UNIVERSITY OF TURKU

ABSTRACT

- [ ] Bachelor's thesis
- [ ] Master's thesis
- [ ] Licentiate's thesis
- [ ] Doctor's thesis

Subject	Accounting and Finance	Date	23.4.2019
Author(s)	Charlotte Minogue	Student number	507867
		Number of pages	98
Title	Robotic process automation and the work identity of accountants		
Supervisor(s)	Ph.D. Jan Pfister		

Abstract

Advances in technology create change, dilemmas and great possibilities for companies and their finance function. The accounting field is continuously evolving, as technology based tools are able to mimic the work and actions of humans. Robotic process automation (RPA) is the most recent automation technology to transform financial accounting by providing a quick, accurate and effective way to perform routine financial accounting tasks. These disruptive changes can cause various reactions in financial accountants ranging from positive to negative. Thus, identity theory, which includes work identity, provides a way to better understand RPA and its effects from the human perspective.

The objective of this thesis was to discover the relationship between RPA and the work identity of accountants. More closely, the point was to find out the effects that RPA has on the work identity and roles of accountants in addition to discover which aspects of RPA strengthen or threaten the work identity of accountants. Moreover, the aim was to see how accountants perceive future automation and their future roles and work opportunities in financial accounting.

The empirical data of this qualitative research was collected through semi-structured interviews with eight financial accountants from one case company with various educational backgrounds, financial accounting experience as well as knowledge and use of RPA. After data collection the interviews were analysed using discourse analysis.

The findings of the study showed that there are various effects that RPA has on the roles and work identity of accountants, which mostly depends on the use and knowledge of RPA. Mostly RPA was perceived well with RPA bringing beneficial changes to the work of accountants. The increased job satisfaction and better quality work impacted work identity positively while the possibility of losing a job and malfunction had a negative impact on work identity. Furthermore, the future of financial accounting was seen with increased automation either RPA or artificial intelligence and the roles of accountants were predicted to be different in the future.

Key words	Robotic process automation, Work identity, Financial accounting, Artificial Intelligence
Further information	

TURUN YLIOPISTO

TIIVISTELMÄ

- [ ] Kandidaatintutkielma
- [ ] Pro gradu -tutkielma
- [ ] Lisensiaatintutkielma
- [ ] Väitöskirja

Oppiaine	Laskentatoimi ja Rahoitus	Päivämäärä	23.4.2019
Tekijä(t)	Charlotte Minogue	Matrikkelinumero	507867
		Sivumäärä	98
Otsikko	Ohjelmistorobotiikka ja kirjanpitäjien työidentiteetti		
Ohjaaja(t)	Ph.D. Jan Pfister		

Tiivistelmä

Teknologiset kehitykset luovat muutoksia, ongelmia ja mahdollisuuksia yrityksille ja niiden taloushallinnolle. Taloushallinnon ala muuttuu jatkuvasti johtuen uusista teknologiaan pohjautuvista työkaluista, jotka pystyvät simuloimaan ihmisten toimintaa. Ohjelmistorobotiikka on uusin automaatioteknologioista, jotka uudistavat kirjanpitoa tarjoamalla nopean, tarkan ja tehokkaan tavan automatisoida manuaalisia ja toistuvia kirjanpidon tehtäviä. Automaation tuomat muutokset voivat aiheuttaa joko positiivisia tai negatiivisia reaktioita kirjanpitäjissä. Identiteettiteoria, joka sisältää työidentiteetin, tarjoaa mahdollisuuden ymmärtää paremmin ohjelmistorobotiikkaa ja sen vaikutuksia inhimillisestä näkökulmasta.

Tämän tutkielman tarkoituksena oli ymmärtää ohjelmistorobotiikan ja kirjanpitäjien työidentiteetin suhdetta. Tarkemmin tavoitteena oli tunnistaa ohjelmistorobotiikan vaikutukset kirjanpitäjien rooleihin ja työidentiteettiin ja lisäksi selvittää, mitkä ohjelmistorobotiikan osa-alueet vahvistavat tai heikentävät kirjanpitäjien työidentiteettiä. Tavoitteena oli arvioida miten kirjanpitäjät näkevät automaation tulevaisuudessa, erityisesti taloushallinnon tulevaisuuden roolien ja työmahdollisuuksien näkökulmasta.

Kvalitatiivisen tutkimuksen empiirinen data koottiin puoli-strukturoiduilla haastatteluilla kahdeksan taloushallinnon asiantuntijan kanssa yhdestä yrityksestä. Haastateltavilla oli erilaiset koulutus- ja kirjanpitotaustat sekä vaihteleva ymmärrys ja käyttöaste ohjelmistorobotiikasta. Datan keräämisen jälkeen haastattelut analysoitiin käyttämällä diskurssianalyysiä.

Tutkielman tulokset osoittivat ohjelmistorobotiikan vaikutukset kirjanpitäjien rooleihin ja työidentiteettiin. Vaikutukset riippuivat enimmäkseen ohjelmistorobotiikan ymmärryksestä ja käytöstä. Haastateltavat suhtautuivat ohjelmistorobotiikka pääasiassa hyvin, koska ohjelmistorobotiikalla on monia hyötyjä kirjanpitäjien työssä. Työmotivaation kasvu ja parempi työn laatu vaikuttivat positiivisesti kirjanpitäjiin, kun taas pelolla työpaikan menettämisestä sekä ohjelmistorobotiikan toimimattomuudella oli negatiivinen vaikutus työidentiteettiin. Lisäksi kirjanpitäjät näkivät taloushallinnon sisältävän tulevaisuudessa enemmän joko ohjelmistorobotiikalla tai tekoälyllä tehtävää automaatiota. Haastatteluissa kirjanpitäjien roolien arveltiin muuttuvan tulevaisuudessa paljon.

Asiasanat	Ohjelmistorobotiikka, Työidentiteetti, Kirjanpito, Taloushallinto, Tekoäly
Muita tietoja	

UNIVERSITY OF TURKU
Turku School of Economics

ROBOTIC PROCESS AUTOMATION AND THE WORK IDENTITY OF ACCOUNTANTS

Master´s Thesis
in Accounting and Finance

Author:
Charlotte Minogue

Supervisor:
Ph.D. Jan Pfister

23.4.2019
Turku

The originality of this thesis has been checked in accordance with the University of Turku quality assurance system using the Turnitin OriginalityCheck service.

Table of contents

List of figures

List of tables

1 INTRODUCTION

1.1 How technology influences the field of financial accounting

Advances in technology, such as software and processing power, create change, dilemmas and great possibilities for companies and their finance function (Bhimani & Willcocks 2014, 469). The accounting field is evolving, as technology based tools are able to do the work previously done by humans (Drew 2012, 76). The speed and capacity that computers can process information has grown significantly, which enables accountants to perform tasks at a quicker pace and allows them to do more tasks than before (Hopper & Northcott & Scapens 2007, 119–120). There are several new forms of automation that are able to transform and improve processes, such as robotics and artificial intelligence, which are continuously developed further (King, Hammond & Harrington 2017, 55). The next innovation trend that is considered to become an integral part of financial accounting is robotics, which is a part of the automation that is influencing the change in financial accounting (EY 2016, 2–7).

Robotic process automation (RPA) is a technology-based tool that enables the automation of tasks including several accounting tasks. It refers to software tools and platforms that can perform rules-based processes. RPA can mimic the actions of humans and it can function within the existing information systems and communicate between several systems (IRPAAI 2018). Some of the advantages of implementing software robots are that they can execute set tasks precisely and quickly while working continuously (Lacity & Willcocks 2016b, 41–43). Financial accounting is one of the fields that can incorporate RPA into their work in order to automate certain processes and tasks. Financial accounting refers to recording, processing and presenting historic data for external stakeholders, which includes collecting and recording data, preparing a balance and preparing various financial statements (Sittle & Wearing 2008, 4–7).

RPA can only process structured data, which means there is still a need for humans to handle the unstructured data and transform it into structured data for the software robots. The tasks automated by RPA have several distinct characteristics. RPA can execute processes that are rules-based, the data has to be structured and have a deterministic outcome. In other words, the process has to have a single correct answer (Lacity & Willcocks 2016b, 41–43). Thus, financial accounting tasks, such as invoice processing, bookkeeping or data entry can be performed by RPA (Asatiani & Penttinen 2016, 68).

