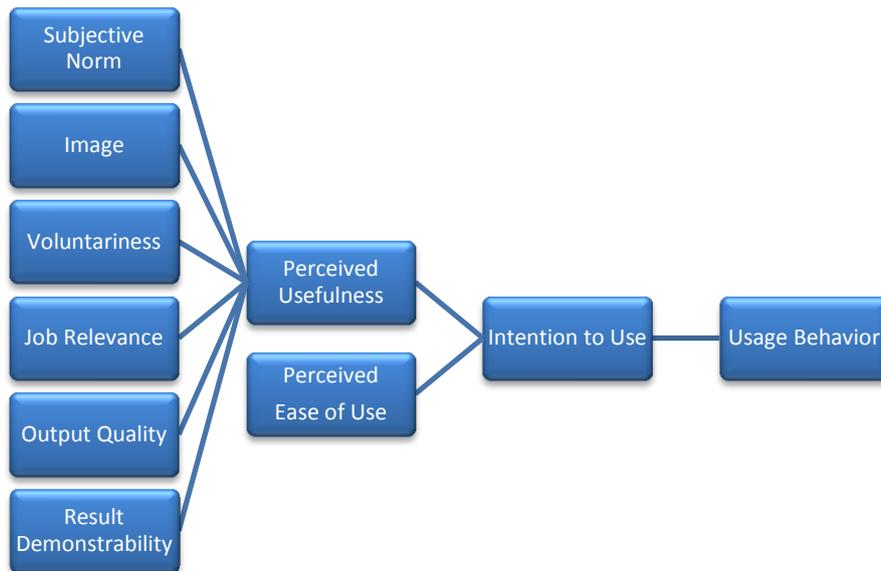


Figure 3: TAM (Based on Davies & Venkatesh, 2000, p. 188)

Despite the widened usage of the TAM model, it has been criticized from several scholars. Salovaara and Tamminen (2009, p. 168-169) argue that the model is too broad and do not consider the technology's contextual purpose, which can have a substantial variation. Further criticism concerns the variables, where more are needed to create a stronger model (Legris et al., 2003, p. 202), or that it lacks perspectives of individual differences, influences by managers, and the organizational context (Brandon-Jones & Kauppi, 2018, p. 35).

The purpose of using TAM in this study is its prominent applicability on attitudes toward technology and in the widely usage of the theory in previous research, the model has been able to explain the phenomena during a significant time (Bach et al., 2016, p. 997). Thereof, since the extended usage among scholars, and where the model has been proven useful, it will fit in this thesis because attitudes among the accountant firms' consultants towards automated accounting will be studied. With the named model, we will be able to explain attitude from a technology perspective, where other attitude models may be too general and not as useful. The pillars of TAM, i.e. perceived usefulness and perceived ease of use, construct the individual's attitude towards an object. Unfortunately, TAM does not provide a definition of attitude, which drives a need of a model that gives the underlying factors of attitude. A model that could satisfy this need is the affect, behavior and cognition (ABC) model.

3.5 ABC Model

The definition of attitude is commonly referred to "a person's general feeling of favorableness or unfavorableness toward some stimulus object" (Fishbein & Ajzen, 1975, p. 216). To explain the structure of attitude, this thesis relies on the ABC model, which is the most established and used model by scholars to explain attitude (Jain, 2014, p. 5). The first component, affection, concerns the individual's feelings and emotions towards an object where positive feelings about an object may cause positive attitude to the object, and negative feelings may cause negative attitude correspondingly. Second, behavior means that one's attitude towards an object is dependent on how one behaves. Past behavior or experiences of the object can generate different attitudes towards an object. Third, cognition means that a person's beliefs and knowledge about an object influences the attitude, where one's associations or previous knowledge about an object can generate different attitudes (Jain, 2014, p. 6-7; McLeod, 2014). A graphical summary of the model can be seen in Figure 4.

In this context, affection can be exemplified with the accountant's technological skill. When technology in general is easy or difficult to understand and use, the automated accounting could also be perceived as easy or recognized as a problem. The behavioral component could be illustrated as if the accountant has negative or positive experience from automated processes in other contexts, one will also possess the same attitude to automated accounting. The cognitive component can be exemplified with the accountant's beliefs and knowledge about automated accounting processes, derived from previous own experiences or by rumors from the industry and the social environment, which can affect the accountant's attitude.

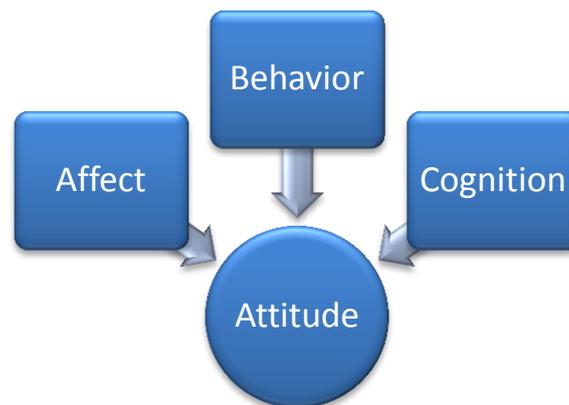


Figure 4: ABC Model (Based on Jain, 2014, p. 6)

Even though the widened usage of the ABC model, it has been criticized for various reasons. First of all, the definition of attitude has been inconsistent, where several users of the model uses different definitions and the affect, behavior and cognition categories may not represent the whole perspective of attitude (Wilt & Revelle, 2015, p. 479). Stedman (2002, p. 577) also adds that the cognition perspective is too subjective, where more research is needed to explain the real foundation of its meaning. Furthermore, the ABC model is perceived as a model which is too generalized to be able to capture specific beliefs for a particular behavior (Hsu & Lin, 2016, p. 43). The extended usage of the model serves as evidence that the model works in an empirical context, which the authors of this study find as sufficient for this research. Hence, the advantages of using the model outweigh the disadvantages.

The purpose of using the ABC Model in this thesis is to grasp the underlying factors that constitute the concept attitude. There is a necessity to first understand what constitutes attitude to develop an understanding of the attitudes among the accounting firms' consultants. Hence, this model will be the foundation of the concept attitude. With this model, it would also be possible to find the underlying factors that may affect the accountants' attitude towards automated accounting. The ABC model does however not provide a full disclosure of the underlying factors that affect the attitude towards an object. An individual's' historical actions may also affect the attitude which drives the need of including the path dependency theory (PDT) in the theoretical framework of this study.

3.6 Path Dependency Theory

PDT has its foundation in institutions which constraints or inspires organizations and their actors and activities. A normal conceptualization of the theory is that the past reflects the present actions (Mahoney, 2000, p. 510). There is no agreed, unified definition of institutions, but normally one refers to established ways of acting, cultural assumptions, or conscious or subconscious actions (Eriksson-Zetterquist, 2009, p. 7-8). Hence, institutions, also described

as social constructions that affect organizations' actions and at the same time restraining them, could have an impact on how firms and individuals are influenced by technologies and their chain reactions (Krell et al., 2016, p. 684). Path dependency can be found in several articles put in different contexts, such as institutional paths or organizational paths (Bergek & Onufrey, 2013, p. 1263), but in this thesis it will focus on the technological perspective. Organizations and their actors have their inherent behavior and actions in entrenched paths, where the paths are a construction of institutions and societal policies rooted in previous decisions. The paths taken in a historical context is difficult to change, because the institutions are grown into one's processes and becomes costly in terms of investing, learning, coordination and anticipation, where it is cheaper to continue in the same manner as previously (Trouvé et al., 2010, p. 4). In our understanding, the reasoning behind PDT is that one continue to act as one always have, e.g. continue to use a specific system, due to one's historical preferences even though there comes new innovative and more efficient approaches to the problem. Hence, it is more costly in the terms mentioned above, to change one's preferences even though there are more efficient solutions.

Traditionally, the PDT is applied on an industry level to explain why inefficient technology can be locked in and used as industry standards, where the lock-in effect is a result of above mentioned institutions (Stack & Gartland, 2003, p. 487). However, PDT has also been able to explain behavior on a personal level as well, within the same boundaries (Egidi & Narduzzo, 1997; Roedenbeck, 2011).

PDT has been under criticism from different scholars. Altman (2000, p. 128) argue that it is not reasonable for an inefficient technology to be locked-in and that market participants will at some point in time adopt the more efficient technology. Others have criticized the model for being too narrow, where it is difficult to determine which historical path that is the cause of the lock-in (Haydu, 2010, p.31-32) or in more philosophical terms, that some things might just happen, and there are no contingencies from the past that are affecting one's actions (Kay, 2005, p. 565).

The purpose of using PDT in this study is to be able to analyze the constraints expressed by the accounting consultants in our interviews. We believe that some negative attitudes may derive from an unwillingness to adapt to new technologies, where the individuals may restrain the usage of automated accounting. The PDT may thereby be useful to analyze such constraints.

3.7 Summary theoretical framework

Derived from the theories and the literature review, a conceptual framework has been developed for how this study interprets the relation and connection between the theories (Figure 5). The model is used to enhance the comprehension and connection between automated accounting, its impacts on accounting firms, and the attitudes among the accounting consultants, and nevertheless be able to answer the research question. When automated accounting can be explained as an innovation, one could explain the development and diffusion of innovations, i.e. the development of automated accounting. The diffusion led to the construction of a profession given by the theory of professions. Moreover, the profession may face impacts by the usage of automated accounting, which led to a description of the impacts of technology in a job polarization perspective. Nevertheless, empirical findings of the different concepts and automation have been introduced to give a fruitful background on how technology may impact the accounting firm and the accounting consultants. Furthermore, the technology needs to be accepted by the users to provide the full

capability in the profession, which led to TAM and the pillars perceived usefulness and perceived ease of use. These pillars do affect the individual's attitude towards the technology but TAM does not provide a definition of attitude. Thereof, the ABC Model with its affect, behavior and cognition perspectives has been used and inserted in TAM to explain the phenomenon attitude in the light of the model. Finally, attitude is influenced by past behavior and underlying assumptions of how one conducted one's tasks in the past. Such perspectives are given by the PDT, which is also incorporated in TAM in this study.

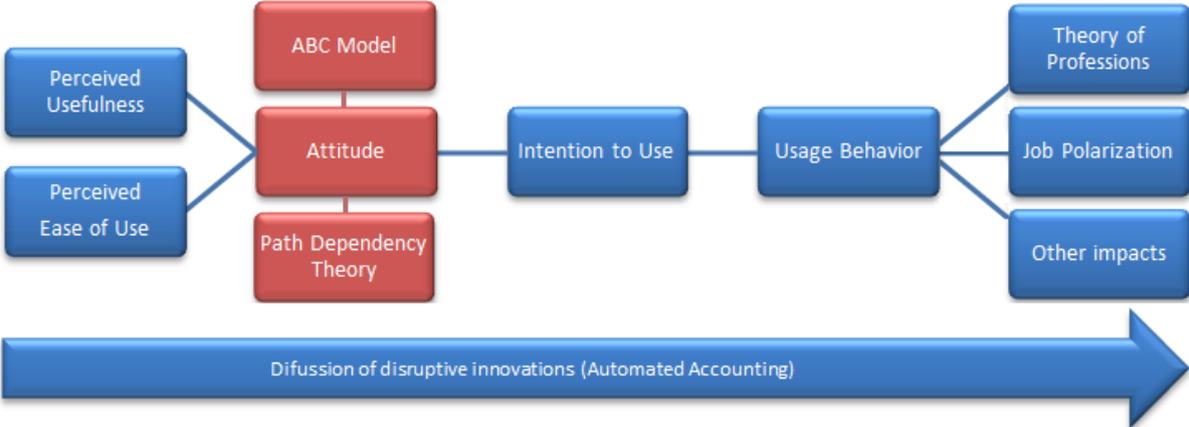


Figure 5: Summary theoretical framework

4. Method

In this chapter, the philosophical standpoints and the methodological procedures are presented. The chapter also embraces information about sampling method and information about the participants in the study. Moreover, the chapter contains information about how the interviews were constructed and conducted and the analysis method.

4.1 Preconceptions and background

The authors of this study are students at Umeå School of Business, Economics and Statistics and this thesis is a part of the examination within the Master's Programme in Accounting. Both have a background in business studies and possess a bachelor's degree in business administration and the interest for accounting has developed during these years of studying the subject. One of the authors has experience in accounting in a Big Four company, while the other has experience in controlling in a major manufacturing company.

During the years of studying accounting, a deeper understanding of the subject has been developed and a more comprehensive knowledge of its necessity and risks has grown. The courses at the university have brought insight to the subject and led to increased knowledge in business administrations but such education could lead to some preconceptions about the subject as well. We want to stress that we are aware of such issues, which could lead to a biased result. To prevent this problem, the thesis will be as transparent as possible, where both advantages and criticism of the methods and theories used in the thesis will be displayed, and the practical process will be described explicitly. Furthermore, since the preconceptions and opinions about automation in accounting are present to us authors as well, we will do our best to not influence the research and be as objective as possible where the statements presented will have its foundation in facts or scientific articles. We also want to highlight that this thesis is not written on commission or received any funding from any company or organization.

Finally, the idea of the subject came up when reading about the latest and hottest topics within the accounting field. Mainly newspapers and websites of practitioners have been the source of the idea, which states that the accounting profession may disappear in the future due to automation. Such comments made us uncomfortable of why we are studying accounting when we may no longer be necessary. Technological development may also create higher barriers to enter the job market as graduating students, and we wanted to develop a further understanding of how automation is developing and how it affects the profession. To get a deeper understanding of the problem, we also wanted to include the accounting consultants' comments and attitudes towards the effects, where they could also bring up interesting thoughts of how the profession will, or not will, change.

4.2 Research philosophy

Below follows the philosophical approaches in terms of ontological assumptions and epistemological standpoints where the nature of knowledge has its foundation. Epistemology refers to how one enhances the knowledge, while ontology concerns how one interpret the social factors, such as human behavior (Peile & McCouat, 1997, p. 344). The philosophical standpoints are used to guide the study and are important to describe for the reader, where one develop a comprehensive view of how reality is apprehended in this study.

4.2.1 Ontology

Ontology is described as the philosophy about reality and refers to the researcher's view of how to see and perceive the reality. It is common that the researcher asks oneself "what is the

nature of the reality that we study?" (Raadschelders, 2011, p. 918). The assumptions that a researcher holds about the reality can either be objective and external, or subjective and cognitively constructed (Long et al., 2000, p. 190). If objective and external, there is a distinct line between the phenomena and the social actors, where they are unrelated and the phenomenon is not a product of social constructions. On the other side, if subjective and cognitively constructed, the phenomenon is dependent on the views and actions by the individuals (Chipangura et al., 2016, p. 261-262). The cognitive positions examines the individual's view of reality and all views are of importance, where the result will be a relative truth of reality (Creswell, 2004, p. 8-9) and no absolute reality exist (Collis & Hussey, 2014, p. 47). In this research, we are going to study the potential impacts by automated accounting on the accounting firm, and also the attitudes among accounting consultants towards automated accounting and the corresponding impacts, which takes the stance in the subjective ontology. Thoughts, beliefs and expectations on the future among the accountants are subjective and dependent on the individuals' view, where the subjective ontology is the most suitable for this purpose.

4.2.2 Epistemology

The concept of epistemology focuses on the researcher's knowledge, where it derives from and how one explains the phenomena (Chipangura et al., 2016, p. 262; Raadschelders, 2011, p. 918). The researcher's epistemological approach can be divided in two main paradigms, the positivist paradigm and the interpretivist paradigm (Peile & McCouat, 1997, p. 344) while Saunders et al (2012, p. 134-137) argue that there are four main approaches and adds realism and pragmatism. According to the positivistic paradigm, knowledge is gained from experiments and observation (Peile & McCouat, 1997, p. 344) where the researcher should be independent and objective and the process should be value free (Bryman & Bell, 2015, p. 27-28). On the other hand, the interpretivist paradigm is characterized by subjective meanings, where the individual's thoughts and underlying assumptions are of value. Knowledge about the phenomena is understood by interpretations and human's perception (Peile & McCouat, 1997, p. 345). Interpretivism do not emphasize external forces in the same extent as positivism, but rather focuses on the understanding of human actions and the social meaning to individuals (Bryman & Bell, 2015, p. 28-29).

The focus in this thesis is to see what impacts automation in accounting has on accounting firms and the attitudes among the accounting consultants towards automated accounting. Hence, when the study will try to develop a deeper and better understanding of impacts of automation in accounting and attitudes among accounting consultants, the interpretivist approach is of best fit. An interpretivist approach will make it possible to see how the accountants understand the automation and how they reason about the impacts, both the negatives and the positives. Their experience of the accounting process and digitized data could have impacts on their beliefs which only the interpretivist position can extract.

4.3 Research approach

When conducting research, there are several research approaches one can adapt to gain an understanding of the topic, such as deductive, inductive and abductive approach (Baddache & Nicolai, 2013, p. 28; Ghauri & Grønhaug, 2010, p. 15). The deductive approach is characterized by the examining and testing of existing theory and knowledge by applying or controlling them on empirical data, constructing hypotheses, and make conclusions about the phenomena. The theories are the foundation which the research is built upon and influences the process. Hence, it is the process where one draw conclusions from known premises or from substance acknowledged as true (Ghauri & Grønhaug, 2010, p. 15-16). The inductive

approach is described as the opposite, where the researcher sees a pattern in one's observations and findings and tries to improve or construct theories based on generalizations from the data (Ghauri & Grønhaug, 2010, p. 15). The final approach is abductive which can be explained as a combination of deductive and inductive approach (Morgan, 2007, p. 71). According to Bryman and Bell (2015, p. 27), an abductive approach is used when empirical data cannot be explained by existing theory. The researcher tries to find a reliable answer to the phenomena by looking at existing explanations and interpretations of empirical data and chooses the best explanation.

