A CASE STUDY: PERCEPTIONS AND EXPERIENCES ON ARTIFICIAL INTELLIGENCE IN FINANCIAL ADMINISTRATION

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ABSTRACT

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Abstract
Artificial intelligence is rapidly becoming a technology that has the potential to create significant competitive advantage for companies in different sectors of business, and financial administration is not an exception. While there have been some studies on AI from the accounting perspective, research on the human perspective on AI in financial administration (or any other sector of accounting) is non-existent. This master's thesis has been produced to fill the gap between technical AI research and subjective human perceptions. Research on the subject is especially important, since perceptions of financial administration personnel, especially those in management or executive positions have major impacts in how their organizations use AI, regardless of if they are true or accurate.

The research of this thesis was conducted as a case study together with Snowfox Oy, that has since 2018 been offering one of the first AI-based solution for purchase invoice management in the world. The research material was collected through half structured thematic interviews of customers of the case company and the research material was analyzed with qualitative methods. Based on the results, AI is rapidly becoming a part of financial administration and other accounting processes, but there are clear challenges ahead in this trajectory. Most of these challenges seem to be related to human factors and the general understanding of AI-based technologies. This thesis was able to identify a significant number of motivators for using AI in financial administration, main challenges organizations face when implementing AI into their processes and a significant amount clearly defined and re-occurring benefits AI-usage has brought into financial administration organizations, such as better understanding of an organization's own processes.

In the big picture financial administration personnel seem to have an overall positive feeling about AI, but the nature of the accounting field causes certain challenges in implementing the technology. The possibilities for AI utilization seem to appear mainly disorganized for professionals of the field, but the general potential of the technology has been recognized. The need for more education on the subject also came up in the research material, which correlates well with existing research.

Key words
AI, artificial intelligence, digitalization, experiences, financial administration, perceptions

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TIIVISTELMÄ (ABSTRACT IN FINNISH)

Tekijä
Santeri Punnala

Työn nimi
Case tutkimus: Kokemuksia ja käsityksiä tekoälystä taloushallinnossa

Oppiaine	Työn laji
Laskentatoimi	Pro gradu
Päivämäärä	Sivumäärä
19.6.2021	72

Tiivistelmä
Tekoälystä on nopeasti tulossa teknologia, jolla on potentiaalia luoda liiketoiminnan eri sektoreilla merkittävää kilpailuetua sitä hyödyntäville yrityksille. Taloushallinto ei ole tässä suhteessa poikkeus. Vaikka tekoälyn potentiaalisia sovellutuksia on laskentatoimen näkökulmasta tutkittu jo jonkin verran, käytännössä yhtään tutkimusta ei ole tehty siitä näkökulmasta, kuinka taloushallinnon (tai minkään muun laskentatoimen osa-alueen) ammattilaiset kokevat tekoälyn osana työtään. Tämä pro gradu on tehty täyttämään kuilua teknisen tekoälytutkimuksen ja ihmisten subjektiivisten kokemusten välillä. Aiheen tutkiminen on erityisen tärkeää, sillä etenkin johtavassa asemassa olevien taloushallinnon ammattilaisten käsitykset ja kokemukset vaikuttavat merkittävästi tekoälyn hyödyntämiseen organisaatiossa, riippumatta niiden todenperäisyydestä.

Tutkimus on toteutettu case tutkimuksena yhdessä Snowfox Oy:n kanssa, joka on vuonna 2018 tuonut markkinoille maailman ensimmäisiä tekoälypohjaisia ratkaisuja ostolaskujen käsittelyyn. Tutkimusaineisto on kerätty haastattelemalla yrityksen asiakkaita puolistrukturoitujen teemahaastattelujen kautta ja aineisto on analysoitu laadullisilla menetelmillä. Tulosten perusteella tekoäly on nopeasti tulossa osaksi taloushallinnon ja laajemminkin eri laskentatoimen prosesseja, mutta tähän liittyy haasteita. Suurin osa haasteista näyttää liittyvän inhimillisiin tekijöihin ja teknologian yleiseen ymmärtämiseen. Tässä tutkielmassa onnistuttiin tunnistamaan useita motivaattoreita tekoälyn hyödyntämiseksi, pääasialliset haasteet, jotka vaikeuttavat tekoälyn hyödyntämistä taloushallinnossa, sekä merkittävä määrä konkreettisia hyötyjä, joita tekoälyn hyödyntäminen on taloushallintoon tuonut, alkaen esimerkiksi paremmasta omien prosessien ymmärtämisestä.

Kokonaisuudessaan taloushallinnon ammattilaisten käsitykset tekoälystä ovat varovaisen myönteisiä, mutta alan luonne aiheuttaa tiettyjä haasteita teknologian implementoinnissa. Tekoälyn hyödyntämismahdollisuudet taloushallinnossa näyttäytyvät alan ammattilaisille pääosin jäsentymättöminä, mutta teknologian potentiaali yleisellä tasolla on tunnistettu. Myös koulutuksen puute aiheeseen liittyen tuli esille aineistossa, mikä korreloi hyvin olemassa olevaan tutkimukseen.

Asiasanat
digitalisaatio, kokemukset, käsitykset, taloushallinto, tekoäly

Säilytyspaikka
Jyväskylän Yliopiston Kirjasto

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1 INTRODUCTION

1.1 Thesis background

Artificial intelligence (AI) is all around us nowadays. And not just figuratively in jokes and trendy LinkedIn profiles. AI is used as a tangible tool in almost every sector of the modern society, from academic research to chat bots. Even as you read this text, there probably has been an AI application somewhere down the line participating in moving the information in front of you. As said, we do talk about AI a lot nowadays. Just taking a look at any random newspaper makes this quite clear. One day AI is saving lives, the next day taking over the world and enslaving humankind. But when one starts reading what is said about AI it becomes clear that most people have no idea what AI is, what it can and cannot do. And many experts, such as Goode (2018) agree on this observation in terms of the general population.

On a thesis focusing on accounting and financial administration, a logical question is why does the accounting world need to care about AI? Or to take thinking a step further, why should we be interested in what accounting personnel think about AI? After all the fundamentals of accounting have not really changed since 1494 when the Italian mathematician Luca Bartolomes Pacioli published his book "Summa de Arithmetica, geometry, proportions et proportionalità" or as many now know it, the accounting bible. You could even argue that computer systems in general are unnecessary for traditional accounting. In theory all you need for the traditional accountant's task in a global company is a pen and a bunch of pre-printed T-accounts. Though there probably are very few accountants alive who could take on the task and even fewer who would do it voluntarily.

This is also seen in the general development of accounting information systems (AIS), which seem to mirror the requirements placed upon the traditional accountant rather than what utilizing the changes today's technology would allow. As Syed (2017) suggests, the development of accounting information systems seems to be focused on making the "new and innovative" systems a more efficient way for processing paper information or linking traditional accounts together. This leads to accounting databases often becoming storage places for massive amounts of specific information that has absolutely no value for business decision makers and the processes of keeping these databases (such as purchase ledger data) up to date easily become remnants of the past stuck in the information age. It could be argued that this is enough for external accounting and often also is. However, we do need to ask the question of what actually is the goal of accounting and more specifically financial administration? Fulfilling the legal requirements is one of them, but shouldn't efficient processes and efficiently providing up to date financial information to decision makers also be a key goal?

AI is a tool that could help (and as later is demonstrated, already does) solve some of the challenges the 21st century financial administration is facing. So, if the technology is there, why are organizations not using it? As Davenport (2021) puts it, "*AI will no doubt become a revolutionary force in the fullness of time, but right now it is largely evolutionary*". Evidence strongly suggests that new technologies do not appear first into the financial administration domain, but somewhere else. The technology simply seems to not be mature enough to be adopted by large players in the field, but as will be demonstrated that is about to change. At the same time, many core processes of financial administration are ideal for using AI, as they often contain large quantities of data, defined structures and clear rules.

Organizations do not make decisions on acquiring new technology or developing AI-based solutions, people within those organizations do. This is a critical realization and the main motivation this thesis. As is shown in the conclusions, the attitudes and (often wrong) perceptions on AI play a significant part when we look at why AI has not yet taken a foothold in the financial administration domain.

As will be presented in this thesis, AI is making its way into the financial administration and broader accounting context and organizations need to start preparing for the change that come with it. Cobb et al. (1995) have presented a model for describing how change happens in the accounting context (Figure 1). While for instance Kasurinen (2002) has since updated the model, the original model simplifies why the themes in this thesis are important. In the model potential for change must cross the barriers for change and most often this is done through leaders pushing the change forward. Perceptions and experiences on AI have an effect on both, they can act as either barriers or be the carrying force over them.

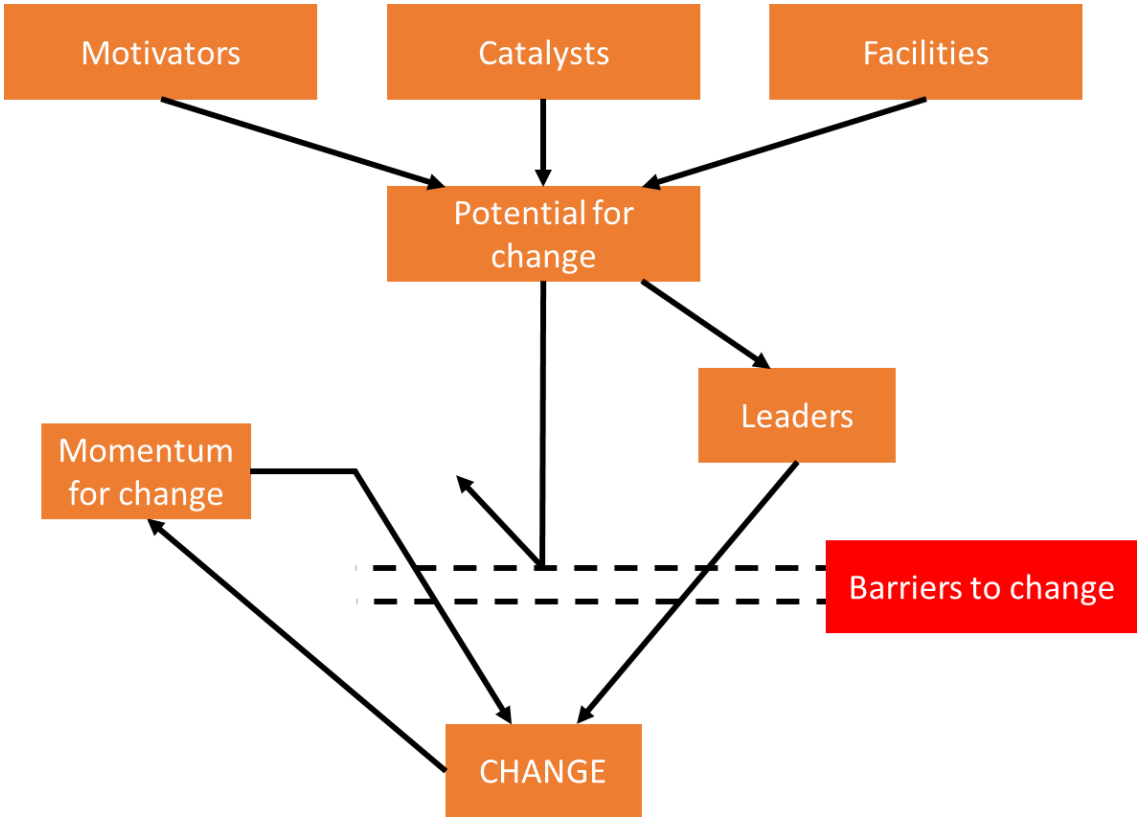

Figure 1 - Accounting change model, after Cobb et al. (1995)

The overall change in the AIS field is also largely changing the skill profile required to be able to successfully work in the field. As Oesterreich et al. (2019) demonstrate, the competences required from controllers and other accounting personnel are very different from what they used to be twenty years ago or what they will be in ten years.

This thesis was conducted as a case study with a partner company, Snowfox Oy. Snowfox is a relatively new company, offering one of the first AI-based, solutions for streamlining the purchase invoice management process (invoice workflow) in the world. The research material of the study was gathered by interviewing customers of the case company. While the conducted case study was centered around their product and customers, the findings and conclusions of this paper can be applied widely to the financial administration domain, as most of the interviewees also work outside the invoice workflow context. The significance and limitations of the research are described more thoroughly in the final chapter.

1.2 Research problem and research questions

Two key observations have been made above. Firstly, current AI-solutions have massive potential in the financial administration domain and that these solutions continue to evolve in a rapid pace. Secondly it is clear that even though AI is a theme that shows itself pretty much everywhere, it is clearly not a concept that is well understood by the masses. Apart from the most tech-related business sectors, this applies to financial administration as well.

In short, this thesis asks and answers the question of how do perceptions, expectations, and experiences of financial administration personnel on AI affect the way financial administration of today is carried out? By answering the research questions below this paper aims to give a broad overview of the barriers of AI-adaptation in financial administration in terms of human factors.

Research questions:

- What does AI mean to financial administration personnel?
- What kinds of experiences and perceptions financial administration personnel have about AI?
- What kinds of possibilities do financial administration personnel see for AI-usage in the future?

As later will be shown, there are plenty of well defined, proven, and scalable uses for AI that could easily be applied to financial administration problems. This paper however explores specifically the human side of AI and how financial administration professionals perceive the technology and its possibilities. The technical aspect of the subject will also be explored as it is necessary to understand it as an underlying factor, but the focus is kept on the human point of view into the subject.

It is fair to ask why it is feasible to study what a certain group of professionals feels about a certain technology. As Sutton et al. (2016) indicate, AI research in the accounting domain is not exactly a new topic, even if the amount of research is not staggering. They also call for extensive research on the topic from different angles. The problem is that the existing research is mostly from the technical point of view, rather than the human side. This absence of research is alarming, as while there are lots of clearly defined possibilities to utilize AI in financial administration processes, research suggests that most operators within the domain seem to have major obstacles in doing so, many of which are mostly related to human perceptions on the issue.

1.3 Structure of the thesis and overview of the data and methods

AI is a somewhat abstract concept that is not yet fully understood by everyone and especially in the financial administration domain there seems to be much uncertainty of what the concept of AI in fact does and does not contain. Therefore, in this paper special attention has been put into defining artificial intelligence and considering the different themes that and topics that underly the discussion of AI in the financial administration domain. After the introduction, the paper advances to defining key concepts such as AI and financial administration and how these interact with each other. After this the acquisition and analysis of the research data is laid out, lastly culminating into a comprehensive analysis of the research results and conclusions drawn from them. It should be noted that previous research on the subject is minimal and as such the theoretical framework is limited and often supported by more general research.

The research and conclusions are based on qualitative data and analyses based on it. The research material has been gathered through interviewing relevant financial administration personnel, mainly financial directors, controllers, and purchase ledger-keepers. Snowfox Oy has given a tremendous contribution for this paper by providing expertise and contacts of customer companies, enabling a very deep sampling of different types of financial administration personnel. Some case company employees were also interviewed to give a general overview of the market of AI solutions for financial administration, as well as customer perceptions on the subject. The research material has been analyzed with relevant qualitative methods, mainly through thematic analysis of the interviews.

Due to the Covid-19 pandemic all the research interviews were conducted remotely through Microsoft Teams, but this did not influence the quality of the data. Data-acquisition and analysis are described thoroughly in the fourth chapter.

2 DEFINING AI AND FINANCIAL ADMINISTRATION

2.1 AI and financial administration supporting business

Financial administration is a business function found in about every single company, NGO, or governmental organization of meaningful size. Artificial intelligence on the other hand is a general tool that has nothing to do with financial administration but is rather used in almost all sectors of business. According to research and findings presented later in this paper, financial administration does not seem to be on the forefront of AI-adoption and AI-innovations are usually rather presented in another domain first. This means that development of AI for financial administration rests on just a few and often small companies.

This chapter was written to give a baseline for what AI and financial administration mean in the context of this thesis. According to Winston (2016) the term suitcase word was first used by the iconic cognition scientist Marvin Minsky to describe concepts, that mean many things depending on the situation and listener. As we will note later in this thesis, AI is an especially good context for demonstrating the concept of the suitcase word as the research on the subject is extremely scattered and defines same themes differently depending on the researcher. In addition to defining the themes, the chapter takes a brief look into the themes that affect how people see AI and how this might affect our perception on different issues. The procurement to pay (P2P) process is also defined, as it acts as the framework the case company currently offers its products in.