Furthermore, the importance of understanding identity in organisations has become more common in literary research (Brown 2015, 20). However, Alvesson and Willmott (2002, 620) recognize that identity has not been sufficiently studied in relation to organ-

isations and financial accounting. More closely, work identity is important in organisations, as it forms the roles a person takes on and dictates how a person conducts himself or herself in a work environment (Walsh & Gordon 2008, 47–48). Thus, work identity is crucial to how a person feels, values and acts in social situations including the work environment (Alvesson & Willmott 2002, 620) and is especially integral when disruptive events happen in organisations, as work identity provides a way to understand and explain them (Brown 2015, 20).

Introducing new technologies like RPA into financial accounting can be a challenging experience for accountants, as the sudden changes and ambiguities make it increasingly more challenging and problematic to secure a work identity (Alvesson & Willmott 2002, 623). The tasks and roles of accountants might shift, as software robots begin to perform certain tasks that were previously the responsibility of accountants. Thus, RPA can cause accountants to define their role in the organisation differently and lead to a shift in the work identity of accountants (Parker 2007, 406). Moreover, work identity is closely related to social identity of accountants, which is the collective identity of the accounting profession and is highly influenced by how other people view the profession.

Advances in technology can cause different, either positive or negative, reactions and feelings to arise in accountants and other professionals. People can see several benefits in technological advances for both companies and employees; companies can become more productive and achieve financial benefits, such as cost savings, while the benefit for accountants regards the reduction of routine tasks (Lacity & Willcocks 2016b, 41–44). The implementation process can be relatively quick, taking only 2–4 weeks and software robots are easy to modify since there is no need for advanced coding skills, which make software robots flexible (Asatiani & Penttinen 2016, 68). Technological advancements can also cause a certain degree of uneasiness, even fear, particularly in organisations, which are resistant to change. Therefore, technological change can be a significant cause for stress within the accounting profession since the work is changing to incorporate more technology and some might lack the necessary technical skills to keep up with these rapid changes (Drew 2015, 29).

These changes can be perceived as disruptive, disarming or even marginalising by certain accountants since some of their work is threatened by the implementation of RPA (Billett 2007, 198) and the loss of human jobs is a common perception associated with automation (Lacity & Willcocks 2016b, 41–43). This fear is understandable since the aim of RPA is to replace people by automation (Aalst, Bichler & Heinzl 2018, 269). Furthermore, in a study about the future of jobs, Frey and Osborne (2017) examined how probable it is for certain types of jobs to be automated and computerized. The results showed that the likelihood of accountants being replaced by technology is 94 per cent. This paints a grave picture for the future of accounting, as a career choice.

However, Billett (2007, 198) discovered that disruptive changes can have a positive effect on the morale of employees. The changes in the work of accountants can provide a motivation for advancing their careers to more challenging work or shifting their competencies to adapt to the changes. The purpose of software robots is to perform repetitive tasks that are often seen as undesirable by humans. Therefore, RPA can make being accountants more enjoyable for modern day professionals by reducing manual and routine tasks (PWC 2016, 36). Furthermore, this offers an opportunity for accountants to focus on more interesting tasks, such as strategic work (Lacity & Willcocks 2016b, 41). This would bring the role of accountants closer to a business partner by focusing on assisting management with decision-making (Goretzki, Strauss & Weber 2013, 41). Another opportunity for accountants is to shift their competencies into more technical knowledge, for instance specializing in robotics. Thus, the ideal situation would be to have teams of both robots and humans who work together while complementing each other (Lacity & Willcocks 2016b, 41).

There are several questions about RPA that have yet to be answered, as the topic has not been comprehensively researched (Moffitt, Rozario & Vasarhelyi 2018, 1). Aalst et al. (2018, 271) point out several of these questions: "What processes are suitable to be automated by robotic process automation?" and "How to coach robotic process automation agents?" Researchers are mostly focused on the technical side of applying RPA into accounting, for instance what processes are suitable for automation with software robots. However, the human view, which relates to how people perceive robotics, is also a key topic. Aalst et al. (2018, 271) highlight that the relationship between RPA and people should be studied further. Therefore, this study attempts to bridge this gap in the literature of RPA within the context of financial accounting through the theoretical lens of identity theory.

1.2 Purpose of the thesis and research questions

The aim of this study is to understand more about RPA in the context of financial accounting. The use of robotics in accounting is a relatively new phenomenon, which makes the topic relevant for research. The purpose is to shed light on how RPA affects the work identity and roles of financial accountants. Another objective is to discover the potential advantages and disadvantages of robotic process automation and find out if they strengthen or threaten the work identity of financial accountants. Furthermore, this study will provide a brief insight into how financial accountants perceive their future work opportunities in financial accounting with future automation in mind.
The research questions are:

1. How does robotic process automation affect the work identity and roles of financial accountants?
2. Which aspects of robotic process automation strengthen or threaten the work identity of financial accountants?
3. How do financial accountants perceive future automation, as it relates to their future work opportunities or role in the organisation?

This research is from the human view of the phenomenon with the focus being on the impacts of RPA on financial accountants from their own perspective. The human view is emphasised by focusing on the work identity and social identity of accountants while researching RPA. Financial accountants were chosen instead of management accountants for the scope of this study for two reasons. Firstly, financial accounting tasks are more suitable for RPA. Secondly, the chosen case company had implemented RPA to automate only financial accounting tasks at the time of the empirical study.

1.3 Key concepts

The importance of identity in understanding phenomenon in organisations has been recognized in literary research (Brown 2015, 20) since identity is crucial to how a person feels, and acts in social situations (Alvesson & Willmott 2002, 620). Work identity is especially paramount when studying individuals in organisations, as it is a work-based concept of one's self that forms the roles a person takes on and the manner a person conducts himself or herself in a work environment. Work identity is one aspect of a person's entire individual identity (Walsh & Gordon 2008, 47–48). This research is on the work identity of accountants, which focuses on how accountants perceive themselves in the context of work.

Social identity is another important concept relating to identity theory. Social identity refers to an individual's sense of self that is based on the membership of a group. In other words, it is how individuals define and describe themselves as members of a particular group (Brouard, Bujaki, Durocher & Neilson 2017, 227; Taylor & Scapens 2016, 1077). Social identity is constructed by social processes (Howarth 2002, 158), which involve outsiders' opinions as an influencing element of social identity. Image is a term often associated with social identity that describes how members of a group believe people outside the group define them. The image of a group has an effect on the level of self-esteem that individuals gain from being members of a particular group (Taylor & Scapens 2016, 1077). In the context of financial accounting, social identity reveals how accountants see themselves in regards to being accountants. Image reflects how accountants think other professionals define accountants as a group of professionals.

Robotic process automation or RPA is a term used to describe a specific form of automation. The term is defined as a technology-based tool, such as a software robot, which enables the automation of tasks and processes by mimicking human action (Mancher, Huff, Grabowski & Thomas 2018, 36). RPA can execute processes that are rules-based, using structured data and with deterministic outcomes, which means that the process has to have a single correct answer (Lacity & Willcocks 2016b, 42–43). RPA can be applied to financial accounting, as some financial accounting tasks are suitable for RPA (Asatiani & Penttinen 2016, 68).

In addition to RPA, artificial intelligence (AI) is used in this study to enable the comparison of RPA capabilities to a higher form of automation. Finding a clear definition or AI is challenging as it encompasses various subfields and techniques (Russell & Norvig 2009, 1). Institute of Robotic Process Automation and Artificial Intelligence (2018) describe AI as the collection of cognitive automation, machine learning and natural language processing among other tools producing analytics and insights at or above the capability of humans. AI is able to mimic human judgement at advance levels human intelligence (Mancher et al. 2018, 36). Cognitive automation is part of the AI field and refers to the ability of machines to mimic human judgement (Kaizer, Ponce & Steinhoff 2018, 14). Cognitive automation is used in this thesis to reflect some of the abilities of AI and reflect a higher form of automation than RPA.

1.4 Methodology

RPA has not yet been studied extensively, which means there is a limited amount of academic research on the subject (Moffitt et al. 2018, 1). Moreover, the relationship between RPA and people has been often overlooked with the focus being on the technical side of RPA (Aalst et al. 2018, 271). Therefore, an empirical research has been added to provide a more comprehensive understanding of RPA. This thesis utilises qualitative research method, where the subject can be studied as extensively as possible (Eriksson & Kovalainen 2008, 5). The purpose of qualitative research is to understand and describe a phenomenon (Eskola & Suoranta 1998, 61). Within qualitative research, the perspective of the individuals involved in and affected by the phenomenon is emphasised (Mack, Woodsong, MacQueen, Guest & Namey 2005, 1; Ghauri & Gronhaug 2002, 86). Qualitative method was chosen for this study, as RPA is a relatively new phenomenon in financial accounting and the intent of this study is to discover the perceptions and views of accountants.

