Changes in Accounting under the Influence of Automation

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The main objective of this thesis was to study the influence of automation technologies on the profession of accountants. This thesis also intended to address the question of the future in accounting without human intervention.

Technologies have developed a lot over the past few years in the sphere of accounting. As a result, the duties of professional accountants have changed. The ongoing process has now reached a new phase. Accounting process automation is described as the main trend. These changes will have an even greater effect on the profession.

For conducting this study, different articles were selected and analysed. Interviews and questionnaire regarding the use of automation technologies in an accounting firm and the future of the profession were handled with professional accountants.

The findings of the research indicate a situation where the main duties of accountants will move from routine tasks to advisory roles and analytics. The strategies of firms will probably change, and individuals who are not ready for the implementation of automation technologies will be replaced by AI. New people coming to the profession will need to show a knowledge of using automation technologies.

Keywords
Automation, accounting, automated accounting, artificial intelligence, profession

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1 Introduction

This chapter presents the thesis subject, main point, and the background of the research. The other thing this chapter is telling about is the research objective and the way of reaching it. Also, the scope, demarcation, and structure of the thesis will be presented.

1.1 Background

The twenty-first century is called the era of digital technologies. Different parts of our lives are getting more digitalized and computerized. The accounting sphere is not an exception. Each firm has its own way of the accounting process, and each of them is using different software for it.

Studying of processes is impressive because it makes it possible to get to know how these things work, and which impact has the automation on the process of bookkeeping and accounting.

Accounting professionals nowadays highlight technical advancement as one of the biggest megatrends pending in the accounting sector (EY 2015). The megatrend can be characterized as a systematic arrangement or phenomenon that contributes to enterprises and has an impact on business operations (Lancefield 2015, 3).

1.2 Research Question

The purpose of this thesis is to increase the level of knowledge about the future of accounting with the usage of automation technologies and the real benefits of implementation of Artificial Intelligence (AI).

The research question of the project can be worded as "How the automation technologies change the profession of accountants?"

IQ 1. How the accounting sphere is developed to be ready to work with automation technologies?
IQ 2. What accounting tasks can be transferred under AI control?
IQ 3. Does the implementation of automated software to accounting help to increase efficiency?

Table 1 below presents the theoretical framework, research methods, and results for each investigative question.

Table 1. Overlay Matrix

Investigative Question	Theoretical Framework	Research Methods	Results
IQ 1. How the accounting sphere is developed to be ready to work with automation technologies?	Academic theory; Articles from reliable sources and databases	Desktop study; Analysis of articles content; Qualitative interview	Data, Conclusions of the research
IQ 2. What accounting tasks are can be transferred under AI control?	Articles from reliable sources and databases	Desktop study; Qualitative interview; Questionnaire	Data, Conclusions of the research
IQ 3. Does the implementation of automated software to accounting help to increase efficiency?	Academic theory; Articles from reliable sources and databases	Desktop study; Analysis of articles content; Qualitative interview	Data, Conclusion of the research

1.3 Demarcation

The main focus of this thesis is the subject of automation of accounting operations and the impacts of that. It is specified in accounting firms or only the accounting departments in organizations. The companies, where automation accounting is implemented, are also limited. Large firms are implementing new solutions faster than small ones. These companies, taken for the analysis, will have at least 10 employees. The thesis does not analyse the software, which is used for automation but will take these IT solutions into consideration. Central Federal District of Russia is taken as the area for this research. The thesis is mainly telling about the future of the accounting profession and the aspects of the implementation of automation.

1.4   International Aspect

The results of this research can be used by Russian and international companies that have an interest in implementing automation and AI into their accounting operations.

1.5   Benefits

The results of this research thesis will be useful for small companies, start-ups, which are still looking for the best solution for accounting purposes. Also, the results can be interesting for companies, which are still using common accounting software without automation. Also, it will be beneficial for the companies to know more about the efficiency of implementing AI.

1.6   Key Concepts

Accounting

Accounting is the process of evaluating and reflecting on organisations' financial operations. From a vast range of activities, accounting professionals need to choose those that impact an organisation and can be financially evaluated. The chosen and evaluated activities are then presented in financial reports. (Croteau 2019.)

Automation

Automation is a broad concept that includes various technology fields in which human involvement is minimized. Basic automation takes and automates basic simple tasks. Automation for Artificial Intelligence (AI) is the most complex level of automation. The application of AI ensures that computers can "learn" and make choices based on previous circumstances that they have experienced and analysed. (IBM.)

AI

Artificial intelligence (AI) is the simulation of human intelligence processes by machines, especially computer systems. Mostly these processes are learning (collection of data and rules for future usage), reasoning (usage of rules to make approximate or direct conclusions), and self-correction.

Automated accounting

The manual process of accounting is time-consuming (Qiu 2016, 15). Also, it takes a big amount of time to collect data from different departments and processes. Those timelines have an impact on the decision-making process because the financial statements and reports may be given late or the information in it may be out of date. Automated accounting can be the best solution to solve these problems.

Cloud accounting

Cloud accounting software is similar to traditional, on-premises, or self-install accounting software. The difference is that the software is placed on remote servers.

Clouds are used on many levels, both individually and within organizations (Bojanova 2013, 12). When the clouds are used within the accounting sphere, they have been recognized as cloud accounting (Dimitriu & Matei 2014, 238).

Cloud use in accounting circles is also on the rise. It hits 51% of usage by accounting firms. According to a 2017 report on American and Canadian businesses, that is 27% greater than in 2014. (Robert Half International 2017.)

2　Impact of automation on the accounting field

This part of the thesis will describe the profession of accountant and technology progress. This should help to improve the awareness of how automation and AI are implemented in the accounting field. Also, the principles of automation will be described, as it is important to understand the acceptance of technologies in the sphere.

The conceptual image of the theoretical framework (Figure 1) shows how key concepts are related to each other.
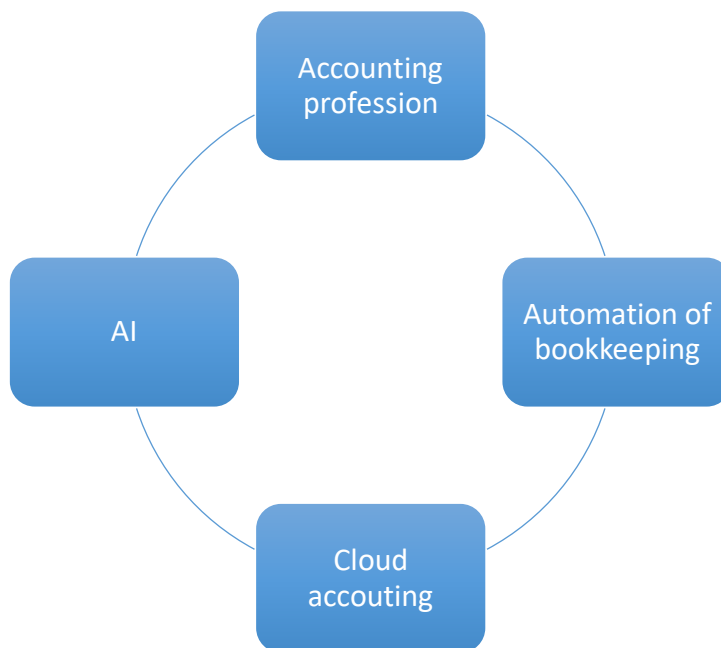
Figure 1. Conceptual theoretical framework

2.1　Technology development

In the past 20 years, computer technology has been growing. Additionally, the number of organizations, that use computers for their daily operations, has increased.