2.2 Financial administration and the P2P process

The Cambridge dictionary (2021) defines financial administration (or financial management) as "the job of managing financial tasks for a company or organization, for example, controlling the budget, writing financial reports, and providing money for projects". As we can immediately notice the definition is broad and contains a multitude of tasks.

The exact tasks and execution of financial administration services vary a little from one company to another, but in general it incorporates at least functions such as billing, purchase invoice processing, inventory administration, payroll, accounting, and tax related tasks (Viitala 2006, 29). Many of these tasks are also interlinked, such as purchase invoice processing has a strong link into inventory management and accounting. As the financial administration processes are centered around either keeping track of the company's finances or executing different payments and these processes are heavily interlinked, we can generalize the processes into three main categories: handling sales invoices, handling purchase invoices and other processes (payroll etc.). This is a very rough generalization, but it works, as most financial administration tasks are a result of an event in one of the three categories.

This thesis examines how financial administration personnel in general see AI in their domain. The study was however carried out as a case-study in the purchase invoice domain and as such only the procurement to pay (P2P) process will be laid out in detail.

As the name suggests, the P2P process incorporates every step from procurement planning to paying the invoice and receiving the ordered goods or services. Financial administration naturally plays a huge part in this process, as it incorporates almost all functions of the financial administration services in one way or another. The traditional purchase invoice process is presented in Figure 2 from the financial administration perspective. As can be observed, the process contains a significant number of steps, of which most require a stake from different people within the organization. While the process is time-consuming, as well as expensive, it is also a core function of accounting as it directly affects the company's financial statement. Errors in the process can also cause direct and possibly significant losses if e.g., fraudulent invoices are paid resulting in avoidable losses.

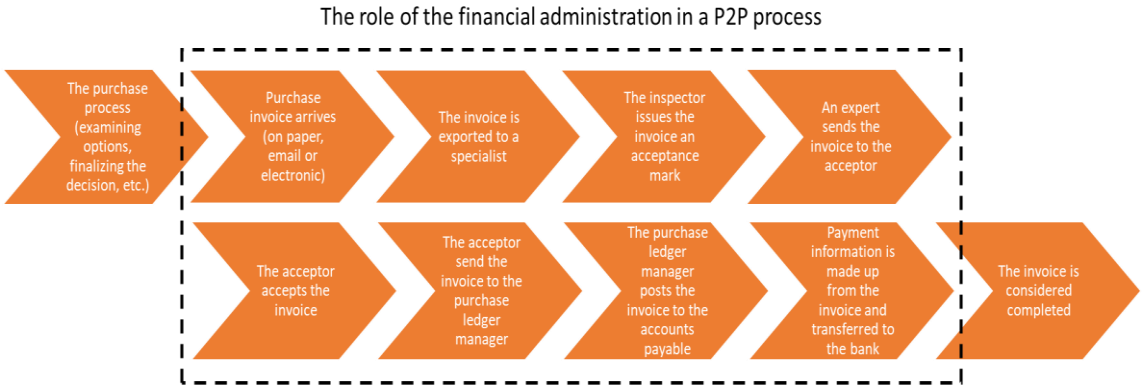

Figure 2 - The role of the financial administration in a P2P process, after Lahti and Salminen (2014, 48), steps not part of financial administration processes simplified

As Keifer (2011) describes, the high cost of purchase invoice management has led to a significant global push for making the process more efficient. This however has two significant obstacles. First is the massive amount of paper invoices, that are still being sent in many countries, though this is slowly changing, as for instance in the EU the fairly recent electronic invoice directive (European parliament and council 2014/55/EU) is beginning to be applied into national laws of member states. This paper focuses on companies based in Finland, where according to Bank of Finland (2020) this issue is minimal, as almost all invoices sent between Finnish companies are sent as e-invoices. However, many of the companies interviewed in this study act on the global market, which forces them to accept varying amounts of paper and PDF invoices.

It should also be clarified that in the corporate world e-invoices mean strictly invoices that are transmitted by invoice providers in special systems and in a standard format. While for example PDFs attached to emails are electronic in a way, they should not be interpreted as e-invoices as sometimes happens. As Koch (2019, 26) observes, the Nordic countries in general are leading the global race for e-invoice adoption along with a few isolated countries around the world. From their point of view the invoice practices in many countries can be described as primitive. Figure 3 describes the global status of e-invoice adoption. The second challenge in purchase invoice workflow automation is the irregularities in the data. Paper and PDF invoices never come in a standard format, and due to their nature, they cannot be automated before (manually) transferring their information into a standardized format. Even e-invoices are extremely hard to automate, as they often have information in wrong fields or missing entirely.

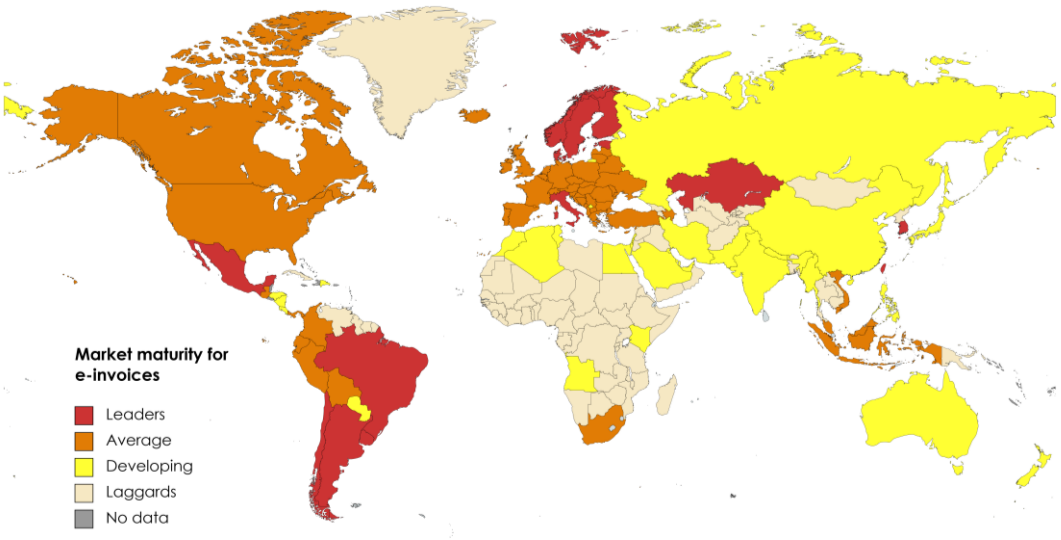

Figure 3 - Market maturity for e-invoices, after Koch (2019, 26)

It is also important to understand that not all invoices are alike from the financial administration point of view. Generally, invoices can be divided into PO (purchase order) and non-PO invoices. The difference is in the purchase that generated the invoice. When a purchase requisition process is in place, the purchase will be triggered by a pre-approved purchase order that is sent to the supplier. In the case of purchases made outside the regulated purchase process, a non-PO invoice will be sent from the supplier. The distinction is important when considering ways for automizing invoice processing. PO invoices are usually relatively easy to automate, as they are always similar compared to previous ones and the processes that create them allow for traditional automation with relatively low effort. Non-PO invoices on the other hand have much more variance, errors and in general are in a format that makes traditional automation almost useless.

2.3 Artificial intelligence – the very short syllabus

It is essential to understand that defining AI is a task, that is much harder than it sounds. In Wikipedia (2021) AI is defined as *"intelligence demonstrated by machines, unlike the natural intelligence displayed by humans and animals, which involves consciousness and emotionality"* and that *"The traditional goals of AI research include reasoning, knowledge representation, planning, learning, natural language processing, perception and the ability to move and manipulate objects*". In a previous edition (2020) of the articles Finnish version AI was defined as *"a computer or computer program,*

that can execute actions considered intelligent". Even though these are common definitions for artificial intelligence, in reality they do not describe the technology much. At the same time, they portray the scope of the problem well: we tend to define everything that seems intelligent to be artificial intelligence and this is a great problem in AI-related research. This is the very definition of the suitcase word mentioned earlier, and it is a problem, because when we define everything remotely "intelligent" as AI, we do not really define the term at all. To add into the confusion intelligence and consciousness often get mixed up in the conversations of non-experts.

In this thesis the exact definition of AI is not the main concern, as even the best experts on the subject are yet to arrive to a common definition of the term. It is however a theme that must be discussed, as the research focuses on how financial administration personnel perceive AI and as such baseline of some kind must be established. The challenges in defining AI (understanding what AI is) are also a major contributor to the slowness of adopting the technology in financial administration as will be shown in the results.

While Wikipedia is far from ideal for a source defining anything in an academic thesis, in this case it offers a good view into how most (non-expert) people perceive AI and has been included as a cautionary example.

Haenlein and Kaplan (2019) define AI as *"a systems capability to interpret external data in a correct manner, to learn from the data and use the knowledge from the previous data to achieve a certain goal through flexible adaptation"*. This is a much better definition compared to the ones found in Wikipedia, as it portrays the true nature of AI: statistical data processing. Their definition also includes the importance of learning, which is a key factor in separating AI from other statistical analysis methods. Many other experts agree with them. Such as in the Technical Oxford Dictionary (Butterfield ja Szymanski 2018) it is precisely the capability for learning that separates AI from other methods of data analyzation.

Haenlein and Kaplan (2019) also present a useful term to help differentiate AI and non-AI systems from each other. They use the term expert systems to describe possibly very complex and seemingly intelligent systems, that do not have an AI component in them, but rather work through a fixed set of rules. A good example of this is the IBM Deep Blue chess algorithm mentioned by them, which can beat the best grand masters in chess and even seems to be somewhat intelligent, but actually only follows a very strictly defined set of rules and cannot become better in the game without human involvement. Figure 4 describes the division between AI and non-AI systems. As with almost everything related to AI, the term expert systems also presents the definition problem, as some researcher use it also to describe AI-solutions. It is also hard to draw a line between the different levels of AI or non-AI solutions, which is why Figure 4 should not be seen as an absolute truth, but rather as a general idea of the division between different technologies.

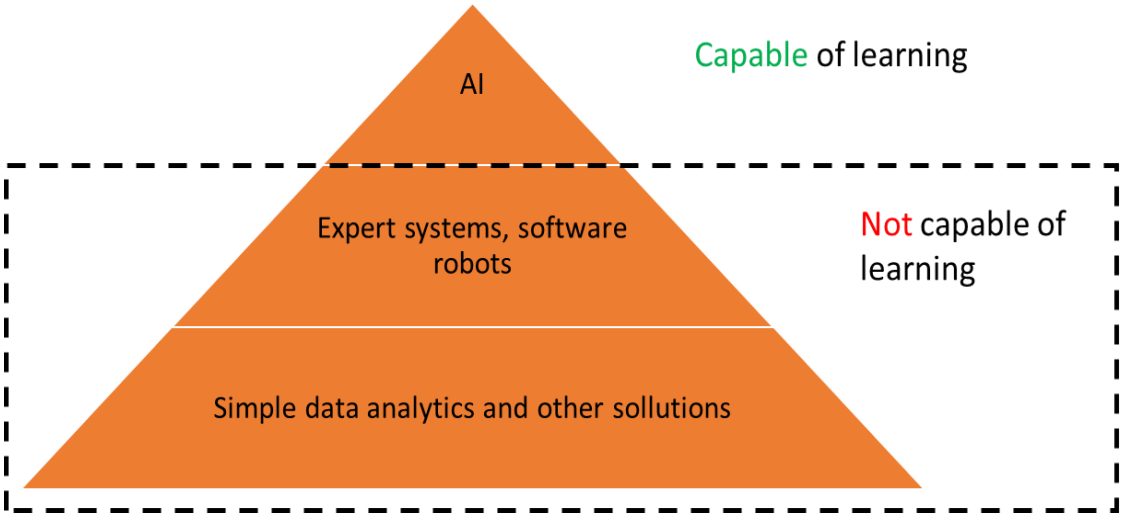

Figure 4 - The relationship between AI and non-AI data analytics after Haenlein and Kaplan (2019)

It should be noted that the presented division between the different AI and non-AI systems are not absolute, and they can in some cases contain components from each other, depending on who you ask from. Haenlein and Kaplan (2019) also divide AI into three levels depending on sophistication. This however should not be interpreted as a division of existing technologies, as all current AI-applications are meant for fairly specific tasks and as such occupy the lowest level (artificial narrow intelligence or ANI). AI applications from the higher levels (Artificial general or super intelligence, AGI and ASI) are seen unlikely to emerge in the foreseeable future. As Ng (2016) has observed, current AI applications are mostly in fact very simple data processing, creating simple numerical results and that the probability of a super intelligent AI emerging (let alone taking over the world Terminator style) in the near future is pretty much non-existent.

While the classifications of different artificial intelligences are not at the center of this thesis, it is useful to understand that such structures have been presented. This also helps to understand the important division between intelligence and consciousness. As an AI moves up on the levels of intelligence, it usually becomes more "humanlike", as it can complete more abstract tasks. This should not be interpreted as an AI having a consciousness. As PhilipDavid et al. (2007, 117-150) phrase the issue, it has not been possible to isolate how the consciousness works in the human brain and have no evidence that computationalism (the theory that a brain is a computer) applies to artificial intelligence. This thesis again does not seek to prove the existence or absence of a link between intelligence and consciousness. It should rather be understood that non-experts often mix these two with each other, even though for instance Goutam (2004) sees it unlikely that we will ever create (accidentally or on purpose) an AI that has a consciousness.

As one last note on the subject it is worth to point out that those who do not often work with AI easily confuse it to the technologies behind it. Terminology such as deep learning, neural networks or machine learning often come up,

but these are rarely used to describe artificial intelligence. They are rather technologies that make building AI possible, as has been well described in the Elements of AI educational material created by the university of Helsinki and Reaktor (2019). Their material is also a very good starting place for anyone hoping to gain a basic understanding of AI.

As said, for the purpose of this thesis we do not need to understand the nuances of defining different types of AI. The key is being able to roughly tell AI and non-AI applications apart, as they have their best uses in very different types of business applications. As such the definition of AI has been kept relatively simple. Therefore this thesis does not compare the different nuances of the many scientific articles defining AI, but rather settles for giving a rough framework to understand the technology, which is well enough when considering the objectives of this thesis.

2.4 The layman's point of view into AI

As per the previous sub chapter, we quickly notice that the field of AI research is scattered and even the experts of the field have not reached a common definition of the very thing thy are researching. This is not an easy field to navigate for the average person. For instance, Harari (2018) suggests that according to multiple academic studies most people cannot differentiate intelligence and consciousness from each other. According to him most people make up their perceptions of AI based on science fiction movies, that often mix consciousness and other often irrelevant themes into AI-research. Many others have come to the same conclusion.

It is interesting, that most people understand practically nothing about AI, while at the same time almost all digital services we use daily have AI-components in them. A great example of the double standards of people was found in a global study by the American software company Pegasystems (2019), where two thirds of participants informed researchers that they do not trust or do not know if they trust corporations that utilize AI. In the same study 72% of participants stated they know what AI is, but only 34% admitted using services with AI components. In reality, almost all the participants had used AI-based services, they just did not recognize this. Another interesting finding was that only about half of the participants perceived the ability to learn to be an important factor in defining AI. As Cave et al. (2018) put it, the gap between perceptions and reality of artificial intelligence has a huge effect on not only how AI is used in everyday applications, but also how these AI-based applications are developed.

As Vermeulen (2019) suggests, we live in very challenging times in terms of human-computer interaction and one of the complicating factors in this equation is artificial intelligence, because it has a useful application in so many different fields. It is not an understatement that AI can be utilized in every single field of business and society, which will affect how we do our jobs and if jobs existing

today even survive this transition. Anderson and Smith (2014) suggest that by 2025 AI will have influenced employment and economic prospects in almost every sector of business out there, so staying on par with the requirements of your job will almost certainly require some level of understanding about AI in the future. As an expert quote in their paper phrases the issue well: *"While automation will be less than perfect by 2025, we are likely to witness a trend in which routine white-collar jobs, such as routine legal work, accounting, and administration, will be replaced by AI tools."* This is frightening to almost anyone and one could even say the whole fabric of our society is changing in the process.