In this research, there are existing theories about human behavior and attitudes to technology adoption but they are not put in a context of accountants and automated accounting. As well, there are existing theories and empirical data about the impacts generated by the concepts of automation, but they do not present a comprehensive view in the light of automated accounting and they have not been studied in relation to accounting firms. This study does not follow a proper deductive approach because no hypotheses are a subject of testing, neither does it follow a strict inductive approach where new theories are built upon the empirical data. The best approach in this research is thereby an abductive approach, where existing theory will be applied as a foundation of the discussion about the gathered data and theories are used as a guide to develop and extend existing knowledge (Van de Ven & Poole, 2015, p. 1384).

Research is also classified as exploratory, explanatory or descriptive (Blaikie, 2009, p. 70). Explanatory research is related to quantitative research and tries to find correlations between variables or cause and relationship in quantitative data. Descriptive research is characterized by that the researcher describes a certain phenomenon (Bless et al., 2006, p. 43). This study is considered an exploratory research which is characterized by an area with scarce research, or an area where research exists but not conducted in a certain context. As shown in the theory chapter and the literature review, research are available on attitudes and acceptance of technology, and how the different concepts that builds automated accounting could impact the profession, but they are not tested in a context of an accounting firm. Furthermore, researchers have to take a position when it comes to the time frame of data collection. Blaikie (2009, p. 201) defines them as cross-sectional, longitudinal or historical. Longitudinal studies are conducted in different times, where one can see the impact over a longer, specific time (Blaikie, 2009, p. 202) and historical studies are focused on past events (Blaikie, 2009, p. 203). In this study, a cross-sectional study is conducted, which is defined as a study on a phenomena which analyzes data on a specific point in time and includes population characteristics, attitudes, values and beliefs (Blaikie, 2009, p. 201). Such design is best suited for this study since it does not seek to find a change over a long time, nor is it applicable to historic time since automated accounting is a hot topic now and undergoing radical changes on the profession and accounting firms in present time.

4.4 Research design

There are two main strategies to gather data for the study, a quantitative study or a qualitative study (Polit & Beck, 2010, p. 1452). A quantitative study is characterized by objectivity (Long et al., 2000, p. 190) and answers the question "how often" or "how many" and is difficult to use if one want to study the social phenomena (Malina et al., 2011, p. 61; Trost, 2016, p. 23). The quantitative design contains information that is described in numbers (Blaikie, 2009, p. 204) and the purpose of it is to measure statistical data (Malina et al., 2011, p. 60).

On the other hand, a qualitative study is used when one wants to provide deeper understanding of people's thoughts and the underlying assumptions behind their actions (Polit & Beck, 2010, p. 1452) and is a more subjective approach (Long et al., 2000, p. 190). Through a qualitative approach, one gets a more detailed and insightful explanation of the phenomena (Polit & Beck, 2010, p. 1452) and can be used to answer the “how” and “why” questions (Malina et al., 2011, p. 61).

In this study, the focus is on the impacts of automation for accounting firms and the attitudes among their accounting consultants. The research field is in a nascent phase and research is scarce when it comes to impacts and attitudes within the accounting firms. In such context, where one is exploring a nascent field of research, there is a need for qualitative research to enhance the knowledge with comprehensive data through interviews and questionnaires. Such detailed and enriched data are needed in a nascent field of research to explore the phenomena (Edmondson & McManus, 2007, p. 1162). Hence, since this thesis aims to deepen the understanding in this area, and through the perspective of the employees in the accounting firm and their attitude towards automation, a qualitative approach is of best fit and as well in line with above reasoning.

4.5 Literature search

Before conducting a study, a literature review is necessary to create a solid knowledge base within the field (Webster & Watson, 2002, p. 13). The need for selecting reliable sources is significant due to different sources have different purposes. Some sources are built to convince the reader where other sources are available to inform the reader by introducing both positive and negative information. Therefore, the choice of including reliable sources in the study is of significant importance (Ghauri & Grønhaug, 2010, p. 90). There are commonly two different types of sources. The first, primary data, can be described as the data gathered by the scholars when conducting their original research. The second type, secondary data, refers to data collected from other scholars in order to use it in other research experiments. Secondary data is appropriate if one wants to find information about an already examined field and solve a research problem, or if one wants to get a better understanding and explain a problem (Ghauri & Grønhaug, 2010, p. 90; Saunders et al, 2012, p. 304). We used secondary data in our study for several reasons. First, we collected the data in order to clarify the different concepts and theories. Second, it is also cost and time efficient and easy accessible, where it is easy to generate new insights and comparing previous studies. Secondary data also clarify the gaps in a research field, where it helps to specify what additional research that needs to be made. Thereby, we got a deeper understanding and a better background of the topic.

In this study, we started with a literature search in order to find relevant scientific articles and other literature such as books, websites or electronic newspaper articles within our research field. We tried to adapt the systematic search as proposed by Webster and Watson (2002, p. 16), where the point of departure is leading journals, and in a second step, the references in those journals were reviewed. The scientific articles used in the study were peer reviewed to ensure high quality. The articles were available via Umeå University's library, where their own search engine and the databases Academic Search Elite and Business Source Premier were used. In order to find all the relevant peer reviewed articles, several key terms for the different fields were necessary. At first, we identified the terms that were relevant for our study and thereafter applied them to the different search engines. The key terms included words as “automated accounting”, “automation accounting”, “blockchain”, “cloud accounting”, “internet of things”, “big data”, “technology of accounting” and “attitude”.

These keywords were used either alone or together with other formulations of words. After finding pertinent articles within our research field, we did select the most relevant articles by sorting out the older ones, though some older articles were, in our opinion, still relevant. Henceforth, we continued searching for other sources by viewing the already existing articles and exploring the reference list of the articles. Some literature used in this study, which were found relevant to use in order to explain the concepts, was not available in peer reviewed articles. Such articles were mainly newspaper articles and issues published by universities.

4.6 Data collection

According to Ghauri and Grønhaug (2010, p. 125), interviews are seen as the most appropriate method to use when collecting data in a qualitative study. The positive outcomes of in-depth interviews are that it is possible to get a clearer and deeper understanding of the participants' behavior and thoughts, due to open-ended questions where the respondent has the possibility to answer what feels suitable for them (Ghauri and Grønhaug, 2010, p. 126-127). In research, one generally divides interview methods in three different categories. The first, structured interviews, are used when short answers are wanted and the interview is strict in relation to the questions constructed (Stuckey, 2013, p. 57). Secondly, unstructured interviews are characterized by one broad question where the continuation of the interview depends on the answer of the respondent (Doody & Noonan, 2013, p. 29). In this study, the third option semi-structured interviews were used which means that the topic and the issue, the size of the sample, the participants and the interview questions were decided and regulated in an early stage. The semi-structured interviews are also open-ended which means that the respondents have a greater liberty to argue for their stances and the interviewer can ask follow up questions (Ghauri & Grønhaug, 2010, p. 126). For the interviews, an interview guide (Appendix 2) was constructed to ease the discussions and keep the interview to the subject. Below follows further disclosures about the sample, background of the respondents, how the interviews were conducted and ethical considerations.

Semi-structured interviews are appropriate to use when one wants to expand knowledge within a certain area (Alshenqeeti, 2014, p. 40) and create a more flexible interview compared to other methods (Hofisi et al., 2014, p. 62). The problem with semi-structured interview is that it can generate a huge amount of data compared to questionnaires or other structured interviews (Alsaawi, 2014, p. 151) and there is a possibility of subconscious bias (Alshenqeeti, 2014, p. 43). Another problem with interviews in general, is regarding the transcript. When the researcher transcript the interview, it is possible that one misunderstands statements from the respondent (Alsaawi, 2014, p. 155). Since both authors of this study were present during the interviews, subconscious bias would be eliminated in a higher degree than if only one interviewer participated. Hence, such problems may be diminished. Furthermore, contact information to the respondents were collected in order to ask for further disclosure if some statements were difficult to assess or if additional comments were necessary.

4.6.1 Sample

In the process of selecting individuals to be included in a study, one usually refers to two approaches of sampling which are probability and non-probability sampling (Ghauri & Grønhaug, 2010, p. 139). The probability sample can be described as when the population in a study has been randomly selected and the ones conducting the study have no possibility to influence the process of selection. The second, non-probability sampling, refers to when a population has been selected in any other way than randomly. In this sampling method, some individuals in the population have a higher chance to be selected and included in a study than others (Bryman & Nilsson, 2011, p. 179). In this study, a non-probability sample has been the

foundation where a purposive sample has been used, which means that the participants have been chosen in a strategic process in order to represent the most relevant sample for the study (Bryman & Nilsson, 2011, p. 392). In our sample, we have selected relevant local accounting firms for our study which are represented all over Sweden or is well known and established on the Swedish market, which may be representative for other cities and accounting firms. The firms included are large firms, with either local offices spread all over the country or with clients all over Sweden. We contacted 14 accounting firms with a local office in Umeå, where each of the firms which accepted to participate selected the respondents based on role in the firm and possibility to participate. The sample included accounting consultants who have both a shorter and a longer working experience and is disclosed further below. The aim was to interview twelve persons from various accounting firms where each firm contributed with one or two respondents. Since every company has their own way of conducting their tasks, and different technologies used, the spread between different firms was needed for a more fruitful result in this study. In the end, ten respondents (n=10) from six different accounting firms in Umeå participated in the study.

As mentioned earlier, the sample chosen in this study is defined as a purposive, who some scholars argue to be negative for the study. Palinkas et al. (2015, p. 536) argue that a purposive sample assumes that the researcher knows where to find the knowledge needed but also when choosing participants, one need to know that the participants have the certain knowledge. Furthermore, Tongco (2007, p. 153-154) argue that purposive sampling can be biased and the sample depends on the convenience of the researcher, or that the researcher's judgement of the participant's knowledge could be wrong. Elo et al. (2014, p. 4) also adds that when using purposive sampling, it can be difficult to the reader to validate the trustworthiness of the study and one need to explicitly explain the background information about the sample process and the participants. We find accounting firms and their accounting consultants' knowledge as adequate for this research and do not think a purposive sampling method will reduce the validity of the result. Furthermore, we have also been transparent of how the participants were chosen, which should keep the trustworthiness of the study as high.

4.6.2 Presentation of respondents

Respondent 1 is working at one of the Big 4 accounting firms which offers accounting services, payroll services, auditing and other financial assurances. The local office in Umeå has clients that only are located in or near the municipal of Umeå, which is a general concept of the firm's local offices all over Sweden. Furthermore, the size of the clients varying between small and large companies where only a small amount of the companies are listed, hence the majority are privately owned companies. Currently, all local offices are working with the accounting software Fortnox or E-conomic, even though other software is in use but they are being phased out continuously. Respondent 1 is a team member of five to six persons who do the accounting for the clients, and the formal description of the profession is a certified accounting consultant. The daily tasks consist of account managing, bookkeeping and financial consulting. The respondent started to work as an accounting consultant approximately 30 years ago, first started as partly bookkeeper and partly auditor, but is currently only an accounting consultant. The experience of automation and digitization goes back almost seven years ago, where some names of the concepts were familiar, even though there was an understanding of all concepts' functions. Cloud accounting and IoT were the most recognized concepts, which have been available for some years where recent accounting software made it available to connect different sources of the accounting processes. During the later years, the respondent argued that digitized data is the most dominant data, which nowadays makes technology in accounting as the normal way of doing their work. Regarding

the experience of full automation, the most pertains to the bookkeeping process, such as invoices and reconciliations.

Respondent 2 is working at one of the major local accounting firms in Umeå, which offers accounting services and have approximately 15 employees, where two of them are working as controllers and representing the financial department of the company. The majority of the clients are located in Västerbotten, but there are also clients located all around Sweden. The clients are varying from smaller firms with only a few verifications per year to bigger firms where the clients have outsourced all of the tasks to the accounting firm, but, the majority of the clients are small and medium-size companies. When conducting the accounting process, the firm is solely using the software Fortnox. Respondent 2 is a certified accounting consultant and has approximately 30 years of working experience in the accounting field and 15 years of experience in various degrees of digitalization and automation. The functions of the four concepts were recognized, even though the respondent was mainly familiar with cloud accounting and IoT. The respondent stressed that the firm is working toward a more automated and digitized working place and they are introducing automation everywhere it is possible. The respondent is of the opinion that the biggest development of automation has been during the last four to five years and elucidated that their company always want to be on the leading edge in automation and digitization.

Respondent 3 is working at one of the major national established accounting firms which offers accounting services, legal services and advisory services. The firm is established in 140 cities, and the regional office of Umeå comprises approximately 25 employees. The clients are spread nationally within Sweden, but the regional office has the majority of clients based in Umeå and its surrounding municipalities. The size of the clients are both small and bigger companies, but the niche is on small companies. The firm uses different software for the accounting process, such as Fortnox, Brilljant, and EkonomiOnline, where the most used is Fortnox. The formal description of Respondent 3 is an accounting consultant, where the daily tasks consist of bookkeeping, income-tax returns and annual accounts. The respondent's experience in accounting goes back several years, though as an accounting consultant for approximately ten years. The names of the concepts were not familiar, but their functions were recognized in the daily work. The experience in automated accounting processes started when the respondent was employed at the firm, and the introduction of automation has been implemented progressively.

Respondent 4 is also working at the same firm as respondent 3. For further disclosure of the company's information, see above. Respondent 4 is working as a certified accounting consultant and has an experience in the profession of 25 years. All the four concepts and their functions were familiar, even if the respondent does not have direct contact with them. Current recording of transactions are however not considered as a daily working task to the respondent because such tasks have been transferred to the assistants. The respondent is however participating in the accounting process in the later phases of the process. The automated processes have been implemented after the respondent has passed by the process of current recordings, which also explains why the respondent does not have a broad experience of automated processes.

Respondent 5 works at one of the Big 4 accounting firms which offers accounting, auditing, tax and VAT services. On the Swedish market, the company is established in several cities with regional offices, and in Umeå there are approximately 30 employees. The clients vary between small, medium and big companies, where the customers are active in the whole

country. The firm uses several software for the accounting process, namely Fortnox, Hogia, and Xor, depending on the preferences of the clients. Respondent 5 is a certified accounting consultant, with 20 years of experience in the accounting profession. During the years, the participant has also encountered some auditing tasks. Regarding the concepts of automation, the names were not familiar but the functions and the descriptions of the other concepts were recognized. The experience of automation goes back to approximately 2009, when cloud based software entered the market which consisted of automated processes to some degree.

Respondent 6 also works at the same firm as respondent 5 and for further disclosure of the company's information, see above. Respondent 6 has worked as an accounting consultant for approximately five years and the respondent was only familiar with cloud accounting by name, where the others were unknown. However, the functions and descriptions of IoT, big data and blockchain were recognized. The automated processes have become more and more integrated over the years, where in the beginning of the career paper and pen were used. Nowadays, cloud services are a central part of the daily work.

Respondent 7 is working at one of the Big 4 accounting firms and offers several business services such as accounting, auditing, assurances and tax consulting and employs approximately 50 persons allocated to the different divisions, though the most are in accounting. The firm is located all over Sweden, but the clients of the local office are located mostly in the municipal of Umeå, even though they have some clients spread all over the country. The sizes of the clients are micro, small and medium enterprises and are in general privately held companies. The local office uses a self-developed accounting software with integrated services, where mainly Fortnox and Medius are the foundation, but it depends on the client's preferences. Respondent 7 is an accounting consultant where the daily tasks consist of bookkeeping and financial consulting and has been active in the industry for approximately five years. Regarding the concepts, all of them were very familiar but the blockchain technology and its application were less known. The experience in automated accounting started when the company changed to cloud based accounting software, though some automation has been present in the previous software as well, such as file transfers between bank and software. A contributor to the experience was that the company integrated the concepts as a mandatory working procedure.

Respondent 8 is also working at the same firm as respondent 7, and for further disclosure of the company's information, see above. Respondent 8 possess a position that includes a relatively low proportion of bookkeeping and instead have a role of responsibility towards both customers and their accounting consultants in terms of satisfaction, quality assessment and accounting solutions. The daily tasks consist of coordinating the consultants, allocating resources and finding new and profitable accounting solutions. The respondent started as an auditor, but later on changed profession to accounting consultant, and has been active for approximately 20 years. Since the respondent is active in finding new accounting solutions, the concepts were well recognized, but when it comes to experience in automated accounting, the integration into the process were known but not encountered personally because bookkeeping was no longer a part of the daily tasks.

Respondent 9 works at national established accounting firm with approximately 20 local offices all around Sweden and offers accounting and advisory services. The local office employs twelve persons where all are accounting consultants and the clients are spread all over the country with no geographical limits. The main clients are small or medium enterprises, but they also have listed companies as clients. The software used at the company

is BL Ekonomi, but other software, such as Fortnox, is also used and depends on the clients' preferences. Respondent 9 is an accounting consultant, with 15 years of experience in the accounting industry. The names of the concepts were not familiar, but the functions were well recognized and the person has experience of automated accounting since the beginning of the career, though in various extents. The respondent's increased usage of automated accounting did not start however until approximately five years ago.