Today, a big amount of organizations are using Computer Information Technologies in their data processing, archiving, and distributing the same to their customers (Al-Laith & Ghani 2012, 12), especially e-accounting systems, which undoubtedly use IT.

E-accounting is electronic accounting. This term is used to name an accounting system that uses computer technology for the work inside the organizations. It is used for

operations with data. These software systems are responsible for recording, reviewing, tracking, and assessing organizations' financial statements.

New software programs include different ways of dealing with problems in the industry. Investors and decision-making teams are always in need of accurate and reliable data on the financial performance of the firms. Providing such data is the principal aim of accountancy practice.

When using the automatic accounting systems, the organization would potentially gain greater insight on the daily corporate processes and better exposure to important details (Wang & Huynh 2012, 13). Accounting systems with the usage of AI have the ability to evaluate vast amounts of transactions with a high speed and efficiency.

The whole power of automated accounting can be seen only when the integration of Artificial Intelligence into the process is completed.

2.2   Artificial Intelligence

Artificial intelligence (AI) is the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages (The Oxford Dictionary of Phrase and Fable 2005). The machine is able to learn when doing different tasks. It means that in the future there is a possibility that these systems can be used for solving various problems.

John McCarthy invented the concept of Artificial Intelligence in 1956 (Smith & al. 2006). Then, in 1950, English mathematician and computer scientist Alan Turing has published a report, where he was explaining the capacity of computers to perform in intelligent tasks.

The term Artificial Intelligence can be interpreted as more complex automation.

Automation means some technical solution when the machines and computers are used so that everything can operate without needing human control (Cambridge Dictionary). The main goal of automation is to make computers doing all the tasks, which are needed to be repeated big amount of times.

Before the time of AI and automation, accountants usually had to check plenty of transactions and sort the results instead of analyzing the data. This was time-consuming.

Since that time the role of an accountant has totally changed. As soon as the automation and AI have been implemented into the processes, the data is being sorted and analyzed way faster, compared to the speed performed by a human (MTI College 2018). A big variety of accounting companies have started to invest extensively into the infrastructure, technologies, and computer systems.

2.3   Accounting profession

The profession of an accountant and a bookkeeper is taking an important place in our community because the financial data has an impact on everyone. The person working in the accounting sphere is nowadays required to have the ability to perform in more than one task. It is also expected from the professional that he has experience in various areas, such as accounting, auditing, and corporate law. (Marsden 2018, 2.)

Most of the services, which are offering the accounting firms, are bookkeeping, salary, and tax documentation, the process of forming and issuing the annual financial statements. All businesses are supposed to hold a track on their financial documentation (Gooderham & al. 2004). That is why they have an accounting department or use the services from outsource.

Like any other profession, the accounting profession requires specific knowledge and skills. They are presented in Figure 2. Every professional must be very accurate and be focused on great customer service. Also, organizational skills should be on a high level. As this business segment is very sensitive, accounting professionals need also be reliable and trustworthy. Most of the companies nowadays are using computers for different operations, so, it is required from the accountant to have a good experience in the usage of various systems and programs. The person itself, working in this sphere, has to be ready always developing himself and his knowledge. In order to handle the job properly, it is necessary to have knowledge of regulations in the sector. (Ammattinetti.)

Figure 2. Knowledge and skills requirements for the accounting profession

As accounting professionals are usually doing a big number of working activities, I can highlight two main roles in their job. One of them is related to the tasks of bookkeeping. And another role can be described as business oriented. Today we can see that the second role applies to most accountants, which means that the professionals of this job will take part in processes that require to make important decisions. They will also give advice and support to the managers of the company. (Morales & Lambert 2013.) Such skills as advisory and consulting are essential for the corporate workers to lead the company to better positions on the market. That is why the main functions of the accountants will transform to meet these needs. (Gooderham & al. 2004.)

2.4 Job Polarization

Improvements in digital technologies and automation of operations bring the professions to a process called job polarization.

The market of professions is divided into three types of careers. The cognitive careers, which require a degree and usually have high wages. On the other side, there are professions which are managed manually, professions which provide different kinds of

services, and they usually have low wages. The third profession type is between those both. It can be described as the one conducting daily tasks, having an average level of income, and the middle level of education. (Autor 2015, 12.)

It is almost impossible to replace the cognitive profession with machines. Also, the professions, where full manual control is needed, cannot be replaced with the usage of automatization. At the same time, the repetitive activities at work may be carried out more effectively by using automated technologies (Shim & Yang 2018, 144).

When the number of tasks, which is completed by the automatic technologies, increases, the process of job polarization appears. It carries out the increased need in cognitive careers and the increase in recruiting for the jobs, where the low level of education is required. It happens because the middle type of professions is being forced out of the market. The middle type of professions with average pay, where the middle education level is required, is affected the most by the automation of technologies, and this is where the profession of accountants is based. (Goos & Manning 2007, 118.)

Automation starts the process of pushing out the people from the profession. It means that there will be a decrease in the number of workers required, as all accounting operations are going to be handled by the machines. Workers, who are specializing in economic aspects, will not take part in handling the daily operations, and will then be forced to do other tasks, such as helping with analytics and consulting services. They will have an opportunity to strengthen the administrative management and decision-making processes.

The requirements, which are set for consultants, are also changing. Companies, when performing the recruiting process, prefer to hire people with higher education and analytical abilities. Therefore, it may be problematic for economists with less experience to get a job. And at the same time, automation technologies may overtake accountants with less rational abilities (Frey & Osborne 2017, 265).

There are many ways how the implementation of automation and AI into the processes of accounting may affect the accounting firm and the accountant profession. Automated accounting systems are relied on its consumers' attitudes.

2.5   Cloud accounting

Cloud accounting is mainly provided to the companies as an Internet-based solution. All users can access up-to-date information, the company's data storage, and applications online.

There are several advantages of using cloud accounting services. The main one is that cloud accounting increase efficiency among workers. It is happening because they can freely share the information. Another advantage is that the company doesn't have to spend extra money on having their own servers. As everything is stored in the cloud, workers can use the power of it to use complex software. (Waters 2005, 35.)

2.6   Summary

If it is possible to understand the process of automated accounting as an improvement or as an invention, it can be the discussion of the advancement of technologies such as the development of the automatization of accounting.

The accountant profession will experience the impacts of the implementation of automation and AI. This process has given a picture of technological influence from the viewpoint of job polarisation.

It is understandable that most of the accountant's functions will be automated in the near future. The daily tasks in this profession are already changing, and professionals are required to have more and more analytical and advisory knowledge. But it is too early to say that the accounting profession as such will disappear, since accountants can also perform other functions in the company, which are closely related to accounting.

3 Empirical part

This chapter of the thesis describes the research framework for the study. This part of the work will also describe the findings, which were obtained during the interviews. There will be some quotes and general replies to these. Also, this chapter has the results of the questionnaire.

3.1 Research methods

This study is a combination of quantitative and qualitative research. In quantitative researches, the outcomes are derived from numbers collected and statically analysed. In qualitative studies, verbal data and experiences are necessary for completeness. (Verhoeven 2010.)