This chapter was written to prove two essential points. Firstly, that there is a huge, AI-driven change happening in every business sector. Secondly to demonstrate that the change might seem frightening to many, especially as most people whose jobs or daily routines AI will affect seem ill-equipped to understand the factors behind the change. This is a theme that can be seen in financial administration as well. As this thesis will demonstrate, the AI-revolution has already begun in the financial administration domain and all the same challenges will come up there. Mostly the challenge is not technical, but rather springs from the human perspective into the issues in questions, a theme this paper has been written to shed light on. It should also be noted that while this thesis predominately talks about artificial intelligence, there is also the larger picture of computer and automation development, that AI is ultimately only a piece in.

The whole myriad of issues caused by fast and wide scale adoption of AI boils down into one simple picture. As Howard (2014) suggests in Figure 5, we are approaching a turning point in technology adaptation. While AI is only part of the equation, it forms a positive feedback loop with the ever-cheapening computing power and data storage. Managing this equation from the perspective of humans, employees, factory workers or accountants is challenging, but essential if organizations wish to utilize AI to its full potential. It should be noted that financial administration is facing these exact same challenges, as can be seen from the next chapter.

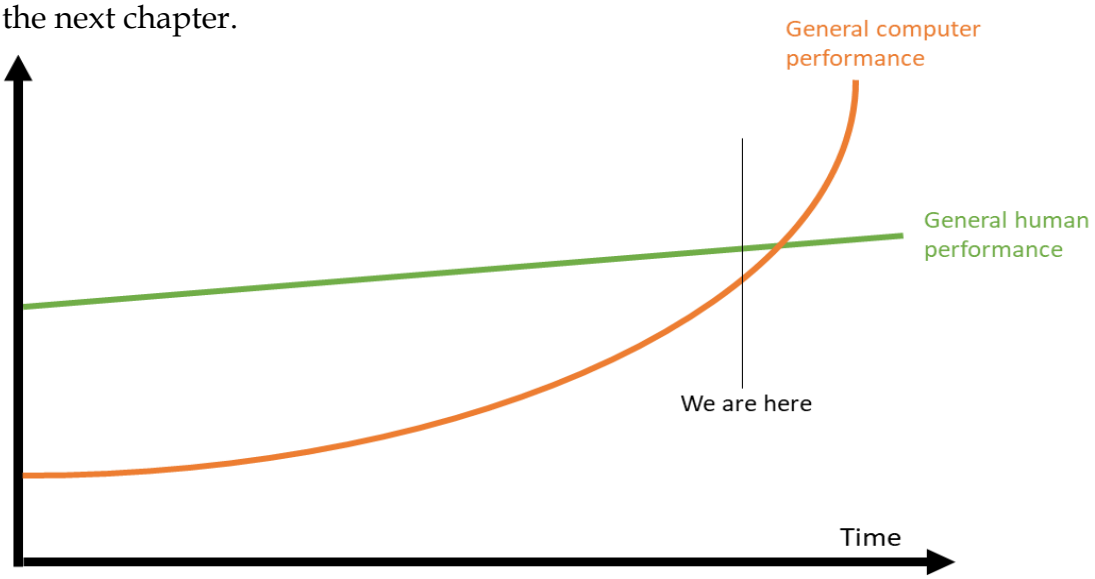

Figure 5 - Machine performance compared to human performance, after Howard (2014)

3 ARTIFICIAL INTELLIGENCE IN FINANCIAL ADMINSTRATION

3.1 AI research in the financial administration context

Financial administration and artificial intelligence are both themes that have been researched somewhat thoroughly, even if AI-related research still is fragmented. It seems however, that the boundary between them has been forgotten by researchers. It is probably because these kinds of questions sort of "fall between" the two domains and as such might often get overlooked. This chapter examines how these two themes interact with each other in research.

In the previous chapter examined at the challenges financial administration is facing today. As companies get into more and more complex and bigger business ventures, the strain on the financial administration functions grows. The growth usually tends to also be non-linear, adding even more strain on the team. Laughlin (2007) also indicates that the amount of regulation towards accounting practices has grown significantly, a trend that is still continuing. In too many cases the growing amount of regulation, documents and corporate operations have made the 2020 financial administration a compilation of expensive and inefficient functions that exist because they must, while providing minimal value for the company. An obvious solution for lowering the costs of financial administration functions is using technology to make the processes more efficient, though this is a process with its own challenges.

Hunt and Morgan (1995) state an obvious but important fact. According to them the basic principle of modern economics is that companies seek to gain a competitive advantage in all sectors of their business, so that they could produce their services or products with a cheaper price compared to their competitors. While the often-expensive financial administration rarely creates any direct value for companies, it is essential for fulfilling not only legal obligations, but also often necessary to keep daily operations running by for instance ensuring payment by

customers and keeping management informed about the company's economics. As the financial administration services can rarely be reduced in volume, increasing the efficiency of the financial administration functions is the way most companies have chosen for acquiring a competitive advantage in this business sector. Naturally in the computer age the most obvious and used way to pursue efficiency has been to deploy different IT-solutions to aid in routine tasks of the field. The traditional IT-projects however do not seem to be enough for gaining a competitive advantage.

As Seasongood (2016) has observed, software robots and other types of similar, traditional automation solutions are already beginning to become mainstream in financial administration. While these types of technologies are yet to be adopted by even most financial administration organizations, they are beginning to be widespread enough, that gaining a competitive advantage through them is beginning to look less and less likely. Artificial intelligence on the other hand is a technology, that enables totally new approaches on financial administration problems, as in many cases it is not limited as much by constrains such as data format, outliers in the data or process defining in the same ways as the traditional automation methods tend to be.

Lambert and Marshall (2018) see AI as a disruptive technology that may lead to a momentary competitive advantage on many business sectors. This is since AI usage is not yet widespread and as such the new possibilities it offers are probably not yet utilized by competitors. In practice the competitive advantage can in the financial administration context be achieved by for example through better analysis of financial data, faster processes or even new innovation that using AI tends to cause. As Cockburn (2018) points out, implementing AI into processes not only provides new approaches to complicated problems, but also causes organizational learning and nurtures future innovation. Figure 6 positions AI in relation with other financial administration technologies and actors in the AIS context. While the figure is a simplification of a complex issue, it helps to understand why AI has a huge potential to change the financial administration domain in the future and provide a considerable competitive advantage now.

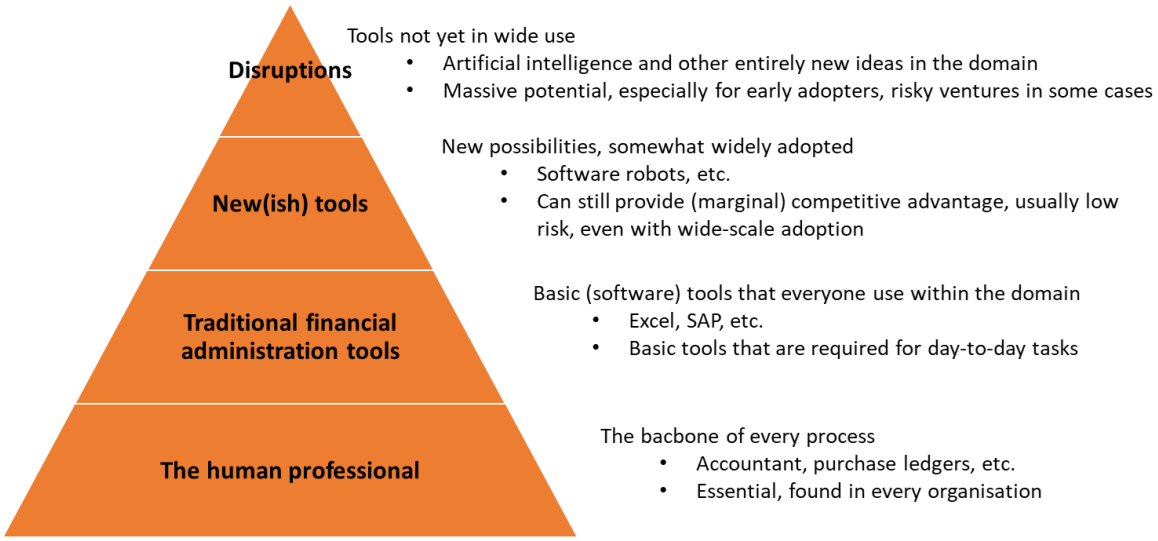

Figure 6 – A rough way to generally classify operators and technologies in the AIS domain based on the research showcased in this chapter

According to Pannu (2015) most AI applications in accounting (and financial administration) are centered around changing massive amounts of data into an easy-to-understand form. Overall, the research in AI, specifically from a financial administration point of view is absent. This probably is since AI as a technology has simply not existed in the domain for long and its potential is yet to be widely understood. Gillonin (2018) predicts that most software used in accounting and financial administration is going to be expert systems and other traditional also software in the near future, though as practical AI-applications become more available, they will undoubtedly become more common.

As mentioned in the introduction, there is very little research on AI in financial administration and most of the research is from a somewhat technical standpoint, usually overlooking the human side of the issue. A characteristic of a disruptive technology is that it fundamentally redefines the processes within a domain. Or as Utterback and Acee (2005) define it, a new technology having lower costs, at the same time providing better performance. This can cause challenges, as disruptive technologies indeed often disrupt the "usual way of doing things", which can lead to unforeseen consequences and conflicts within the domain.

CRM systems were once a disruption in the financial administration domain, but now occupy the lower levels of technological advancement in Figure 6. This thesis exists to shed light on the human side of the ongoing disruption, maximize its potential and help manage the challenges that arise from it. The next sub chapter considers AI research from the financial administration personnel point of view.

3.2 Financial administration (personnel) point of view of AI

If AI research from a financial administration point of view is scarce, from the point of view of the financial administration personnel it simply does not exist. As has been described in the previous chapters, the field of AI is complex and fragmented. This does not make it easy for financial administration personnel to understand the true potential of the technology or how it could be implemented into financial administration processes. Most findings presented in chapter 2.3 detailing the layman's point of view into AI apply directly into financial administration personnel, as few of them have a substantial experience on AI, statistical mathematics, or IT-development.

According to Sutton et. al. (2016) accounting research does not have a clear picture about AI. Rather than that, AI has been called everything from intelligent systems to expert systems, making the whole field of AIS research confusing. The complexity of financial administration systems also makes perceiving individual technologies such as AI hard, because they often contain multiple parts and technologies, or who would call the average ERP easy to comprehend?

Baldwin et. al. (2006) have also suggested, that most AI-related research in an accounting context is done by accounting or financial administration professionals who do not necessarily have a deep understanding of the AI side. On the other hand, they can arguably have the best outlook on what AI in the financial administration context should be, but at the same time technical constraints might be neglected or the full potential of AI overlooked. Some experts such as Gray et al. (2014) even ask if the accounting information system researchers need to care about AI at all, a path we should avoid taking, considering the already proven possibilities of the technology.

As has been presented, there is practically no research at all to answer the question of how specifically financial administration personnel perceive AI in their own domain. We can however safely assume, that in general their knowledge on the subject is thin and fragmented, as is the case with information regarding AI in financial administration. As AI takes foothold in the field, the educational needs will most likely also be recognized. Right now, the financial administration professionals have received their education in an age, where accounting information systems were a disruptive technology. As Baldwin-Morgan (1995) has suggested, the education of the time was not focused on innovative technologies such as AI. By looking at accounting syllables of business schools (such as University of Jyväskylä OPS 2021 or Aalto University accounting curriculum 2020) we can see that AIS education (including AI themes) has gained a foothold in them, at least in Finnish business schools. Research however remains scarce, especially in terms of AI in financial administration.

Davenport (2021) suggests that generally one of the biggest concerns regarding AI is its tendency to reduce the number of jobs available. This is also a theme often visible in public conversation about AI, though as Davenport phrases it: *"so far none of the organizations in which I have conducted interviews have*

reported significant job cuts". For some reason this does not seem to be translating into the public conversation. Oesterreich et al. (2019) do however at the same time indicate that the skills required from the accounting personnel of tomorrow are changing. It can be expected that not everyone will keep up with the changing requirements, eventually resulting in some kinds of conflicts in terms of job security. It can safely be expected that this is also the case in most other domains.

When speaking about a certain group of people, as in this case financial administration professionals, it is important to remember that averages do not describe individuals. On a strictly work-related domain such as financial administration, organizational values and objectives also have a considerable effect on what professionals of the field want to and can learn of new technologies such as AI. As research on financial administration point of view into AI simply does not exist, this paper cannot give an absolute theoretical frame for the subject. We can however assume based on other research laid out in this paper, that from their point of view the possibilities and threats of AI often seem incoherent and hard to quantify. As AI becomes more mainstream in the domain, the possibilities and risks will become clearer, helping to accept the new technology. Until that happens, the AI – financial administration relationship seems to be staying relatively distant and unstable, providing great possibilities to those who dare to be the first ones.

Boden (1998) claimed that a computer traditionally always wins a human in analysing numerical data and calculations, whereas human strengths are more in tasks requiring a more abstract way of thinking. Even though new breakthroughs in AI research have made it possible for computers to perform more abstract and creative tasks, Boden's decades old observations still seem to hold true. It is surprising how hard some routine financial administration tasks have turned out from the point of view of automating them, which in turn has maintained a large number of humans doing routine financial administration tasks, such as purchase ledger. In the next sub chapter is presented a tangible AI-driven disruption into this equation, which also acts as the basis for analyzing this papers research data.

3.3 The case company – automizing the invoice workflow

This chapter gives a basic overview of the case company and its primary product. This is necessary, as it gives a background for assessing the results drawn from the research material. Roughly understanding the case company's product is also a perquisite for being able to perceive the significance of certain findings of this thesis that are presented later.

As has been previously demonstrated, from a financial administration point of view the P2P process is a time consuming and expensive process, but also at the very center of providing high quality financial administration services.

This makes developing the processes within the domain challenging, as most of them must be carried out with high precision and in the worst cases mistakes might have significant financial or legal consequences. At the same time, the push to automate these processes is growing.

From an automation standpoint purchase invoices are challenging to manage. This is due to the nature of the raw data. Providers, acceptors, contracts and essentially all parameters involved in the process chance regularly. As Koch (2019, 67-80) presents, this sector of financial administration is particularly hard to automate using the traditional methods available. Many financial administration organizations have anyways tried, usually ending up with massive rule libraries that need to be constantly updated and maintained. Artificial intelligence can be used to solve this problem with its learning capabilities.

The case company in this study is Snowfox Oy, which from since 2018 has been offering an entirely new type of solution for automating the invoice workflow, primarily for mid and large size companies. The company offers an AI-based solution, that can be connected to any existing invoice management system (Snowfox 2021.)

As the case company is a relatively new contestant on the market and creating an entirely new kind of service, their customer base is also often only taking their first steps with artificial intelligence, providing a perfect platform for gathering the research material for this thesis. According to their customer register (2021) the case company's customers include all sizes of companies from a variety of different industries. The customer companies are mainly based in Finland, however most of them are large enough to have substantial global operations. This can also be noticed from this studies research material, that includes a large variety of different companies.

In short, the Snowfox artificial intelligence provides accountants and ledger keepers predictions about an invoice's routing and posting based on historic data. The predictions are presented usually as pre-filled posting fields in the customers invoice software, where an accountant or similar person than makes the final decision about the posting and routing of the invoice. The AI than later receives a feedback on how well it predicted different dimensions of the invoice and learns from the data provided, bettering its capabilities with every invoice predicted. The AI is also pre-trained with 3-12 months of old invoice data before deployment and during production in special cases. This makes it possible to deliver accurate predictions immediately when the AI is implemented into existing processes and maintain a constant accuracy in the service in case there are major changes to the customers processes. The whole process is described in Figure 7.