Respondent 10 also works at the same firm as respondent 9 and for further disclosure of the company's information, see above. Respondent 10 is a certified accounting consultant and has experience in the field since almost 20 years and also have a few years of experience in the auditing profession. The respondent is also active as a property accountant. The four concepts were familiar even though the names of the concepts were not used at the office. However, the functions of them were recognized. The respondent has experience of working with automated processes since eight to ten years when the cloud services were introduced. Since then, the development of automated processes has decreased in a rapid manner. In which extent the respondent works with automated processes depends on the clients though, the willingness from them and how open they are to automation.

A summary of the respondents, their position and experience is provided in Table 1 below. The date and length of the interviews are also included in the table.

Table 1: Summary of respondents

Respondent	Position	Experience in accounting (yrs)	Date of interview	Length of interview
1	Certified accounting consultant	Approx. 30	2018-03-20	Approx. 45 min
2	Certified accounting consultant	Approx. 30	2018-03-21	Approx. 50 min
3	Accounting consultant	Approx. 10	2018-03-26	Approx. 30 min
4	Certified accounting consultant	Approx. 25	2018-03-26	Approx. 45 min
5	Certified accounting consultant	Approx. 20	2018-03-27	Approx. 35 min
6	Accounting consultant	Approx. 5	2018-03-27	Approx. 40 min
7	Accounting consultant	Approx. 5	2018-03-28	Approx. 45 min
8	Accounting consultant	Approx. 20	2018-03-29	Approx. 55 min
9	Accounting consultant	Approx. 15	2018-04-05	Approx. 50 min
10	Certified accounting consultant	Approx. 20	2018-04-05	Approx. 35 min

4.6.3 Data gathering procedure

The interview guide (Appendix 2) was developed by the authors of this study and is based on theories, previous empirical studies, and the two research questions constructed for this study. The questions in the guide were formulated with the emphasis on current impacts, potential impacts, and the attitudes towards automated accounting, where also impacts discovered in previous empirical research or related to the impacts were discussed during the interview. The respondents got an email two days before the interview, consisting of ethical considerations, background information of automation and the concepts, and the full interview guide. The purpose of sending the questions beforehand was to give the opportunity to define the concepts and give the respondents a possibility to prepare for the questions to give a more comprehensive answer. We also believe that this option would lead to a collection of more high quality data, due to the respondents would have time to reflect about their thoughts about automation and it would therefore result in deeper reflections and answers. On the other hand, sending out the interview questions in advance may also result in misstatements, because the

respondents have more time to consider their answers which may lead to that the respondents do not answer what they actually feel. To have more time to think may change one's thoughts and this scenario would therefore not reflect the respondents truly feelings and thoughts. In this thesis, we were of the opinion that the positive aspects of sending out the questions in advance outweigh the negative. The interview guide consisted of 18 questions and is constructed as it starts with background questions of the respondent as well as how experienced one is regarding automated accounting. These questions were used to be able to describe the respondent as presented in chapter 4.6.2. The interview guide continues with questions regarding impacts of automation and its concepts and how their attitude is towards such solutions and effects.

The empirical data was collected through personal interviews with the participants at their working places, all stationed in Umeå. The choice of conducting the interviews at their company was to facilitate the participation in the study, as well as the time of the interview was during their working hours. During the interviews, both authors of this study was present and were able to ask follow-up questions where discussions during an interview can be subjective and interpreted differently by different individuals, hence the importance of both authors to be present. Another important aspect before starting the interview was to acknowledge the ethical perspectives, though they had been presented during the scheduling of the interview but needed to be repeated. The aspects of recording the interview and the possibility to be anonymous were especially emphasized, but no person chose to be fully anonymous. A full statement of the ethical considerations is presented in chapter 4.6.4. During the interview, one of the authors was responsible for conducting the interview while the other was responsible for taking notes and be able to ask further questions. Furthermore, the interviews were recorded on two different units to be sure of getting the proper records and prevent loss of data.

After the interview, the records were transcribed to ease the analysis. Since anonymity is an important ethical consideration, we chose to not disclose the full bio of the participants. Even though some data as company name and state of profession is presented to create a more fruitful data, some parts we deliberately omitted or changed, e.g. names, age and pronouns, to prevent the full disclosure of the person. We do not believe that the inclusion of gender, age or names would bring any additional value to this study. To keep the anonymity, the data was only treated by the authors and not made published. Furthermore, quotations and empirical data has been masked and written in terms of “respondent X”.

4.6.4 Ethical considerations

When conducting research, it is important to take the respondent's ethical issues in consideration. Such considerations are necessary when it involves the participation of individuals as respondents, and in this thesis, the four principles stressed by Bryman and Bell (2011, p. 128) are used as a foundation; harm to participants, informed consent, invasion of privacy, and deception. Harm to participants is described as the need for the respondents to not being physical and emotionally distressed, such as feelings of stress, discomfort or embarrassment (Saunders et al., 2012, p. 231). Informed consent means that the respondent has been given sufficient information about the study and enough time to consider one's participation (Saunders et al., 2012, p. 238). Invasion of privacy relates to that the respondent should be respected, know the voluntary nature of participation, and the researcher should responsibly handle the data after the interview (Saunders et al., 2012, p. 231). Finally, deception is described as when the respondent is misled of the purpose of the interview, or when the researcher presents a false intention of the study (Bryman & Bell, 2011, p. 136).

These principles are interconnected and they were treated in the extent that the respondents were given the full information of the purpose and general information about the elements of the thesis. They got a full disclosure before the interviews were conducted, such as voluntary participation, recording of the interview, and how the data is treated after the interview, to make the participant more comfortable. Furthermore, the questions were not constructed as it can generate conflict of interests between the respondents and the company, as well as it does not contain any questions that could lead to harm to the respondent. The respondents were given the opportunity to be fully anonymous but no person chose to be anonymous. Moreover, to make the data more fruitful, we asked the respondents if they accepted that we included their background and current tasks in the thesis which all respondents accepted. Since we find anonymity as an important consideration, we chose to treat anonymity in the extent that certain information is not disclosed (e.g. firms, names, gender, age) even though no respondent asked for it.

4.7 Analysis method

A researcher can choose between several different analysis methods to study the empirical data. In the following chapters, the method used in this thesis, the thematic analysis, will be introduced and followed by a description of how attitudes are measured in the analysis.

4.7.1 Thematic analysis

When conducting a qualitative research, the researcher has to conduct the analysis in a systematic manner to get meaningful results (Attride-Stirling, 2001, p. 386). Regarding the analysis of qualitative data, researchers normally choose between different common strategies, such as narrative research, phenomenology, grounded theory, ethnographies or case studies (Creswell, 2014, p. 12). Another widely, or even more, used method in qualitative research is thematic analysis, which is a method used to identify, analyze and find themes of the empirical data (Braun & Clarke, 2006, p. 79). A thematic analysis is an effective method for analyzing empirical qualitative data in terms of participants' perspectives, their similarities and differences (Braun & Clarke, 2006, p. 81).

Braun and Clarke (2006, p. 87) provide a linear six-step approach to the method, though Nowell et al. (2017, p. 4) argue that the steps should not be strictly followed step-by-step, but rather it is a process of jumping back and forward between the steps. The first step is to transcribe the interviews and get familiar with the data gathered (Braun & Clarke, 2006, p. 87). One need to repeatedly read the data and begin the search for patterns between the respondents' answers (Nowell et al., 2017, p. 5). The second step is to convert the data into codes which are described as data which stands out and is interesting to the researcher or thoughts that appears repeatedly (Braun & Clarke, 2006, p. 88-89). Nowell et al. (2017, p. 5) adds that coding creates the possibility to clarify the data and target specific characteristics. In the third step, the researcher sort and combine the codes into holistic themes, hence the name thematic analysis (Braun & Clarke, 2006, p. 89). This process helps the researcher to find the underlying assumptions and patterns (Attride-Stirling, 2001, p. 392). The fourth step relates to reviewing the themes, reconsidering the patterns, and refining the themes so they capture a perfect balance between broad and narrow sets of the data (Nowell et al., 2017, p. 9-10). It is however important that the researcher keeps the validity of the data and that the themes are consistent with the reflections made by the respondent (Braun & Clarke, 2006, p. 91). In the fifth step, one is satisfied with the themes, gives them names, and refines them so the underlying concept of the themes do not overlap each other (Braun & Clarke, 2006, p. 92). In the final step, the sixth, one finalizes the report and writes everything up. It is important to explain the themes extracted from the previous steps to give validity to the analysis and to

explain for the reader how it all binds together. It is also important to include quotes from the respondents to give a depth in the analysis, otherwise it will be too descriptive (Braun & Clarke, 2006, p. 93). A summary of the thematic analysis process is seen in Figure 6.

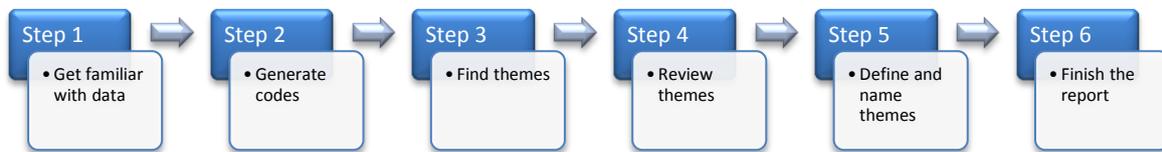


Figure 6: Thematic Analysis Process (Based on Nowell et al., 2017, p. 4)

The choice of thematic analysis as a research analysis tool has also been criticized. Nowell et al. (2017, p. 2) stresses that despite the extensive usage of the analysis method, there is a lack of literature to explain how the analysis process is conducted, which can result in many different processes depending on which literature one uses as a reference. Another critique relates to the flexibility of the analysis, where the method gives the researcher a great flexibility in choosing themes, and such flexibility could lead to inconsistency and lack of coherence of the themes (Holloway & Todres, 2003, p. 346). Other scholars also focus on the problems with themes and its flexibility, where the researcher could develop themes that are too weak or unconvincing in explaining the phenomena (Braun & Clarke, 2006, p. 94). Such criticism has been in our minds when constructing our themes, but is difficult to overcome in all thematic processes.

4.7.2 Attitude measurement

A common strategy when measuring attitude is to use numerical scales, e.g. Likert scale, semantic scales and staple scales, where the respondent identifies where on the scale one fits (Yusoff & Janor, 2014, p. 4-5). Such methods are though more adequate when using a quantitative approach with numerical variables (Yusoff & Janor, 2014, p. 1) which is not suitable in this study. Thereof, the respondents were instead asked to describe how they felt towards automated accounting and its impacts in terms of positive, neutral, or negative. When they did not explicitly tell their opinion, they were asked again to tell if they were positive, neutral, or negative. If no clear answer still was made, an analysis of their answer was made by the authors of this study to interpret their stance. In other words, if they only described automation with a negative tone, an interpretation was made that they were negative and vice versa.

4.8 Methodological summary

The methodological chapter is very exhaustive, consisting of philosophical standpoints, choices of approaches, and important considerations. Still, it is a very important chapter to give the reader a context of how the study was conducted. To ease the reading and outline the most important choices of methods used in the study, we think a methodological summary is necessary, which is presented below in a graphical form (Figure 7).

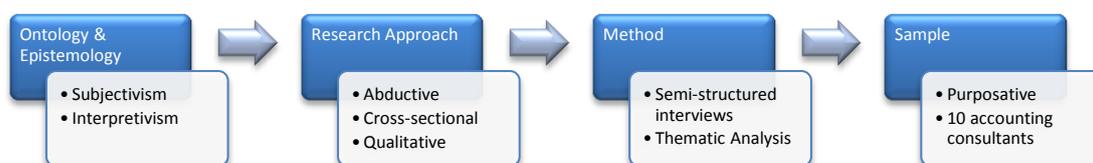


Figure 7: Summary methodological chapter

5. Empirical data

This chapter will present the empirical findings during the interviews, where some quotations and general answers will be brought up. The chapter starts with some background information of the data, following with the findings in the interviews.

5.1 General information

The following chapter presents the empirical data gathered for the study. The interview guide was originally in Swedish and the interviews were conducted as well in Swedish because all the respondents had Swedish as native language. The interviews and the interview guide have been translated to English in hindsight, and difficulties in translate literally may result in that the quotes and sentences are not exactly the same due to differences in grammar between the languages.

5.2 The four concepts

Since previous scholars have emphasized cloud accounting, IoT, blockchain and big data as a foundation of automated accounting, it was of interest to study the awareness among the accounting consultants. Furthermore, the impacts of the concepts and the respondents' attitudes towards the implementation and effects will be presented.

5.2.1 Awareness and usage of the concepts

A general conclusion was a significant awareness of cloud accounting and IoT but lower awareness to blockchain and big data, where the general procedures of their tasks were conducted through Internet based software and the availability to transfer data through Internet connected devices directly into the accounting software. Many respondents also referred to the extended usage in their private life of cloud services and units with Internet connection as the major cause of knowledge. Another perspective of the lack of knowledge of the concepts may derive from that the names are not used in the profession or that the functions are integrated in the accounting software, which can be explained by the following quotes:

“We do not use the names, I think it is more of an academic matter. We need to remember that our clients are specialized in their own field. I need to speak Swedish [...] and the digital flow is normal to me, but in my client’s world, it is not a normal word”

- Respondent 1

The recognition of the concepts has grown during the last years, where many of the respondents encountered a major shift to digitized accounting processes during the last five to ten years. Some companies were though late to implement the concepts due to teething problems. The usage of cloud solutions and Internet infrastructure were commonly recognized when the companies implemented Fortnox as accounting software, which they argued was the main introducer to new accounting process. Almost all respondents argued that cloud accounting was the concept that are the most used in today’s practice. Cloud based accounting software is almost exclusively the main argument of why clouds are integrated in the accounting process, but with the increased number of Internet connected devices, the usage of digital transmission of data have escalated though some hindrances still are present.

“It is rather a question from the customer’s perspective, than from our perspective. We are trying to make the customer embrace these services because it is much smoother [...]”

It is almost two camps, some really wants and understands it, while others do not yet understand the benefits of it, which puts the brakes on”

- Respondent 3

When talking about the concepts during the interviews, some current areas of application were brought up. One area consistently mentioned was invoice scanning and digitized invoices which can be send directly into the accounting software, where both suppliers and the firm’s clients have increased the amount of such documents. Other respondents argue that Internet connection in different devices is now taken for granted, which ease the interaction between units and encourage a more paperless community.

5.2.2 Impacts of the concepts

The respondents were also asked to describe what impacts the concepts have generated because such impacts could also be related to automated accounting. The most positive impact mentioned was flexibility, both for the clients and for the accounting consultants themselves. Both the consultant and the client can access the ledger independently of where one is located. One is no longer bound to one’s workplace or a specific computer, the only thing needed for the accounting process is Internet access. Other respondents emphasized the reduction in paper handling, where the physical archives are reduced, and time-savings in terms of collecting data from clients for the accounting process. Other impacts mentioned by the respondents were cost savings both for firm and client, faster accounting processes, ease of use, and more diverting working processes.

One of the negative impacts of the concepts brought up by the respondents was the dependence on Internet. When everything becomes digital and the accounting process relies on these concepts, some argued that if the Internet is unstable or completely down, there is a risk of not get access to the accounting software and the ledger which may complicate the accounting process. Other respondents stressed that the community gives too much emphasize to the digital transmission even though they yet cannot handle the amount of data as described in the following quotation.

“One has noticed that, for example when it comes to the final days for submit reports to [an authority], they encounter problem. The more who becomes digital, the more congestion they get which they are not ready for yet. During some occasions over the last years they had to expand the deadlines because they cannot operate the E-services”

- Respondent 4

Another negative impact emphasized by some respondents is the conversion to the digitized community, which the concepts need. The respondents argued that experienced employees can be resistant to the change because they are used to do the accounting manually, and when digitization and automation is implemented, they are doubtful and feel a lack of comprehension which leads to stress.

5.2.3 Attitudes towards the concepts

The respondents were also asked to describe their attitude towards the implementation and the effects of these concepts. The result showed a mix of both positive and negative attitudes, though the positive attitudes stand for the vast majority. The respondents who were positive argued that everybody gains on technological development, and the concepts make the working process more amusing when the manual handling is decreased. Others argued that they have an interest in technology or that they have felt a shift towards more cognitive rather than repetitive tasks which affect their attitude positively as described in the following quote:

“I am positive to this, I have been doing this for a long time, and one rather wants to put more time in analytics, make comments on reports, and a consultancy role is more amusing than just sit and entering numbers”

- Respondent 5

Many respondents showed also a positive attitude because of the enhanced process from a client perspective, where the client gained on the implementation of the concepts both in terms of costs and ease in the client’s ordinary business process, which made the consultants positive. The ease of the process, where data and necessary material for the accounting process was easier to find, contributed to the positive attitude and the transition from physical papers in binders to digital documents stored in the cloud has made it easier to conduct the accounting which enhanced the positive attitudes. The positive attitude does also derive from a more effective working procedure, where they feel more positive when the client can be updated frequently, and the accounting procedure is faster, as described by the following quote:

“I am very positive because I want to be effective. Nevertheless, it is amusing as well to find solutions and make it as good as possible for the client when it results in less costs and more data for them. It is more amusing to get a report every two weeks than after four to five weeks”

- Respondent 7

One respondent was positive but argued that some negative attitude was present which derived from the lack of control over one’s job assignments. It is also a lack of trust of whether the concepts work as they should do, or if something is going to fail. Some other negative attitudes could also be found amongst the respondents. Even though one was positive to the implementation and its effects, the negative attitude derived from the initial processes of integrating the concepts in the firm-client relationship, where it was common that many problems occurred during the start-up which created some hesitation.