The purpose of case studies is to explain and describe the research topic (Saaranen-Kauppinen & Puusniekka 2006, 43) and it provides a way to gather detailed data from a small group (Hirsijärvi Remes & Sajavaara 2004, 125). The focus is on the experiences,

perspectives and conceptions of the people that are included in the case study (Eriksson & Kovalainen 2008, 120). The empirical research is based on a single case study, where the focus is on the financial administration department, which categorizes the study as an intensive case study.

The empirical research is conducted by interviews, which can provide in-depth answers and results. Interviews are often the only mean to discover the meanings people give to issues (Koskinen, Peltonen & Alasuutari 2005, 106), which make them suitable for studying the effects of RPA on the work identity of financial accountants. More specifically, the conducted interviews can be categorized as semi-structured interviews or thematic interviews. Semi-structured interviews provide a platform to discuss key research themes while giving the researcher freedom on the order and structure of the questions (Ghauri & Gronhaug 2002, 101). The interviews contained five themes; background information, technological change, the role and work identity of financial accountants and finally the future of financial accounting. Eight financial accountants, from different teams within financial administration department, were interviewed to get a wide range of opinions and perceptions on RPA. Moreover, the work experience and educational background varied among the interviewed professionals.

Discourse analysis has gained importance and popularity in qualitative business research (Eriksson & Kovalainen 2008, 227). Discourses define how individuals express opinions and discuss about a phenomenon and provide one of the best means to understand organisations (Alvesson 2011, 1123). Social psychological discourse analysis was chosen for this analysis, as it focuses on individuals' identities. The interviews were transcribed as accurately as possible using symbols to indicate pauses and non-verbal reactions of the interviewees. The data analysis began with repeatedly reading the transcribed interviews to discover patterns, themes and metaphors that occur numerous times throughout the text (Eriksson & Kovalainen 2008, 227–233). Then categories were developed within themes to represent interesting findings and the most frequent views of the interviewees (Joutsenvirta & Vaara 2015, 749; Vaara, Tienari & Laurila 2006, 797). Coding, where subjects are assigned a specific label (Eriksson & Kovalainen 2008, 128), was used to find recurring perceptions (Erkama & Vaara 2015, 822). The categories were then refined and made into subchapters of the empirical findings chapter. After coding, the findings were compiled with relevant quotes from the interviewees that completed and reflected the findings of the empirical research.

1.5 Structure of the thesis

The thesis is structured into eight chapters starting with the introduction, which gives a brief overview of the topic of this thesis as well as its purpose. The second and third

chapters consist of a literature review, which give a theoretical framework to this study. The first theoretical chapter gives the reader more knowledge on financial accounting and the concept of identity and how it relates to financial accountants. The second theoretical chapter begins with a brief overview of the development of automation and ends with a more extensive presentation of robotic process automation and its connection with the identity of financial accounting. The theoretical framework is followed by research design, which informs how the empirical study of this thesis was conducted. This includes the presentation of the research approach, the empirical data, case company selection and themed interviews as a data collection method. In addition, the chapter on conducting the study explains the data analysis method used and evaluates the reliability and validity of this study. After the research design the empirical findings of the study are presented. In the discussion chapter the results of the study are combined with the literature review in order to answer the research questions. The last chapters contain conclusions, which includes possibilities for further research and a chapter providing a summary of the study. The references and appendix comprising of the interview themes are at the end of the thesis.

2 FINANCIAL ACCOUNTING AND IDENTITY OF ACCOUNTANTS

2.1 Financial accounting

2.1.1 Financial accounting as a part of financial administration

Financial administration is a commonly used term in the accounting literature and also within companies. However, the term is not clearly defined in most published articles and books (Lahti & Salminen 2014, 15). McMenamin and Petty (1999, 9) agree and add that there are several terms that can be used to describe the same thing. In most literature the focus is on accounting and more specifically management accounting. Financial administration is seen as a wider system than just accounting, which can be defined as a system that enables an organisation to follow financial events in order to report on their activities to stakeholders (Lahti & Salminen 2014, 16).

Financial administration is an integral part of the overall management of organisations, which makes it a fundamental and necessary part of any business. Financial administration works together with several other management disciplines, which means that the department is not isolated (McMenamin & Petty 1999, 8; Parminder & Vickerstaff 2014, 2). In addition, it can be viewed either as a business process or a supportive function of the company. Financial administration can be separated into external accounting, better known as financial accounting, and internal accounting also called management accounting based on the type of financial information produced for the stakeholders (Lahti & Salminen 2014, 16). Thus, professionals in financial administration are either called financial accountants or management accountants. This study focuses on financial accountants, who will be referred to as accountants.

Financial accounting produces financial information for both individuals and companies that are external to the organisations, such as authorities and shareholders (Atkinson, Kaplan, Matsumura & Young 2007, 3; Warren, Moffitt & Byrnes 2015, 401–402). By contrast, management accounting focuses on producing relevant and timely financial and non-financial information for the managers and employees of a company (Madegowda 2006, 2; Coombs, Hobbs & Jenkins 2005, 2). Financial accounting and management accounting are considered to be separate forms of accounting that exhibit general differences (Bhimani, Horngren, Datar & Foster 2008, 6; Hlaciuc, Vultur, Cretu & Ailoaiei 2017, 103), yet they are becoming increasingly intertwined (Lahti & Salminen 2014, 16). Atkinson et al. (2007, 5) conclude that the two forms of accounting are in contrast regarding audience, purpose, timeliness, restrictions, type of information, nature of information

and scope. Since the focus of this study is on financial accounting, only financial accounting will be presented in more detail. The important elements of financial accounting can be highlighted using the features mentioned earlier, which are also depicted in Table 1.

Table 1 Basic features of financial accounting (Atkinson et al. 2007, 5)

Basic feature	***Description***
Audience	External: Shareholders, creditors, tax authorities
Purpose	Report on past performance to external parties
Timeliness	Delayed; historical
Restrictions	Regulated; rules driven by generally accepted accounting principles and government authorities
Type of Information	Financial measurements only
Nature of Information	Objective, auditable, reliable, consistent, precise
Scope	Highly aggregate; report on entire organisation

Financial accounting audience varies from shareholders to creditors (Atkinson et al. 2007, 5). Other relevant external individuals include authorities, employees, customers, partners, investors and lenders (Sittle & Wearing 2008, 9; Quinn & Strauss 2018, 4), who may need different types of financial information (Alexander & Nobes 2001, 11). The purpose of financial accounting is to prepare and report on companies' past financial performance to external parties (Atkinson et al. 2007, 5). The reports of financial accounting tend to be backward looking and historical since they generate financial information of organisations from the past period. Moreover, the reporting interval for financial accounting can vary between quarterly, semi-annual or only annual (Bhimani et al. 2008, 6). The information of financial accounting is financial in nature and does not contain non-financial information. That is to say, the financial accounting reports contain only financial measurements. The aim is to produce objective, reliable, consistent and precise financial information through financial accounting (Atkinson et al. 2007, 5). The scope of financial accounting is highly aggregate as it provides a broad overview of the position of an organisation in a certain time period (Murthy 2009, 11), as a means for external stakeholders to evaluate the recent financial performance of a company (Quinn & Strauss 2018, 4).

Regulation has become prominent in financial accounting, as there are increasing amounts of standards and regulations that must be followed (Angeloni 2016, 247; Lovell 2014, 261). The standards and regulations are set by regulatory bodies with the purpose of monitoring and regulating the level of quality and quantity of information that companies provide. The development of international accounting standards was based on the objective of having consistent accounting standards to apply in companies globally (Sittle & Wearing 2008, 6–7). Financial accounting is highly regulated both by international

accounting standards and country specific financial accounting standards (Atkinson et al. 2007, 5). All listed firms in the European Union, including Finnish companies, are required to report their financial statements according to two sets of international accounting standards, which are International Accounting Standards (IAS) and International Financial Reporting Standards (IFRS), in addition to national accounting systems. Compliance with national accounting standards depends upon the country in which the company is registered (Sittle & Wearing 2008, 6–7). In Finland companies use the national accounting system called Finnish Accounting Standards (FAS) (Lantto & Sahlström 2009, 341; Miihkinen 2008, 388–389).