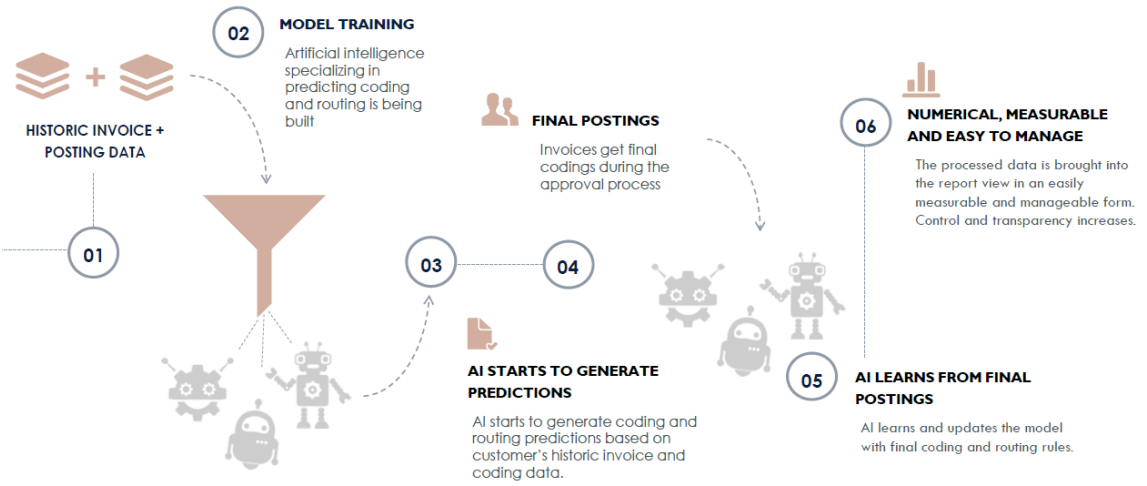

Figure 7 - Snowfox AI in the P2P process (Snowfox 2020), figure with courtesy of Snowfox

The company's service also has other experimental features, some of which are already in production with a limited number of customers, but from this thesis's point of view it is important to only roughly understand the main service provided.

While the case company has a limited capability to already provide total automation through AI, an overwhelming majority of customers use their product only in its predictive mode. This seems to be a good strategy for taking the first steps of AI-implementation in financial administration processes, as it requires no additional controls to be put in place and poses minimal risks to the organization. At the same time the service provided by the case company can automate a significant percentage of the customer companies purchase invoices as can be concluded from the research data provided later. Due to the case company's result-based pricing model (2021), the implementation of their product also carries a relatively low financial risk to the customer while providing a significant automation potential.

4 DATA AND METHODOLOGY

4.1 Data

This thesis is based purely on qualitative data. The data was gathered between 9.3.2021 and 13.4.2021 by interviewing financial administration personnel from customer companies of Snowfox Oy and some employees from the case company.

According to Saaranen-Kauppinen and Puusniekka (2006) special attention must be placed on choosing relevant interviewees so that the gathered data is useful for research. In this research choosing the interviewees was a theme that was emphasized so that it would be possible to gather a wide as possible understanding about AI in financial administration. The perquisites for choosing interviewees were that they work in a position where they have a wide as possible view into financial administration, while also having at least a basic level understanding of different accounting information systems.

The interviewees were chosen to represent a wide range of companies in different industries and a range of different financial administration positions ranging from CFOs to purchase ledger team managers. All the companies were based in Finland, but most also have substantial international operations. Many of the interviewees also work in companies providing financial administration services as a purchasable service, thus giving a broad view into different kinds of companies. More information on the companies and employees interviewed can be found below in Table 1. To protect the identities of the interviewees and trade secrets of their employers the data in the table has been anonymized and exact information about the companies size and industry generalized. A total of 14 financial management professionals from 9 different companies in different industries were interviewed for this study. The research material represents a wide variety of professionals from recently graduated ones to individuals with decades of global experience in the field. The interviewees represent a much wider sample than their amount would suggest. This is because about half of

them work in positions that contain responsibilities over financial administration processes of dozens of other companies as well.

Industry of organization	Revenue (2019), MEUR	Position of the interviewee
Software outsourcing	0-25	Business director
Software development	0-25	Chief operational officer
Industrial rental services	25-100	Controller
Finance and management consulting	25-100	Invoice software administrator
Finance and management consulting	25-100	Product manager
Conglomerate	500-750	Service center manager
Conglomerate	500-750	Financial coordinator
Health services	500-750	Development manager, financial processes
Health services	500-750	Invoice software administrator
Consulting services, concern	500-750*	Purchase ledger team manager
Consulting services, concern	500-750*	Chief financial officer
Transportation	750-1000	Financial services team leader
Car sales	Over 1000	Purchase ledger team manager
Car sales	Over 1000	Service center manager

Corporate data by Fonecta (2021), positions of interviewees based on interviews and LinkedIn profiles (2021)
* Total revenue of the concern

Table 1 - Interviewees of the study

Due to the COVID-19 pandemic all the interviews were conducted remotely as (video) calls through Microsoft Teams. This had no negative effects on data quality as analyzing the nuances in interactions between the interviewer and interviewee were not relevant for the study. The remote interviews probably even made it possible to include subjects who would have been too busy for a physical face to face interview. As the pandemic had been ongoing for over a year at the time when the research material was collected and most financial administration organizations had been working remotely anyways, remote interviews were also a more natural option than they would have been before the pandemic.

The interviews were conducted as half structured thematic interviews. As Eskola and Suoranta (2014, 86-87) suggest, they are a great way for gathering data in a qualitative study like this because the interview type allows deep reflection on the themes from the interviewees side without ruling out any answer possibilities beforehand. A thematic interview also makes it possible to ask relevant additional questions from the interviewee based on their answers and background. All the interviews were conducted in Finnish, as that was the native language of all the interviewees. The main structure of the interviews is presented in appendix B.

Saaranen-Kauppinen and Puusniekka (2006) stress the importance of recording the interviews and transcribing the recordings in a valid way, so that meaningful analyses can be made about the data. In this study each interview was also paired with extensive interview notes, that were used to aid in analyzing the data. The interviews were transcribed fully as clean verbatim, meaning that

for example intonations or "thinking sounds" (like "hmmm") were left out of the transcribing. This was done to make the data clearer and it did not affect the analysis of the research material. The interview extracts presented in this paper have been translated into English after analysis and have had certain words, such as names of companies or employees retracted from them to protect identities and business secrets. Retractions have been marked on the extracts.

4.2 Methodology

Qualitative research is a combination of gathering the research data and analyzing it. These are not individual processes and happen mostly simultaneously, also affecting each other. The end goal of a qualitative analysis is to create connections and classes within the research data that in turn give answers to the research questions. The complexity of the research process can be seen in Figure 8. Analyzing the research data is perhaps the most challenging part of qualitative research due to the complexity of the data (Järvenpää 2006.)

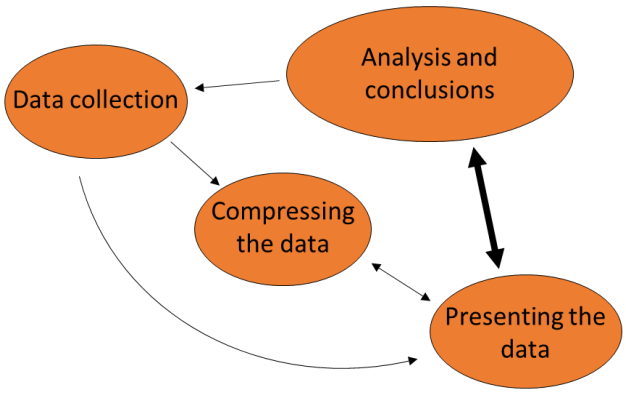

Figure 8 - Factors of analysing qualitative data, after Järvenpää (2006)

The research material of this study has been analyzed through thematic analysis. As Saaranen-Kauppinen and Puusnieka (2006) point out, the thematic analysis of research data is an especially good solution for analyzing thematic interviews as it makes it possible to divide the interview answers into themes that the research is based on. They also emphasize the end goal of the thematic analysis, which is recognizing different entities from the research data. This has also been the main goal of this research.

As all the research data was in Finnish, the analysis was also conducted in Finnish. The different interview extracts presented in the results section were translated into English after the analysis to avoid translation related mistakes in the analysis process. Special care was taken in the translation process to preserve the original meaning of the interview extracts.

As the themes addressed in this research are intricate, exact thematic division was often not possible. The data was not extensively quantified expect for a few exceptions, as the amount of research data was very manageable and the interviewees were from so different positions that the interviews often took very

different paths depending on who was interviewed. This turned out to be a sensible approach and also justifiable in terms of the research in question, as Saaranen-Kauppinen and Puusnieka (2006) suggest.

5 RESULTS AND ANALYSIS

5.1 General

This chapter presents the different results obtained from the research material, as well as analyses based on it. Conclusions based on the findings are presented in the final chapter.

The following sub-chapters contain a comprehensive presentation of this study's findings, sorted by the main themes that could be identified from the research material. During the analysis of the research material emphasis was placed on factors that seem to be making AI adoption in financial administration more challenging.

The results have been divided into six main categories that could be identified from the research material. First are presented the different ways in which financial administration personnel perceive AI as a technology. After this, drivers for AI usage and decision-making processes for acquiring one are explored. The next themes are experiences and perceptions of implementing AI into processes and challenges regarding this. Lastly, we take a look at how financial administration personnel believe (and wish) AI to be used in the future.

The large amount of research material extracts has been included to give the reader a comprehensive insight into the thoughts of financial administration personnel, as this is a subject that has not yet been widely researched. The interview extracts also portray information that is hard to quantify or presented accurately in other ways. As some of the interview extracts contain personal information or business secrets, there are individual retractions that have been marked in the extract (such as [company name] or [name of person]).

5.2 Understanding AI as a concept

Based on the research material, artificial intelligence is a term that everyone in financial administration describes a bit differently. A notable ang generally recurring theme is a certain level of uncertainty the interviewees have on their own definition of AI. As the interview extract below suggest, defining a common baseline for AI-related conversation can be challenging. This was expected and follows the definition of the suitcase word well.

> I define artificial intelligence as… Kind of if we think about the difference between a traditional script or algorithm compared to an AI, then I'd classify it as an AI when we humans don't directly know what it does and how… …So it's artificial intelligence when we have no direct view into why it does something and how.
>
> I'd say AI is that… Well what I've learned from this project is that it's based on historic information and then with some algorithms we predict the future. Something like that.
>
> Well right now it (AI) is machine learning for a lot, that you process historic data. It's not in a kind of neural network situation.
>
> How I define AI? I think it's deducing the future in similar transactions based on similar historic transactions.
>
> Aha. How do I define (AI)? Well yeah… Is it then like… I think it somehow like…. How should I say it? I mean it kind of isn't even any kind of artificial intelligence stuff, it's a series of complicated algorithms that receive data and it can just learn from that and create new models… …Seems like magic, but something it can do. [laughs]
>
> Well it (AI) is kind of like teaching a computer, or it's probably called machine learning. Or I don't know how the terminology goes, but I understand it so that we teach it and then at the same time the AI starts to learn by itself, that they don't… We don necessarily even know what kinds of things it combines from the data and then it makes observations based on it. This is how I see machine learning.
>
> It (AI) is… I've perceived it so that it's. I don't know, you're asking really hard questions. What does it mean? It's kind of something that can logically handle information and materials, or it's not only, we're used to robots doing things, but they only do what they are thought, as an AI actually learns.
>
> I actually just did a course on AI in the university an mainly these statistical models stuck with me from it… …But somehow these (mathematical) models that are used to solve problems stuck with me.
>
> Well yeah, it (AI) is many things. I've seen many presentations about it, but it's a collection of different factors and how you define it, but from our perspective we don't use artificial intelligence but rather machine intelligence, we use machine learning and that's AI for us in financial administration.

> Well it's kind of a thing that can do routine things more automatically in the background. Obviously AI can't do everything, I see it maybe more like that it kind of just does those more routine things and a human can check them if there are mistakes or weird things, those are maybe things an AI can't do.

Based on the previous, different financial administration personnel can perceive AI to mean entirely different things depending on their level of technical understanding. Naturally, those, who possess some level of technical understanding on the subject also seem to take a more technical approach in what they perceive AI to be. On the other hand, financial administration personnel lacking the basic technical knowledge required to understand the nature of AI seem to often define it based on how they interact with different AI-based accounting information systems in their work. It can also be seen from the research material that many of the interviewees define AI through their experiences with the case company's service. This is expected, as most of them had no other experiences of AI-based solutions.

Many also seem to get the technologies enabling AI (like neural networks) mixed up with artificial intelligence. The capability to learn is also absent from many definitions, which can be described as surprising, as all the interviewees had experiences with the AI provided by the case company, where learning is a key element of the system.

Common themes that come up when financial administration personnel define AI seem to be predicting the future, learning and statistical data processing. When looking at the fragmented and often hard to understand field of AI-research, it is understandable that financial administration personnel can have a hard time in understanding and defining AI. Many interviewees also openly admit that AI knowledge in the financial administration sector in general is very limited.

> No I don't understand anything about (AI) and really about anything else either. My role is more to just make PowerPoints and sit in these meetings. I don't know, I think it's enough that some others are the experts, that I maybe just can tell customers about possibilities and think about how… I often just think about what this will mean for the customer as a business case. I can maybe explain a little, but I don't even want to try and understand what happens inside the box.

> No, they (potential Snowfox customers) don't often understand anything about AI, rather we need to teach it to them from the very basics. Obviously, it's a reality we need to accept when we're bringing a new technology to the domain, but especially in the beginning it was surprising to see how little there is knowledge about the subject (in financial administration).

> No I don't generally understand a lot (about AI), I understand those what we've had and have my own feeling, but don't have an academic background or anything.

> Yes, I've myself met many financial coordinators that haven't had any idea about what this artificial intelligence is. Really interesting field and… But there are immense possibilities in that sector coming and that financial administration really has to be developed a lot with those… And we need to get AI and robots interlinked.

This however is changing. The financial administration sector in general seems to be undergoing a shift in how AI is perceived. Many interviewees state that in just a few years knowledge on the subject has increased substantially. Companies seem to also seem to be keeping these topics afloat, as many interviewees clearly are interested to know more about AI partly due to their employer's encouragement. Employers have also set up limited possibilities for more training on the subject.

> Knowledge about what AI is has really increased with financial personnel in just a few years.

> Yes. Yes (knowledge about AI has become more common), but it's good as this (AI) is probably something that everyone should kind of be able to understand something about in 10 years.

> (In companies) no (there is no understanding of what AI is). Or lets say that now the situation is much better than two years ago, so compared to that there has been huge advancement… …When we started selling this no one understood what we were speaking about. No everyone understands, at least much more quickly.

Financial administration personnel are divided in the question if their current knowledge of AI is sufficient in terms of their current position. Those working mainly with day-to-day tasks seem to perceive their AI-knowledge to be sufficient more often than those with more development-oriented positions. Some interviewees in development-oriented positions even described their lack of AI-knowledge a clear challenge for their day-to-day work. Almost all the interviewees however think that understanding more about AI would be beneficial for their work.

Most believe that they will never need a deep understanding of artificial intelligence or the technologies behind it. It seems that the urge to understand more has to do with being able to better manage different development tasks, that most interviewees believe will contain an AI-component in the future.

> Well actually knowledge on AI, I don't think I need to be able to produce them or understand it from the technology standpoint. It's who provides the service who needs to have the AI knowledge and they need to assure me that they have it… …I'm not the programmer, I trust that there is a service provider that has the technical know-how.

> When we don't go into the technical details, I think I have a sufficient knowledge (on AI). And precisely as my responsibility is thinking about the future, where this world is going and so forth. I'd say I have a reasonable understanding (in terms of AI).

> I'd say my knowledge is sufficient for my current position. Obviously you could always know more and especially about the different possibilities, so I could provide more development ideas. I'd say some kind of additional training wouldn't be bad.
>
> Well maybe for my current position (AI knowledge is sufficient). But it would always be better to know more, so that you cold perceive the future somehow. What is coming and like that.
>
> To put it frankly, no (I don't have enough knowledge on AI in terms of my current position).
>
> Certainly not (I don't have enough AI knowledge), if we start doing anything in the corporate world.
>
> I'd see it beneficial to understand more about it. Maybe the greatest benefit would be being able to understand all the different possible uses for it, so you could even begin to research if it was viable to use it in some process.
>
> The logic of it (AI) should be understood (by future financial administration personnel). Deep knowledge is not so important. Understanding the logic why an AI does or does not do something is important, I think that is enough.