“It sounds very easy when you hear about automation, and all these commercials emphasizing that it is very easy to use, but it is not. Especially in the initial processes, our commitment is usually to start up the process and make it all work and give related advisory.”

- Respondent 3

5.3 The current state in accounting

To get a grasp of the extent of automation in accounting, the respondents were asked about which processes that are fully or partly automated, and which processes that could, according to the respondents, be automated but are not yet implemented.

5.3.1 The extent of automated accounting

When asking which parts of the accounting process that is in the state of automation, all respondents emphasized the process of invoices. It is very common that the firms are using software for reading the invoices, where they are electronically send directly into the software and the software is reading the invoices and proposes an accounting entry. The billing information, the amounts and VAT, and predetermined cost pools are proposed. Other processes that are automated are bank account reconciliations, but it depends on which bank one uses, where some banks have the opportunity to automatically transfer the account statements into the software. Another process that is automated is the reporting to the Swedish Tax Agency, where the entries in the accounting software are transferred automatically to the

tax statement. Previously, the accounting firm also had to wait for the physical tax document to arrive by mail and all numbers had to be written by hand, but they can now find it electronically where the accounting software helps to fill it in. Further processes which include automatic procedures are the final accounts, payrolls and depreciations.

5.3.2 Future automated processes

The respondents were also asked to describe what processes that could be automated, or most probably will be automated, but not yet are. Many respondents argue that there already are available solutions on the market for automation of various accounting processes, it is more a question of costs were many of the participating firms have small clients where it is not economically defensible to implement such solutions. They argued that it is necessary to lower the prices of the services to appeal the small clients, and to get more clients into the automatic world.

Another process that the respondents argued will be more automated in the future is related to receipts which are perceived as a burden. Most receipts are still on paper, but with the help of e.g. Internet of Things, telephone applications is starting to grow on the market where the client takes a photo on the receipt and the telephone reads it, proposes an accounting entry and sends it to the accounting software. These applications are relatively new on the market and are still not fully automated, where the accountant still need to verify and confirm the entry, but the respondents think it will change in the near future.

Furthermore, cognitive thinking created divergent opinions, where some respondents argued that everything in the accounting process cannot be automated. There are still decisions that need to be made by accounting consultants with the economical skills that a computer never can replace.

“New questions will always emerge: ‘I want to buy a new car, can I do that?’ where one has to sit down and do an analysis [...] or ‘can I afford to...?’, it is a lot of questions. I am still needed and I am not worried to be idle”

- Respondent 2

On the other hand, some respondents argued differently, where they think that it is just a matter of time when computers can do the cognitive thinking. When asking which accounting process that may not be automated, one respondent answered:

“Tax related decisions, and how to handle related things. But such things will for sure be automatic as well, it is plausible that a computer will be able to say ‘this is the best way to act for this company, in this particular situation’ but such solutions may not be developed in the near future”

- Respondent 7

Another common argument is related to generations, where many respondents argued that it is not possible to integrate full automation in accounting for the next foreseeable years. Older clients are still reluctant to use digital solutions and the accounting firms cannot force them to use such solutions. It is not uncommon that clients still using fully manual processes and not having accesses to e.g. mail, Internet, and computers, which constraints the implementation of automated solutions. Hence, everything need to be delivered to the accounting firm as physical papers, and the accountant need to digitize all documents by themselves and do the accounting with manual processes.

5.4 Impacts and attitudes to automated accounting

Below follows the answers from the interviews related to both present impacts which already have been exposed and potential future impacts which automated accounting can generate. Also, the accounting consultants' attitudes towards an automatic accounting profession and the subsequent impacts will be presented.

5.4.1 Impacts of automated accounting

One major impact which all respondents brought up during the interviews is time efficiency. One time consuming process for an accounting consultant is to gather all data that is necessary for the accounting process and there is a major difference between the clients when it comes to the deliverance of material. With automatic file transfer from various sources and units, and automatic accounting of such data, time consuming processes are diminished and the accounting process can start earlier and will be much faster, hence the process is both more time efficient and the payments are easier to track. One respondent brought up that automation ease the profession as an accounting consultant and facilitating the corresponding tasks, for instance the work regarding the final accounts. Another respondent argued that the daily working tasks are more efficient due to several manual processes are eliminated and the amount of time for every tasks decrease. The workload is today, compared to the time before automation, quicker and easier. These argumentations are shared among all of the respondents. More functions in the accounting process can be performed automatically which enables the consultants to focus more on the customer instead of registration of data. Such impacts allow the accounting consultant to spend more time on the clients to strengthen the client relationship and to analyze the client's business on a more detailed level. The major gain of such impacts, shared among all of the participated accounting consultants, was the time they win in their daily work:

"We can get started earlier and do our job, instead of being dependent on waiting for documents or the customers to finish their part in the process. Our workflow gets better and it becomes more efficient"

- Respondent 4

Another impact is that the repetitive tasks, such as account distribution, will be diminished and replaced by more cognitive and analytical tasks where advisory was the most common answer. When the bookkeeping gets automated, the accounting consultant will instead change its focus from the manual entering to business advisory. As one respondent argued:

"It will bring added value to the customer, which is the biggest gain. The customer will not demand a referral about the current recording during the latest month, instead they will demand feedback about how the reports are looking. That will be the most interesting discussion"

- Respondent 1

Similar statements were provided by other respondents. When the accounting consultant's tasks changes from repetitive and manual to cognitive and analytical, their entire working process will change. The customer also needs the expertise and knowledge from the accounting consultant to understand the numbers and the process. One respondent also mentioned that they need to have a notion about the technical parts in the processes in order to transfer the skills to the customers and help them forward. Arguments that this shift is already present were found, where they already have started to give advisory within the technical field. Instead of knowing how to account for different transactions, one respondent argued:

“I think we need to be able to draw more conclusions, see trends, ask more supplementary questions and be proactive towards customers. We need to know what is happening, what is not happening, if something else should happen, or if we should do anything at all. We need to develop more of an advisory and analytical role because more and more will be done automatically. I believe that we will be more towards analytics, fault-finding, advisory and change management”

- Respondent 8

The respondents emphasize that even though they offer analytical and advisory services today, these services will become more detailed in the future because of sophisticated accounting programs and the automated processes will be used in an even greater extension. The customers may therefore expect more from the accounting consultants but most of the respondents do not believe that everything in the profession can be automated. The human factor will be needed in some extent and one respondent stressed the importance of an economist in order to perform, deliver the right documents, and the expertise about the dos and don'ts.

“It is the customers who hire us and there are the same services now but include more automated processes and less manual. [...] We are still the ones with the expertise to see if everything is correct, managed in the right way, that rules and laws are being followed and if taxes and other fees are being paid in time”

- Respondent 1

The respondents were also asked to take a stand about the impacts on the job opportunities. The answers differed between the respondents were several argued that there will be no loss of jobs. Even though the manual processes may disappear and decrease the amount of simple accounting tasks, they argued that the analytical knowledge will be more demanded and several respondents may even see an increase in jobs. Even though the automation will decrease the workload, rumors will arise that the accounting firm can offer automated processes. The clients want easier processes, and when they hear about the firm's automatic solutions, they will buy their services. Hence, the amount of clients will increase and more personnel are needed.

“We will save time on some process but we will find new jobs instead. I do not believe that we will lose a person because something is easier to do [...] I believe the jobs will remain and that we will need more persons because we'll find other things to do and it creates other opportunities”

- Respondent 6

The accounting consultants are clear in their thoughts that the automation will decrease parts of the daily working tasks. However, many of the respondents are not worried about the future and state that new tasks will arise and therefore the job opportunities too. Through the automation, new areas will be lighted up which leads to new working tasks and more jobs. New services will require new types of knowledge which may lead to increased number of vacant jobs. Also, when the accounting process becomes automated, the workload will be more efficient and faster compared to today. This allows the accounting consultants to increase the number of customers because of more time for the tasks when the manually work decrease, where several respondents agree. One respondent mentioned that the automation has resulted in better service towards the customers, which leads to bigger amount of customers for the accounting firms. The technology therefore facilitate for the accounting firms to employ more consultants. One respondent stressed that the efficiency derived from automation has led to a higher ratio of employees compared to the past.

“Even if we are more efficient, we have a higher amount of employees. This has to do with that more and more customers are choosing us. Even if our processes becomes more efficient, we have to hire more people”

- Respondent 8

On the other hand, there were several respondents who argued that jobs will disappear. One respondent mentioned that their firm already is in talks of changing their recruitment process, where they discuss what is needed in the future because they anticipate that the regular accounting role with basic accounting skills will change in the near future. Other arguments were that, when less people are needed in the accounting process, the profession will most likely see a decrease in jobs.

“I think the number of available jobs will decrease because each person will be able to do more by themselves when it becomes automated. It will not be as many jobs as now in this profession”

- Respondent 5

A difference in affection between seniors and assistants was also emphasized, where the market may see a decrease in demand of assistants because they are the ones who do the repetitive tasks. One respondent added that the current assistant may not serve as an accounting consultant in the future, where it is more likely that they are computer professionals instead. The arguments were that there will be an increase in demand of new computerized solutions when everything gets automatized. Hence computer skills are more needed than economic skills. On the other hand, there were also arguments that there are the seniors who are the most repellant to new technologies because of their age and inexperience in digital solutions, and if they are not following the new technological changes, they are facing the same risks as the assistants.

An additional impact generated by automation is a change responsibility. Already, when some processes have been automated, new tasks for the accounting consultant have been added. The respondents emphasized thereof that more changes in their tasks is yet to come. When payments are automated and accounted for automatically in the accounting software, there has been a new area of responsibility for the consultant, as one respondent argued:

“The process of being responsible for the companies’ payments has been added, which not always has been a part of our responsibilities. It is a new responsibility when payment falls within our remits. If one misses a payment, there will come a reminder, and if one misses the reminder, it will be a collection of debts [...] which is a responsibility which now often falls on the assistant who becomes a part of the company’s daily business”

- Respondent 7

Some of the respondents also emphasized other changes in tasks derived from automation of accounting procedures. According to them, the accounting consultant will in the future be more of a salesperson, where they would be selling new solutions and promote the automated services which the firms offers. According to the respondents, the impacts of such changes towards a role of a salesperson may have a great impact on the profession and one could expect a loss of accounting consultants in the industry. Many accounting consultants do not want to sell and they have chosen the profession because of the current introvert role, where numbers are interesting, explicit frameworks and rules exists and there is no subjectivity. The respondents argued that the increase of salesperson tasks leads to that the consultant needs to

work proactively with the customer. This means that they need to be forward-looking, work active as a preventive measure and act foresighted.

“Of course, we need to be more proactive, I know that it is in demand by the customers. It is not just about producing a VAT declaration, which is not what the customers want anymore”

- Respondent 1

When the accounting process gets automated, it may not only be the accounting firms that implement such solutions but also their clients may find that automated accounting brings advantages to their firms. The respondents were therefore asked to answer what services and tasks that will be demanded by them as a consultant in the future when the companies' own enterprise resource planning systems get automated. One respondent argued:

“Well, that is the big question. We really have to show what we can offer because if everything is automated, why should they hire us? We really need to be active and promote: ‘these are the reports we can generate which makes you more noticed about this particular part of the process and how profitable it is’ and so on. That is a real challenge. When everything is automated and we are not needed anymore, we need to find new services to sell”

- Respondent 5

The respondents also emphasized that automated accounting will have impacts on the education and knowledge of the future accounting consultants. When the tasks move from pure accounting tasks to instead focus on selling, an increased knowledge of automation and technical expertise is needed. Almost all respondents argued that technical skills needed relates to the technique behind the automation, how one incorporate automation in the best way for the client, and which automated services the firm can offer. One respondent argued that the current accounting assistants will be entirely replaced by IT consultants and computer specialist in the future, when there will be an increased focus in mining data for analyses and extended usage of automated software. Another consultant argued, which also is in line with several other respondents, that what is needed is:

“It is probably the technical skills. The programs need to integrate with each other, and that's where we encounter problems. The clients have their system, and we want to add automation but it is not possible and we cannot tell the client to buy new systems. [...] The combination of data skills and accounting skills is fantastic, our applications are made by accountants and they are perfect. Hence an accounting consultant combined with an IT consultant would be magnificent”

- Respondent 9

When almost all respondents argued that there will be an increased demand of analytical skills and less current recordings of transactions due to the automation, not only technological skills are needed. Moreover, the accounting consultant needs to possess a broader skill set in economics. One probably requires to be updated into new fields within accounting, which imply that they need to explore new areas. The expertise within advisory needs to be strengthened but also the ability to anticipate the future and think outside the box. New problems and questions will encounter the accounting consultants, hence they will need to extend their knowledge in e.g. tax, laws and regulations. Emphasize was put on such knowledge was lacking from the new accounting consultants, and they will not be ready for the change. One respondent stressed:

“When one is newly graduated from high school and start working here, one cannot analyze in the same manner as me who worked here for 20 years. A whole new education is needed [...] you’ll need to have a deeper understanding, be able to analyze causality relationships, why the numbers look like this, and what can be made to change them. Currently, you cannot do that when you come from high school or even from the university”

- Respondent 5

A further impact emphasized by the respondents was that automation will bring more faults in the bookkeeping, where the accounting consultant will instead be more of an auditor to assure that everything is correctly stated and give advices of future prospects. Companies with cash-account systems with automatic integrations is an example of a company where the respondents believe extra support from the accounting consultant is necessary, due to the accounting and consulting expertise. Another respondent believed that the consultants need to be more updated about the customer’s situation, have the ability to see patterns and propose solutions about the customer’s business. Some respondents argued that if the accounting consultants are not at all involved in the accounting process, and everything is entered automatically, misstatements and faults will increase. Some respondents even stressed the feeling of loss of control, which may result in uncomfortableness and stress. When one relies too much on computers and automation, invoices or other transactions which are not related to the client’s business may be sent into the records and create financial misstatements. It would also be easier to conduct fraudulent behavior when fake invoices, which currently are detected by the consultants, would easier be accounted for in the records.

“Someone has to keep an eye on the accounting, both regarding fake invoices and if the employees buys inappropriate or excessive materials, or whatever it could be, if someone slipping in a snowmobile jacket or whatever. That won’t be detected if one is inattentive”

- Respondent 2

There were some respondents who argued that such faults are already appearing, where one relies too much on the automatic entries and that there may even be more faults now than it was when everything was manual. On the other hand, contradictory comments were present where such faults have not increased, and that they always have and will exist.

A further statement of the usage of automatic accounting relates to the cost factor. Today’s automatic solutions are costly, which makes it difficult to implement them into the accounting consultant’s daily work. The clients are not yet willing to invest in such expensive solutions when the company is small or medium sized, and this is still a hindrance to automated accounting. Furthermore, when automation has increased in usage, one respondent argued that clients already have terminated parts of the accounting process with the accounting firm, where they find it easier to by themselves use automation and do the limited parts of manual handling that exist in their bookkeeping. Another respondent also argued that the number of clients, especially small clients, have even decreased when automatic solutions have been incorporated in the accounting firm’s services. The argument behind this change is that they cannot afford these solutions and prefer to do the accounting themselves. The technology of automation and its functions do not bring enough advantages for smaller firms which therefore may be the reason for not demanding the support from the accounting consultants where the costs exceed the advantages. On the other hand, the accounting firm’s own profitability is at stake:

“We try to have fixed rates, which results in that you pay a monthly price every month for the service. You sell the totality, you sell a balance sheet and an income statement [...] you don't pay for two hours of work because if we make everything automatic you only need to work for 30 minutes and then we do not make any profit on the commission”

- Respondent 9

5.4.2 Attitudes towards automated accounting

Automated accounting has its positive and negative impacts as explained above. However, it is also of interest to understand the accounting consultants' attitudes towards the implementation of automation. In general, many of the respondents were very positive to automated accounting and its outcomes and argued that the positive attitude is a result of more social contacts with the clients. When less time is needed on the accounting entries, one can concentrate the time on the client which in today's work is perceived as absent or less prioritized. One respondent argued that the accounting consultant profession is often synonymous with introvert behavior, that one hides behind one's computer, and automated accounting urge one to withdraw from that. Such changes created a positive attitude among many of the respondents in this study, but they also argued that such impacts could lead to negative attitude as well because many people do not want to socialize. Furthermore, a willingness to make the customer happy is also one factor that drives the positive attitude towards the automated accounting. When using automated accounting, advisory services increase and generate more happy clients which also create a more positive attitude among the consultant towards the usage.

Another common reason to the positive attitude was the shift to more cognitive tasks rather than repetitive tasks, and such shift was perceived as challenging and leads to enriching experience. When the repetitive tasks are automatic, one could develop new ways of thinking, creating new routines and improve planning for the future, which enriched the accountants on a personal level and created a positive attitude towards the implementation.