2.1.2 Financial accounting processes and tasks

Financial accounting is the process of recording, communicating and summarizing the financial transactions of a company (Parminder & Vickerstaff 2014, 2; Sittle & Wearing 2008, 4–7). The tasks of financial accounting encompass the processes that lead up to the presentation of the company's financial statements to its shareholders (Murthy 2009, 11). Financial accounting is a system that consists of interrelated components that work together to achieve the end result of financial accounting, which are the financial statements. Thus, there are several components that make up the financial accounting process. Lahti and Salminen (2014, 16–19) divide financial accounting into accounts payable, accounts receivable, travel expense accounting, payment transactions and cash management, fixed assets accounting, payroll accounting, which together form the general ledger accounting. In larger organisations, such as financial institutions, there are specific teams that are responsible for each component of financial accounting. Therefore, all accountants do not participate in the following financial accounting process.

Murthy (2009, 15) disclosed a four step financial accounting process starting from identifying business transactions and ending with the preparation of financial statements in addition to closing and zeroing the revenue and expense accounts. This process can also be called the financial accounting cycle as the process begins again after the final step (Corporate Finance Institute 2018). The first step of the financial accounting process is to identify the business and financial transactions, which are dealings that a company has with different types of stakeholders (Murthy 2009, 13–15). A business event or activity that needs accounting recognition can be called a financial transaction, which is often complex and affects several items that appear in financial statements (Parminder & Vickerstaff 2014, 19). All financial accounting transactions consist of general ledger transactions, business process transactions and the transactions of auxiliary accounts (Lahti & Salminen 2014, 150).

The second step is to enter the identified business transactions into the book of account, which means recording the transactions into the company's journal (Murthy 2009, 15). Companies currently use accounting information systems, which store all business transactions (Quinn & Strauss 2018, 3). Day-to-day bookkeeping is a disciplined system, where legislation dictates the specific financial transactions that are mandatory to record in the company's ledger (Leppiniemi, Martikainen, Virtanen & Kinnunen 2000, 15). Financial accounting is based on double entry bookkeeping and the dual aspect rule, where all transactions are recorded as both debit and credit. Double entry bookkeeping enables crosschecking of accounting transactions in order to determine the correctness of transactions (Parminder & Vickerstaff 2014, 19).

The third phase of the financial accounting process consists of verifying the accuracy of the entered records and potentially correcting them if needed (Murthy 2009, 15). After entering business transactions at the end of each accounting period, the ledger accounts, which is a collection of financial transactions, needs to be balanced (Parminder & Vickerstaff 2014, 21–24). This part of the process involves making a trial balance monthly, quarterly or only yearly to see if the debit and credit are equal. When an unbalance appears, accountants must find the errors causing the unbalance and make corrective adjustments to the financial transactions in order to balance the accounts (Corporate Finance Institute 2018).

The final phase is to prepare the financial statements, which are released usually yearly depending on the financial period of the company. Financial statements include the income statement, balance sheet, cash flow statements, annual report and auditors' report (Murthy 2009, 12–15). The most fundamental components of financial statements are the balance sheet and income statement (Alexander & Nobes 2001, 111). The income statement is a document showing the result, which is either a profit or a loss, of a company for the financial period. In addition, the income statement demonstrates how the result has formed by reporting the flows of expenses and revenues of the financial period (Leppiniemi et al. 2000, 24).

The balance sheet presents the financial status of the company on the closing date (Leppiniemi et al. 2000, 27) and is the culmination of the complex and time-consuming recording process that accountants are responsible for. The aim is for the two sides of a balance sheet, i.e. assets in addition to liabilities and capital, to provide the same figure. Assets are the resources that are under the control of the company, which are expected to bring future economic benefits and could be used to pay off debts (Alexander & Nobes 2001, 13). Liabilities and capital explain where the assets come from, which include the shareholder's equity, accrued discretionary reserve adjustments, compulsory reserves and liabilities (Leppiniemi et al. 2000, 27). Cash flow statements report the cash positions and cash flows of the company. There is a clear difference between a cash flow and profit flow, as cash flows represent the movement of money and profit flows movements where

the company gains financially (Alexander & Nobes 2001, 27). The annual report should contain relevant information regarding developments of the operations of a company. Furthermore, the auditor's report gives stakeholders verification that the information given in the financial statements is reliable and follows the mandatory standards and regulations (Leppiniemi et al. 2000, 30–69).

Historically financial accounting has been done manually, however, the incorporation of computers into accounting has changed the processes into well-established procedures with the use of accounting information systems. Accounting information systems are a computer-based collection of accounting data that are maintained by companies. The systems handle the collection, storage, processing and analysis of the accounting data (Parminder & Vickerstaff 2014, 2). Accounting information systems generally consist of a transaction processing system, a general ledger or financial reporting system and a management reporting system. The transaction processing systems enables the day-to-day recording of the financial transactions, while the financial reporting system compiles the financial statements (Quinn & Strauss 2018, 7). Accounting information systems are among other technological developments that have changed financial accounting and will be elaborated on next.

2.1.3 The change of financial accounting with the development of technology

Globalisation and increased competition in the economy have influenced the acceleration of technological developments (Kloviene & Gimzauskiene 2014, 60). Advances in technology, such as software and processing power, create change, dilemmas and great possibilities for companies and their finance function. All aspects of an organisation are affected by new technologies, which enable organisations to increase the speed of their work and allow more flexibility into organisations' decision making (Bhimani & Willcocks 2014, 469–470). Business environments have become increasingly more turbulent, since rapid technology developments cause occasionally unpredictable changes. These changes are forcing organisations to continuously adapt in order to survive and prosper in the competitive economy (Kloviene & Gimzauskiene 2014, 60).

The fast development of technology are changing the way people work, what type of work people do and what tools people work with (Bhimani & Willcocks 2014, 469–470). Thus, the accounting field is evolving, as technology based tools are able to do the work previously done by humans (Drew 2012, 76). The speed and capacity that technology-based tools can process information has grown significantly, which enables accountants to perform their tasks at a quicker pace and allows them to concentrate on more complicated tasks than before (Hopper et al. 2007, 119–120). In addition, the use of technology-

based tools has caused the increased reliance of information technology to function effectively (Quinn & Strauss 2018, 3). Drew (2018, 4) predicts that there will be two major transformations in accounting due to technological advances. The first phase will concern the increased leveraging of data and the second phase will transform the processes of accounting.

The automation of the financial accounting process would have a paramount impact on the quality of reporting, the scheduling and deadlines and finally on the accuracy of financial information (Lahti & Salminen 2014, 150). Moreover, providing financial accounting information is mandatory for companies (Quinn & Strauss 2018, 4), which is why companies are interested in making the process more efficient. RPA is a way for companies to automate accounting tasks, which will enable organisations to gain higher productivity and achieve financial benefits, such as cost savings (Lacity & Willcocks 2016b, 41–44). Reliability is another significant factor in introducing automation into accounting, as software robots are believed to reduce human error (Parasuraman 1997, 235).

These rapid changes disrupt the traditional processes and procedures of financial accounting (Zhang, Dai & Vasarhelyi 2018, 20; Drew 2018, 32; Alexander & Nobes 2001, 9), which will eventually cause a shift in the roles and identities of accountants (Parker 2007, 406). Identities are important to understand in organisations as they affect how accountants perform their tasks and interact with other people within the organisation (Alvesson & Willmott 2002, 620). The next chapter will give a more detailed explanation of identity theory in an organisational context and its significance in understanding the effects of technological changes on the accounting profession.

2.2 Identity theory from the perspective of accountants

2.2.1 The concepts related to identity theory

The importance of understanding identity in organisations has become more common in literary research (Brown 2015, 20). However, Alvesson and Willmott (2002, 620) recognize that identity has not been sufficiently studied in relation to organisations. Identity is crucial to how a person feels, values and acts in social situations including the work environment, which is why it should be understood better. Brown (2015, 23) acknowledges that there are several differentiating perspectives on identity and researchers have not found consensus on how to explain identity. Nevertheless, researchers are in agreement that identity reflects meanings that people can connect to themselves. Identity theory has

many important terms, which are often intertwined with one another. However, this research concentrates on five concepts that are relevant for studying the identity of accountants: identity, work identity, social identity, image and identity work. The definitions of these concepts are described in Table 2.