In the financial administration context, there does not seem to be a "single truth" about what AI is or how much knowledge on it is required in financial administration positions. In general, there seems to be a need for more financial administration personnel with knowledge on the subject, as well as a common understanding of what artificial intelligence means, as right now different entities are not always able to easily discuss the subject, due to the lack of a common definitions for key terms. Generally financial administration personnel seem to think understanding AI is the responsibility of those, who provide services based on it.

The varying understanding of what AI can be explained partly due to financial administration personnel's habit of learning about the issue through their work, rather than formal studies or literature. This makes their perceptions on the issue reliant on how organizations communicate about AI. Traditional automation such as software robot also seem to get often mixed up with AI.

5.3 Main drivers for implementing AI into financial administration processes

Based on the research material, especially seven themes (listed in Figure 9) can be seen as the motivators for implementing AI into financial administration processes. Better cost efficiency and the reduction of personnel doing simple, automatable tasks are obvious themes to come up, as can be expected when re-

searching the motivations behind AIS development. Surprisingly though, the reduction of financial administration personnel is not (yet) the main driver for using AI. Rather than that, financial administration organizations are now focusing on making their processes more scalable and homogeneous, as well as focusing their human resources on more active and abstract tasks, instead of routine work.

Financial administration organizations seem to often have a feeling that they are missing out on today's possibilities, which can also act as a formidable driver to use AI. There is also substantial frustration towards the high cost of manually handling massive amounts of invoices and other documents, that have little overall significance for their accounting processes, such as recurring 5-euro bills.

> As I said, I've been thinking since the beginning of the 90's what it costs to receive one purchase invoice. And it is unbelievably expensive. If you think it from an outside perspective, do you want to pay for receiving an invoice. Practically every company has to do that through labor costs, pay for just receiving invoices. It feels foolish as a thought and eventually the cost is quite high… Obviously depending on the company it ranges probably between five to 20 euros per invoice. And then if you receive 100 000 invoices annually you can start using math to estimate how much it costs you to just receive invoices. And it's all a bit unnecessary to pay for that, because it can be automated…

> I can't really tell what the driver (for using AI) has been in the management and executive level. But probably that we would be a kind of modern company, that works with modern, or preferably future software. And so that we would use our employee resources wisely for more productive work that creates additional value for the customer, rather than pounding invoices into our system. That can be done by someone else than a human.

> The driver is… It's not reducing personnel or moving them into other tasks, rather managing our fixed expenses, as we've been… Or as we have a goal of rapid growth. We have quite big goals at the moment as a concern and we have been growing with quite a large annual percentage for many years. It has meant that we've had… I remember that a few years ago we handled about 60 000 documents annually. Now we do 650 000 annually. So the document (invoice) amount has grown tenfold in just a few years. If I had grown our financial administration organization with the same pace… That wouldn't have been sensible, at least from a cost perspective. That has been the driver, that we don't need to add personnel costs linearly with business costs.

> It's perhaps because there can be very high transaction amounts, we might be speaking about customers who have over 20-30 000 purchase invoices in a month and to handle an amount like that some customers have really had 10-20 employees to do that… …If the invoice workflow is not automated at all, then it's a really work intensive thing. They come all the time and you need to process them every day and you must be able to do certain things in a certain timeframe…

When you circulate a 100-euro invoice ten times, so that ten people touch it during that, that isn't rational. That's why it (AI) maybe surfaces in these issues, the process… We see that purchase ledger is the first sector (of financial administration) we've started doing this in and the good results may feed our enthusiasm to try this in other sector as well.

Yes, in our case for instance it feels like the number of invoices is growing all the time, so we'll either need more employees or a change to our systems. You could say we have two drivers. Obviously, there is the cost-efficiency, and another is homogeneity. Homogeneity, so that we can optimate the number of mistakes. Kind of… It's probably not the goal to make our tasks 100-percent error free. At least a few years back when I went to a large accounting firm to see how they have solved these things, and it… It surprised that they were thinking about essentiality in everything, does it matter if a 10-euro travel invoice has been posted wrongly? If we can accept that and that in turn lets us use automation that saves us a five or six-figure sum of money in the process, then…

It frees human work time. That is the biggest driver, practically that the AI works 24/7 if we want that and… And also that it works like… As I previously said before, when we've had people sick or there's been some other plug in the process, these kinds of variations don't show anymore in our work. It (AI) smooths out our workload a lot, but also the savings in personnel costs are a definitive driver.

We've been talking about AI in financial administration any time we think about development, that we'd get automation and stuff like that forward. As we need to do a lot of manual things all the time and that takes massive amounts of working hours, I think there is some kind of considering going on in relation to this all the time. Maybe not artificial intelligence yet so much, but everything related to automation.

Figure 9 – The seven identified key drivers for AI-utilisation in financial administration

While many interviewees could list clear, quantifiable drivers behind their motivations for implementing AI into their processes, most did not recognize specific (financial) goals their organizations wish to achieve. Based on the research material it seems, that if one must be named, the key motivation for AI usage right now is staying within or above industry standards and preparing to gain a competitive advantage in the future when more and more technological advancements make larger scale AI-utilization possible. This does not mean that financial administration personnel are missing out on possibilities of cost reduction or similar themes. The maturity of the used AI-applications and organizations using them simply does not yet allow for those radical changes in processes, so organizations are focusing on positioning themselves within the domain in a way, that allows them to make radical changes rapidly in the future. As later will be seen, learning, and building future capability for AI-utilization in financial administration is seen as perhaps the most important take away in today's AI-trials and small-scale projects.

> Precisely like that, I think we need to gather the ability (to utilize AI) already now, because it can be seen that with a great probability these kinds of solutions are going to start popping up more. And when building these becomes lighter, then we can deploy these to smaller and smaller teams.

> At this moment probably those two things, better quality and more efficiently… …But then if we now do these kinds of things, it also creates capability for the future, so that we can use AI, even if we don't exactly know what kinds of solutions will be available then. Now we need to gather data and experiences and later when we come up with possible uses (for AI), then it's possible to implement them into the real world.

> Many see the implementation of Snowfox as a first step towards future financial administration. When AI is clearly coming to the domain, why not try it out already? Especially when building these kinds of capabilities are possible with a very small financial stake and practically risk free through Snowfox.

5.4 The decision-making process to acquire an AI-based system

As has been demonstrated in the previous chapters, there is an interest in using AI in financial administration and using it can provide competitive advantage. Why are there so few AI-based solutions in use in the financial administration domain then? According to the research data these kinds of projects usually rest solely on dependent on the activity of financial administration personnel, or in many cases even a single manager or executive. If the goal is to utilize the newest disruptive possibilities in technological advancement, then this is not a good combination with the previously demonstrated poor and scattered AI-knowledge of financial administration personnel.

One thing that affects the decision-making processes when considering AI-based systems is that such solutions do not seem to be available widely and as there is also no knowledge in companies to create such systems from scratch or even specify their own needs, acquiring one becomes challenging. The general attitudes towards developing financial administration practices also influence these procurements, as will later be clearly shown.

> These AI and automation projects in general are maybe more of the service provider's (financial administration) own things, it doesn't interest the final customer how the service is provided.

> (Financial administration) customers can't name its AI what they need. But a lot of demands are made about automation. How to get automatic postings, this and that. But I think customers don't say it should be some AI that we use. As our customers are from [specific industry], they have maybe a bit more old-fashioned and stiffer people in their ranks, if so can be said.

> I'd say its our CFO who ultimately is responsible (that we utilize AI in financial administration). But then operatively it comes down to often maybe to me… But when the technology matures more, than probably teams themselves can also do these things.

> I think (financial administration) probably is something that management wants to develop, but then when prioritizing, those (projects) that affect customers and sales are higher. And yes, I understand they need to be prioritized higher than some financial administration AI-project.

As later will be demonstrated, getting enough resources for the development of AI-capabilities in financial administration or even AIS-development in general is weighing development down. For many interviewees Snowfox was the only AI that was in use in their financial administration. Besides the case company offering a defined product that solved existing challenges, a key reason for this seems to be the simple fact that the company actively offered them their product, suggesting that many of the organizations do not even have the resources to chart the different possibilities there are for utilizing AI in the financial administration.

> You could say… You could say it was because of the activity from Snowfox (that we began utilizing AI), if one factor needs to be named. When they contacted us, about a year ago we obviously also looked at the market for other solutions. Maybe we realized at that point that Snowfox had the most sophisticated product and obviously the fact that this is directly integrated into our invoice workflow was a big benefit. And also [name of invoice operator] mentioned that something like this exists if you are interested. Maybe that our invoice operator was aboard in this solution was a clear criterion for Snowfox's benefit.

> Snowfox was a clear and well-defined service and I also heard about it in one customer event, where there were others who had used with the same invoice management system we have. And they also recommended it, said it is a good system. And then also our executives also asked me to look into it and comment what I think and we thought this to be really good.
>
> It was initially when we changed our whole invoice workflow, we started thinking what would be a more modern way of doing things. And even then I wanted that everything would be automated as much as possible, so we wouldn't have to manually check basic information and so forth. At that time [name of invoice operator] was a really relevant option, as they from the very beginning were speaking about these AI things that we could utilize with them.

As resources for AI-development seem to generally be low for financial administration teams, most of them see buying such solutions as the only way to be able to utilize the possibilities created by new technologies such as AI. Some interviewees see it as an interesting possibility to build an AI from scratch, but also state that they lack the resources to do so. This seems to be the case also in the future, except maybe for the largest companies. The inability of financial administration personnel to understand where AI could be used in is also a factor that seems to speak against developing such solutions internally.

> [Sighs] Well we've also used outside help for it (to vision uses for AI in financial administration). We've had one workshop with one supplier where we specifically visioned, we had a large group and had a workshop and thought about different options for (AI) implementation.
>
> I don't think, at least in the SME sector its not worth it to produce these (AI-based) solutions at this time, but if the know-how becomes more available and the tools needed become more user friendly, than that will help this to spread into smaller companies also. But in bigger companies this kind of calculating might often lead into the result that they'll try themselves.
>
> I'd put it so that those who develop it (AI) by themselves, it requires massive resources for it. And how you get the professionals, yeah… It's possible to do this by yourself. We also wanted to, and maybe still want to, but we are not mature enough yet to do so. But I would think that it (AI knowledge) is going to be bought from the outside.
>
> It's going to be quite a challenge if someone wants to copy this product. I already know that many have burned a lot of money in it, but ultimately haven't been able to produce anything useful. I mean if you think about case Snowfox…. This also was developed many times from scratch and had a lot of money poured into it before getting an outcome like this.

Even though AI is a new and disruptive technology in the domain, it is naturally not going to replace traditional systems or processes overnight (or ever). This also means that in some cases (and apparently more and more often) some kinds of AI-based solutions are also implemented as a part of larger scale reforms. The

research material also seems to generally speak for smaller, AI-dedicated companies to develop these kinds of solutions. Integrability also seems to be a key factor, as larger (like invoice workflow providers) are seen unable to provide customer-oriented solutions.

> We're all the time considering where financial administration is going, is there any processes that could be done smarter. We're always following the market, but right now I'd say we have three, no four sectors where we try to help our customers. The first is looking at the customers process, because the best automation is removing anything unnecessary. Lets not do anything that doesn't create more value. After that we always check that the customers current solution is working optimally. Like Snowfox says that they come as an addition to everything else that the current solution doesn't take care of and we help our customers check their systems have been configured correctly so that their processes work correctly. Only after that we look at additional elements, can we use robotics for something, or can AI be used for anything. We rely quite a lot in our consults and experts, who have a vision of what are the best practices for financial administration and we want to take them forward. If we find some spots where AI can help, then we promote it to our customers.

5.5 Experiences and perceptions on implementing AI into financial administration processes

Most of the interviewees work in organizations that have just began to utilize AI in their financial administration and in most of the organizations the service provided by case company was the only AI-based solution in use. Thus, most of the interview extract presented in this chapter look at the studied issues from the point of view of an organization taking its first steps in using AI.

Most interviewees have an overall positive image of implementing AI into financial administration processes. The overall positive experience of AI-implementation has also given a boost in many organizations for developing financial administration systems and processes into a more modern direction. The general attitude also seems to be that AI is coming into the financial administration domain and preparing it is essential.

> This (Snowfox) has brought only positive things to our day-to-day work and we're eagerly waiting to see where we'll end up with this and how much it can automate our processes. I mean it could be that I have an overly positive picture about this and at some point everything will stagnate, but right now this seems really good.

> It (accuracy of predictions by Snowfox) is really good. I'd say it is already better than what a human can do, in our case at least. We have over 90 percent accuracy in all dimensions now.

> Our processes have become more efficient (as a result of using AI), how many do we have now, we have maybe ten purchase ledgers now. And I don't know what percentage of their work goes into maintaining our traditional automation rules and everything else… But less people we have doing this than ever.

> This Snowfox was a really good addition for us because we have certain (rule based) automation already. And these are already in use with us and now this AI came as an addition to that. So now we have some kind of logic doing postings behind every invoice we receive.

> At least for the world of purchase invoices it (AI) seems to fit really well into, we've been very satisfied. I'd see that we have, for instance we've developed automation and robots for billing , there is a lot of that and I think because you need to do much background work for them to work, this makes it easier on that side also.

In addition to providing good results, financial administration personnel generally seem to see using AI for their processes as economically viable. As previously was mentioned, this does not seem to be the main goal yet for many organizations. Many even admit that they would be able to instantly make their existing AI-solutions more profitable for them but have actively not chosen to do so. Mainly this seems to have something to do with other developments in their financial administration or because the technology is still fairly new and managers leading financial administration organizations are still waiting to see where the field is going with AI and how they should solve the challenges related into it. The research material also contains instances where economic viability was not even a relevant factor, as the AI-solution was needed to even provide the services expected from the financial administration at all. Based on the interviewees using AI is starting to become essential for providing certain financial addition services, instead of being a nice addition to their processes.

> That (profitability of an AI) depends on a bit whose point of view you look it from. We are a [specific industry]. For us it might be profitable, but I haven't… It's so use case dependent kind of… Obviously if we can remove working hours from financial administration with AI, we can easily count if it's profitable or not, but for now with Snowfox, due to our own actions, because we've kind of been afraid to use it to its full potential the profitability has been about plus minus zero… …But that's due to ourselves now.

> If you do this (develop AI) to yourself, without thinking possibly commercializing it, then I think it might be too expensive. Then if you can commercialize it, it might be financially sensible.

> It's been surprising how much we've been able to lover costs (due to Snowfox), that has surprised myself even though we knew it would happen, but in my opinion, they fell much more than expected.

> It is (financially sensible to utilize AI in financial administration). I mean well… It has two sides to it, obviously one is the mentioned euro side… …It also helps to patch… Financial administration processes are cyclical in nature, cause every company has that end of the month at the same time. All companies want those reports at the same time… I'd say artificial intelligence helps us to manage our need for resources in a cyclical business like this. And then there is unfortunately also the other side, that while our people are professionals, machines still make fewer mistakes. And then in invoice circulation they also get sent forward much faster, it doesn't depend on if a human is working from eight to four, machines do the job around the clock.

> It's not my primary goal to produce the (financial administration) service at the lowest possible cost. Rather that I can produce as high quality and useful service with a reasonable price.

> Absolutely (makes financial sense to use AI in financial administration, though it probably depends on volumes, cost structure and things like that, so maybe it is still only for the bigger players.

> I'd say that our personnel amount has been reduced, that less people deal with a larger invoice amount and to my knowledge the invoice circulation has also become faster. All this considered I need to argue that it (using AI) has to be somewhat cost efficient.

Implementing AI into financial administration processes has also been a wake-up-call in some organizations, as it has brought into light major underlying problems that have gone un-noticed for a long time. This highlights the possibilities of AI as a catalyst for broader innovation.

> We noticed in the testing phase when we started analyzing (the postings), that where Snowfox was wrong, we actually noticed that it wasn't… We had done the mistake ourselves… …There are obviously risks when an AI does the postings, but the result might be that the quality of the postings gets better.

> I've noticed during these talks, that there is a surprisingly bad understanding of financial administration processes within the domain. The financial administration personnel know really well the production processes and the measurements for them have been fine tuned. If there is for instance a production plant, they know every single crack from the production line, but when looking at their own processes, then they… They know their overall costs, but no one knows what a single purchase invoice costs and like that. It is mind boggling really.