The beneficial part of qualitative research is that during the collection of information, emotions, opinions, and also the experience of different people are explored. It can give a better understanding of the subject of research.

During this qualitative study, the interviews have been conducted, as this way is the most beneficial for gathering the data (Myers, 2013, 119-120). Accounting professionals were interviewed regarding their use of technology and their thoughts about the future perspective of using automation and AI in the accounting sphere.

Also, during the quantitative study, the questionnaire was done. Accountants from three companies were asked to answer the questions related to the automatization of the profession.

Figure 3 below shows how research methods are organized. The flow of the research is shown from top to bottom. The top block of the figure shows the investigative questions of the thesis. Firstly, the collection of primary and secondary data was done, and then the analysis of this data was made. Primary data has the form of the interviews and questionnaire, and the theoretical analysis with the information from the website and reports provides background information about the research.
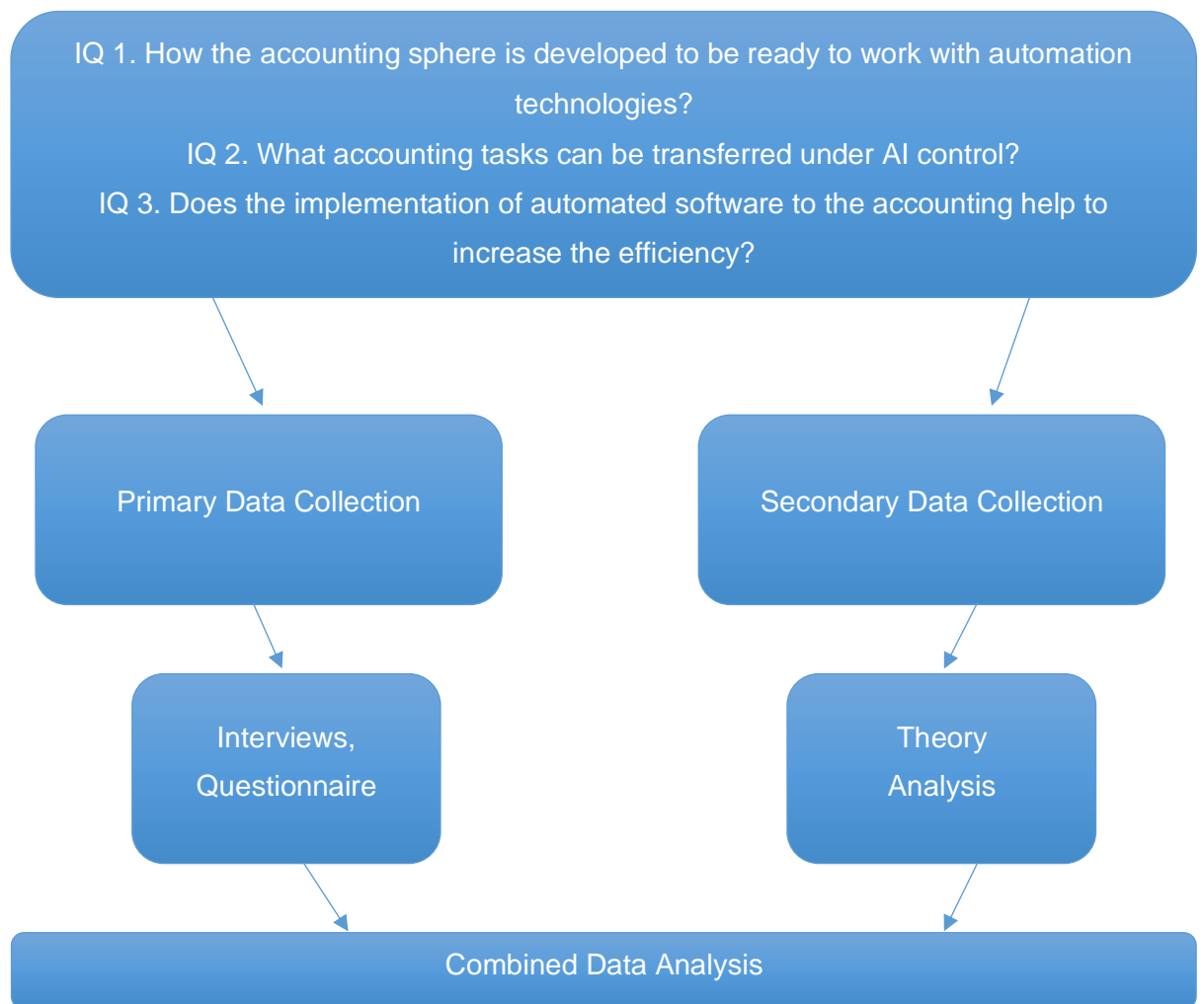
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│      IQ 3. Does the implementation of automated software to the       │
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Figure 3. Research Methods

3.2 Interview process

The interviews were conducted in English and Russian with the accountants. A guide for the interviews is presented in the appendices.

This thesis is using the data collected from 2 interviews. Interviewees were from different age groups and had a different experience in the profession. They were also holding different positions in their companies. One of them was an accounting consultant, and another one was a financial director.

Getting the information and opinions straight from the professionals is a great opportunity to make an overview of the accounting profession nowadays and analyze the opportunities and difficulties in the future.

3.2.1 Risk management

The main risk of this research was to find accountants to have an interview with. Due to the Covid-19 pandemic, most of the people were trying to avoid face-to-face meetings. But at the same time, this risk was managed as an advantage, as the interview could be done as an online meeting with less strict scheduling.

3.2.2 Automation of different processes

One of the questions to the accounting professionals, who have agreed to take part in the interview, was to give an overview of automation and usage of AI, and also to try to give a prediction on what will happen with automation in the future.

The response of the accounting consultant was that these technologies, which allow to automate accounting processes, are already presented on the market. They can be simply integrated into existing accounting systems. The main question of implementing it is the cost. A big number of small companies see the opportunity of automation as an economically disadvantageous process. In order to make this software attractive for small companies and bring more consumers into the digital universe, it is important to make the prices of these solutions lower.

The financial director, who was interviewed, said that many organizations, and the one she is working at, are already implementing AI-related initiatives. Not to all segments yet, but they are being tried as pilot projects. As a plan for the future, their company is thinking to implement AI into more and more processes. But nowadays, the most common way is still the usage of cloud-based solutions. As she claims, their company and their clients are very impressed how cloud technologies can make any information being accessible whenever and wherever is needed.

Both interviewees have given an opinion that the operations that should be automated are linked to receipts. These receipts are still most commonly on paper. There are also developments in this area. Nowadays, there is some number of mobile apps, that allow to use the possibilities given by the phone to scan the receipts and make an entry into the

special software. These accounting technologies are, however, just appearing at the market. So, the automation level in them is not complete. The accountant still has to validate the entry and approve it manually. Although, the interviewees claim that such technologies will be improved in the short term and will be used more widely in their companies.

Nevertheless, despite certain advantages of automation, the accounting professionals, I have talked with, agreed that it is not possible to automate everything inside the accounting process. For qualified professionals, there will always be situations, where the final decision should be made. For now, machines cannot do that without the help of the human.

3.2.3   Automation accounting influence

Time-efficiency has been called the one big influence by the accounting consultant. Gathering all documentation is the most time-consuming task for the accountants. When the transfer of all information from different units will be automized, it will be way easier and quicker to start the tracking cycle.