Table 2 Definitions of identity terms

Term	***Definition***
Identity	The way an individual subjectively sees himself or herself
Work identity	An individual's sense of self in the context of work
Social identity	The sense of self that comes from belonging to a certain group
Image	The way group members believe outsiders view the group as a whole
Identity work	Interpretive activity individuals use to consciously reproduce and transform their own identity

Identity is an individual's subjective construction of who he or she is, was or desires to become in the future (Brown 2015, 20). Giddens (1991, 53) defines identity, as the self that is reflexively understood by the person himself or herself. Alvesson and Willmott (2002, 625) derive from Giddens' view that identity can be thought of as a spontaneously organized combination of narratives that are based on various experiences and competing discourses. Burke and Reitzes (2013, 85) recognize three distinct characteristics of identity. Firstly, identities are formed through social processes, where individuals classify themselves in generally known categories and roles. Alvesson and Willmott (2002, 625) similarly mention central life interest as a way to explore identity. Central life interest refers to a person's feelings about identity issues, which can be understood with questions such as "Who am I?" or "Who are we?" The corresponding answers in the context of organisations might be related to occupational affiliation or position, e.g. accountant (Schwartz, Luyckx & Vignoles 2011, 2).

Secondly, the meanings and values related to identities are specific to certain situations or roles (Burke & Reitzes 2013, 84). Likewise, Brown (2015, 27) in addition to Karreman and Alvesson (2001, 63) discuss the term coherence, which refers to a feeling of continuity and recognisability in regards to time and situation. Furthermore, coherence includes the acceptance of our identities and a feeling of completeness or wholeness (Brown 2015, 27). Thus, individuals can have several identities that vary depending on the situation and environment (Walsh & Gordon 2008, 47).

Thirdly, identities are symbolic in nature. Individuals begin to understand the meanings associated with their identity through interactions with others since others respond to the individual in a way that correlates with the individual's identity in a particular role (Alvesson & Willmott 2002, 626). Thus, identities are developed and sustained in social

situations (Brown 2015, 23), as others evaluate if the individuals' actions are appropriate or inappropriate for a specific role (Burke & Reitzes 2013, 85). A way of constructing identity is distinctiveness, which signifies that somebody can be defined as unlike someone else. These types of characteristics that are occasionally deemed unique can be shared with some people and simultaneously differentiate them from others (Alvesson & Willmott 2002, 625).

Work identity is a work-based concept of one's self, which involves a combination of occupational, organisational and several other identities that form the roles a person takes on and dictates how a person conducts himself or herself in a work environment. An individual's work identity is among several personal identities that form an individual's identity. Work identity is especially paramount when considering the concept of identity in the context of organisations (Walsh & Gordon 2008, 47–48). Identities are particularly integral when issues appear and events happen in organisations, as work identity provides a way to understand and explain them (Brown 2015, 20). Therefore, work identity is relevant in this study in order to better understand the effects of technological change on accountants.

Identities can be studying from both the view of individuals and groups. Social identity is defined by Tajfel (2010, 2) as "the part of the individuals self-concept which derives from their knowledge of their membership of a social group together with the value and emotional significance attached to that membership." In other words, social identity refers to how individuals define and describe themselves, which is developed from being a member of a particular group (Brouard et al. 2017, 227; Taylor & Scapens 2016, 1077). Ashforth, Harrison and Corey (2008, 327) simplify that social identity is something shared with members of a group as well as something that separates one group from another. The construction of individuals' identity through social processes sets a limit to the level of freedom individuals have to select which identities to associate with. The reason being that people have to incorporate representations of social groups into their own identity (Howarth 2002, 158).

Moreover, identity is constructed by social processes (Howarth 2002, 158), which involve outsiders' opinions as an influencing element. Image describes how individuals believe people outside the group define them. The image of a group has an effect on the level of self-esteem that individuals gain from being members of a particular group, while the identity is influenced by how they think other people define the group they are members of. Thus, image can influence and change identity. Moreover, social identity and image are linked as what others believe about a group impacts how group members see the value of the group (Taylor & Scapens 2016, 1077–1078).

Alvesson & Willmott (2002, 627) distinguish identity work as a core term other than work identity in order to comprehensively understand identities in the organisational con-

text. Identity work is an interpretive activity, which individuals use to consciously reproduce and form a coherent identity, while understanding the relationship between identity and social identity (Watson 2008, 129). Identities can be described as improvised or created through processes of identity work, which can be pragmatic or emotionally charged. Therefore, identity work can be different for each individual, similarly, as identities differ between people (Brown 2015, 26). Individuals can use identity work to diminish the gap between their current identity and the one they aspire to have. This happens through the pursuit of more positive meanings (Goretzki & Messner 2018, 1) by forming and strengthening their sense of distinctiveness and coherence (Alvesson & Willmott 2002, 626).

However, identity work can include dirty work that is thought of as degrading or demeaning work, which increases negative meanings (Morales & Lambert 2013, 228–229). Conscious identity work involves an element of self-doubt produced by a mix of existential worry and the inconsistencies that occur in interactions with others. In an organisational context, individuals can experience self-doubt when the feeling of being replaced unsettles their identity, for example when RPA replaces accountants. When a feeling of being one's self is disrupted, feelings of shame and confusion might arise. These self-doubts can be alleviated with remedial identity work. The basis of identity work is managing a continuous identity against a changing environment that is provided by socially constructed truths about things that are normal and rational (Alvesson & Willmott 2002, 626). The next chapter focuses on how work identity is created using social identity as a base for the process.

2.2.2 Forming and transforming work identity

Social identity can be used as a foundation for the explanation of how accountants create and sustain their work identity, as individuals use group memberships to define their own work identity (Walsh & Grodon 2008, 48). Work identities can vary significantly by the meanings individuals associate with them and in regards to the importance of work identity to one's whole identity (Kirpal & Brown 2007, 211). The process of forming an individual work identity is a continuous and on-going process, which is based on identifying with certain work groups, such as occupations or organisations. For example, accountants identify with the accounting profession. Individuals use defining work groups that reflect their own values and enhance their sense of self as the starting point for creating their work identity (Walsh & Gordon 2008, 48). The process of forming an individual work identity is depicted in Figure 1.

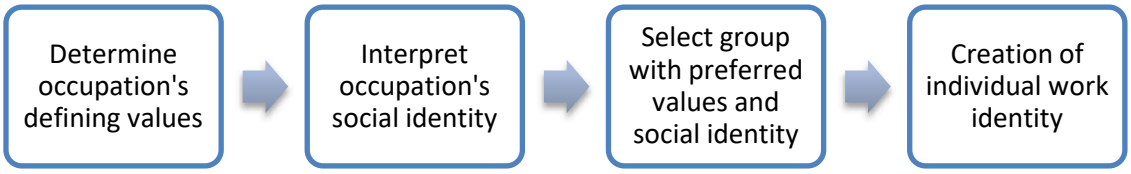

Figure 1 The process of creating an individual work identity (based on Walsh & Gordon 2008, 49)

This forming and transforming process, which can also be called organisational identification, happens by identifying what a membership of each work group offers. This involves determining the work group's defining values and distinguishing competencies. The process continues by an evaluation of the degree to which the social identity of the group aligns with their own preferred identity. Individuals' evaluation of the work group identity can rely on numerous processes including conversations with co-workers, in-house communication or speeches from management. The purpose is to discover and evaluate the potential positive effects of being a member of a specific group compared to other groups (Walsh & Gordon).

Individuals will eventually identify with a work group, which enhances their own personal work identity and has the most meaning to the individual (Walsh & Gordon 2008, 48). Moreover, distinctiveness is another criteria for choosing a work group to relate with. Consciously determining the work groups that encompass the self-concept that is desired and disassociating from groups that do not align with their valued identity create work identity (Alvesson & Willmott 2002, 625). Work identities are re-evaluated and redefined as comparison with others continues. Thus, the process of creating a work identity is continuous (Walsh & Gordon 2008, 48). Ashforth (1998, 217–221) presents another way of creating and modifying work identity, which is based on three separate processes. The first process involves letting go and forsaking the formerly desired and valued work identity with its defining qualities. Thus, ensuring that an individual is prepared and available to accept a new and improved work identity. In the second process, an existing work identity is modified, which usually occurs before a known change and can be referred to as proactive identity formation. This encompasses preparing oneself for the requirements of a new role or situation and incorporating the pivotal characteristics needed. The strength of the proactive work identity formation can depend on how much the potential role is desired. In the last identity formation process an individual's new work identity is enforced and established. Furthermore, the identity begins to be internalised by an individual and the new work identity is associated as a reflection of oneself.