“It has given me a fresh impetus, because I am a digital lover and this has turned my way of work upside down. I think it is very amusing because now everything is not repetitive and is more about build up new routines [...] It results in more innovation and one gives the opportunity to professional development and it is a challenging and enriching experience which makes me positive”

- Respondent 2

The shift from repetitive tasks to a more cognitive and nuanced profession also led to that many accounting consultants found more amusement in their work which created a positive attitude. Many of the responds were tired of manual handling and lacked the cognitive parts in their current tasks. Emphasize was also put on that automation led to ease of the accounting process, less perfunctory tasks and increased efficiency, which in combination with the increased cognitive tasks led to more positive attitude. The respondents felt a lack of amusement in the manual processes because of the time factor and low enjoyment in relation to other cognitive or client relationship related processes, and where therefore very positive to the new, faster way of doing their work.

“I am very positive! I have been doing the bookkeeping for a long time and there are other, more amusing things to do. Hence I am very, very positive to them”

- Respondent 8

“I think it is very exciting because I don’t like to record things. I like to think and create new possibilities which suits me very good [...] My positive attitude derives more from a willingness to be in the leading edge, I want us to be in the future, I want us to be the ones who drives this change because it is enriching and amusing to not sit still”

- Respondent 8

The positive attitude was also a result of perceived time savings. The accounting consultants felt that the time needed for the repetitive tasks was reduced, which created a positive attitude because such processes were less amusing. A time consuming, tedious process tends to create a negative attitude towards the task, but the less time consuming the more positive attitude is generated. One respondent also emphasizing the leisure perspective, where the vacations were affected with the present manual handling:

“I would never go back to how it was before, never! Previously, I had to cancel my vacation to register invoices and create payment files, which I don’t need to do anymore. I can do it from my home if the customer wants it, but otherwise it goes on by itself. The client has one’s business twelve months a year while we works eleven months, so previously there were a lot of work just before and directly after my vacation, but that’s not how it is anymore when the current entries are entered by itself. The automation is a supplement to my tasks and helps me”

- Respondent 1

There were no respondents in this research who was completely negative towards automated accounting and the impacts on the profession, but there were a number of respondents who expressed a mix of positive and negative attitude when focusing on specific impacts it could generate. The problems that appear from accounting, such as dysfunctions or flaws in the process were emphasized by a number of respondents which could create a negative attitude. Two respondents argued that automated accounting has been implemented too fast, where it was common that many problems arise. Such inefficiencies made them negative to the current system, but looked forward to better solutions in the future. One argument behind the negative attitude towards automated accounting in general was:

“There are two sides. It simplify for many as it at the same time... A current concern in the industry is that we are going to lose our jobs but we are not there yet [...] It is also not as easy as it sounds, the clients often have concerns, there are uncertainties in the process and it is not easy to launch and make it work as easy as it’s been told”

- Respondent 3

Further reasoning behind the negative attitude is the risk of losing accounting knowledge when one relies on the automation or that is would even lead to more misstatements due to loss of knowledge. Automation in general was also perceived by some respondents as frightening when losing the control of the data, which increases the negative attitude. One respondent who was positive to automation still had some concerns of how it would affect their clients. The respondent argued that automated accounting may exclude some businesses in the society which made the respondent express some negative attitude to the implementation.

“My stance is that you cannot stop the development and the innovations. You have to accept it and make the best of it [...] But it is important though to not forget the group who are not as automated or digital as the younger generation. As long as the older generation exists with their preferences, you cannot forget that group”

- Respondent 4

There are however not only the clients who are lagging behind in knowledge. One respondent argued that there exist some experienced accounting consultants with the opinion that it becomes more difficult to understand the tasks with automation and leads to loss of control. Another respondent stated that one risk when computers are performing the activities automatically, the understanding behind the activities in the accounting process is not more fully clear. Other respondents also agree with the fact that they are losing the control through automation. Such obstacles drove a negative attitude towards automated accounting. At the moment when automation is on the verge to become more implemented in the daily accounting processes, it may exist a difficulty when everyone is not using the systems in the same manner. The respondents pointed on the obstacle in the use of automated processes, and the existing different ways of working leads to less understanding. With automated processes, the understanding may not be there in the same manner which is truly important even with or without automated processes.

The job perspective and loss of job opportunities was nothing that worried or created a negative attitude among the most of the respondents. The most common argument of why they are not worried was that they have been in the industry for too long to be expendable. Only one respondent with less experience had concerns and expressed a negative attitude of whether automation would result in the loss of job.

“It is frightening of course. I will not be able to sleep tonight when I understand that I will not have a job in five years. I have read that the accounting consultant is one of three jobs that will disappear. But I understand that, I had a meeting with some people in Stockholm and the next step is underway with big data and so on. The goal is to make more material readable but there will still be other options”

- Respondent 7

As stated earlier, many of the respondents argued that the accounting consultant will be a salesperson rather than an accounting consultant when automated accounting is used. In contrast to the relative low fear of losing the job, this was one of the impacts that created the most negative attitude towards the change to automation. The sales task was not of interest and many respondents thought that it is not preferable before other changes in tasks. Two respondents argued:

“It is bothering, because one is not a seller. It would be more preferable that the firm has its own selling department who works with that. But we have to be more outgoing and face it, but it is annoying”

- Respondent 5

“I see on those who work at a bureau and do the manual entries are often not particular promotional but rather feel that it is annoying. They may not stay in the industry of just that reason, that it will be more of a profession based on selling”

- Respondent 10

Finally, as presented in the below quotes, one respondent felt that the loss of the current working process would create some negative feelings towards the implementation when less manual handling is needed, but a second respondent had another important opinion.

“Overall it is positive, but one thinks about the future effects of automation. When one not fully understands what’s happening, how will it be in the future? Will we still be accounting firms? [...] It will also be a little sad, it is amusing to agree accounts sometimes and only analyze reports is not the only thing one want to do. It is a little bit

amusing to sit and do the account distributions and one don't want it to disappear totally"

- Respondent 5

"I want to add that the person itself, the one who's going to work with automation, has to be receptive. Those who are not showing receptiveness do not have a future in this profession. One simply needs to get on the train"

- Respondent 1

6. Analysis

In this chapter, the analysis of the empirical material is presented. The chapter starts with a brief analysis of the concepts and continues with a more extended analysis of automated accounting, its impacts and the attitudes. The analysis is based on themes, which are presented in the subsequent chapters.

6.1 Themes development

The thematic analysis was used to create a holistic view of the answers and be able to analyze the participants' perspectives, their similarities and differences. In order to create the themes, the first process was to read all the interviews carefully to find the codes. The codes could then be transformed to holistic themes and in Figure 8 below, the themes which were found are displayed. A list with examples of the codes which generated the themes can be found in Appendix 3.

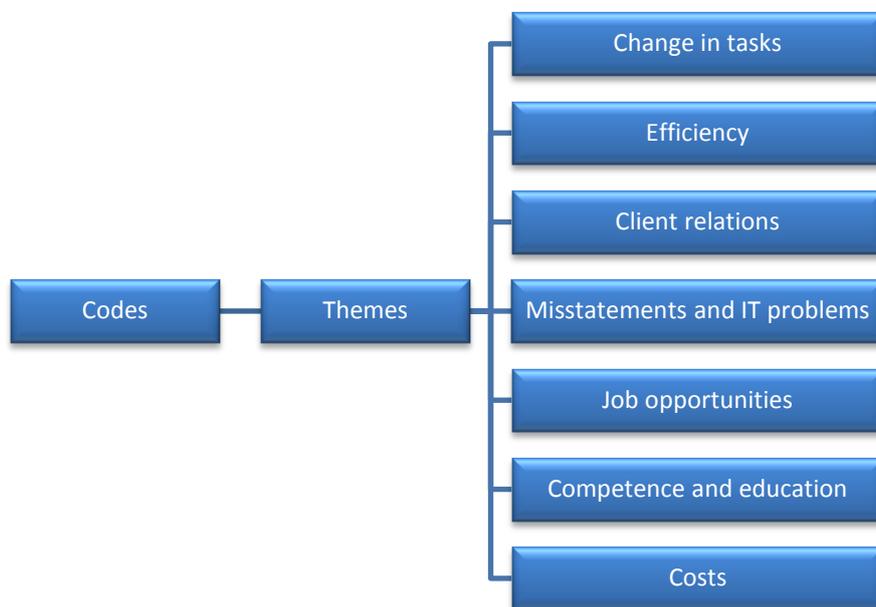


Figure 8: Themes of impacts

The themes were constructed through the answers by the respondents, and therefore, a disclosure of how the themes were composed will follow. First, the majority of the respondents mentioned that, when automation becomes more integrated in the daily work, the current tasks will change and completely new tasks will also arise. Today, the analytical and advisory services are an important part of the profession, but almost every respondent asserted that these services will be even more important in the future and will become a more central part of the accounting consultant profession. Several respondents also added that the role of a controller or big data analyzer will grow and the accounting consultant will most probably be a salesperson in the future in order to attract new customers and promote their automatic solutions. The accounting consultant may therefore need to be more familiar with the client's business, and be able to generate insights and conclusions about the market in their particular industry. Hence, due to the majority of the respondents stated that the future tasks by the accounting consultant will shift to new fields and increased analytical and advisory services, we are of the opinion that there are sufficient indications that the tasks will change for the consultants. Therefore, we consider that *change in tasks* will become the first theme.

The respondents also mentioned that, through the automation, the accounting consultant's tasks will become more efficient. This is an opinion shared among the majority of the respondents. With efficiency, the respondents meant that the working flow will become faster compared to when manually tasks are being performed. They also argued, when the use of automated processes increase, the total amount of manually tasks decreases which results in time efficiency for both the consultants and the accounting firm. Several respondents also asserted that automated accounting gives the opportunity to start the accounting process earlier than before due to enhanced availability of material and documents which facilitate the processes. Further, many respondents emphasized better control and overview of the tasks. We find that the results are sufficient to conclude that automated accounting brings efficiency to the profession, where *efficiency* will become the second theme.

When automated accounting increase in usage, the respondents emphasized the importance of a good relationship towards the customer. They assert that discussions with the customer will become a central part in the profession due to complex systems where the customer needs guidance. Therefore, according to the respondents, the contact towards the customer will increase but also lead to a different kind of client relation compared to today because of increased focus on other parts of the accounting process than the bookkeeping. Also, several respondents emphasized that they believe that the amount of customers will increase when automated accounting usage increases. On the other hand, some respondents mentioned that the personal meetings with the customers instead will decrease and it will become more of a computer oriented profession. Concurrently, the personal contact that will endure may be different, comparable to a customer-computer relationship. This objective relationship may even lead to a decreased amount of customers when clients usually like to talk about their business with the consultants. The majority of the respondents reflected about the relationship and therefore, we are of the opinion that these impacts form the third theme, *client relations*.

Moreover, the respondents also argued that faults and misstatements may arise in the process when automated accounting is used, in terms of faulty documents and increased amount of fake invoices. Lack of knowledge may also lead to increased faults, where the consultants believe that when the processes are fully automated one lose the economic skills, but there is still a need of human support in order to function correct. Furthermore, automated accounting may lead to less control which may cause misstatements. Other risks stressed by the respondents are related to the beginning of the implementation, where bugs may occur and therefore it may not work correctly. Finally, when all the documents are collected in the digital world, the accounting consultants are fully dependent on that the system is working faultless. One risk stated by the majority of the respondents was that if the system or the Internet is at a standstill, it would be a serious problem for the consultants. These several statements are sufficient to conclude that that they will represent the fourth theme, *misstatements and IT-problems*.

Several of the respondents argued that many jobs may disappear when implementing automated accounting because of less manual needs and stressed that the consequences will be less working hours and decreased job opportunities. The respondents argued that when clients themselves also adopt automated accounting, the demand of services offered by the accounting firms will decrease. On the other hand, when automated accounting will be available for companies, some argued that the accounting consultant's services will even be more needed because more faults will be made. Thereof, job opportunities may increase when the consultant are more demanded in finding the faults and correct them. However, the majority of the respondents shared the thoughts that the current accounting assistant and the

accounting consultants with less experience or qualifications belong to the group that may not stay within the profession. These risks are substantiated by many respondents and will together form the fifth theme, *job opportunities*.

Some of the respondents argued that automated accounting will lead to a lack of knowledge about the accounting process. They meant that the need of understanding accounting will not be of importance in the same manner as when the tasks are being performed manually, and the accounting consultants will therefore lose parts of their core understanding within accounting and economics. Several respondents also stressed that the future accounting consultant needs a broader set of skills, experience, and a higher competence. They mentioned that technological skills and an increased understanding of IT and computers is needed. Moreover, the respondents also mentioned that the qualifications of a salesperson are needed too in order to promote their automated services and incorporate them in the client's own accounting software. We consider that these arguments are sufficient to build the sixth theme, *competence and education*.

Finally, several respondents stated that automated accounting may be too costly for the accounting firms and their commissions. Some clients cannot afford such solutions, especially the small and micro firms, which may lead to a loss of the client because it is not economically defensible for the smaller customers with few transactions per year. One of the respondents also mentioned that the accounting firm's revenue will decrease which leads to less income for every activity. These arguments form the seventh and the last theme, *costs*. In Table 2 below, a summary of the number of respondents who have given emphasis on each theme is illustrated.

Table 2: The respondents' emphasis on themes

Respondent No.	1	2	3	4	5	6	7	8	9	10
Change in tasks	X	X	X	X	X	X	X	X		X
Efficiency	X	X	X	X	X	X	X	X	X	X
Client relations	X	X	X				X	X	X	X
Misstatements and IT-problems	X	X	X	X	X	X	X	X		X
Job opportunities	X		X		X		X		X	X
Competence and education	X		X		X	X	X		X	X
Costs		X		X		X	X	X	X	

6.2 Impacts of automated accounting

In the following chapter, the impacts of automated accounting on the accounting firms and the accounting consultants will be analyzed in order of the seven themes constructed. The impacts are analyzed in the light of the theoretical framework and the empirical findings from previous research.

6.2.1 Change in tasks

The implementation of automated accounting in an accounting firm may result in a great number of possibilities. As a result of the automation, several of the accounting consultant's tasks can be performed automatically which leads to less manual work for the accounting consultant (Uwadiae, 2015). As a consequence, there is also an increased risk for several jobs to be replaced or even disappear (FAR, 2013, p. 15, 23). On the other hand, Lupasc et al. (2012, p. 582), asserted that when the manual entries and tasks no longer are needed because

of the automation, the accounting consultants allows to focus on the analytical services instead and the consultants will have more time for the clients and their businesses. This is in line with the respondents' thoughts and views, where the majority of them elucidated that they will get more time for analytics and advisory to the customers. One respondent also mentioned that the profession will align with the tasks compared to a controller. When the processes become more automated, the demand of accounting skills will be even more important. Even though the advisory service and the analytical tasks are an important part in the profession today, it will be even more important in the future when the automated processes will increase in use.

The empirical findings in this thesis point on that the advisory services have already increased the last years, since the automation has become more introduced in the daily working tasks. This is in line with Alarcon and Staut (2017, p 3-4), who stated that the routine tasks will disappear and be replaced by advisory and analytical services. This may lead to an approved decision-making processes. The respondents stressed that there have already been a change to the more analytical and advisory parts of the profession, but are clear in their thoughts that it will increase even more in the future. An explanation may be that, when the accounting processes are digital and being performed automatically, the customers need the expertise and knowledge from the consultant to understand their business and the financial statements in a better way. Several respondents mentioned that their customers want the advisory service from the consultants in order to get a better understanding of their business and future. Such impacts may be an indication of an upcoming job polarization as argued by Goos and Manning (2007, p. 118), where an increased demand of more cognitive thinking is needed from the accounting consultants, which may result in a push out effect from the market and the tasks may be overtaken by other professionals.

Furthermore, Dahlberg and Carlsson (2014) argued that there will be a change in the assignments, where other tasks will arise through the automation. According to the respondents in this study, they believed that the future consultants need to act more as a salesperson and sell new solutions and services to the clients. In other words, they need to promote the services they offer to the clients and convince them why they should engage the accounting consultants. A possible reason why they may be required to act more as a salesperson is, when everything become automated, the demand of the accounting firm's current services will decrease. When the demand decreases, the consultants need to find other areas where they can be active. If the clients own enterprise planning system become automated, they will not need the accounting services anymore. One respondent also argued that it may become a challenge to prove to the clients what they can offer but at the same time, they may not have the analytical and advisory skills, which the accounting consultants possess. Bresnahan et al. (2002, p. 344) asserted that these kind of knowledges cannot be replaced by computers, but only the routine tasks conducted by the consultants. The reason hereby is the difficulty to program the system to perform advanced and complex tasks. Therefore, the consultants need to find areas where they can offer their knowledge and skills in order to improve the business of the customer. Many of the respondents were clear in their opinions that the proactive work will be more of importance in the future, where they have to be forward-looking and try to predict the future in order to see what actions they need to perform or not. The need for finding new services to offer, may be a solution for the profession to survive, as Brante's (2009) theory of profession includes the abstract knowledge factor, where one need to possess a knowledge to transmit to the public.

This new field of tasks within the profession may lead to a decrease of accounting consultants. The empirical findings shows that the amount of consultants that are pro the salesperson and promoting services are balanced with the amount of consultants that do not want to step into the new role as a seller. The opinions about it differed thereby between the respondents. Some respondents do like the shift to new services because they see it as a challenge and they want to develop and improve their skills. Other respondents are more critical to the idea of entering new areas. One explanation to this may be that they have chosen the accounting profession because of the introvert role as the accounting consultant profession was, or because the numbers, frameworks and the rules are interesting. There is no subjectivity and they like the process of manual entries and the administrative work. This is line with PDT, which explains that people do not want to change in the future and instead want to continue as in the past, even though new innovations exists. Furthermore, the historical behavior may be difficult to change. It may be more easy and comfortable to stay with the same tasks than to widen one's intellectual horizon, which requires the capability to think outside the box (Trouvé et al., 2010, p. 4). Thereof, the employees may be a constraint to the usage of automated accounting and its impact on the current tasks.