Nowadays more and more accounting tasks may be done by automation technologies. It helps accountants to concentrate more on the clients rather than data input. These influences grant the opportunity for the specialists to devote more time with customers and improve the partnership with them to understand their field of operations better.

The financial director, I have talked with, has said that since the amount of repetitive procedures is reduced, and for each assignment the worker is spending less time than before, the normal working day of the accountant is becoming more efficient.

For the same question, the accounting consultant has told me that automation gives the possibility to make the work faster. If comparing the nowadays work and the work before the implementation of automation, she could strongly say that the workload today is smoother and simpler. And because of that, the effectiveness of the workflow, in general, is becoming better.

One of the other influences, noted by both respondents, is that the amount of work, which was always done repeatedly, will be reduced. The intellectual duties will become the normal work for the accountants. They can focus more on the corporate advising area when the process of bookkeeping will be automatic.

Accounting consultant had this opinion on it: "I think that the accountants could concentrate more on developing the partnership with customers. In order to be accurate in forecasting, we will precisely interpret and evaluate information, which is coming from different sources. I see that the position of our profession will be in consulting. A big number of tasks can be performed automatically now. From my point of view, we should put our focus mainly on the analysis of data and consulting."

The accountants, I have been talking to, has also been asked about the future work prospects. Even if the common manual input of the data can recede and the number of basic accounting duties can be diminished, the interviewees say that there will be a need for people who can perform in an analytical type of work.

The accounting consultant stated that it is predictable, that the implementation of the automatic solutions will lower the workload. But if looking at it from the customers' point of view, it can be beneficial for them. The process itself becomes quicker and smoother, and the automatization can bring new clients to the accounting firm. And if the new customers come to the accounting firm, it will need more workers to perform different tasks.

"Digitalization will make us more efficient, which will lead us to hire more workers. This is due to the fact that the number of clients, who are choosing us, is increasing. In the situation when the workflow is speeding up, we still will have to increase the number of job places." – the accounting consultant stated.

The financial director had a bit different opinion on it though: "The professional duties can of course switch to more advisory because I can see it as the only way of change in the accounting profession. In our company, it is already noticeable that the need for accounting job positions is decreasing. This is the simple result of the effectiveness of the analysis of different data."

3.2.4 Opinion on automation of accounting

The point of view, that the experts in accounting have towards new technologies in the profession, is also an important and interesting topic to discuss. The interviewees I have been talking with were mostly optimistic regarding implementing automated Artificial Intelligence systems and its effects on the duties.

If the time spent on basic accounting inputs decrease, the accountant may give more time for the improvement partnership with a customer. When the firm is also providing good

consulting to its clients, the outcome is becoming way better as the clients are satisfied with the services provided. This is also a positive thing for the accounting professionals, which creates a positive opinion about the automatization.

Since the implementation of automation and AI into the accounting process is decreasing the amount of monotonous work, which had to be done by accountants, they can spend more time working on complex challenges. This is also one of the positive sides of automatization as the professionals can get experience, when working on them.

"When the automated systems came to our company, for me it was like a fresh boost. I love technologies and this improvement has changed my functionality at work. There are no more tasks, which are done as a pattern. Each of them now requires more creativity, more analyzing skills. I see it as a chance for personal development. Getting new experience is important at every stage of the career." – the accounting consultant said.

The financial director was sharing a common opinion on this matter: "As being for quite a long time in this profession, I can say that the work became more complex today. Sometimes even a bit difficult. But I look at this thing as at advantage for me and my colleagues, because I believe that it makes our job more valuable. I started to enjoy my work even more."

When there is a change happening, that the same everyday activities are replaced with tasks which require a lot of thinking processes and analyzing, it is promoting the better mindset of the accountants. It is an opportunity to find more pleasure in their job duties. If the person is day by day doing the same things at work, it may lead to a situation, where the worker can get tired of doing it. Every professional deserves a chance to improve the knowledge and get the needed experience to perform in more challenging tasks.

"If talking about my opinion, I am optimistic towards the implementation of automized technologies. I am working in this profession for quite a long time already. There are a lot of greater opportunities that arise now, not just bookkeeping. And, of course, I cannot be not happy about it. Doing different tasks, developing your personal knowledge, and getting new expertise – these are the things I want to get from my job." – the accounting consultant said.

The financial director said this about the advantages of automation: "Automated technologies give us a great opportunity for personal development. It is, first of all, very valuable for the worker himself, that working as an accountant, he or she can develop the

knowledge of business in general. The consulting and analytical duties require the knowledge of the customer's business, of course. And when you learn something new and doing at work not only the bookkeeping job, it is absolutely fantastic."

However, a negative opinion towards automation and AI implementation exists. The reason for this is the risk that the knowledge about accounting and manual bookkeeping will be lost. More mistakes might be happening as a result of loss the expertise, if people are fully relying on technologies in the processes of accounting.

"It is pretty obvious that no one can pause the processes of innovations. That is why the best choice in this situation is to accept it earlier and make it more beneficial for yourself. However, it is necessary to remember that we still have people, who can't as easily adapt to digitalization as youngsters. Companies cannot ignore this category of workers as long as they have their own preferences. At the same time, I also want to add that if the individual wants to work with the systems, which are based on automation, he or she would better be friendly towards it. Otherwise, this person will lose a chance to be the part of the profession in the future." – the accounting consultant stated.

3.2.5 Developing areas of accounting

Based on the results of the interview, the conclusion can be made that there are several areas that are changing under the influence of the implementation of AI into accounting.

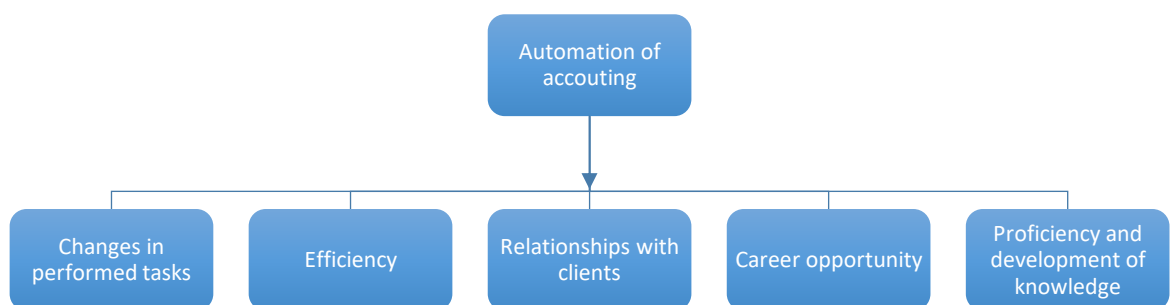Figure 4 below is presenting these areas and their relationship.

Figure 4. Influence of implementation of automation on different areas of accountant's job

3.3 Questionnaire results

The quantitative research part was done by using and analyzing the Google Forms Questionnaire. The total amount of questions in a questionnaire was 11. The questionnaire was sent by email to the accountants in 3 different organizations and the findings of it were collected during the 20.9.2020 - 10.10.2020 period. The total amount of received answers was 62.