Working and well-thought controls are an essential part of all accounting-related systems. Artificial intelligence provides a challenge in building and maintaining them, as in some cases laying out the inner workings of the system can be hard or even impossible. Most organizations present in the research data were only taking their first (and small) steps in utilizing AI. This is probably the main reason, why no interviews felt that utilizing AI would have weakened their controls. This is however a theme, that is likely to come up more often in future AIS research. Controls altogether seem to be the basis financial administration personnel approach developing any of their processes.

> In my opinion Snowfox coming along has not reduced our controls at all. I'd say it has created them. Now that we receive ready predictions, in the same way our people make decisions how they do the postings, but now they are based on data… …So as I said, this has rather made our controls better than reduced them.
>
> I think we now have better control (of our processes) than ever before, because now we know what our postings are based on, before we had over 1000, 1500, 2000 people checking invoices, who did postings willy-nilly, so yeah, feeling of control was worst. This (Snowfox) has provided us quality, which I think I mentioned also earlier.

As presented before, preparing the financial organization for future technologies is one of the greatest drivers for undergoing different AI-ventures at this time. According to the research data these trials are also bearing fruit, as organizations generally seem to feel more ready for AI implementation in the future after taking their first steps with these kinds of projects.

> The (interest towards AI) shows through us having some kind of project related to it going on all the time, I mean now we're takin one project forward and we know there might be lots of starting costs, so it might not be as justifiable as some other things from a financial standpoint. But we invest in it because we see that building the capability now might open doors in the future that we don't even recognize now.
>
> In my opinion using AI has also (additional) value, because I sometimes get a feeling that it helps us understand certain reason-consequence links. It kind of makes them visible… …So I think it creates value as it gives us a view into our own processes.
>
> Well, it (using AI) has opened my eyes, as ok, if this is now possible, then what next? I'm kind of thinking about possibilities to utilize it more in financial administration in the future and it does make sense that if this now does things like this, could it be used to track realized transactions, or maybe somehow use it from a control or illogicality point of view.

The research material suggests that the talent profile required from the future financial administration professional is changing. It seems that financial administration work is undergoing a radical change from repetitive, transaction like work into a more abstract specialist type of work requiring a wide knowledge of not only AI, but about different automation possibilities within the AIS-context. It might even be time to start speaking a broader change in the whole domain.

Artificial intelligence is also shaping the types of jobs that are available in financial administration. While basic, repetitive tasks seem to be staying at least for the time being, their amount seems to be reducing rapidly. The domains nature as a servicer to people also seems to speak for keeping at least a skeleton staff for interaction.

> I'd say it (interest towards AI) probably (shows) in our recruitments… Or now we don't… If you think about it, our purchase ledger team is at its minimum right now… …Currently we are looking for more accountant-human resources type financial administration personnel as we are trying to automate those basic processes.

> It (Snowfox) has impacted (financial administration), so that we've done a total overhaul of tasks in our organization. Our operations are organized totally differently than before.
>
> Yes, many customers have said that this product of ours (Snowfox) changes the skill profile they are looking for their financial administration teams in the future. It isn't enough anymore to know how to handle purchase invoices, you need to rather be able to solve problems and work in a more multidimensional environment.
>
> We also need to start considering… As we have these people who do not have the required skillset and learning new things might also not be their first priority, where do we place them. What kinds of task are suitable for them when machine intelligence does all the repetitive and easy tasks?
>
> Now as we've been able to move routine tasks under the artificial intelligence by Snowfox, we've been able to create more kind of specialist and expert roles.
>
> In my opinion using AI frees working hours from those repetitive tasks to helping business functions in those challenging issues and we can maybe even start to predict issues that will arise in the future.

The broader change of the skill profile required from a financial administration expert in general seems to be creating some friction within organizations. This seems to manifest especially in older employees, whose skills are more outdated by default and many interviewees also feel that their learning capability might not be high enough to adopt the necessary skills.

5.6 Challenges of AI adaptation in financial administration

In the previous chapters it has been clearly presented that financial administration organizations have an urge to use AI in their processes, but usually lack the resources and know-how to do so. This naturally creates major challenges in terms fulfilling said urge successfully. If the industry is to ever achieve wide scale adaption of AI in its processes, overcoming the challenges presented below is crucial. One might even suggest that companies that are able to defeat them will probably gain a major competitive advantage compared to those, that are unable to adapt in the changing environment.

Figure 10 lists the six main challenges based on the research material that financial administration organizations are facing in implementing AI into their processes. It should be noted that every organization is different and only a few ones part of the research data had challenges in all of the areas.

The lack of know-how could be identified as a hindering factor in terms of AI implementation in almost all the organizations found in the research material. This was expected, as professionals with a deep understanding of both financial

administration and AI are few in numbers and there is significant competition between companies for them.

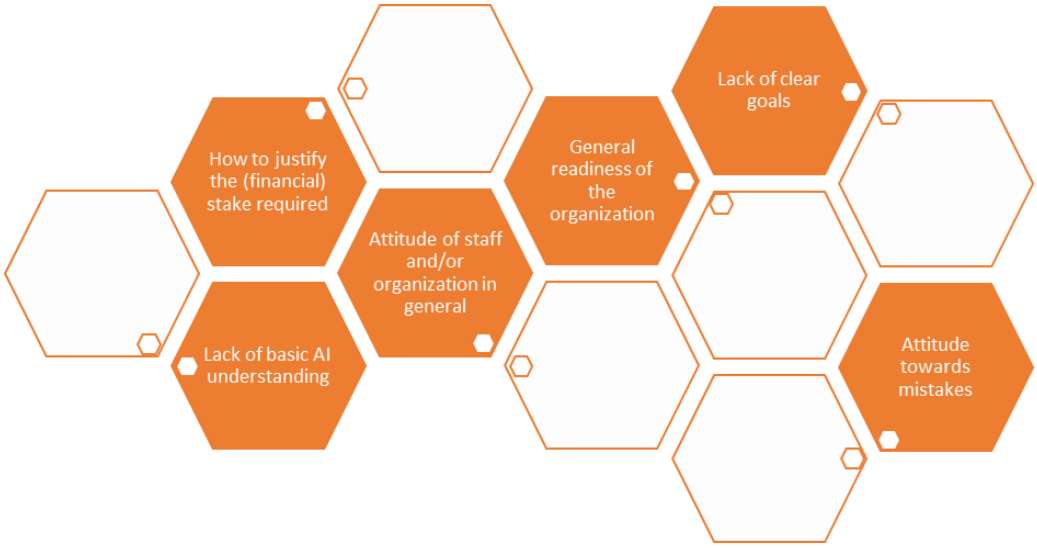

Figure 10 - Main challenges financial administration organizations face in utilising AI

> It (would be) good to understand how the AI works. Then you would understand why it has made such a prediction in this case or a posting like this, especially if it has been totally wrong.
>
> Maybe one (challenge) is that there are so few people that have hands-on experience about working with AI, I'll use myself as an example. I've used AI in my own projects in my free time but haven't been active on it in a work context, because I have no idea how it would happen here. We always need the consultant from outside.
>
> All these projects have been a bit frozen, mainly because I always need a partner from our IT department. I cant do these by myself, I need someone to help me in the programming side and taking the process into the bit-world. That's been a problem in our concern, because we have a kind of resource shortage in IT. And I'd say its also a knowledge related shortage.
>
> Clearly the greatest challenge is the lack of knowledge, it's the kind of knowledge we don't have in the whole company. And the same problems arise when talking about automation, not only AI… We're still learning and there is a lot of competition of the experts… That's clearly a major bottleneck.
>
> Our own AI-development project simply stalled due to lack of knowledge.

Financial accounting personnel and organizations also seem to be relatively cautious towards AI in general. From the staff point of view the most common fears seem to be related in job security or sufficiency of one's own competences. Especially staff but also general organizational opinions towards AI seem to change

towards the positive spectrum after the deployment of the first AI-based service in the organization, at least in the case of the case company. Positive and supporting attitude of the managers seems to be a key factor in achieving this.

It seems that when financial administration organizations began utilizing AI, the basic principles of successful change management are emphasized. Based on the research material these kinds of projects are radically changing basic processes of the domain and organizations might want to take a sensitive approach when doing so.

> It might create a kind of… Threat on job security to employees. Employees might feel their tasks are threatened when… Or it might be a more general thing about automation, and we've been communicating it to them so that its better use for the employees skills if these routine tasks are done with artificial intelligence or automation.

> Yes, there is a fear of losing jobs or that the tasks change. Then there is will I know how to, will I master it? Am I at my best solving problems, these might not be pleasant changes for everyone.

> Yes, there's always resistance towards change, when you do any kind of changes to a system that [specific job tittle] use, someone always calls to ask what the fuck have we done this time, but nothing wider. We tried to do it so, that there wouldn't be anything like that. So that there are no additional clicks anywhere… …The only times we've been thinking if there is any sense in this are the cases when there have been totally incomprehensible predictions (by the AI), that are clearly false and we can't tell why. But these cases have been few in numbers.

> They (end users of financial administration services) only look at euros, what does the service cost. They might not want there to be changes and beginning to use AI is a change. On the other hand they want to lower costs all the time. And you can't lower costs in any other way than adding more automation.

> I think the initial fear (of losing jobs) has faded and now they (purchase ledgers) see it (AI) as something that eases their work and lets the focus on other things.

> Obviously it doesn't please everyone (that we utilize the latest technologies). Employees that do more hands-on tasks are sometimes even a bit frustrated about our development pace. But they've gotten used to it, this is the [company name] way to do things.

> It (caution towards technology) somewhat makes it harder (to develop financial administration processes. We could automate many things further, but the challenges with documentability and that fear of something going wrong, those hamper development. We need to figure out so many things before we actually get to the development part.

> Probably the human side has been (the biggest challenge in using AI, but… It's been a long road. I'd say change management has been a really essential part of all this.

As many financial administration personnel have very limited knowledge of AI, defining clear goals for AI-usage within the domain (and also more widely) seems to be a theme that most organizations face. This seems to often lead into a situation, where the organization is using AI in their processes, but it is used in a non-optimal way or AI is used simply "to use AI". As can be expected, this causes sub-optimal results, leading into a not so good perception of the technology. The general, not always high valuation of financial administration services within companies also affects perceptions on the issue.

> I see that there are a couple of things. One (challenge) is that we are a company that has grown quite quickly, and as such the daily problems kind of take priority compared to these larger development projects. Our resources simply fall short. And the other is that we've settled for that this is now in use, so we are not putting thought into how we could use it (AI) optimally.

> Maybe one way of thinking has been that financial administration is a necessary evil. I'm not signing that, because it is an important part of the big picture, financial administration. Obviously when corporate leadership makes decisions where they put their stakes, they put them where they create an inflow of cash. We're talking about automating order processing, or that robot do that somehow… …These are projects that business functions have a more approving attitude towards, and they get funding more easily.

Based on the research material, the challenge of setting clear goals for AI-usage seems to be closely linked to the often-poor general readiness of financial administration organization to use new technologies or even adapt to changes at all. This is worrying, because without clear goals, the possibilities for analyzing development the development of processes becomes challenging. This is a combination of attitudes, missing resources, and a kind of stagnation in general. Previous decisions in terms of AIS-development also seem to play a key part in the capability for a financial administration organization to adopt AI into their processes. Organizations also seem to be often incapable of taking into account some of the special characteristics of AI when developing processes.

> Financial administration personnel have a baseline fear towards anything to do with information systems, it's a bit built into that profession. They always see massive risks in new information systems and the expectation is that costs will rise and operations become harder.

> I'm just thinking out loud, but often it's that when they tech you something in school, how things should be in theory, then when you come to the corporate world you often realize that the practical way of doing things is really different… I can imagine… I don't know, Last time I've been in school was four years ago, they probably talk a lot about AI today and often you get the impression that things are going well in companies. But then often the reality is the opposite, things are done still in Excel and we use 80s systems, so that (AI) often is just a faraway thought in the day-to-day operations. But it's good we speak about it and that there are thoughts about what it could be used for.

> And yes it (AI) somehow shows in what kinds of issues we take forward, but sometimes it kind of feels that we do something with artificial intelligence so that we can say we do something with AI.

> The fragmentation of data and maybe a bit poor quality are things, at least with my experience of two projects, feels like the challenge is that the data we can produce is newer good enough, you need to know who owns it and when we know who is starting a new project, the team needs to be so that they know the history of the data, what outliers there are that need to be recognized and maybe dealt with. That is at the very center of all this. Another challenge, I suppose is finding the suitable cases to use the technology in, that's kind of a challenge that slows these things down for now.

Lastly the way people and the financial administration in general react to mistakes poses a challenge for using AI. Based on the research material, it seems that the basic nature of AI is not always compatible with the basic nature of the traditional accountant. Statistical data-processing always results in some level of mistakes. While for instance the case company seems to be able to control these mistakes relatively well through use of easy-to-understand confidence values, this is not often enough for personnel used to manual work and perceived 100% accuracy. This gap is especially interesting when considering the previously shown evidence that for instance the Snowfox AI has in some cases outperformed humans in accounting accuracy, thus exposing the accuracy of employees to be much lower than perceived.

Based on the research material, the attitude towards mistakes made by AI varies significantly between organizations and to some extent between individuals within organizations. Mostly the attitudes towards mistakes seem to be bound to the organizational culture. This seems to have a significant effect on how much the organization can utilize the possibilities created by artificial intelligence. The research material also suggests that in some organizations the mistakes made by AI are often blamed wrongly on the financial administration personnel, naturally lowering their approval rating of the AI service.

> The people in this domain have a kind of wariness and aiming for perfection built into them. Many can't tolerate even small mistakes in their accounts, even if they do not matter at all in the big picture. And that is a major challenge with these AI-projects, because there will be mistakes. We're talking about statistical data analysis and predictions after all.

> Yep, that's probably going to be a question forever. What I see is that if an AI makes mistakes, it can at most be on the same level as what humans do… …But than in financial administration, At the maximum the amount can be the same as humans do, but we also should maybe think about how crucial they are.

> In my opinion an AI can make (mistakes). You know, humans too make mistakes. And the Snowfox also makes mistakes, if there are mistakes made by humans in the background. If you teach that Snowfox a model based on our false postings, then Snowfox will also make mistakes based on it.

> It's obviously an assumption that it (AI) doesn't make mistakes, when it should be smarter than a human. But surely there is a human often causing the mistakes, if there is historical data that affects the predictions. It would be if I understood better how it works. Or a more precise level…
>
> It would be good if it (the AI) had a type of prediction probability included, that it could be, like Snowfox is, that we could adjust the threshold value, so we only predict things where we have basis for our predictions. Those kinds of AI systems that don't have that probability would be a bit dubious.
>
> We try to bring a model to our employees where we celebrate our successes and figure out the mistakes. We (in the accounting domain) have a kind of Finnish way of thinking, that we fear making mistakes. When we ultimately talk about financial administration, it isn't the end of the world if a mistake gets through, as long as it eventually gets corrected. But this aiming for perfection, it does a bit… It's a bit expected that a machine won't make mistakes.

Different types of mistakes also seem to have different tolerance levels. While mistakes that even human accountants make regularly seem to be often frowned upon when done by an AI, the most problematic are mistakes that a human accountant would simply never make, even if the AI works well in general. It can only be described as surprising that a system that objectively helps employees in their work can bet bashed so much do to mistakes.

> It (AI) obviously makes mistakes, everyone understands that. But of course, it can't make dumb mistakes. As just a small example if we have an invoice that directly says something, but the AI has made some other judgement based on something else, then that's a dumb mistake, because the reviewer sees it and thinks what the hell is this, this should have gone to her and it came to me even if my name is on the invoice.
>
> Artificial intelligence can't make foolish mistakes.
>
> Our customers who get the end product produced by the AI, they kind of blame us if there are errors. It's a constant battle in a kind of between state, if everything has gone well, the AI works and such, we don't really even notice it. They keep out of our eyes and its good with that. But then these dumb mistakes come back many times.
>
> It isn't enough that it actually eases and speeds up our processes, if it produces something totally stupid at times. So even if it objectively helps us, if it produces even isolated predictions that are way off, then it (AI) loses credibility.
>
> I felt that the mistakes made by it (AI) received a lot of criticism and people thought that this can't do anything, that this is only in the way and I'll always have to fix mistakes. But now that they've seen it actually learns, there has been a kind of wow effect.