The formation of identity is a constant process. Therefore, enforcing or creating an identity should not be thought of as final since identity can change constantly. In other

words, identity is naturally variable instead of a stiff, formal and unchanging process. Stepping into a new role or work group causes change as individuals are faced with new challenging tasks. However, another key thing to remember is that forming a work identity does not always occur suddenly after a crisis, new possibility or change. The process can be slow and happen unconsciously (Ashforth 1998, 217–221). In the field of accounting work identity becomes the prominent identity, especially as accountants identify with the characteristics of the profession. The next section discusses identities of accountants and how they might transform due to RPA.

2.2.3 Work identities of accountants

The work identity of accountants has been previously studied in several scientific articles with varying perspectives and emphases. In his article Roberts (1991) contemplated the identity of accountants and how differentiating forms of accountability can produce diverse identities. Morales and Lambert (2013) focused on the construction of identity and differentiating between tasks that enforced the desired work identity of accountants and other tasks that worked against it. However, Alvesson & Willmott (2002, 620) acknowledge that identity of accountants has not been sufficiently studied. Albert et al. (2000, 14) concur that the work identity of accountants should be better understood in an organisational context as well as the impacts of work identity in the field of accounting (Morales & Lambert 2013, 228). Brouard et al. (2017, 225) add that especially in times of uncertainty the importance of researching work identities in organisations is highlighted.

The work identity of accountants is influenced by many internal and external elements and is continuously forming and transforming (Walsh & Gordon 2008, 48). Social identity, image and the role of accountants are critical factors determining the formation of the work identity of accountants. Social identity theory brings light to the fact that the work identity of accountants is undoubtedly entwined with several social identities, even though work identities are unique to each accountant (Brouard et al. 2017, 227). Social identity refers to the part of accountants' work identity that derives from belonging to the accounting profession (Taylor & Scapens 2016, 1077). According to Empson (2004, 759) there is a collective perception and understanding among accountants of what it signifies to be a professional. Then again, Brouard et al. (2017, 227) recognise that there might be discrepancies with the social identity of accountants and that it is not completely homogenous.

Furthermore, the social identity of accountants is linked with the stereotypical assumptions made of accountants as a group, which can be called image (Richardson, Dellaportas, Perera & Richardson 2015, 29). Roberts (1991, 355) states that accountants are seen

by others as impartial and trustworthy professionals who use accounting information to deliver information about the financial workings of an organisational. Then again, Richardson et al. (2015, 28–29) admit that the image of the accounting profession is quite poor compared to many other professions. Accountants are often portrayed in media with negative stereotypes, which has become embedded in the image of accountants. Thus, there is not an unequivocal image of accountants. There are alternative views and images of accountants that might be contrary to the work identity that is preferred by accountants, which can lead to a complicated sense of self (Roberts 1991, 355).

Morales and Lambert (2013, 231) discovered that other professionals in an organisation saw financial accounting tasks as dirty work, which are undesirable or demeaning tasks. Other professionals expected accountants to only produce the financial information, but not to state any opinions on them. Accountants saw this as a sign of misrecognition, as they considered their work and contributions to have more value. Doing dirty work undermines the work identity of accountants, since the tasks do not correlate with the work identity that they aspire to be seen as by other professionals (Heinzelman 2018, 465). The findings showed that accountants view themselves in higher regard than how other professionals within the organisation see the role of accountants (Morales & Lambert 2013, 231). Therefore, the social practices and opinions of other members in the organisation can affect accountants' work identity either negatively or positively (Alvesson & Willmott 2002, 625), which is a clear indication that work identities and roles in organisations are socially constructed (Parker 2007, 404).

Goretzki et al. (2013, 46) suggest that there is a connection between role and work identity, as they change interactively. Thus, a change in role will cause the work identity to evolve. The role of an individual in an organisation includes the type of tasks, problems and targets they see as their responsibility. Roles are related to the way accountants believe that they should approach these responsibilities (Parker 2007, 404) and what behaviour is expected of an individual in a certain situation or context (Sveningsson & Alvesson 2003, 1169). Accountants can have completely diverse views of what their role is in the organisation, even when they have the same job and tasks. One accountant might have a very broad view of their role, such as being a core part of the financial department, while another account might see their responsibility as merely to check the accuracy of the financial transactions and prepare the financial statements (Parker 2007, 403–404). The roles of accountants might change over time due to the alterations of the understanding of what type of tasks and goals belong to the profession. Furthermore, roles are associated with a social status, which can cause individuals to attempt to work towards a certain role or try to extend their current role to achieve a greater social status (Goretzki et al. 2013, 45).

The constant changes and ambiguities of organisations make it increasingly more challenging and problematic to secure a work identity (Alvesson & Willmott 2002, 623). Introducing new technologies like RPA into financial accounting can be a challenging experience for accountants. The tasks and roles of accountants might shift as the software robots begin to perform part of the tasks that were previously accountants' responsibility. Thus, causing accountants to define their role in the organisation differently in addition to shifting their work identity (Parker 2007, 406).

RPA can be perceived as disruptive, disarming or even marginalising by certain accountants as some of their work is threatened by the implementation of RPA (Billett 2007, 198). However, Billett (2007, 198) discovered that there was an opposite effect on the morale of employees. The changes in the work of accountants can provide a motivation for advancing their careers to more challenging work or shifting their competencies to adapt to the changes. Heinzelman (2018, 473) found that accountants perceive technology-based tools as the most influential aspect in shaping their careers. Through motivation and career progression RPA can bolster accountants' senses of self and cause a positive shift in the work identity of accountants (Billett 2007, 198).

Alvesson & Willmott (2002, 620) reflect on how the use of certain job titles with positive connotation are a way to obtain organisational control in addition to enforce positive work identity. Former less attractive job titles such as foreman and supervisor have been replaced with leader and team leader. They also reason that organisational identification reduces the possible choices one can make, as the potential alternatives are confined to ones that are compatible with affirming organisational identification. In addition, they conclude that this type of internal control is more effective than organisational control that relies on external motivation or direction. As accountants are going to be involved with the automation of some accounting tasks with robotic process automation, there might be an opportunity to change their job titles to incorporate an element of technology.

The purpose of this theoretical chapter on financial accounting and the identity of accountants was to provide a foundation for the empirical research by several means; Firstly, the aim was to give a brief overview of what is financial accounting and what type of work accountants do. Thus, understanding which tasks could be considered undesirable dirty work in addition to giving an idea of the suitability of tasks for RPA, which will be discussed later in more detail. Identity theory is a way to study the change that accountants experience as a consequence of RPA implementation. Identity, social identity, work identity, image and identity work are important terms in order to analyse the effects of RPA on the work identity of accountants. The next chapter gives a brief look into automation development while focusing mostly on RPA.

3 DEVELOPMENT OF ROBOTIC PROCESS AUTOMATION IN FINANCIAL ACCOUNTING

3.1 Automation in financial accounting

3.1.1 Definition, classifications and development of automation

The word automation became relevant during the automation of the manufacturing industry, where machines began replacing the production and inspection tasks previously performed by humans (Fung 2014, 1). Originally the industrialization process led to the current progressive automation of processes and tasks with the purpose of gaining economic efficiencies and higher product quality (Moffitt et al. 2018, 1). Parasuraman, Sheridan and Wickens (2000, 287) define automation as a machine agent performing a function that was previously done by a human. That being said, they acknowledge that what is considered automation will change over time as technology advances.

Automation has traditionally been for physical functions (Parasuraman 1997, 231), which has in turn allowed humans to move on from several time-consuming and labour-intensive tasks (Endlsey 2007, 5). This was followed by the automation of paperwork (Silverman 1966, 3), which was made possible by the development of computers and computer-based systems. Financial accounting involves large amounts of data to be processes, which represents a large cost burden on companies. The incorporation of computer systems into financial accounting was highly motivated by the need to lower these costs. The continuous development of better functioning computers enabled the spread of computerisation in accounting, for example the complete replacement of manual systems with computer-based systems. Nevertheless, computerization has affected some parts of financial accounting more than others, as financial accounting tasks vary slightly (Wilson & Sangster 1992, 65).

However, after the realisation of the previously mentioned automations, there are still advances that can be achieved with automation, especially with regards to cognitive functions. This applies to the field of accounting as well since the automation of tasks with large amounts of interpersonal contact and extensive professional judgement has been proven more challenging to automate (Wilson & Sangster 1992, 65). Planning, decision-making and creative thinking are some of the cognitive functions that are currently not fully automated (Parasuraman 1997, 231).