According to the answers to the first question, we can see what the diversity in age among the accountants was. The biggest group are people in the age of 36-45 years old (45,2% = 28 accountants). The next group of people was in the age of 25-35 years old (35,5% = 22 accountants). The third group was people of age 46-55 years old (11,3% = 7 accountants). The fourth group was people, who are younger than 25 years old (6,5% = 4 accountants). And the last group was the person, who is older than 55 years old (1,6% = 1 accountant). This data is presented in Figure 5.
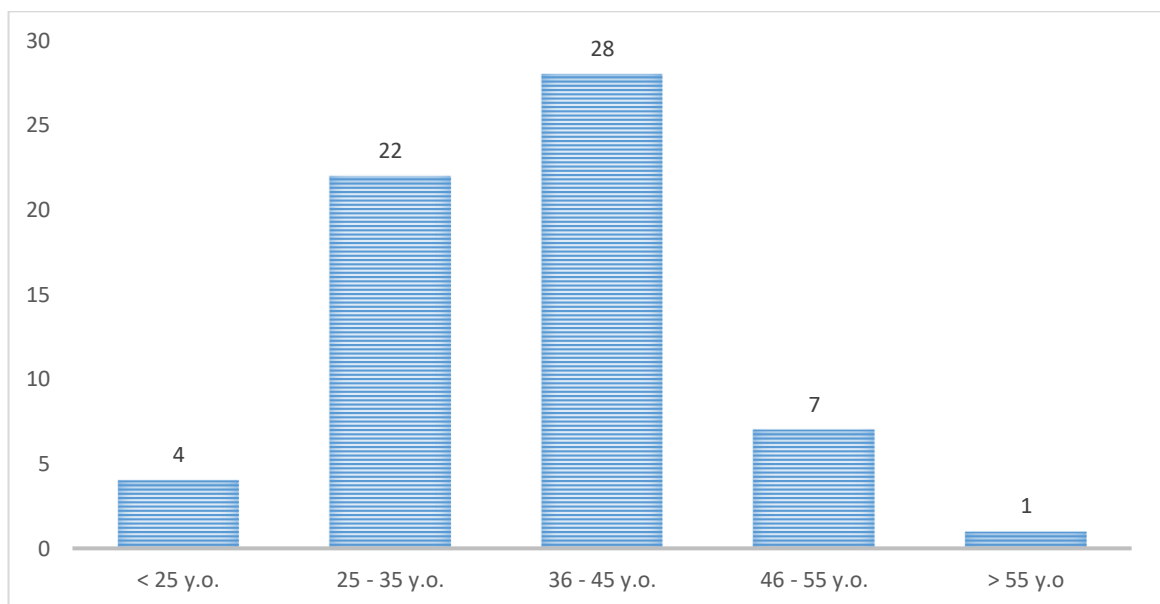

Figure 5. Age of accountants (number of responses)

11 questionnaire participants (17,7%) were men. Another 51 participants (82,3%) were women. Thus, we can make a conclusion on the basis of the data obtained that in these three firms, more women are employed than men. This is presented in Figure 6.
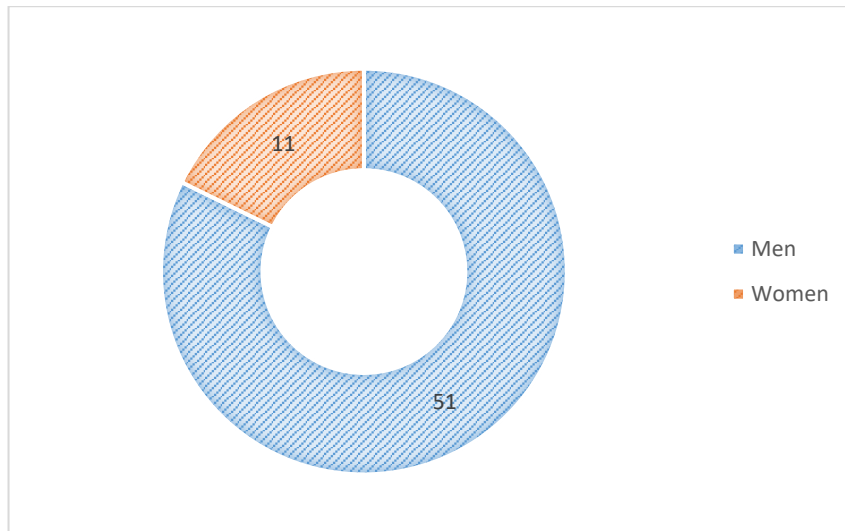
Figure 6. Gender of Accountants (number of responses)

All the respondents of the questionnaire had a higher education degree. This can be explained as one of the requirements for the employment in companies.

As the biggest age group of accountants was 36-45 years old, the answers to the questionnaire for the question about the experience were looking like presented in Figure 7. Nine accounting specialists (14,5%) had less than 3-year experience in the profession. There were twelve respondents (19,4%), who had 3-7 years of experience. Fifteen accountants (24,2%) had 7-15 years of experience. The biggest group consisted of people (26 accountants = 41,9%), who had more than 15 years of experience.
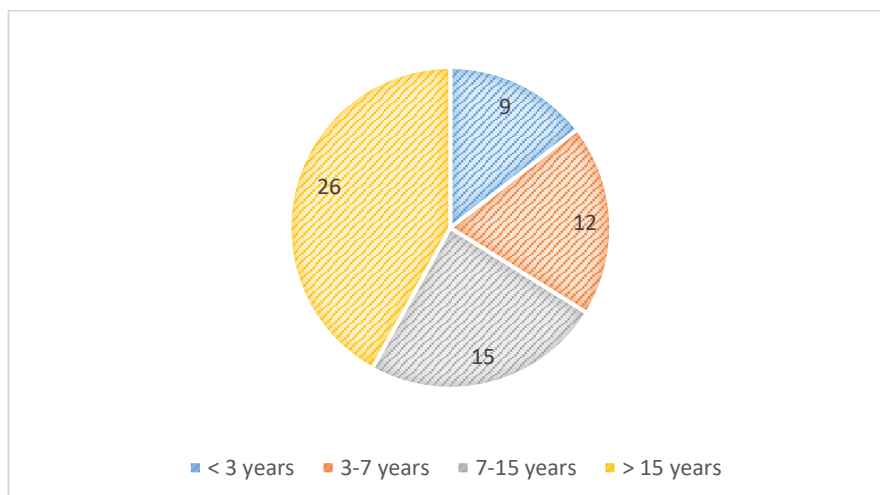

Figure 7. Work experience (number of responses)