6.2.2 Efficiency

As mentioned, the implementation of automated processes in a business can lead to several positive effects. Through the automation and the corresponding decrease of manual handling, it allows the consultant to work more efficient. The systems and the computers give the possibility to perform activities without the human resource supporting it. Thereof, automated processes may affect the accounting processes in a positive way in form of productivity (Uwadiae, 2015). Our empirical findings are in line with such arguments, though our data shows that the respondents already experienced that their working flow has reached a higher level of efficiency even though full automation is not used. One respondent mentioned that, when the data and the documents are gathered and placed in a digital system, the accounting processes can be initiated in an earlier stage compared to when documents are printed on papers and collected into folders. The data is available from everywhere and anytime, which many of the respondents emphasized as a positive effect of automated processes. The respondents also stated that the automation allowed them to work from everywhere and anytime that suits them, and they are not forced to be at the office in order to accomplish the activities.

A constraint to increased efficiency is time-consuming tasks which are known for not being efficient. Manual accounting tasks can often be seen as time-consuming where the data needs to be collected from several different systems or divisions. This may lead to that data or documents will be delayed and will not reach the right person or division in time (Drum & Pulvermacher, 2016, p. 181). By implementing automated processes, it will facilitate the daily work for the accounting consultants and the tasks may lead to more efficiency. The respondents in our study argued that the working tasks can be performed in a faster manner with automated processes compared to when the tasks was being performed manually, which is also in line with Uwadiae (2015). As stressed by several respondents, such bottlenecks are not uncommon in today's accounting activities. Many accounting consultants struggle with the gathering of data, where their clients can show a slack in delivering the material. If the processes are automated, such struggles may be diminished. Furthermore, Uwadiae (2015) emphasized that a human being who does the manual entries cannot be compared to automated processes, because of its higher efficiency. It is a simplification of the accounting process when steps in the process can be reduced. Several respondents also mentioned that

there are less faults occurring with automation and the consultants become a better overview of the work due to most of the material is collected at the same place.

The PDT asserts that the actions taken in the past, in other words, the historical behavior, reflect the future decisions and actions. The reason may be that one is grown into the already existing processes and it may be cheaper and easier to stay in the same manner instead of change (Trouvé et al., 2010, p. 4). According to the empirical results in the study, this case can be applicable on the accounting consultants, though not only the participating consultants, but also other consultants working with the respondents at their firm. A few respondents argued that some accounting consultants do not want to change their way of working, and instead want to continue their historical behavior. An explanation may be the difference between the generations, which also some of the respondent mentioned. The younger generation has grown up with technology in a greater dimension than the older generation. For the younger ones, the technology belongs to the everyday use, which may count for the older generation too, but not in the same extent. For the accounting consultants who do not want to change their historical behavior, the reason may be that they do not want to learn new technology. Learning to handle new technology may take time, and many do not like new changes. New changes can be fearful in the way that there is something new and the one do not possess enough information about the new technology. The younger generation may be more open to try new things and the older generation show less willingness to let in new technologies in their life. Another reason may be that the older generation is not interested in new technologies. Zero interest often leads to that one does not want to learn the new tasks that comes with new software or systems. Even if the technology becomes more integrated in everyone's life, not everyone wants to accept it and be open to it. Furthermore, the respondents mentioned that these consultants will probably not stay within the profession in the future if they are not willing to change the tasks or their behavior.

6.2.3 Client relations

The Swedish Institute of the Accountancy Profession (FAR, 2016, p. 16) argued that the accounting profession is in the risk zone of disappearing when talking about automated accounting in the future. They do believe that the development of the processes will increase rapidly which will affect the consultants in a negative way. They predict that all the tasks belonging to the accounting consultants will be automated in the next two decades. Such arguments are also stressed by Taipaleenmäki and Ikäheimo (2013, p. 342), when the development of automated processes continues and when computers can perform accounting tasks by their own in the future, i.e. no human is needed, the knowledge of bookkeeping and accounting is not essential in the same extent as it is today. That may result in less clients that are demanding the expertise of accounting consultants, due to same knowledge of accounting is not necessary when computers can perform automatically. Taipaleenmäki and Ikäheimo (2013, p. 342) elucidated that these actions can lead to that the clients will no longer demand the accounting consultants for the accounting processes but instead operate on their own without support from accounting firms. If this happens, the accounting firms will lose clients in the future. These beliefs are however not shared with the respondents in the study. The participating accounting consultants do not see the development of automated processes as negative. Through the automation, new services as advisory will emerge and will become more important, which will result in a higher amount of customers. Even though several scholars do believe that the profession will die out, because of less commission and sinking amount of customers, the accounting consultants are clear in their thoughts that the automation will bring new customers because of more advanced processes.

Through the new services, and especially the advisory services, the personal contact with the customers will increase and become more important. Some respondents mentioned that, due to more advanced processes and systems, the customers are in need of expertise and will therefore demand more help from the consultants in order to enhance their business and allow them to focus more on the business instead of the accounting tasks. The statements by Taipaleenmäki and Ikäheimo (2013, p. 342-343) are thereof on the contrary to what is discovered in this research. The respondents believe that the contact with the clients will change and become more important and more frequent in the future compared to nowadays. They also believe that there will be more discussions between the consultant and the client and the customer value becomes more important due to the increased objectivity that arises between the parties through the automated processes. By objectivity, we mean the computers way of talking instead of bringing the subjective opinions and thoughts of the accounting consultant. The objectivity will increase when computers are taking over the processes and activities. Therefore, the personal discussions with the customer will become more important in the future.

Even if there are several positive effects of automation regarding the customers and the contact towards them, some respondents stressed that negative consequences will follow. One respondent mentioned that the automation may lead to less personal meetings with the customers. Through automated accounting, the majority of the tasks and activities are digital but also the contact between the parties. The respondent sees a risk that the personal meetings will disappear and state that the relation to the customer will therefore be suffering or even go lost. Another respondent believes that, when the processes goes automated, the customer will see the accounting consultant more as a computer than a human being, because of the majority of the tasks are being performed automatically in the system. The risk will be that the human being will be compared with computer software. However, according to Sun and Lu (2017, p. 1-2), the human can never be completely replaced by a computer. The scholars state that the computers and its software are not enough developed to perform tasks as analyses or interpretations, where therefore a human being is needed. Another respondent mentioned the risk that the communication between the accounting consultant and the customer may die out if everything becomes automated. The relation may turn into a static communication and will not be improved. The relation between a customer and a computer cannot be compared with a relation between a customer and an accounting consultant. That relation is not pleasant, but is also difficult. The respondent continued by saying that the customers usually wants to talk about their business and future, which may be truly difficult with only a computer.

6.2.4 Misstatements and IT-problems

Automation is still in its initial phase in the accounting field. According to the respondents, automation has faced an incremental implementation during the last five years, where some extent of automation has been available on the market for at least ten years. Considering the new development, it was not a coincidence that it has its flaws. As Alpar and Winkelsträter (2014, p. 2267) argued, predetermined rules in the automation which should make it operating properly are important to generate quality in the financial statement and they also added that the involvement of humans in the process may decrease the quality. According to our empirical findings, these arguments only apply partially. The software developers may have released their products too fast. Many respondents argued that misstatements, faulty readings of scanned documents, and the risk of misstatements has already been discovered or they emphasize that it will increase even more in the future. Hence, humans are needed to correct such misstatements and their involvement will rather increase the quality of the statements because they may have to correct the wrong entries. Thereof, Sun and Lu (2017, p. 1-2) who

argued that today's computers and software are not good enough are more in line with our results. However, our results indicate that the trust in automation is lacking, and the accounting consultants still sees a risk of misstatements as a future problem as well. Moreover, a significant number of respondents argued that the process of automation is difficult to implement, and many malfunctions are encountered in the beginning of the implementation process. There was though not possible to extract if the problem derives in lack of skills to handle the new technology as Wilson and Sanger (1992, p. 71-72) and Nyang'au et al. (2015, p. 1549) emphasized as one major constraint to automated accounting, but it is possible that it is a combination of lack of skills and inferior software.

Moreover, the shift to automated accounting will also give the accounting process a greater dependability on Internet connection, electricity, less malfunctions of systems and safety. A problem that has been encountered by the accounting consultants is the disconnection to Internet and lack of electricity, which stalls the process and they cannot perform their tasks. As Dimitriu and Matei (2015, p. 669) stressed, this problem will continue to interrupt the process in the future and there are currently no solutions to it, which will make it persist even for a significant time ahead. Regarding the safety issue, where Dimitriu and Matei (2014b, p. 239-240) and Ionescu and Prichici (2013, p. 284) argued that hacker attacks will cause a severe damage to the accounting firms in terms of loss of data and disruption of the accounting process, where not concerns that was emphasized by the respondents. Only one felt that these problems were of significant interest and will be a consisting problem. What instead could be seen in this study was a perception of less control over the accounting process and accounting data, which Dimitriu and Matei (2014b, p. 239-240) also emphasized in their study. Less control of the process and the data, derived from the decrease in manual handling and the storage of data on external servers, which still is seen as the future of accounting. Since such anxiety is inherent in the personality, it may remain as a future problem until more trust is gained.

As stressed by several scholars (e.g. Borgia, 2014, p. 3; Dimitriu & Matei, 2014b, p. 239-240; Du & Cong, 2010, p. 68; Ionescu & Prichici, 2013, p. 284; Payne, 2014, p. 492; Quinn & Cleary, 2014, p. 39), the use of digitized solutions and automated accounting may lead to an increased security risk in terms of hacker attacks, loss of data, breaches and intrusion. Such extensive emphasize was not encountered in the empirical data of this study. Only two respondents argued for such increased risk, which we find peculiar. An important aspect to include is that one of the respondents who emphasized such risks also was responsible for the accounting solutions in the firm, which may be a reason for the awareness. We could though not draw any conclusions if such neglect of security risks depends on unawareness or lack of knowledge among the accounting consultants, but it could also be a result of interest where they feel that it is not within their professional boundaries to prevent or detect.

6.2.5 Job opportunities

As stressed by Frey and Osborne (2017, p. 278) and the Swedish Foundation for Strategic Research (2014, p. 6-7), automated accounting will result in a loss of job opportunities. The empirical findings comply with such statements to a certain extent, however contradictory arguments were found. Almost all respondents argued that automation leads to less people involved in the process, which already has been faced during the later years when some tasks, such as account distribution, involves fewer persons nowadays. Mainly, the respondents argued that it is the repetitive tasks that face the greatest risk of being replaced by automation, which is often assigned to accounting assistants. Accounting consultants with less experience in the profession or accounting assistants are perceived by the respondents as in the risk zone

to relinquish, which is in line with Nagarajah's (2016, p. 35) standpoints. This is an indication of job polarization where the middle educated category of employees are pushed out of their profession, as expressed by Goos and Manning (2007, p. 118) and Shim and Yang (2018, p. 144), and need to find a more cognitive orientation to keep their jobs.

On the other hand, cognitive tasks such as advisory are not possible to replace by automation and will still need accounting consultants even in the future (Bresnahan et al., 2002, p. 344; Greenman, 2017, p. 1453) which also were confirmed in our empirical data. Such cognitive work is often conducted by a senior accountant or a more experienced professional and the respondents argued that those professionals are safe from being replaced even in the future. However, some respondents argued that it is just a matter of time when computers would be able to do a part of such tasks, and it is also the older generation who struggles with new processes and digitization in general, which may lead to a loss of jobs for seniors as well, which are contradictory findings to Sun and Lu's (2017, p. 1-2) arguments. There were also findings which relate to the seniors, who are not open to new solutions and older techniques may be locked in as in the explanation given by the PDT. These persons are not ready to adapt to the new technology and may be related to the educational factor in the model as presented by Trouvé et al. (2010, p. 4). Such conclusions are though too harsh to draw, where only a few of the respondents emphasized the loss of seniors, but the decrease in accounting consultant assistants is more grounded in the empirical findings.

As automated accounting is increasing in usage, less hours will be given to the accounting process and in turn decrease the number of job opportunities. Furthermore, when automated accounting becomes rooted in the client's own enterprise resource planning systems, it will be more difficult for the accounting firms to promote parts of their services and attract new or keep the current customers. Hence, as stressed by the respondents, the accounting firms need to find new services to offer, such as big data analyses or other, more industry analytical tasks. But with the new services or the increased misstatements derived from increased usage of automated accounting by the clients, there was a common perception that even more jobs will be available, which constitute a conclusion not found in any of the previous studies. The respondents also mentioned that more clients will be equal to more jobs. They do believe that the possibility of new and other sorts of tasks will occur which leads to new types of working tasks, and therefore a higher number of vacant jobs. A higher number of jobs also require a higher amount of personnel. Such conclusions are neither found in previous studies.

6.2.6 Competence and education

The accounting consultant will no longer have the same competence in the future. The future employee needs a combination of technical skills and economical skills to be adapted to the new processes, and also be able to understand the technology behind the automation (Zhang & Gu, 2013, p. 143). In this study, evidence was found that this argument holds true, and almost all respondents argued that there is currently a lack of technological skills, and the demand from the accounting firm of such skills will increase even more. While some respondents only argued that brief technological skills are needed, which also is stressed by Güney (2014, p. 855), other respondents argued that the future consultant needs to understand the underlying technology to be able to incorporate the automated solutions into the client's enterprise resource planning systems. This study also found evidence that the accounting consultant assistant may even be replaced by IT-consultants to comply with technological development, which is not found in previous empirical studies. This is an indication of a future job polarization, as stressed by Shim and Yang (2018, p. 144) and Frey and Osborne (2017, p. 265), where individuals with a certain level of education and income will be pushed

out from the market. An IT-consultant may be categorized as a more cognitive profession, where it is difficult for computer to solve problems generated by computers. Instead, a more cognitive ability is needed to solve such problems and promote the technological solutions the firm will offer.

The need for an IT-consultant instead of an accounting assistant relates to shift in competence towards a more salesperson rather than an economist. When the current recordings are no longer entered by humans, assistants may instead both promote and incorporate it into the client's current business processes. Many respondents argued that the salesperson perspective will increase, when the clients do not have knowledge of the new automated accounting processes, and instead the accounting firms need to promote the new solutions. The salesperson must therefore know the underlying function of automation, to know how to incorporate in the best way as possible for the clients. Hence, instead of doing the manual handling of the accounting process, the assistant who has shifted to an IT-consultant, need to both promote and be able to incorporate the solutions. The shift to IT-consultant rather than an accounting assistant was not emphasized by previous scholars, and this change may depend on location and market competition where places such as Umeå, where this study was conducted, does not have an unlimited number of companies who demanding the accounting consultant's services.

Furthermore, when the accounting processes becomes more automatic, a substantial finding was that the accounting consultants will in the future lose or lack the basic understandings of accounting which is in line with the arguments by Taipaleenmäki and Ikäheimo (2013, p. 342). When the process is made automatically, one will lose the comprehensive view of bookkeeping. A new education is needed to prepare for these changes (Güney, 2014, p. 855; Pincus et al., 2017, p. 7) which also were a common understanding to our respondents. Whilst the respondent argued that the comprehensive view of basic accounting will diminish, the higher education also needs to incorporate technical classes in their syllabuses to comply with the changes on the market. Hence, the universities need to both educate the graduates more basic accounting skills and computer technology.

According to Brante's (2009) theory of professions, one could draw the conclusion that the accounting consultant is a dying profession. Several of Brante's (2009, p. 25-28) underlying factors of a profession are at stake, where first of the education is in a transition phase. Higher education is needed, but with no change, the education is not sufficient to access the market. Secondly, automation affects the autonomy of a profession. One is no longer characterized by independency to make own decisions when the process is automated. Third, the trust in the importance of the accounting consultant is already in an imbalance, where many of the respondents argued that mainly the accounting assistant will no longer be needed. Nevertheless, the knowledge conveyance is no longer present when the tasks are no longer demanded by the society. Yet, the accounting consultant is not on the verge to disappear according to the empirical findings, because the consultants will adapt to the external changes and develop their knowledge and services to comply with the changes but in the light of Brante's (2009) theory of professions, accounting consultant will not be a profession in the future.

6.2.7 Costs

During the interviews, interesting aspects were brought up. According to the respondents, the technology is already available on the market for implementing automated accounting but is yet to be used. When analyzing these aspects, the first constraint, *cost perspective*, and the

fifth constraint, *difficulty to find software*, as presented by Wilson and Sanger (1992, p. 71-72) were found as still valid. The most emphasized by the respondents was the cost perspective, where automated processes are still expensive to implement. Commonly, automation is presented as a cheap solution which reduces the expenses, which is true, but often the implementation process is overseen. When the costs are still too high to implement, the technology investments are not considered priority. Considering the other aspect, difficulty to find software, relates both to the usage of software and to the lack of knowledge among the accounting consultants. The accounting consultant firms are sometime restricted to specific accounting software depending on the preferences of the client. They do neither want to force the client to use other software. Thereof, automation cannot be implemented yet by the full functionality because it is difficult to find automated solutions that are financial viable to be integrated in their current software and the knowledge among the accountants is lacking to make it possible.