As the previous findings clearly show, most challenges in implementing AI into financial administration arise from human factors. This is a clear indication that

AIS-researchers should be putting much more effort into understanding the correlations with the changing skill profile of an accounting expert and how it needs to be addressed when designing accounting information systems.

5.7 Visions on future use of AI in financial administration

Based on the research material financial administration personnel have a positive attitude towards utilizing AI more in almost all financial administration processes. They also expect AI-based solutions to become constantly more available. While the research data suggests that financial administration personnel are starting to recognize a massive potential in artificial intelligence, there is an overall cautious attitude towards the technology.

The caution towards these kinds of development projects clearly arises from the factors presented in chapter 5.6. This is a good demonstration of why system designers need to be on top of how the end users see their products. The financial administration is also clearly a tempting domain to develop AI in if these challenges can be overcome.

> I can see it (AI) in bookkeeping also. In payroll for instance we need to make large amounts of statistics and predictions about the future, so that we stay on par with developments… this… I'm talking about creating a budget, AI can read these kinds of inputs and interpret them, I'd see it to be useful in these kinds of things in the future.

> I see that it (AI) should be utilized very widely, we should be able to use it for routines and removing repetitiveness. I mean in everything, if there is some kind of AI solution that can do something better, then why not? I think the potential is huge.

> There is so much routine tasks in financial administration, it's largely like, we have all these laws and statutes that give us very little leeway to work with and how things need to be done, so keeping that in mind it creates basis for automation. When you have a certain frame you need to work within.

> Can't really think about any (financial administration process) that I would limit out (from using AI). We're still in the beginning and maybe experiences will show… But let's say that I wouldn't give decision making to an AI yet.

> Absolutely (we would like to use AI more), we constantly go through different things we could automate in our day-to-day processes and artificial intelligence has always been the brightest star in that.

Generally speaking, financial administration processes are a tempting target for AI-usage, as they incorporate large amounts of data, existing structures and a well-regulated and defined operating environment. At the same time many of the processes, (like P2P) also contain variables, that make automation difficult, or at least very unpractical through traditional rule-based automation. The financial

administration domain seems to be waking up to this reality, though based on the research material most financial administration personnel lack the technical knowledge to be able to truly perceive this.

As most interviewees in this study had had their first interactions with AI in the P2P context, naturally most saw it as a process with massive automation potential through AI. It also seems to be a logical financial administration process to begin AI utilization as resistance from staff or organization seems to be minimal, at least after initial deployment. Most interviewees also want to utilize AI in the P2P context much more than is currently done, ultimately hopefully eliminating human factors from the process almost totally.

> I think for instance that invoice workflow as a whole. What we do in financial administration also generally is something it (AI) can be used for.

> I'd claim that you could pretty much totally remove people from it (P2P process) with AI. Obviously, you need humans for anomalies, but in the basic process there is a lot that could be given to a machine.

> Well, this purchase invoice process is the most obvious target (for AI in financial administration), because this has, like… If you think about larger corporations, because their environment changes all the time… …There is so much happening, that everything that learns by itself and reacts to change, that is sensible.

> It (AI) could be used, my thought with [name of invoice operator] is that our personnel would only handle abnormalities. As they now cover all invoices from beginning to end, everything is checked. We're not even close to that goal. I'd want the system to inform when there are abnormalities in some fields.

> Yes, the goal would be that humans could be removed totally from processes where we use AI. It would free work time from the basic tasks, invoice routing and postings. And then we could move more into analyzing the material and serving our customers...

> I would say this (Snowfox) is starting to cause some disruptions in the market.

As was seen with the challenges with AI implementation, financial administration personnel are very careful with processes what they automate and how they do it. This results in some doubts on future AI capabilities in the financial administration context, though the general attitude seems to be overwhelmingly positive and hopeful.

> We're always thinking, so yes, we are active. We've had robots in use for some time already, also in accounting. And we also have robots handling purchase invoices. In purchase invoices we also have rule-based automation, that [name of invoice operator], our invoice workflow provides own product. And all the time we are thinking how we can better handle these data masses, but I'm not sure if there are the same kind of amounts (in other processes besides purchase invoices).

> I think we can use it best in predicting, when we predict something… For instance, when we predict demand. In our company it could be that we predict the demand of a certain product group and then do procurement decisions based on what the AI recommends. Or then it could be that we predict something like the need for [industry specific parameter] based on it.

One of the greatest challenges in visioning future capabilities seems to be that the controls for the AI must be developed and ready before financial administration personnel even want to discuss about the theoretical possibilities of the technology. At the same time this provides an opening for the adaption of AI, as if the proposed system has a ready and proven control set, the attitude of financial administration personnel immediately becomes more permissive. This makes development challenging, as AI-developers are expected to deliver a totally ready product before they get the change to try it out in the real world.

> Lets put it this way, you need to have a kind of control in it… A good control practice behind it, so that you'll also catch the mistakes there… And like those uncertain cases, they'll probably need to be handled manually, but I think it would still be…
>
> But using artificial intelligence, that would require there to be some kind of control behind it. Because you need to always look at it, it's just a prediction.
>
> I probably wouldn't dare to put our payments behind an AI, even though it is a handy fellow. Something like that would feel wild, at least to me. But that depends on the process…

The research material suggests that while the P2P context seems to be the most obvious target for AI utilization in financial administration, there are other just as attractive possibilities, that in some cases might lead into even greater effects. In general, financial administration personnel seem open for using AI in practically all processes of the domain, as long as all the previously presented factors are solved.

> I'd say it this way, It (Snowfox) is a good and working niche product by itself, that every company can use to raise their automation level substantially and lower costs. What we can offer to raise the efficiency even more or lower costs, those are things we are already working on.
>
> We're also only in the beginning, I kind of see that many things require that we automate these large and resource-intensive processes in general. We've been takin that forwards. But then with AI, one thing that comes into mind is the controls, that we need to have certain instructions and policies that should be followed. An AI could probably oversee them so… and… We could build controls that might be hard to implement into systems. And then different analyses come to mind. And then obviously these purchase invoices…
>
> Yeah, now that you start thinking, in addition to pure bookkeeping and accounting we do have a lot of other, like our customers due balances to follow, where AI would definitely help… …And maybe the integrability in general is the thing.

> Somehow I'd think we could also build different models for kind of scenario type of thinking. If I for instance think about a controller's job, when they do different predictions for business functions, like sales predictions and expense predictions and…

All in all, there seems to be a lot of interest towards using AI in almost all financial administration processes. The limiting factor in visioning the future potential of the technology seems to be the limited AI-knowledge financial administration personnel have. This leads in a situation, where companies that develop these kinds of solutions have practically been tasked with providing their customers the tools they need, not what they want.

As said before, it seems that AI is coming into the financial administration domain, and it might soon not be an option not to use it. Organizations and employees seemingly need to make fundamental changes into their attitudes towards some basic factors in the domain. It seems that this is something that can definitely be done but failing to do so seems to be a genuine risk for some of the less flexible players in the domain.

6 CONCLUSIONS

6.1 General

This chapter explores the different findings of the study and compares them to earlier research on the subject. Many of the findings cannot be exactly quantified under a single research question, but conclusions are nevertheless presented divided under the three research questions. This has been done to provide structure and clarity, but the reader should keep in mind that in reality the themes often overlap. The complex nature of the themes discussed also inevitably makes some of the findings hard to categorize exactly.

The accounting change model (Cobb et al. 1995), presented in the introduction gives a good framework to compare the findings of this thesis against. While artificial intelligence is not all change and new things in the domain, most of the findings of this thesis can be categorized under barriers for change or factors of potential for change. This should not be seen as an exact division, rather as a loose way to give more structure to the results.

There are practically no existing studies on the exact subject of this thesis. As such it is not possible to make direct comparisons between the findings of this thesis and previous studies on the subject. The findings of this thesis are instead presented in a broader AIS-context and compared against more general research on the subject. It should be noted that the conclusions have been made mainly based on averages. The research material included outliers into every direction, and as such the conclusions should not be interpreted as uniformly portraying the exact situation in every company included in the research material. Perceptions on such a complex subject also understandably have much variance.

6.2 How is AI perceived as a concept?

As can be concluded from the source material of this thesis, defining artificial intelligence is challenging even for those who study it daily. As such it was expected that most financial administration personnel will not have a clear understanding of what AI is. The generally poor understanding of AI present in the research material can still be described as surprising, as all the interviewees of this study had experiences at least with the case company's AI-based service and most had implemented it deeply into their day-to-day processes. While most financial administration personnel did mention key aspects of AI, such as capability for learning when defining the technology, the overall understanding on the subject seems to be limited. While for example Ng (2016), Kaplan and Haenlein (2019), as well as Butterfield and Szymanski (2018) see learning capabilities as a key defining characteristic for AI, the average financial administration personnel definition usually seems to be shallow and disorganized. Although learning was mentioned by many as a defining characteristic of AI, it was still referred to relatively rarely, considering that it is perhaps the single most defining characteristic of artificial intelligence. This is especially surprising considering that all the interviewees had had experiences with the service offered by the case company, where capability for learning is a key aspect. Especially different technologies such as machine learning and neural networks seem to be causing confusion when trying to define AI. Often also truly non-AI based technologies are perceived as intelligent, even though they fall far short of the capabilities required from AI.

The findings of this thesis suggest that as financial administration personnel do not usually possess any significant AI-knowledge, they tend to perceive the technology through their experiences on systems that are being used in their organization. As was the case in this study, most interviewees who had no preexisting knowledge on the subject had clearly created their perception through experiences with the case company's product and how the case company communicates about it. This effect was minimal in those, who had some kind of basic knowledge on the subject. This finding highlights the importance of taking the first steps with AI, even if the organization does not feel ready to do so, as these first trials act as a valuable opportunity to train and prepare financial administration personnel for the inevitable utilization of AI that will happen in the field.

A noteworthy finding is also the significant dispersion in terms if interviewees felt their knowledge on AI to be sufficient for their current position. Financial administration personnel clearly (and understandably) do not believe they should be experts on AI, or any other technology. Most still thought that more knowledge on the subject would be beneficial for their work, but especially management and executive level personnel often felt that their level of understanding on the subject was hindering their ability to drive the processes of their organization forward.

The research material does not give a uniform answer to why financial administration personnel seem to have a relatively poor understanding about AI. One reason might be Baldwin's (2006) observation that in the AIS context the responsibility of AI-implementation and research is usually with personnel, who are primarily accounting experts, not AI experts. As Baldwin-Morgan (1995) notes, accounting personnel usually have received no training whatsoever for working with AI. While her observations were done in the 90's and do not reflect the current situation, most of the interviewees for this study have received their education at that time. Many also felt that age was a major factor in determining how well financial administration personnel are equipped to work with AI. As Oesterreich et al. (2019) demonstrate, the requirements for accounting personnel's knowledge have since changed drastically and will change even more in the future.

6.3 Perceptions and experiences on AI

The research material indicates that most experiences on AI within the financial administration context have been positive in their nature. While there have been some challenges, they have usually been relatively easy to solve and have not had major effects on the processes of organizations. However, developing AI-based solutions for financial administration is something there have been major, unresolvable problems.

When considering the results of this thesis, it should be kept in mind that most organizations that were included in the research data had had their only experiences with AI with the case company. This might result into a slightly distorted view on the subject as presumably not all players on the market are able to provide a similar experience for their customers. The research material did though include a significant number of companies, that have also had other more or less successful AI ventures and the interviewees from these companies did not have a uniformly different views on the themes discussed.

Financial administration personnel, especially those in management positions have an overall willingness to develop the domain and push processes truly into the 21st century. This mainly seems to manifest as wanting to advance the overall automation of financial administration services with software robots or other traditional automation. In some cases, the organizations it even means bringing decades old systems and processes up to date, so that basic automation can be enabled at all. This is well in line with the observations of Seasongood (2016). It is not however enough to gain the competitive advantage through domain disruption, as described in the results chapter.

While most financial administration personnel see AI as the disruptive technology described by Lambert and Marshall (2018) and wish to achieve not only competitive advantage, but also an overall modernization of their processes

by using AI, at the same time most of them are not using their existing solutions (AI-based and other) to their full potential. This seems to usually be because of a general risk-averse nature of financial administration personnel and general unreadiness of the organization to work with new, disruptive technologies.

An important factor when considering the fundamental compatibility of AI and the accounting domain seems to be the general attitude towards mistakes. The research material demonstrates that a significant amount of financial administration personnel see mistakes that an AI system makes when for instance predicting postings for purchase invoices to be very reprehensible, even if the system objectively helps them in their job. Most problematic were errors that a human would never make, even if their incidence were very low. From a development point of view this is challenging, as the statistical nature of AI always results in some levels of incorrect predictions. Managing the attitudes towards mistakes will certainly be one of the greatest challenges financial administration organizations will face when they start their journeys with AI. The attitudes towards mistakes might even be the single most challenging question when considering large-scale adaption of AI in financial administration.

Figure 11 in the next page combines all the identified drivers for AI usage in financial administration with the identified barriers standing in the way of wide scale implementation and benefits for AI usage that could be identified from the research material. As can be seen, most of the barriers are human in nature, not technological. This is an important finding, as it clearly demonstrates that the greatest obstacle of taking the financial administration domain to the future is often the domain itself. This is understandable, as the changes that are happening are shaking the domains foundations and re-structuring existing power structures for example. It also provides great opportunities for organizations agile enough to navigate the operational environment successfully. These findings also make it clear that the calls from Sutton et. al. (2016) and others for more AIS-research from an AI perspective are very reasonable. Many of the results of implementing AI into financial administration processes were also something that the organizations did not initially aim for but have later found them to be valuable. It should also be noted that this thesis has probably not been able identify all the different themes that will and do arise when considering AI usage in the financial administration context and Figure 11 should not be interpreted as an all-inclusive list that is valid in every situation.

While the majority of financial administration personnel and organizations are facing challenges with implementing AI into their processes, the general consensus among them seems to be that implementing AI into financial administration processes has major advantages both financially and otherwise. Again, many of these experiences are based on the service offered by the case company, but also a more general positive attitude can also be identified.

Figure 11 – Identified motivators, challenges, and results of using AI in financial administration. A larger version of the figure can be found in appendix A

The advantages of implementing AI into financial administration processes has not been limited to financial gains or more efficient processes. The research material strongly suggests that Cockburn's (2018) observations of AI implementation causing broader organizational learning as well as future innovation hold true. Many organizations in the research material had identified major flaws in their day-to-day processes after implementing AI into them. Interviewees often also stated that the process of acquiring an AI-based solution has also had a tremendous impact on their organization understanding their own processes much better. Especially management and executive level interviewees also felt that one of the biggest benefits of implementing AI into their organizations

processes was that they are now much better equipped for the future as an organization, as they now have first-hand experiences on what using AI might mean. The organizational learning that AI implementation caused was usually also described as significant. This observation suggests that the time to experiment with AI in the financial administration context is now, as it helps to position an organization for the future, when these kinds of solutions move down from being disruptions to being new, but widely adopted tools within the domain. Many also see that financial administration organizations have no other options than to adopt AI-based solutions in the future, as providing a quality service with a competitive price might not be possible otherwise.

While most organizations in the research material were still using AI mainly as an experimentative tool to help in processes, some had already redesigned a major part of their financial administration processes to depend on AI-solutions. Unsurprisingly these organizations also seemed to be the most agile and benefiting the most out of their investments into artificial intelligence. This had in some cases led to an overall re-structuring of the financial administration organization, including some plans for less personnel, or in most cases being able to not hire more purchase ledgers as a reaction to growing invoice numbers. While these kinds of changes require a strong leadership and strategy, as well as the courage to do them in the first place, when successful, they seem to provide a considerable competitive advantage.

As Anderson and Smith suggested in 2014, AI has since altered the employment prospects in many fields of business. Financial administration is beginning to feel this change now, as the first commercially available solutions are popping up. Based on the research of this study, the new technology is however unlikely to lead to major job cuts in financial administration organizations in the near future, just as Davenport (2021) has observed so far. At first glance this is surprising, as a major part of financial administration work is relatively simple and proved automatable with the new AI-based approaches. The main reason for this seems to be that many financial administration organizations are currently barely able to deliver the service expected from them. As the domain's role has largely become a routine task of handling documents, it has led to a relatively significant shortcoming in all kinds of development tasks. In many organizations, a debt that urgently has be dealt with. AI-based solutions have also been able to notably reduce the domains cyclical nature, as automation works efficiently 24/7, not caring about quarters, fiscal years or other arbitrary dates. As the AI-based solutions are usually scalable in terms of data amounts, spikes in invoices or other documents also have much smaller effects on daily operations than before according to the research data.