A task or process can be either fully automated or partly automated, which extends automation to cover a continuum of levels (Parasuraman et al. 2000, 287). Frohm, Lindström, Stahre and Winroth (2008, 5) make a rough separation between complete

manual control and full automation. Full manual control refers to a function that is completely controlled by a human without help from machines, while full automation describes a process, which is entirely controlled by a machine (Parasuraman 1997, 232). Automation can be classified in many different ways between full manual control and full automation. Sheridan and Verplank (1978) created ten levels of automation to help describe the amount of automation used in a task. The levels of automation start at the highest level of automation, where the computer completes the task if it decides the task should be done and informs a human if it decides the human should be told. The lowest form of automation is where a human does the entire task (Sheridan & Verplank 1978, 287).

Endsley (1987) created a more concise four levels of automation to determine the level of decision making of human versus machine. The levels begin with decision support, where humans act with the instructions from machines and ends with full automation, where machines are autonomous and the human is excluded from the process (Vagia, Transeth & Fjerdingen 2016, 192–197). Furthermore, Mancher et al. (2018, 35–36) presents a more current way to determine the automation spectrum, which is depicted in Figure 2.

Figure 2 The automation spectrum (Mancher et al. 2018, 36)

The automation spectrum varies from the simplest form of automation, which are macros to advanced artificial intelligence. The spectrum has four levels of automation that begin with macros, which are computing instructions to use within one application. The next level is robotic process automation, which can mimic human actions using software robots. The third level is cognitive automation that can mimic human judgement. Lastly, the highest form of automation is advanced artificial intelligence, which is able to mimic human intelligence.

3.1.2 The effects of automation on financial accounting

Factors affecting change and enabling the development of automation can originate from either external or internal influence with some encouraging change and others limiting change. One of the limiting factors is the work environment and if financial accounting tasks are possible to automate. Funding is another factor that affects the possibility of

adopting automation into financial accounting. Information technology investments are expensive for organisations and some might lack the funds for the necessary investment. Moreover, especially larger organisations have the necessary funds but instead might face bureaucratic difficulties and resistance to change (Wilson & Stranger 1992, 68). Human machine interaction can be affected by the attitudes of human workers toward automation. Negative or positive attitudes vary widely among people and are a factor that has a large impact on the usage of automation (Parasuraman 1997, 232–234).

The most common reasons for automating certain processes are technological feasibility and decreasing cost levels, while simultaneously having no detrimental effect on the performance of humans (Parasuraman 1997, 232). For example, moving from time-consuming and difficult task of transaction processing on paper to the efficient computer-based accounting information system saved companies time and money. Furthermore, the ability and speed to get the most accurate and relevant financial information is becoming increasingly important (Wilson & Sangster 1992, 66), as there is an attempt to move towards real-time reporting due to the accelerating economy (Drew 2018, 34). Thus, companies experience pressure to constantly be more effective (Wilson & Sangster 1992, 68). Reliability is an especially significant element in introducing automation through computer systems, as it is believed to reduce human error (Parasuraman 1997, 235) and increases the quality of financial information (Wilson & Sangster 1992, 66).

Parasuraman (1997, 230) predicted that there would be big changes in the workforce in the next century as computers increase in speed, capabilities and power. In addition to the increased computer functionalities, the availability of these computer systems and software at low cost would be a contributing factor for the future change (Parasuraman 1997, 230). In some sectors of the economy, automation has had a large impact on the human workforce; one example being the manufacturing industry, where labour was completely replaced by machines. That being said, the adoption of automation in most fields has not completely displaced humans (Silverman 1966, 4). Automation simply changes the type of work humans do (Parasuraman 1997, 231). Even regarding the adoption of full automation, there is often a need for human involvement in a supervisory role. Some jobs or positions might become redundant during the automation process. Then again, it is more common to make adjustments through attrition, where positions are not filled after former employee quit or retire, and reassignment to a different section or position in the organisation (Silverman 1966, 4). One of the reasons that humans have not been completely replaced by machines is the belief that people are more flexible and reliable than machines in unexpected situations. This is based on the fact that the designer of the automation cannot predict all the scenarios that might happen in order to program the machine to react correctly to all situations (Parasuraman 1997, 232–234). However, in the case of advanced artificial intelligence the machine has an ability to learn by itself, and thus, able to create solutions in unexpected situations similarly to people (Mancher et al. 2018, 36).

In the next chapter automation will be discussed from the perspective of robotic process automation, which is a relatively new form of automation that is currently being incorporated into financial accounting work. In addition, robotic process automation is highly suitable to automate accounting tasks, which will become evident in the closer examination of robotic process automation.

3.2 Robotic process automation

3.2.1 Definition of robotic process automation

The phenomenon of robotic process automation (RPA) is an outcome of the explosion of diverse information technology products and services (Vedder & Guynes 2016, 1), which creates opportunities and threats to organisations (Hallikainen, Bekkhus & Pan 2018, 42). It became possible due to the immense improvements in information technology itself. Especially increased processing power and better sensors enabled the developments of information technology and RPA (Vedder & Guynes 2016, 1). RPA has not yet been widely studied, which means there is limited amount of academic research on the subject (Moffitt et al. 2018, 1). However, there are a few articles that have discussed RPA in different contexts. Lacity and Willcocks (2016b) wrote about how companies can benefit the most from RPA by using software robots to amplify and augment the strengths of human workers. Vedder and Guynes (2016) discussed the benefits of RPA and its effects on the human workforce.

RPA is a form of automation that can be applied to financial accounting, as some of the tasks of financial accounting are highly suitable for RPA (Asatiani & Penttinen 2016, 68). There are several questions about RPA in the context of financial accounting that have yet to be answered, as the topic has not been comprehensively researched (Moffitt et al. 2018, 1). Researchers are mostly focused on the technical side of applying RPA into financial accounting, for example which processes are suitable for this form of automation. However, the human view, such as how people perceive robotics and how it might affect their work identity, is also an important research topic. Aalst et al. (2018, 271) highlight that the relationship between RPA and people should be studied further.

Establishing a clear definition for RPA can be challenging, since it is a relatively new term. Lacity and Willcocks (2016b, 42) describe RPA as a technology-based tool that enables the automation of tasks and processes. RPA is defined with a more human view by the Institute for Robotic Process Automation and Artificial Intelligence (2018) as the following: “an application of technology that allows employees in a company to configure

software or a robot to capture and interpret existing applications for processing a transaction manipulating data, triggering responses and communicating with other digital systems". In simpler terms, RPA can mimic the work of humans and it can function within the existing information systems and communicate between several systems (IRPAAI 2018; Davies 2017, 62). The definitions include similar characteristic features of RPA. Therefore, there is a relatively common definition of RPA in academic literature.

While RPA is the most commonly used term to describe this phenomenon in academic research, there are several other terms that can be mirrored to RPA. Fung (2014, 1) talks about information technology process automation and recognises it as a synonym for RPA. Moffitt et al. (2018, 1) mention robots and software robots as terms for the software that automates human tasks. Thus, RPA is a set of instructions to perform a task and the robot or software robot is the technology-based tool that executes the instructions (Mancher et al. 2018, 36). Kaizer et al. (2018, 14) include RPA as part of intelligent automation. However, they use RPA and intelligent automation as synonyms, even though intelligent automation includes higher forms of automation than RPA, such as artificial intelligence. Despite RPA being the most used term, understanding what RPA entails can be difficult with several, often intertwined, terms used currently in academic research to describe this phenomenon (Evans 2017, 212). Thus, the characteristics of RPA will be discussed next by comparing them to the capabilities of artificial intelligence, to give a better understanding of the abilities of RPA.

3.2.2 Capabilities and characteristics of RPA compared to artificial intelligence

It is necessary here to clarify exactly what is meant by the term artificial intelligence before the comparison with RPA is possible. The term artificial intelligence (AI) can be traced backed to Turing's (1950) article on computer machines, which is considered the foundation of the term. The imitation game is a way of determining the intelligence of a computer, which is used to test how effectively AI can simulate a human (Evans 2017, 209). The computer can be categorized as artificial intelligence, if humans cannot distinguish between the machine and other human (Turing 1950, 433–434; Ertel 2011, 1).

Giving a definition for AI can be challenging as it encompasses various subfields and techniques (Russell & Norvig 2009, 1). Nevertheless, AI can be described as the collection of cognitive automation, machine learning and natural language processing among other tools producing analytics and insights at or above the capability of humans (IRPAAI 2018). Salin and Winston (1992, 1) simplified the definition of AI as a set of techniques that enable computers to perform tasks that would in other cases require human intelligence. Machine learning, which refers to the ability of AI to continuously improve its functionalities and expertise (Shukla, Wilson, Alter & Lavieri 2017, 50; Nilsson 1980,

1), is an important part of AI. AI is relevant for the financial accounting field, as it is predicted to cause enormous changes on the accounting profession in the future (Smith 2017, 22), as AI is able to solve problems the same way as humans (Anagnoste 2018b, 490).