In the questionnaire, respondents were also asked to answer the question about their role in the company. There were three answer options given, and also there was an opinion to provide an own answer if the position of the respondent did not fit any of the provided answer options. 19 participants (30,6%) of the questionnaire responded that they hold the position of Business controlling analyst. 15 respondents (24,2%) said that they are Financial advisors. And 27 people (43,5%) answered that they are on the position of Bookkeeper in a company. Also, it was one response from the person (1,6%), who is holding the position of Financial director in the company. The findings of this question are presented in Figure 8.
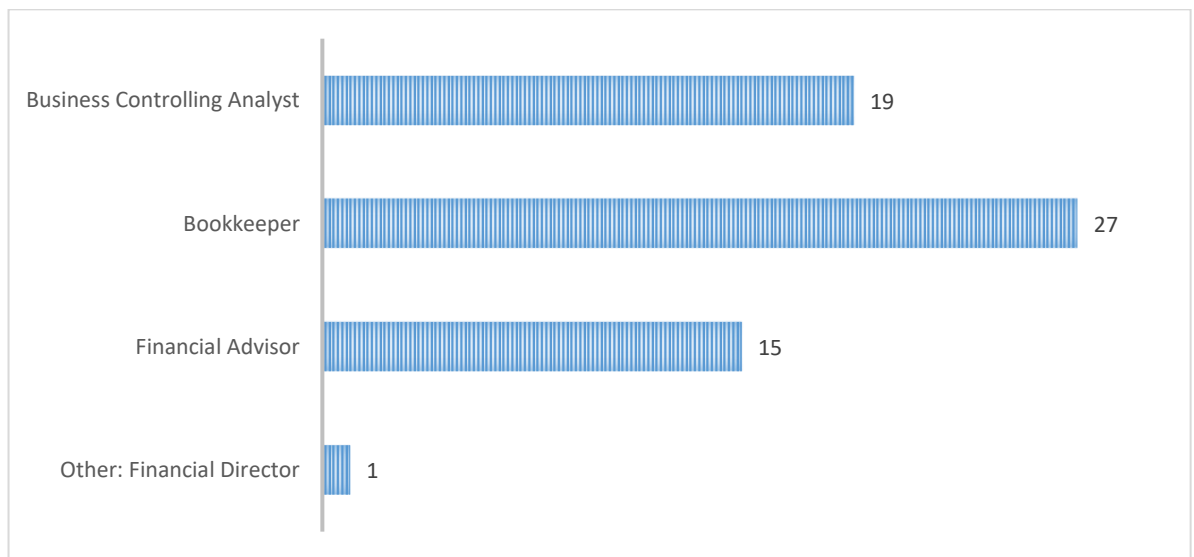

Figure 8. Role in a company (number of responses)

As the companies for the questionnaire have been specially selected, all of them have been using automated accounting software. Despite this, different tasks were automated in each company. Therefore, the answers to the questionnaire gave the results, based on which the conclusion can be made that tasks as Invoicing, Expenses, Payroll services, Cash Flow Forecasting, Payments, and Practice management are automated in most of participating firms. Invoicing and payments tasks are automated in all 3 companies, that were answering the questionnaire. Payroll services are automated in 2 companies out of 3. And only one company had cash flow forecasting and practice management tasks automated. The responses are presented in Figure 9.
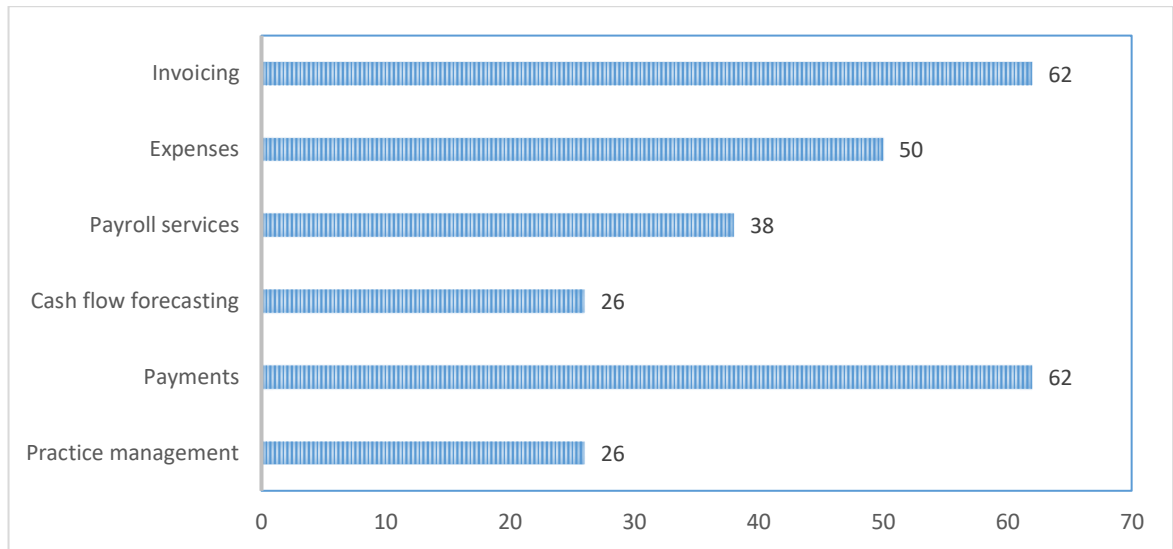
Figure 9. Automated tasks (number of responses)

Another question in the questionnaire was about the daily duties of the accountants. They were asked to agree or not with the statement, that their activities have changed due to the use of automation. Young respondents, who had the least experience in the profession, disagreed with the statement. But the professionals, who had more experience, were answering to this statement as "Agree" and "Strongly agree". As the young accountants came to work not that long time ago, the implementation of automated technologies could happen before their employment, and that is why their daily duties were not changed that much compared with the beginning of the career. The answers are presented in Figure 10.
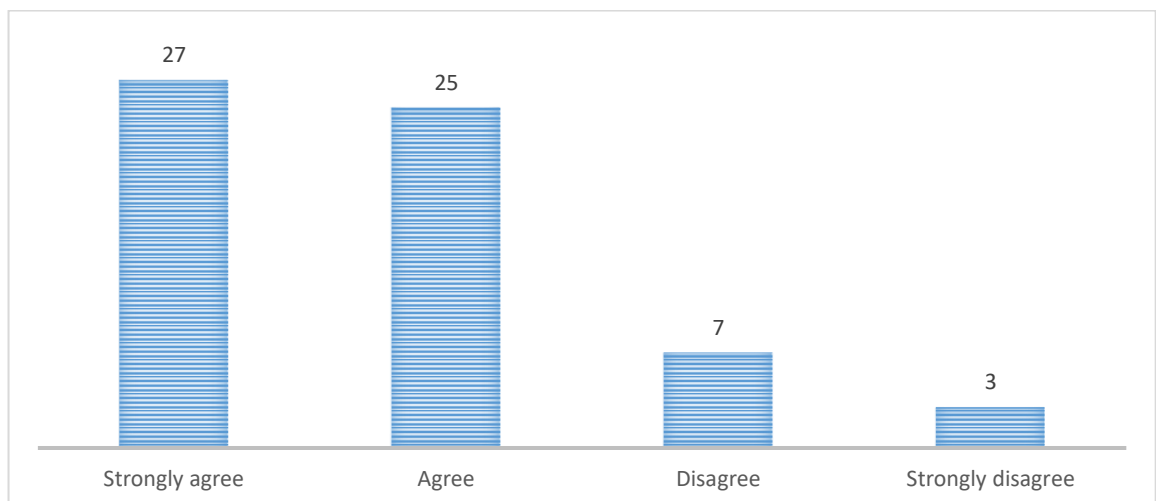

Figure 10. Opinion on a statement about the change of daily activities (number of responses)