Even though only a handful of organizations in the research data were planning or had already reduced personnel amounts, it is a theme that obviously worries many financial administration personnel, especially those in positions that mainly include manually handling invoices or other documents. While this is more than understandable when for instance considering the conclusions of

Vermeulen (2019), it needs to be addressed as many see AI as a considerable threat for job security. The research material suggests that the fears of AI taking the jobs of financial administration personnel usually fade quickly after the implementation of these new solutions, mainly due to the reasons presented above. The skill profile required from the average financial administration worker is however changing permanently and this might have major implications on the field.

The research material uniformly proves that the findings of Oesterreich et al. (2019) apply not only to controllers, but also financial administration and accounting personnel in general. As financial administration tasks shift from repetitive tasks to ones requiring more abstract skills, organizations will undoubtably experience varying amounts of friction in the transition. It could even be argued that the financial administration domain in general is moving more and more into a less stable operating environment, where adaptability is becoming ever more important both for individuals and organizations.

As the knowledge on AI generally seems to be fairly poor amongst financial administration personnel, they are usually also not able to articulate what they want from such services. The attitude towards toward AI-development seems to mostly be that financial administration organizations should be able to buy a ready solution that solves an existing problem or challenge from someone else. As Steve Jobs put it: *"customers don't know what they want until we've show it to them"* (Isaacson 2011, 625).

While there were a few exceptions, generally the research data suggests that financial administration organizations perceive developing AI-based solutions by themselves as impossible, even if their IT-resources are good. This is probably mostly due to the lack of the right kind of know-how, but also because the development processes of such systems are seen (and are) risky projects. Most interviewees also felt that their organization in general is not ready for wide scale adoption of AI, which understandably reduces the urges to undergo such development projects on their own.

This thesis clearly proves that AI is something the AIS domain should be interested about. As presented, the positive experiences on the technology are so uniform and significant that missing out on them seems dangerous. The subject requires a realistic approach though, as while proven, simple and easy to implement AI-based solutions tailored for the needs of financial administration are already on the market, not all AI ventures will be easy. The amount of human related issues is also going to be high, which calls for much more research from this thesis's point of view.

6.4 Possibilities for the future

Similarly to Cockburn's (2018) assessment, the research data clearly demonstrates that financial administration personnel, especially in management or strategic level positions see AI as a new platform for innovation and as a theme that will be present within the domain in the future. The poor knowledge on the subject however seems to be greatly hindering the outlook of AI-usage in the financial administration context.

In general, financial administration personnel seem to believe that AI is a technology, that could theoretically be implemented into almost all processes within the domain. This is a clear indication that overall, they are eager to capitalize on the possibilities new technologies provide. One reason for this is probably the observation made by Viitala (2006, 29), that different financial administration processes are usually heavily interlinked, so automation in one process is usually relatively easy to also transfer into other, similar processes.

While the research material suggests that most financial administration personnel wish to utilize AI in a large scale, the P2P process is something they see distinct possibilities in. The main reason is probably the observation made by Koch (2019, 67-80), that this sector of financial administration is extremely hard (and expensive) to automate using traditional methods. All the interviewees also had pre-existing experiences of automating this sector of the domain, as it is at the core of the case company's product. This again acts as a great example of financial administration personnel making up their perceptions on AI based on how their organization utilizes the technology.

It should also be noted that the enthusiasm to implement AI into financial administration processes is not unreserved. The whole financial administration field seems to be in a kind of state of waiting regarding the subject. While organizations and personnel want to utilize AI in their processes, based on the research data there is also a level of fear in terms of taking the first steps. To add to the equation, a fear of falling behind can also be identified in many organizations and personnel in the field. This combination seemingly often leads to sub-optimal ways of using AI and it is a habit that can be expected to continue with many financial administration organizations. All things considered this creates an interesting situation. It can be argued that right now a relatively large chunk of financial administration personnel, especially in management or executive positions feel an almost obligation to use AI in their processes but at the same time dread taking the first steps.

It seems that the pace of AI development in the financial administration context is largely up to operators such as the case company of this thesis, as most financial administration organizations are incapable of AI-related innovation or even basic development. Although these kinds of individual operators will undoubtably be able to push the development forwards with clearly defined, controlled and low risk services, financial administration organizations will still

need to be able to solve the six barriers for AI usage identified in this thesis (and many more) if they wish to get the most out of the new technology.

While the artificial intelligence is clearly perceived as something with major possibilities for creating market disruptions like Lambert and Marshall (2018) describe it, there seems to be lots of caution towards implementing it into financial administration processes. This is probably due to the poor knowledge on the subject within the field, which mirrors the findings of Sutton et. al. (2016). Financial administration organizations also seem to generally not be ready for using AI. A major contributor to this seems to be the absence of personnel with correct skill profiles, that based on the research material are also evolving constantly. The interviewees of this study do not believe these kinds of professionals will become easy to find, rather that the shortage only seems to be becoming worse in a time when financial administration organizations should be taking their first steps with AI. It could even be asked if there is a basic incompatibility problem between the nature of AI and financial administration, as it clearly causes friction in implementing such solutions in the domain. All the companies part of the research material of this thesis had however solved it, to some degree at least, which suggests that it indeed is a challenge rather than a true incompatibility issue.

Based on the findings of this study, the ability to solve the equation of how to position a financial administration organization and its resources for the AI-driven change that is happening in the domain will soon have major implications for every organization within the field. It is also important to note that simply building potential for change or identifying the barriers for it will not be enough. Based on the findings of this thesis financial administration organizations need to go through a critical exploration of their goals and processes, and critically assess if their core processes and capabilities can match the current requirements of their changing operational environment if they truly want to capitalize on the possibilities created by AI.

6.5 Significance and limitations of the research

The findings of this thesis are based on high quality data, that has been analyzed with relevant modern methods. Based on this we can assume that the presented conclusions also portray the situation of the research's focus group well. The greatest limitations for the conclusions of this thesis arise from the basic nature of a case study. As all the research material was acquired from customers of the case company, this might distort the findings in some way. The research material does however represent the case company's customer base well and as it contains varying sizes of companies from multiple different industries, we can assume the findings to hold true for most companies outside this focus group. The choices made when choosing individual interviewees also makes it possible to expand

the interpretation of these results into the broader financial administration context.

The experiences and perceptions of financial administration personnel in organizations that are already utilizing AI might also be different to those who have never heard of it. The research material however in a way also represents these kinds of companies, as many of the interviewees have roles in multiple different boards of directors or work in organizations that provide financial administration services to many companies with different needs.

Even though most companies present in the research material operate in an international environment, applying the findings of this thesis outside the Nordic countries might be problematic. This is due to the generally better readiness to automate processes than might be found elsewhere. While the same themes will certainly come up when looking at more global entities, drawing direct, unreserved conclusions based on this thesis should be avoided.

One challenge for validating the results of this thesis arises from the nonexistent amount of previous research on the subject. This limits the possibilities of comparing the findings to previous studies, but this has been circumvented by considering the results in a broader AIS-context. Artificial intelligence is in general also a challenging theme to research, beginning from defining basic concepts.

Based on the results, it seems that artificial intelligence is rapidly gaining a significant foothold in the financial administration domain. It also seems that the technology is even changing the ways in which financial administration is carried out. In relation to this, AIS-researchers should be much more interested in the relationship between artificial intelligence and perceptions of accounting personnel, especially considering that the greatest challenges and achievements around the subject seem to revolve around relatively complex human factors. The lack of research together with the rapid change that is clearly happening can even be described as the most important finding of this thesis, proving that there is a definitive demand for more research on the subject, from multiple different angles.

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APPENDIX A

Figure 11, larger version.

APPENDIX B

The main structure of questions for the research interviews. It should be noted that as the interviews were carried out as half structured thematic interviews, the questions have only been used as a main structure for the interview. Finnish interview questions are included as all the interviews were conducted in Finnish.

FI	**EN**
Taustakysymykset	**Background questions**
Kerro lyhyesti koulutuksestasi	Tell shortly about your education
Kuvaile työhistoriaasi lyhyesti	Describe your work history shortly
Kerro mitä tämänhetkinen työsi sisältää, ts. miksi olet tärkeä työnantajallesi	Tell what your current work involves, e.g. why are you important for your employer?
Kauanko olet työskennellyt nykyisessä organisaatiossa ja tehtävässä?	How long have you worked in your current organization and position?
Mitä asiakkaanne haluavat teidän palveluilta?	What do your customers want from your services?

Taloushallinto	**Financial administration**
Mikä sinun mielestäsi on taloushallinnon merkitys liiketoiminnalle?	What do you think is the significance of financial administration to your company's overall business?
Mitä taloushallinto tarkoittaa teidän yrityksessänne? • Millaisia raportteja se tuottaa? • Ketä se palvelee? • Kuka sitä tekee? • Kuka määrittää mitä se tekee? • Ostolaskut osana taloushallintoa? • Muuta mieleen tulevaa?	What does financial administration mean in your company? • What kinds of reports does it produce? • Who do you provide your service for? • Who does it? • Who defines what it should include? • Purchase invoices as part of financial administration? • Anything else?

Tekoäly	**Artificial intelligence**
Mitä tekoäly on?	**What is AI?**
Määrittele termi tekoäly.	Define the term artificial intelligence.
Osaatko nimetä yhtään tekoälyä?	Can you name any AIs?
Osaatko nimetä teknologioita, joita tekoälyt hyödyntävät?	Can you name any technologies behind AIs?

Mihin tekoälyä voi hyödyntää? Entäpä mihin ei?	What can AI be used for? What can it not be used for?
Millaisissa taloushallinon proseseissa näet tekoälylle käyttökohteita?	What kinds of financial administration processes do you see suitable for using AI?
Entä missä siitä ei ole hyötyä?	Where is it not useful?

Tekoälyn käyttökohteet liiketoiminnassa?	**AI in business?**
Miten teidän organisaationne hyödyntää tekoälyä Snowfoxin lisäksi? Jos ei, niin miten tulevaisuudessa? • Anna esimerkkejä. • Entäpä taloushallinnossa? • Entä miten sen pitäisi hyödyntää sitä mielestäsi?	How does your organization take advantage of AI in addition to Snowfox? If not, what are your plans for the future? • Give examples. • How about financial administration? • How do you think you should be utilizing AI?
Mitkä ovat mielestäsi suurimpia tekoälyn käyttämiseen liittyviä haasteita? • Yleisesti • Teidän yrityksessänne? • Taloushallinnossa?	What do you think are the greatest challenges in terms of utilizing AI? • In general? • In your organization? • In financial administration?
Millaiseksi uskot tekoälyn hyödyntämisen taloudellisen kannattavuuden, ts. paljonko uskot tekoälyyn sijoitetun euron tuottavan? • Onko kokemuksia?	How do you see the profitability of using AI? In other words, how much do you believe an euro invested into AI will output? • Any experiences?
Onko tekoälyn hyödyntäminen asia, joka ylipäätään kiinnostaa yritystänne, miksi? • Näkyykö se rekrytoinneissanne? • (Sisäisissä) koulutuksissanne? • Hankintaprosesseissanne? • Tietojärjestelmien suunnittelussa? • Strategisessa suunnittelussa?	Is utilizing AI a theme that your organization is even interested in? • Does it show in your recruitments? • (Internal) training? • Procurement processes? • Information system planning? • Strategic planning?
(Taloushallinnon) asiakkaiden vaatimukset tekoälyn suhteen?	(Financial administration) customer demands in terms of AI?

Onko yrityksellänne tekoälystrategiaa tai tekoälyjohtajaa/vastaavaa? • Jos ei, niin kuka vastaa tekoälyn hyödyntämisestä yrityksessänne?	Does your organization have an AI strategy or AI manager/officer? • If not, who is in charge of utilizing AI in your organization?
Tekoälyn ja lainsäädännön suhde – mitä ajatuksia? • Miten lainsäädäntö vaikuttaa teillä tekoälyn kehittämiseen ja käyttöönottoon? • GDPR ja tekoäly? • Auditoitavuus (esim. tilintarkastus)?	Thoughts on the relationship between AI and legislation? • How does current legislation effect your AI utilization? • GDPR and AI? • Auditability (e.g., account audit)?
Minkä koet suurimmaksi tekoälyn luomaksi uhkaksi, entä mahdollisuudet? • Yhteiskunnallisella tasolla? • Teidän yrityksessänne? • Taloushallinnossa?	What o you believe to be the greatest threat created by AI, how about possibilities? • On the level of society? • In your organization? • In financial administration?
Millaisia yllätyksiä (positiivisia tai negatiivisia) sinä tai organisaatiosi olette kohdanneet tekoälyn kanssa.	What kind of surprises (positive or negative) have you or your organization run into with AI?
Asiakkaidenne näkemyksiä tekoälystä?	Your customers perspectives into AI?
Tekoäly, brändi ja trendikkyys?	AI, brand and trendiness?

Case yritykseen liittyvät kysymykset	**Case company specific questions**
Vapaa sana Snowfoxin palvelusta?	General thoughts on the service provided by Snowfox?
Kauanko olette olleet Snowfoxin asiakkaan? • Onko Snowfoxin palvelu ensimmäinen tekoälypohjainen palvelu yrityksenne käytössä? Entä taloushallinnon organisaatiossanne?	How long have you been a customer of Snowfox? • Is the service provided by Snowfox the first AI-based service your company has started using? How about in your financial administration organization?
Ajatuksia käyttöönottoprosessista (myynnistä tuotantoon)?	Thoughts on the deployment process (from sales to production)?
Millaisia vaikutuksia Snowfoxin käyttöönotolla on ollut? • Miten te mittaatte ja esitätte näitä vaikutuksia?	What effects has the utilization of the service by Snowfox had? • How do you measure them?

Hyödyt, haitat, muutosvastarinta?	Advantages, disadvantages, resistance towards change?
Onko tullut yllätyksiä?	Any surprises?
Miksi päädyitte juuri Snowfoxin tuotteeseen, mikä siitä tekee kilpailijoita paremman, vertailitteko vaihtoehtoja?	Why did you choose the service provided by Snowfox, e.g. why was it better than others? Did you compare options?
Kustannukset vs. hyöty, millainen suhde?	Price vs. benefits, what is the ratio?
Ennustusten osumatarkkuus, onko riittävä?	Thoughts on the hit rate of the predictions provided by Snowfox, is it high enough?
Kontrollin tunne, prosessikontrollit?	Feeling of control, process controls?

Haastateltavan kokemukset ja käsitykset tekoälystä?	**Experiences and perceptions of the interviewee towards AI**
Onko itselläsi suoritettuna tekoälyyn liittyviä opintoja tai koulutuksia? • Koetko oman osaamisesi riittäväksi aiheen ympäriltä -vastaako se työsi vaatimuksia? • Entäpä organisaationne työntekijöiden osaaminen?	Have you completed any AI-related studies or training? • Do you feel you have an adequate knowledge on the subject - does it fulfill the demands of your current position? • How about the knowledge of other employees?
Onko sinulla käytännön kokemusta tekoälyjärjestelmien kanssa toimimisesta? • Entä kehittämisestä? • Hankintaprosesseista?	Do you have any practical experiences of working with an AI-based system? • How about developing one? • Procurement processes?
Miten realistiseksi uskot oman käsityksesi tekoälyn mahdollisuuksista ja haasteista?	How realistic do you believe your perceptions of the possibilities and challenges of AI to be?
Onko tekoälyä käsitelty seminaareissa, koulutuksissa tai vastaavissa työhön liittyvissä tapahtumissa, joihin olet osallistunut?	Has AI been talked about in seminars, trainings or other similar work related events you have participated in?
Onko tekoälyä käsitelty millään tapaa pohjakoulutuksesi (esim. yliopisto) aikana?	Has AI been talked about during your basic education (e.g. university) in any way?

Muita ajatuksia keskusteltuihin teemoihin liittyen?	**Any other thoughts on the themes discussed?**