Furthermore, in Umeå, the clients of the accounting firms are primarily considered as micro, small or medium sized enterprises where many of them have few economic transactions during a fiscal year. Hence, the implementation of automation may not be economically defensible because manual handling is still the cheapest process to use. One respondent argued that the targeted client group needs to be changed in order to even make the automated accounting worthwhile. On the other hand, Ohlsson (2015, p. 17) argued that many accounting firms are charging their clients per hour, and with less hours laid on the accounting process, the service may become cheaper and result in more clients. This was considered a problem among some respondents, where they are concerned about the profitability in the future. If the accounting process is automated, the time laid on clients reduces and their profits may not be covering the cost for using an accounting consultant, which could lead to loss of jobs or even a lock in of old habits, as the path dependency theory proposes. One of the participating firms is already considering a fixed price for their services, because the charge per hour is no longer profitable.

6.3 Attitudes to automated accounting

Below will an analysis of the attitudes expressed by the respondents follow, which have been allocated in themes derived from the technology acceptance model. Thereof, they are themed into perceived usefulness and perceived ease of use which are the two pillars in the model, as expressed in chapter 3.4. We find the pillars in the model as adequate themes for this study, where it will bring an enhanced theoretical view of how attitude is constructed towards automated accounting, rather than creating new themes.

First off, one underlying factor that made the respondents indicate a positive attitude was the fact that automation will facilitate their daily work. Further factors which the respondents mentioned were that automation brings challenges into the profession which leads to increased efficiency and personal development. Several respondents argued that when the repetitive tasks will be reduced, a significant positivity about the new approaches of working was shared among the respondents. Furthermore, automated accounting leads to a more fruitful job where several of the respondents mentioned that that the customer value will increase and the customer will therefore become more satisfied. Although, several of the accounting consultants did also express a negative attitude towards the usage of automated accounting. Some respondents mentioned that they are anxious and worried about the change of tasks, and especially the change to become more of a salesperson. They do not like the idea of promoting the services and products to the customers which generated inconvenience about the future. Nevertheless, automated accounting requires enhanced technology skills which

made some respondents feel worried and created concerns about the future, where the requirements of the accounting consultants may raise which made them anxious. These statements are in our opinion sufficient to conclude that that the pillar *perceived usefulness* will constitute the first theme.

Furthermore, the respondents mentioned that automated accounting will result in an easier way of working. Positivity was expressed when it will ease the profession as an accounting consultant and due to the automatic performance of their tasks, and increased amount of time is possible to spend on other tasks and an increased possibility to focus on parts which may be of more importance. Nevertheless, half of the accounting consultants mentioned that they think it will become a challenge to convince all the consultants to introduce the processes in their daily work. Some respondents mentioned that the processes are complex and difficult to learn and several individuals do not see the advantages of automation. Negative attitude was expressed when increased pressure and more responsibility is required, but also a lack of trust towards the systems made some respondents express criticism. Such argument fits under the second pillar, *perceived ease of use*, which will together form the second theme.

We did find some factors that did not fit under any of the pillars in TAM. Some respondents did not feel anxious about losing their job, instead, they were positive about the future. They felt positive to a change and mentioned that the change will lead to new ways of thinking and new approaches, which symbolize a new start in the profession. Even though there was a high positivity, also negativity was found. Some respondents did not want to change their job, but also felt fearfulness to changes where arguments that changes can be unpleasant and uncomfortable were present. These arguments and aspects found did not reflect perceived usefulness nor perceived ease of use and were therefore categorized under the theme *other factors*. Examples of the codes used for the thematic process of attitudes can be found in Appendix 4 and an illustration of the themes can be found in Figure 9.



Figure 9: Themes of attitudes

6.3.1 Perceived usefulness

Perceived usefulness, if the individual thinks the technology will enhance the current situation, was the factor that created the most positive attitude towards automated accounting in relation to perceived ease of use. A great emphasis from the respondents was that automation leads to less repetitive work, less tedious tasks, and one could focus more on important tasks to create customer value, which generated a positive attitude towards automated accounting. Hence, the factors job relevance and quality output in TAM were of great importance for the positive attitude. Also, when the repetitive tasks disappear, they have to deal with new processes where they perceive themselves as novice, which had an impact on their professional development. Thereof, the cognitive perspective in the ABC model was also of great importance to their positive attitude. But such change in tasks also drives the negative

attitude towards automation, when their jobs are at stake. The affection perspective in the ABC model thereby brings negative attitude, but not to the extent that they show a neutral attitude, rather they are ready to change in accordance with the environment than show a negative attitude towards the implementation and its impacts.

When the repetitive tasks are abolished, a positive attitude also derived from the result demonstrability perspective in TAM. If the processes are faster and the working procedures are more effective, it generated a positive attitude which gives both the affect and the behavior perspective in the ABC model a significant meaning when it comes to attitude towards automation. But result demonstrability could also be the factor that drives a negative attitude towards the automated accounting. Many respondents argued that automation will bring more misstatements, which was a factor that tended to generate skepticism towards it. Such thoughts derived from previous experience of automation, hence the cognitive aspect in the ABC model is also the perspective that could drive negative attitude.

The final aspect that drove the biggest negative attitude towards automated accounting was the change towards a more salesperson than an accounting consultant. Once again, the cognitive perspective in the ABC model, where the accountants' beliefs are of interest, drives negative attitude. The belief in losing their current tasks and changes toward another profession created skepticism, and if so occurs, arguments of leaving the profession were present. Such beliefs could not be analyzed in the light of TAM, where no suitable subcategory exists.

The extensions subjective norm and image in TAM were not as emphasized by the respondents. Social pressures and status were not brought up as a reason for their positive or negative attitude, which may have its reason in that the environment does not demand automation from the accounting consultants. As one respondent argued, the accounting field is not considered as a profession that are associated with automation and the clients were more negative to technological changes than the consultants, which may reduce the social pressures on the consultant. Voluntariness was neither an important aspect according to the respondents. We could not find that compulsory usage was a factor that affected the attitude, rather it they argued that one had to adapt to the current environment to survive in the profession.

The conclusion is that the most important perspectives of TAM were job relevance, quality output and result demonstrability, which drives both positive and negative attitudes. Also, from the ABC model, the cognitive factor was the most emphasized factor to the respondents in this research where previous knowledge and beliefs are commonly used when talking about the future. It is however important to mention that the positive attitudes outweigh the negative attitudes, where even though some negative aspects from perceived usefulness are present, it were not sufficient to create a strong negative attitude towards automated accounting.

6.3.2 Perceived ease of use

The perceived ease of use and the belief in how easy the automation will be to use, generated a mixed attitude towards the technology. While many of the underlying factors that created positive attitudes could be classified to perceived usefulness, a significant amount of the arguments that created negative attitude could be classified under perceived ease of use in relation to the positive arguments.

Starting with the arguments that generated a positive attitude, all of them evolve from the behavioral component of the ABC model, which means that previous experience affects the attitude. When several other processes in the accounting process have been automated, a general reason to the positive attitude derived from previous experience. When the other processes have been automated, the respondents felt that such processes also have been simplified and less effort is needed, which are also thoughts that were applied on processes that are yet to be automatic. When previous application of automation also have shown to be free from effort and facilitates the accounting, one could also argue that the affection component in the ABC model can be applied, where a positive feeling towards automation generates a positive attitude to future installment of other automatic procedures. Moreover, the cognitive component of the model, i.e. knowledge of automation, also had affection on the attitude, where the general perception of automation was that it leads to a simplified working procedure which generated a positive attitude. The positive feelings are however a result of previous experience of the automation, hence all positive attitudes are generated from the behavioral component.

On the other hand, perceived ease of use was the factor that created the most negative attitude towards automated accounting. When breaking down the answers to the underlying assumptions that determine the attitude, the affection component in the ABC model had less significance, where only one respondent showed a negative emotion toward automation because of lack of understanding the advantages of using automation and in turn expressed a negative attitude. The behavioral component in the same model had a greater impact on the attitude, where previous implementation of automated applications has led to difficulties in the start-up phase, led to increased stress and pressure, and showed difficulties in usage in general. The third component, cognition, also was of significant magnitude, where distrust and uncertainty to the system was important concerns. The cognitive component also was the factor that made it difficult for the firms to adapt to the new way of conducting the accounting tasks, where the resistance is related to cognitive aspects.

To conclude the attitude analysis in the light of perceived ease of use, it contained the most negative attitudes in relation to the other pillar. As described, the behavioral and cognitive component in the ABC model were also the most important factors that created a negative attitude towards automated accounting and the impacts which it generate. It is though difficult to exclude the affection component, where an emotion towards an object also can be connected to previous experience and beliefs, but tended in our interviews to be a less important factor.

6.3.3 Other factors

TAM was not able to entirely explain the attitudes towards automated accounting, where some arguments from the respondents did not fit under perceived usefulness or perceived ease of use. As stated by Brandon-Jones and Kauppi (2018, p. 35), perspectives of individual differences are lacking in the model, which was encountered in this thesis. Thereof, the ABC model was a necessary complement in the analysis.

The affection component in the ABC model was of great importance when analyzing the individual perspective. As the component describes, emotions towards an object constructs an attitude, and an interesting observation was that those who had a strong personal interest in technology and technological development, also expressed a positive attitude towards automated accounting. An interest in technological changes and new technological functions drove a positive attitude towards automation and on the other hand, those who did not have

the same technological interest showed a skepticism towards it, where fear of something new existed. Moreover, automated accounting also was perceived as a factor that drove innovative thinking, which was appreciated by the respondents and created a positive emotion.

Finally, the cognitive component was also of significance from an individual perspective. The beliefs of being replaced by a computer may cause a negative attitude towards the implementation of automated accounting. From the empirical material in this thesis, one can see that the more experienced accounting consultants tend to be less negative than less experienced accounting consultants in the light of the risk of losing the job. They had a belief that their experience may keep them safe from being replaced, but could not present a proper reason. The less experienced accounting consultants instead had a belief that it is just a matter of time when the technological development also could replace cognitive tasks, hence all should have a more negative attitude to the implementation.

7. Conclusions

Below follows the overall conclusions made from this study which answers our research questions. Moreover, theoretical and practical contributions of this study are disclosed and recommendations for future research that have been found are described.

7.1 Overall conclusion

Automated accounting is on the verge to be implemented in the accounting firms. Yet, research is scarce in the light of accounting firms and their consultants and how they are affected of such changes in their processes. The aim of this study was to explore what impacts the accounting firms and accounting consultants could expect from the automated accounting and the accounting consultants' attitude toward automated accounting. The interest in these particular questions derived from the increased debate from practitioners and newspapers, where arguments of loss in jobs and decreased need of accounting consultants are present. Prior researches which study automation are available, though they are conducted in other contexts or given a significant interest in auditing. This neglecting in accounting firms and accounting consultants raised two research questions to be answered, where the first is:

- *What are the potential impacts of automated accounting for accounting firms and their accounting consultants?*

The answer is that all of the respondents were of the opinion that the profession of accounting consultant of today will most probably change in the future because of the automated processes. We found seven themes that may have the most significant impacts on the accounting firms and their consultants, namely *change in tasks, efficiency, client relations, misstatements and IT-problems, job opportunities, competence and education, and costs*. From these themes, the most emphasized impacts by the respondents were as follows.

- Advisory and analytical services may dominate the industry. If the respondents are right, automated accounting will lead to more financial misstatements, which drives the increased help with analytical services.
- The accounting consultant assistant will most probably be replaced by IT-consultants because routine tasks will be automated and assistants have insufficient experience. Moreover, in the long term, all consultants will be salespersons rather than accounting consultant.
- The accounting process will be faster and more efficient both in terms of costs and time.
- Less accounting consultants may be needed if the accounting firms do not extend or diversify their services.
- The future accounting consultant may need to possess a different education. More technical knowledge will be needed from the graduates.
- Local offices with smaller clients may not be as affected as bigger offices with bigger clients, due to automated accounting is not economically defensible when the clients only have a limited number of financial transactions.

The second research question relates to the accounting consultants' attitude to the upcoming changes, and is constituted as follows:

- *What are the accounting consultants' attitudes towards automated accounting?*

The answer to this question is that a significant proportion of the respondents in this study were positive to automated accounting in general because of its perceived usefulness. Only one accounting consultant tended to be negative towards automated accounting. Because of the distribution between positive and negative attitudes, we could not find any significant differences between the groups when it comes to different variables, such as experience or position, and it is also difficult to draw any other conclusions than that automated accounting is broadly welcomed by the majority.

On the other hand, the attitudes were mixed when instead focusing on the impacts it could generate. The positive attitude to automation mainly derives in the shift from repetitive tasks to more cognitive work, increased contact with clients and a personal development when new tasks are introduced. Even if the majority of the accountants showed a positive attitude, they expressed some concerns that increased their hesitation to the usage. The negative attitude did in general derive from an increased risk of misstatements, fear and distrust in new technology, and an unwillingness to change their tasks to more selling characteristics. Some respondents also emphasized the fear of losing the job or the risk for a decreased demand in the firm's services as a reason for their negative attitude, but it was too few to state it as a significant result.

An overall conclusion about the attitude is, despite the negative tendency to certain impacts, that the majority of the accounting consultants are positive towards automated accounting and their impacts. One main reason may be that the advantages of using automation in accounting overweigh the disadvantages, and the respondents also emphasized that they probably already have or will have enough experience to not be affected by the negative impacts when they emerge.

7.2 Contributions and socio-ethical implications

This thesis has brought several contributions, both theoretical and practical. Starting with the theoretical contributions, this study has been conducted in a new field which has been neglected in previous research. Impacts of automation in an accounting firm's perspective are considered as a field of scarce research, which this thesis has shed a new light on. Furthermore, new impacts have been discovered, e.g. the shift to a salesperson and the substitution of accounting assistants to IT-consultants, which has not been discovered in the literature review.

The technology acceptance model has also been used when analyzing the attitudes among the accounting consultants. The model could though not give a proper classification of all underlying assumptions that creates an attitude towards an object, where perceived usefulness and perceived ease of use was too narrow, which is in line with previous criticism to the model (e.g. Legris et al., 2003, p. 202). Our criticism shows that TAM cannot be used in all fields yet, and need to be more studied to give an exhaustive set of factors that explains the attitudes.

The thesis has also brought some practical contributions. First off, it has discovered new impacts that could be of interest for managers in accounting firms. The shift in demand from accounting assistants to IT-consultants in the future is necessary for managers to know when hiring new employees. Moreover, it has shed a light on impacts that could appear in the future, where practitioners have given their thoughts about what will happen. Such impacts should be of interest to many parties in the accounting process.

Furthermore, the findings have also shown that the current higher education will not be sufficient for the future accounting consultant. Such findings are of practical interest for institutions when reformulating the future syllabus for accounting programmes. The technology knowledge has to be improved and IT courses have to be introduced to the students, otherwise they will not be ready for the changing climate within the accounting consultant industry.

From a socio-ethical perspective, our findings have point out several implications that have to be considered in the society. Our findings about reduced availability of jobs are consistent with previous studies in automation, and should in our opinion create an increased debate in the society. One can argue for the benefits of automated accounting in several perspectives, but one cannot deviate from the risk of loss of current jobs or inadequate and insufficient education among the current students who soon are going to be graduated. According to the Swedish Foundation for Strategic Research (2014, p. 7), 50,000 economists may lose their job in the future due to the automated processes and one has to consider what will happen to them. The value of the accounting profession is inherent in the professionals' skills and ethics and not in computers, and instead of being replaced by computers, accounting consultants need to co-work with them to keep the value. This is however a more holistic, political issue, where one has to consider the ethical perspective and weigh the advantages to disadvantages of substitute people by computers.

Despite this ethical dilemma, the findings should also start discussions of the environmental affection, where automated accounting and its subconcepts reduce the environmental destruction and should in some sense be a required norm. Digitalization, autonomous processes, and digital archives heavily reduce the environmental impacts and is an important perspective for both stakeholders and the society in general. One could question the accounting firms' norms and why they too easily accepting their clients' willingness of being manual instead of going digital, where a shift could have an enormous positive impact on the environment. This does not necessarily not only applies to the firms' clients, but also their employees as well, where our empirical data shows that many still want to keep the old fashioned manner of work. The challenge of climate pollution and awareness of social responsibility in business should be more emphasized and an increased dialogue with the stakeholders may result in a more positive attitude towards automated accounting and its impacts.

7.3 Limitations

The study has been limited to accounting firms in Umeå and the impacts discovered may be limited to the particular city where the accounting firms have many small clients. However, even if they are local offices, the same processes are used within the corporate group and thereof may encounter the same impacts. Moreover, we did not get a wide spread between experienced and unexperienced accounting consultants, which may limit the perception of impacts and may have different attitudes towards automated accounting. Individuals with lower experience may express more negative attitude to automation because they have an increased risk in being replaced and such conclusions were not possible to draw in this study. The spread of age was also a limitation to this study, where younger individuals may have another view of technology than older individuals where many respondents argued that they have been in the industry too long and do not express a fear of being replaced.

Another limitation relates to the nascent stage of automated accounting. The respondents have only encountered automation in a limited degree and many answers are thereby personal

opinions of what will happen in the future. The findings are thereby limited to potential impacts by professionals and the inclusion of professionals who develop the solutions may give more concrete impacts of what will come. Since this study is limited by time and geographical restrictions, we have not been able to include such individuals in this study.