The same tendency can be traced in the answers to the next question. Accountants have been asked how their tasks have changed. Younger workers, who had less work experience, responded that their work tasks have not changed. But older accounting professionals with more experience gave the answers that they are mostly performing in analytical or consultancy work at the moment.
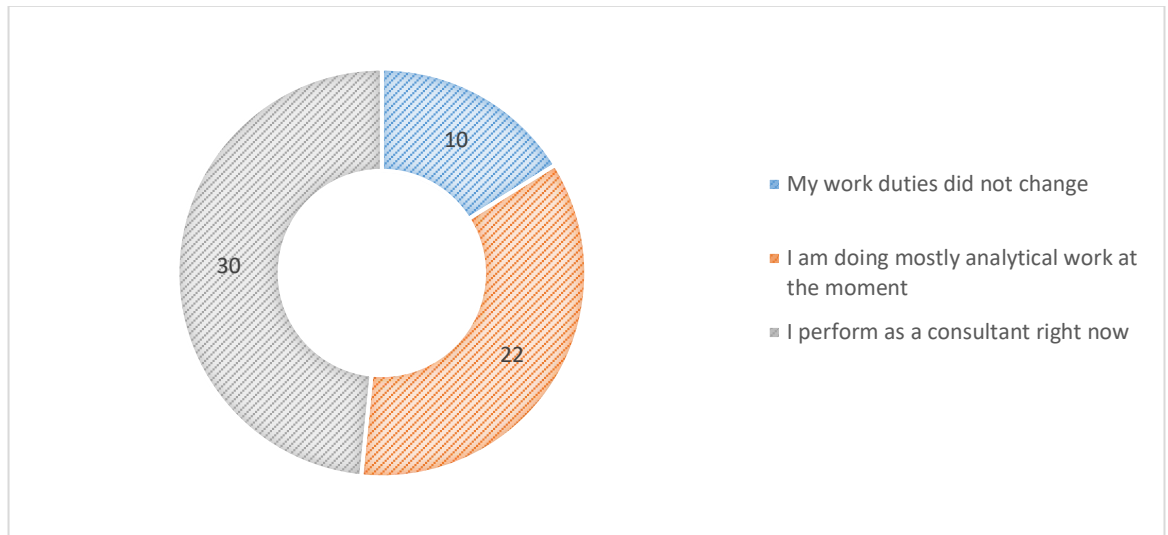

Figure 11. Changes in work duties (number of responses)

On the last question, about whether respondents see themselves as accountants in the future, the majority were negative. Thus, I can conclude that people understand that with the introduction of automated technologies in accounting, their work responsibilities will change, and they will be engaged in other tasks in the company.
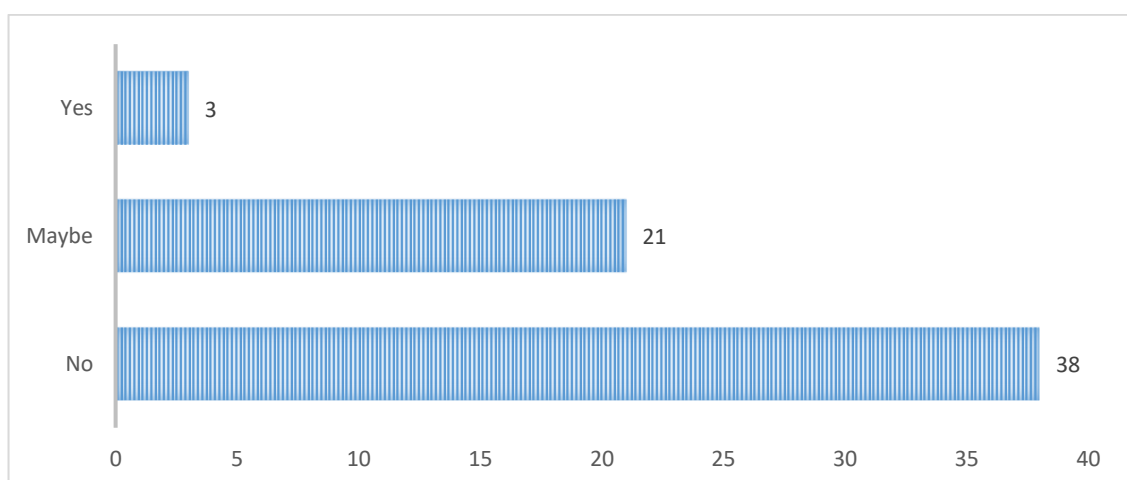

Figure 12. Future as an accountant (number of responses)

3.4 Summary

The questionnaire was limited by the number of accountants, who took part in it. So, it is not possible to apply the results to the whole sector.

The same thing comes to the interviews conducted. As the interviewed accountants could primarily discuss just their own background in their firms, the results and conclusions of these interviews cannot be applied for the whole accounting sector.

However, these mixed analysis approaches produced some valuable findings and insights of the research area.

It is already clearly understandable that automation technologies have a huge effect on the regular tasks of accountants. The results of the questionnaire and the interviews showed that more and more tasks and processes can be done by the automated accounting software. Even if the interviewees were mentioning the positive and negative sides of automatization, they are still considering it as a good trend.

4 Conclusion

This chapter presents the general findings and conclusions made during this study. They address the research and investigative questions.

In addition, the suggestions for potential future studies are identified. Reflection of learning is described in the last part of this chapter.

4.1 General conclusion

This thesis was analyzing the research question: "How the automation technologies change the profession of accountants?".

To answer this question a comprehensive analysis of the theoretical material has been done, and the interviews have been organized. Also, the answers were collected from the accounting professionals by the questionnaire.

The field of accounting in recent years uses technology development products very well. The findings revealed that accountants prefer to use automation and Artificial Intelligence for repetitive tasks. However, new technologies cannot replace people in cognitive tasks, which require analysis and some sort of creativity.

The related areas, where the changes are happening because of the implementation of automation and AI into the process of accounting, have been defined.

- *Changes in performed tasks.*
  The main duties of the accountants will move from routine manual job to the analytics and consultancy.

- *Efficiency.*
  The process of work will become faster and more effective.

- *Relationships with clients.*
  Changes in duties will give an opportunity to develop partnerships with clients.

- *Career opportunities.*
  As the company is becoming more effective, it needs more workers.

- *Proficiency and development of knowledge*

  Candidates for the accountant job in the future will need to present a different kind of knowledge. These people will need to have an understanding of how the computer technology system is operated.

4.2 Suggestions for further research

This thesis was written during the period when complete automation was not yet applied in the companies. Some duties of the accountants were still automated just partly.

As the complete automatization of processes is not applied yet, the impacts, which have been revealed, are just a combination of present and future potential influences. So, when more tasks will be automated and different influences will appear, which are not discovered yet, then the new research can be done.

Also, this study was limited in the number of participants. Therefore, conclusions, which were made based on data from interviews and questionnaires may not reflect the full picture of the industry. For a complete and more detailed picture, it is necessary to conduct wider research in scale and the number of participants.

4.3 Reflection of learning

The process of writing this thesis has given me a great opportunity to obtain a better point of view of the prospects of the profession of accounting.

Things like identifying and limiting the research subject have been learned. Also, an understanding of how to carry out the analysis was gained. As the data was collected in multiple ways, it was a good opportunity to work with different materials from numerous sources. Learning the process of finding relevant information from a massive amount of data has been helpful.

When writing the thesis, the learning of creation the suitable timetable was done. This is a thing that can be developed in the future to be efficient in using the time.

The learning experience has been gained during the time when this thesis has been written. Every phase of the process had its difficulties, but they have been overcome with the help of gained knowledge.

Also, the process of working on a thesis has given a lot of learning outcomes, such as research skills and process management.

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Appendices

Appendix 1. Guideline for the interview (English version)

General questions

1. Could you tell me some basic facts about the firm you are working in, please?

   - o *Primary activity*
   - o *The number of employees*
   - o *The target group of clients*
   - o *Software in use*

2. What are your responsibilities and a job title?

3. How long have you been working in this position?

4. Are you familiar with the terms or their meaning? (Artificial Intelligence, Cloud accounting).

5. Have you ever been dealing with the automation of accounting?

   - o *If no, then what do you know about the automatization of accounting operations?*

Questions about automatization processes

6. Do you have any experience in using Artificial Intelligence or Cloud accounting?

   - o *Opinion on using it*
   - o *Pros / Cons of using it*

7. Which tasks are automated in your company today?

   - o *Completely automated*
   - o *Partially automated*

8. What is the impact of automated processes?

9. How do you think, can the automation of accounting be a positive thing?

10. What are the possible consequences of automation and what do you see as the main obstacles?

11. Could you tell me about the risks and opportunities of implementing AI in your company?

12. Do you think that automation will affect the profession?

13. Can machines completely replace real people at the workplace?

14. Have the duties at the accounting firms been changed due to the usage of technologies in recent years?

    o *How?*

15. Do you expect any changes in your professional duties in the nearest future?

16. Are there any changes in requirements for the newcomers, such as special qualities of competencies?

17. Can the digitalization of accounting lead to a situation, where the accountants will perform as consultants and analytics?

18. Would you like to add something, some things that we have not discussed yet?

Appendix 2. Guideline for the interview (Russian version)

Общие вопросы

1. Можете, пожалуйста, рассказать о компании, в которой вы работаете?

   - *Какая основная деятельность Вашей компании?*
   - *Количество сотрудников*
   - *Основная группа клиентов*
   - *Программное обеспечение, используемое при работе*

2. Какую должность Вы занимаете в компании? Что входит в Ваши обязанности?

3. Какой Ваш стаж работы?

4. Вы знакомы с терминами и их значениями? (Искусственный Интеллект, Облачные вычисления)

5. Вам приходилось сталкиваться с автоматизацией бухгалтерского учёта?

   - *Если нет, то что Ваш известно о процессах автоматизации бухгалтерии?*

Вопросы о процессах автоматизации

6. У Вас есть опыт работы с Искусственным Интеллектом и облачными вычислениями?

   - *Мнение об опыте использования*
   - *Положительные и отрицательные стороны использования*

7. Какие процессы уже автоматизированы в Вашей компании на сегодняшний день?

   - *Полностью автоматизированы*
   - *Частично автоматизированы*

8. Какое влияние автоматизация процессов оказала на Вашу работу?

9. Как Вы думаете, может ли автоматизация бухгалтерского учёта быть позитивным трендом?

10. Каковы возможные последствия автоматизации и что Вы видите в качестве основных препятствий для этого?

11. Могли бы Вы рассказать о возможностях внедрения Искусственного Интеллекта в вашей компании? Каковы могут быть риски?

12. Как Вы думаете, автоматизация повлияет на профессию?

13. Могут ли машины и компьютеры полностью заменить человека на рабочем месте?

14. Изменились ли обязанности в бухгалтерских фирмах в связи с использованием технологий в последние годы?

    o *Как именно?*

15. Ожидаете ли Вы каких-либо изменений в Ваших профессиональных обязанностях в ближайшее время?

16. Есть ли какие-то изменения в требованиях к новым работникам, например, критерии компетенции в конкретных областях?

17. Может ли автоматизация бухгалтерского учета привести к тому, что бухгалтера будут выступать в роли консультантов и аналитиков?

18. Хотели бы Вы добавить что-то, что мы еще не обсудили?

Appendix 3. Questionnaire

Automation of Accounting

Hey!

My name is Pavel Gurov. I am a Haaga-Helia UAS student. Right now I am doing my thesis on the topic of accounting changes due to automation technologies.

I hope you have a moment to answer my questionnaire and help me move forward in my research.

It takes about 5 minutes to answer the survey.

The survey is conducted anonymously, and the answers are treated confidentially.

Здравствуйте!

Меня зовут Павел Гуров. Я студент Университета прикладных наук Haaga-Helia.

Сейчас я пишу дипломную работу на тему изменения бухгалтерского учета в связи с технологиями автоматизации.

Я надеюсь, что у вас будет время ответить на мой опросник и помочь мне продвинуться в моих исследованиях.

Ответ на опросник занимает около 5 минут.

Опрос проводится анонимно, и ответы обрабатываются конфиденциально.

1. What is your age? / Сколько Вам лет?

    - *< 25 years old / лет*
    - *25 - 35 years old / лет*
    - *36 - 45 years old / лет*
    - *46 - 55 years old / лет*
    - *> 55 years old / лет*

2. What is your gender? / Ваш пол?

    - *Male / Мужчина*
    - *Female / Женщина*

3. What is your role in a company? / Какую должность в компании Вы занимаете?

    - *Bookkeeper / Бухгалтер*
    - *Business Controlling Analyst / Бизнес Аналитик*
    - *Financial Advisor / Финансовый советник*
    - *Other (open answer) / Другая (открытый ответ)*

4. Do you have a higher education degree? / У Вас есть Высшее образование?

   o *Yes / Да*
   o *No / Нет*

5. Years of experience / Опыт работы

   o *Less than 3 year / Меньше трёх лет*
   o *3-7 years / 3-7 лет*
   o *7-15 years / 7-15 лет*
   o *More than 15 years / Больше 15 лет*

6. Are you satisfied with your job? / Вы удовлетворены своей работой?

   o *Yes / Да*
   o *Rather yes, than no / Скорее да, чем нет*
   o *Rather no, than yes / Скорее нет, чем да*
   o *No / Нет*

7. Does your company use the software for the automation of accounting? / Ваша компания использует программное обеспечение для автоматизации бухгалтерского учета?

   o *Yes / Да*
   o *No / Нет*

8. If yes, which tasks have been automated? (Possibility to choose more than one answer) / Если да, то какие задачи были автоматизированы? (Возможность выбрать больше, чем один вариант ответа)

   ▪ *Invoicing / Выставление счетов*
   ▪ *Expenses / Расходы*
   ▪ *Payroll services / Заработные платы*
   ▪ *Cash flow forecasting / Прогнозирование денежных потоков*
   ▪ *Payments / Платежи*
   ▪ *Practice management / Управление бухгалтерией*

9. Do you agree with the statement? - "My daily activities at work have changed due to the use of automated accounting tools" // Согласны ли Вы с утверждением? - "Мои повседневные задачи на работе изменились из-за внедрения инструментов автоматизации бухгалтерии"

   o *Strongly agree / Полностью согласен*
   o *Agree / Согласен*
   o *Disagree / Не согласен*
   o *Strongly disagree / Полностью не согласен*

10. How have your work duties changed when some tasks were automated? / Как Ваши рабочие обязанности изменились, когда некоторые задачи были автоматизированы?

- *My work duties did not change / Мои рабочие обязанности не изменились*
- *I am doing mostly analytical work at the moment / Я занимаюсь аналитической работой*
- *I perform as a consultant right now / Я работаю как консультант*

11. Do you see yourself as an accountant in the future? / Вы видите себя в роли бухгалтера в будущем?

- *Yes / Да*
- *Maybe / Возможно*
- *No / Нет*