7.4 Future research

This study was conducted in a time when full automation was not yet implemented, and the accounting consultants' tasks have only been automatic to a certain degree. When full automation is not implemented, the impacts we have discovered are only a mix of already discovered and assumptions of future impacts, hence a future research could thereby be conducted when more processes have been automated and generated more, visible impacts. Thereby, the future research could substantiate our results or give new insights to impacts that we have not discovered.

Moreover, we did not find any differences in attitudes among experienced and new accounting consultants, which we found odd. We had a preconception that people who were in the younger generation or relative newly graduated would possess a more negative attitude towards automation because they, according to previous research, have tasks that are in the risk zone of being replaced by computers. We found though that Umeå as a region have too many small companies where automation may not be economically defensible to implement. Future research could thereby be conducted in a bigger city that has larger companies, which may tend to need automation in a greater extent. Hence, the consultants thereby have an increased risk of being substituted and attitudes may differ, and a more significant difference may be discovered between assistants and senior accounting consultants.

Furthermore, many of the accounting consultants in our study complied with previous research that there may be a decrease in job opportunities due to the repetitive tasks are made by computers in the future. We found though that the repetitive tasks are most probably going to disappear and be replaced by other tasks that are cognitive or analytical, which not may cause a decrease in jobs. A quantitative study if the jobs decreases or remains constant could be conducted in the future to see how it turned out.

Finally, we chose to focus on accounting firms that have more than 10 employees because they tend, according to scholars, to being in the leading edge of using new technology. Interesting discussions during the work-in-progress seminars during the thesis course and lectures in previous courses have though given insight to small companies, which may even have better technology than bigger companies, due to their need of being more competitive. Small accounting firms may thereby have more automated processes and future research could focus on such firms to see if there are any differences in impacts and attitudes.

8. Quality criterion

To conclude the thesis, considerations about truth criteria will be brought up in this chapter. The chapter starts with general information about which criteria that have to be considered and ends with reflections about this study in the light of such criteria.

8.1 General information

In research, scholars usually refer to reliability and validity as the two criteria in quality measurements when conducting a study. Reliability encompasses if the findings would be similar if the research would be performed once again. Validity on the other hand, refers to if the findings in the study are relevant and if the researcher who is conducting the study is measuring the right concepts (Saunders et al, 2012, p. 192-193). Guba and Lincoln (1994, p. 114) state that the two concepts should not be used in a qualitative study and argue that reliability and validity should only be used in quantitative studies. According to Golafshani (2003, p. 601), it is the differences in purpose between quantitative and qualitative research that makes the original concepts of quality measurements not suited for qualitative studies. Other scholars have referred to as using reliability and validity in a qualitative research equals a poor research (Stenbacka, 2001, p. 552). Guba and Lincoln (1994, p. 114) suggest two other concepts, trustworthiness and authenticity, that are more suitable when referring to quality measurements for qualitative studies.

8.2 Trustworthiness

The concept trustworthiness can be divided into four different categories, where all concepts are similar to the quality concepts within quantitative research. The categories include credibility, transferability, dependability and confirmability (Guba & Lincoln, 1994, p. 114; Bryman & Bell, 2015, p. 380). A further description of the categories and how this study relates to the criteria will follow below.

8.2.1 Credibility

The concept credibility refers to internal validity and includes if the results can be considered as trustful by external parties (Bryman & Bell, 2015, p. 380; Tracy, 2010, p. 842). Hence, this means how realistic, logical and conceivable the findings can be interpreted from other scholars and external parties (Tracy, 2010, p. 842). As stated by Tracy (2010, p. 843), credibility is characterized by extensive information on a detailed level. Furthermore, it is of importance that the scholars of a study ensure sufficient and accurate information in order to ease for the reader to draw own conclusions. This is also in line with Shenton (2004, p. 73), who argues that a solid and rich description is required. For the theoretical framework in the study, several different sources were used to ensure such credibility. The authors used interviews as the sole technique to collect data for the study, and even though the limited amount of time, the authors believe that it was sufficient in order to generate dependable and trustworthy conclusions in the study, due to interviews of several accounting companies and the big amount of information delivered in the interviews. The respondents in the study also possess varying degrees of experience and obtain a profession as an accounting consultant which are representative of other cities in Sweden and should give a greater credibility.

8.2.2 Transferability

Transferability corresponds to external validity which measures how the results can be generalized to other situations (Bryman & Bell, 2015, p. 380). A main concern about qualitative research is that the findings are applied to a specific group of participants and environment which result in difficulties to apply the findings on other situations (Shenton,

2004, p. 69). The credibility of generalization can be derived from using known, adequate theories and apply them on one's own study. Such methodological approach is however more representative in an experimental or statistical approach. As the study gets more subjective, as in an inductive approach, it cannot be guaranteed that the reasoning and observations can be applied in a later time perspective and the generalization will be uncertain (Lukka & Kasanen, 1995, p. 74). Since the qualitative studies grasp the underlying assumptions held by the respondents and a contextual understanding, it is difficult to generalize the conclusion in another context because the assumptions are embedded in the chosen respondents, not in a population as a whole (Polit & Beck, 2010, p. 1452). This is also emphasized by Morgan (2007, p. 73) who argue that qualitative studies are used for the contextual knowledge while quantitative research is used for the generalizability. In this study, the purpose is not to generalize the findings to a whole population. Rather, it can reveal the underlying circumstances in an accounting context, and reveal assumptions that later can be tested with another method or sample, also known as transferability (Polit & Beck, 2010, p. 1453). The attitudes from the participants may vary between different people depending on both external and internal affections, though we do want to emphasize that the companies included in the study are spread nationally in Sweden, hence the general impacts may be similar in other cities.

8.2.3 Dependability

Dependability is the qualitative research version of reliability (Bryman & Bell, 2015, p. 380). To attain dependability in a study, it is of importance to ease for future scholars who wants to accomplish a similar study. Therefore, it is necessary to explain the process in detail (Shenton, 2004, p. 71). According to Shenton (2004, p. 71-72), there are three sections that should be included in the study that enable for other scholars and readers to better understand the choice of methods and their performance. The included sections are the research design and the implementation of it, details of how the data was collected and an analysis of the process. The authors of this study explained every step in a clear and detailed way throughout the study. This included selection of the research design, the arguments for the chosen methodology and the process regarding the collection of the data. Furthermore, a detailed description of the theoretical concepts, methodological choices and aspects is included. Also, the process regarding the data collection was clearly described including how the sample for the study was considered and selected as well as all the steps in the interview process, a presentation of the participants taking part in the interviews and ultimately, how the collected data was analyzed.

8.2.4 Confirmability

Confirmability is indicating objectivity (Bryman & Bell, 2015, p. 380; Shenton, 2004, p. 72). It refers to ensure that the findings are a result of the participants' opinions and experience and not biased by the researcher's thoughts and characteristics. In other words, the findings of a study are the result from the collected data. Confirmability therefore reflects the neutrality of the authors (Shenton, 2004, p. 72; Tobin & Begley, 2004, p. 392). To increase the confirmability, a detailed description of the procedure is of importance in order to facilitate for the reader to follow and track the decisions made throughout the study (Shenton, 2004, p. 72). This is also in line with Koch (2006, p. 92) who states that decisions taken along the study should be explained, but also a clear demonstration of how the interpretations have been reached. In this study, the authors have clearly explained the decisions that have been taken along the study as the adopted approaches. This enable for future researcher to follow the trail of decisions. To ensure that the findings derive from the participated respondents, both authors of the study attended the interviews and also all the interviews were recorded. The

interviews are thoroughly transcribed which allows availability for further view if needed. Moreover, a disclosure of how the themes were made and examples of the codes are provided in the forthcoming chapters. To reduce biases during the interviews, the authors were well-prepared and had carefully inspected the literature and theories. Furthermore, since every individual interprets and perceives situations differently, the authors discussed the information from the interviews together before conducting the analysis in order to reduce biases.

8.3 Authenticity

The next criterion, authenticity, is associated with sincerity (Tracy, 2010, p. 841). It refers to self-reflection and openness, but also honesty and transparency about the study and its findings and reflects the researchers' biases and thoughts throughout the study. Self-reflexivity inspires the researcher to be open about the strengths and the weaknesses and show a fair and authentic view of the process. Furthermore, transparency includes the openness about the research process and that the readers should have the possibility to follow every step in the study and the decisions that have been made. This includes all the steps how the study was conducted, from the beginning to the end and all the decisions taken in between (Tracy, 2010, p. 842). The authors of this study have to the greatest possible extent tried to be as transparent as possible throughout the study. Both had self-critical assessments when taking part of the literature and before taking a decision. The authors also explained in detail how the study was conducted and included explanations to the decisions that have been reached. In the thematic analysis used in this study, the authors included the codes from it in order to elucidate and ease for the reader to understand the procedure in a consistent manner and illustrate how the authors have been thinking when developing it.

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Appendix 1: Mail to participants

Dear X,

We would like to express our gratitude to you for participating in our study about automation within the accounting profession!

The purpose of the thesis is to examine in which extent automation has been implemented in accounting firms, how it affects the working processes and the accounting consultants attitude towards automation in their daily work. The interview does not require any technical skills, where we want to discuss how the working procedure has or will change and does not include the technical construction of your, for example, accounting software.

Our goal is to interview ten to twelve accounting consultants who working at different accounting firms in Umeå to get a deeper understanding of the accounting processes in different offices. The interview will take place in your office and will last for 30 to 60 minutes. You as a participant will have the possibility to be anonymous in the study, but we would prefer to include the background of the accounting firm you are working for and parts of your background, e.g. working experience and position. Name and date of birth will not be published and your answers will only be handled by the authors of the study. The answers will not be used for other purposes than this study. If you permit, we would like to record the interview. The recorded material will only be used by the authors to remember our discussion and will be deleted after the end of the thesis course. Finally, we would like to mention that the interview is voluntary and you are allowed to terminate the interview whenever you want to.

Your participating means a lot for us and for our thesis!

Kind Regards,

Erik Törnqvist & Linn Forss

Appendix 2: Interview Guide

Background questions

1. Can you please tell us about your company?
 - What is your company doing and what services do you offer?
 - How many employees do you have?
 - Who and where are your customers?
 - Which software do you use?
2. Can you please explain your role in the company?
3. For how long have you worked as an accounting consultant? Are you certified?
4. Do you recognize any of the concepts (or their function) cloud accounting, Internet of Things, blockchain, big data?
5. What is your experience of working with automation in accounting? Examples of areas:
 - Input data (e.g. reading of data, e-invoices, etc.)
 - Bookkeeping (e.g. automated account distribution, reconciliations, etc.)
 - Final accounting (e.g. assessments, accruals, controls, etc.)
 - Reporting (e.g. income-tax return and other reports, consignments to authorities, etc.)
6. If you are experienced, for how long have you worked with automatic processes? If you are not experienced, do you recognize the availability to automatic processes?

Questions about automated accounting

7. Do you use any of cloud accounting, Internet of Things, blockchain, or big data?
 - *If yes:* For what? What are the pros and cons? What are the impacts?
 - *If no:* What is your opinion of these concepts?
 - *If any of above:* What is your general opinion of the concepts? Are you positive, neutral or negative towards them?
8. In what extent is the accounting process manual today at your company (e.g. account distribution, reconciliations, sorting of verifications, etc.)?
9. Which process in accounting would you describe as fully or partly automated at your company?
 - Where have the greatest changes happened so far?
 - What are the impacts?
 - What do you think about this? Are you positive, neutral or negative?
10. Which accounting processes would be able to be automated?
 - Which cannot and what are the hindrances?
 - What would be the possible impacts?
 - What do you think about this? Are you positive, neutral or negative?

11. What is your opinion of implementing automated processes in your business?
- What are the pros and cons?
 - What are the possibilities and risks?
 - What do you think about this? Are you positive, neutral or negative?
12. Automation is known for e.g. reduce labor, reshape the communication between firm and client, and enhance the productivity. Is this something you noticed? Do you think the accountants will be affected in any way in the future?
- *If yes:* What do you think about this? Are you positive, neutral or negative?
 - *If no:* Are you worried about such impacts?
13. Have the assignments at the accounting firm changed over the last years due to digitization and automation?
- *If yes:* Describe in what way and how the assignments have changed. Have any tasks been added or diminished? Why? What do you think about this? Are you positive, neutral or negative?
 - *If no:* Why has no change taken place?
14. Do you think that the accounting consultant's role will change in the future?
- *If yes:* How?
 - *If no:* Why not?
 - *If any of above:* What do you think about this? Are you positive, neutral or negative?
15. Have you noticed any shift in demand to new, other, wider, or more specific qualities or qualifications by the accounting consultant today compared to when you started to work as an accounting consultant? Is it required more or less of you?
- *If yes:* Why do you think that is?
 - *If no:* Do you think it will be a shift?
 - *If any of above:* What do you think about this? Are you positive, neutral or negative?
16. When the clients own enterprise resource planning systems are getting more automatic, what services do you think they will demand from you as an accounting consultant? Why?
- Have you noticed if the number of clients has decreased as more automatic and sophisticated accounting software enters the market?
 - *If yes:* What do you think about this? Are you positive, neutral or negative?
 - *If no:* Do you think it will be a difference in the future?
17. Have you noticed any twist in demand of services during the later years? Has digitization, sophisticated accounting software and automation led to a role of advisor rather than a bookkeeper?
- *If yes:* What do you think is the reason of this twist? Is it easier for the clients to do the bookkeeping by themselves now?
 - *If no:* Do you think it will change in the future?
 - *If any of above:* What do you think about this? Are you positive, neutral or negative?
18. Do you want to add anything? Is there anything about automated accounting that we have not brought up?

Appendix 3: Coding and themes of impacts

In the figure below, the themes are displayed in the blue field and examples of the codes generated from the interviews are displayed in the bullet list.

Change in tasks

- Qualified services, more important questions, new commissions, controlling, analytical tasks, big data, advising, analyzing, new routines, less repetitive tasks, comment on reports, less registration, less bookkeeping

Increased efficiency

- time efficiency, saves time, effectiveness, more effective, saves money, time-savings, faster, one person does everything, ease of use, cheaper, less work, less manual handling, start faster, less misstatements, enhanced tracking, enhanced holistic view

Client relations

- Customer value, more important relations, more discussions, new contact with customers, increased contact with customers, less contact, static relations, more clients,

Misstatements and IT problems

- Bad readings, bad scanning, more corrections, more faults, bugs, IT-crash, internet dependency, electricity dependency, hacking, loss of control, distrust in the system

Job opportunities

- Less people needed, less job possibilities, less hours, less economists, services disappear, decreased need, less customers, less consultants,

Competence and education

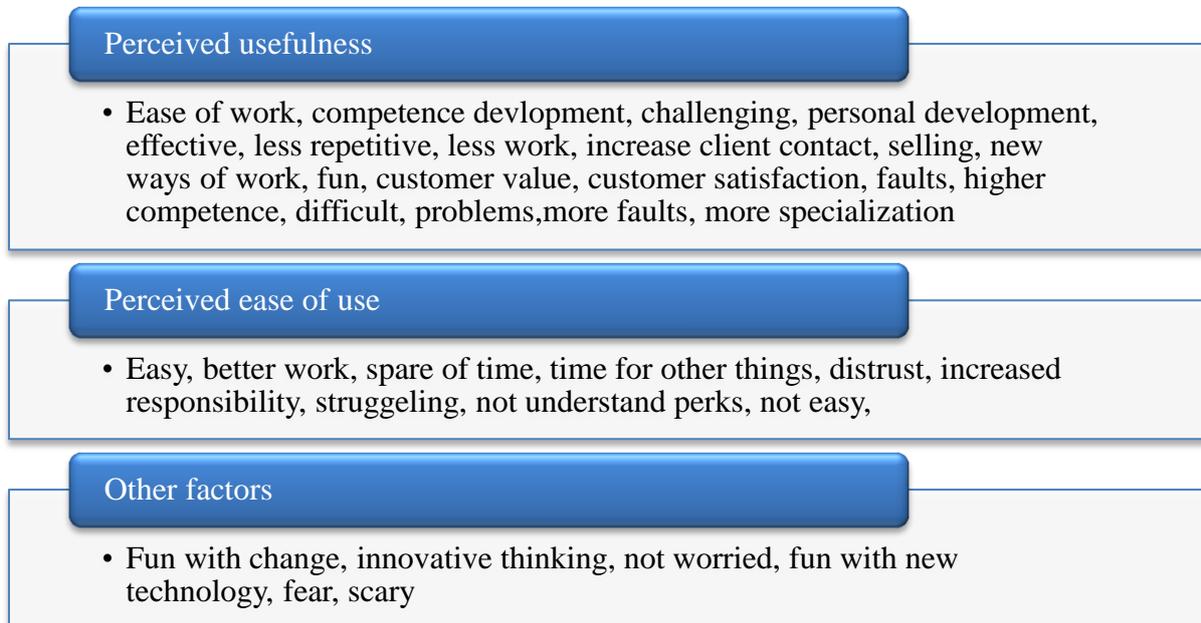
- New competence, technical knowledge, computer consultant, computer knowledge, IT-consultant, broader knowledge, selling knowledge, new education, enhanced knowledge

Costs

- Expensive, high development costs, not economically defensible, less profits, loss of target groups

Appendix 4: Coding and themes of attitudes

In the figure below, the themes are displayed in the blue field and examples of the codes generated from the interviews are displayed in the bullet list.





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