Different automation terms are often intertwined, such as AI and RPA (Evans 2017, 212). Therefore, even with a clear definition of RPA, it can be challenging to distinguish what constitutes RPA and what does not. Comparing the qualities of RPA against more advanced forms of automation gives a better understanding of the characteristics and capabilities of RPA. Lacity and Willcocks (2016b, 43) in addition to Kaizer et al. (2018, 14) make a clear differentiation between RPA and cognitive automation, which is part of AI, to help make sense of the automation landscape. The two classes of automation tools are designed to automate certain types of processes and tasks, which are depicted in Figure 3.

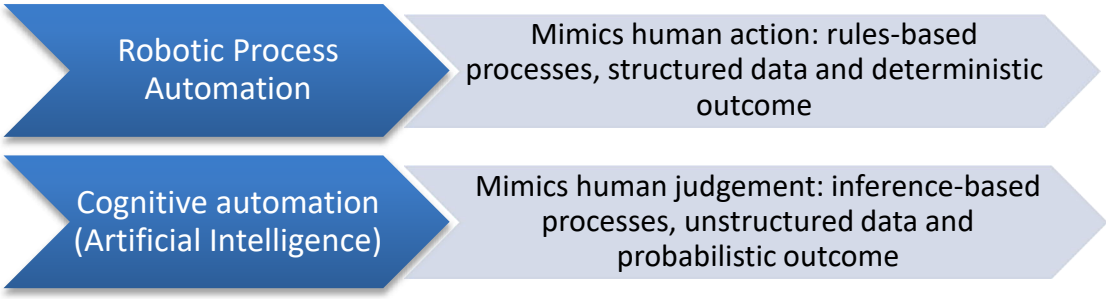

Figure 3 Capabilities of RPA and AI (Lacity & Willcocks 2016b, 43)

The abilities of RPA and AI differ on a general level, as AI is able to mimic human judgement by perceiving, gathering evidence and reasoning, while RPA can only mimic human action by automating very basic tasks and processes (Kaizer et al. 2018, 14; Mancher et al. 2018, 36). Another difference is related to how the software is taught to perform tasks. AI can continuously learn solutions and broaden its expertise and RPA needs to be programmed by humans to be able to perform tasks (Steinhoff, Lewis & Everson 2018, 29).

Furthermore, tasks can be divided into two categories, which elaborate the suitable form of automation, by several distinct characteristics: type of data, processes and outcomes. RPA can execute processes that are rules-based and the data used in the process has to be structured. In addition, the process has to have a deterministic outcome, which means that the process has to have a single correct answer (Lacity & Willcocks 2016b, 43). In other words, RPA automates rudimentary tasks that are repetitive, involve several systems and follow detailed steps (Steinhoff et al. 2018, 28–29). Moffitt et al. (2018, 2) specify what kind of tasks RPA is able to perform in a work environment. RPA software can be trained to open PDF files, read emails, identify relevant information, enter data

into other computer systems, such as enterprise resource planning, and inform supervisors when an error is detected.

Cognitive automation differs from RPA since the tools are designed to interpret unstructured data (Kaizer et al. 2018, 14) with inference-based processes that result in a group of probable answers, which can be described as a probabilistic outcome (Lacity & Willcocks 2016b, 43). Cognitive automation is able to process a massive amount of unstructured data and form hypotheses or possible solutions that even a human brain could not handle (Steinhoff et al. 2018, 29). Moreover, it is able to perform processes where human judgement is required. It is important to recognize that cognitive automation is only a part of AI, as advanced AI is able to mimic human intelligence and replicate natural interactions of humans (Mancher et al. 2018, 36).

Another important characteristic that separates RPA from cognitive automation is what kinds of professionals are able to use the automation tools. Professionals, who are specialized in the subject matter of what is being automated, can use RPA tools (Lacity & Willcocks 2016b, 43). Therefore, accountants are able to use RPA tools to automate financial accounting processes (Asatiani & Penttinen 2016, 68). RPA is user friendly as people with no programming experience can be taught to automate tasks in a couple of weeks. Even though an expert in the subject matter can use RPA software, the information technology department is a critical part of the implementation process of RPA (Lacity & Willcocks 2016a, 23–31). Cognitive automation tools are significantly more difficult to use. There is a need for extensive coding skills, which is the reason why only information technology (IT) experts are able to use them (Lacity & Willcocks 2016b, 43).

Therefore, it can be concluded that RPA cannot automate all accounting tasks since RPA can only be used to automate processes with structured data, deterministic outcome and rules-based processes. This raises the question of which financial accounting tasks and processes can be automated using RPA. The criteria of tasks used to determine suitability for RPA are introduced next.

3.2.3 Criteria of tasks for robotic process automation

Having clear criteria to determine, which tasks are most suitable for RPA is a way to better understand the capabilities of RPA. Moffitt et al. (2018, 3) together with Anagnoste (2018a, 307) consider tasks that are commonly repetitive and manual to be highly suitable for RPA. Aalst et al. (2018, 270) concur and add that RPA is able to automate very basic processes and tasks that follow specific steps. Lacity and Willcocks (2016a, 22) specify that RPA is compatible with a process, where humans work at a workstation and collect data from different sources, add necessary data and finally input the finished work to another information system. Asatiani & Penttinen (2016, 69) created specific criteria,

which are found in Table 3, in order to evaluate which financial accounting tasks and processes are suitable for RPA.

Table 3 Criteria of tasks suitable for RPA (Asatiani & Penttinen 2016, 69)

Criteria	***Description***
High volume of transactions	Task performed frequently or lots of sub-tasks.
Stable environment	Use of predefined and unchanging set of IT systems.
Access to multiple systems	Task involves accessing several systems.
Proneness to human error	Task is prone to human specific error.
Easy decomposition into unambiguous rules	Task can be broken down into simple steps.
Limited need for exception handling	Task is highly standardized. Little or no exceptions.
Low cognitive requirements	Judgement skills are not required.
Clear understanding of manual costs	Understanding of current cost structure of task to estimate difference in cost.

Table 3 shows eight general criteria that are helpful in determining, which tasks are suitable for RPA. It can be concluded that financial accounting tasks are compatible with RPA as they are repetitive, the processes are rules-based (Asatiani & Penttinen 2016, 68) and they do not change often. Accountants in organisations handle a large amount of accounting transactions daily and many use several different information systems during accounting processes (Moffitt et al. 2018, 2). In addition, financial accounting processes are stable with little exceptions and some tasks have low cognitive requirements. There is proneness to human error and usually a clear understanding of the costs. A large range of financial accounting tasks can be automated with software robots, such as generating bills, keeping records up-to-date and finding errors in processes (Lacity & Willcocks 2016b, 42).

The first criterion concerns the volume of transactions. In order for a task to be considered for RPA it needs to be performed frequently or alternatively include various sub-tasks (Asatiani & Penttinen 2016, 69). High-volume processes can provide the most possibilities for reducing costs (Aalst et al. 2018, 270) and achieve greatest benefits with RPA (IRPAAI 2018). Tasks that are performed in non-stable environments are subject to possible uncertainties and exposed to potentially unpredictable alterations (Fung 2014, 2). Thus, RPA requires a stable environment with predefined and constant information systems in order to implement RPA (Asatiani & Penttinen 2016, 69). In addition, processes that involve several systems in order to accomplish the task are suitable with RPA (Asatiani & Penttinen 2016, 69). Proneness to human errors is another criterion, since this

is a way RPA can benefit organisations by eliminating additional work caused by human errors and facilitate superior performance (Fung 2014, 2–3). Easy decomposition into unambiguous rules reflects that a task needs to be easily broken down into smaller and simple rules-based steps in order to eliminate misinterpretation (Kaizer et al. 2018, 14).

A highly standardized process has a limited need for exception handling. In other words, the process has only few or no exceptions, while performing it (Asatiani & Penttinen 2016, 69). In addition, a low cognitive requirement is an important criterion since RPA can only automate tasks with no creativity, interpretation skills or subjective judgement (Moffitt et al. 2018, 3). Therefore, tasks that need humans to make ad hoc decisions with subjective judgements or comprehensive analysis are incompatible with RPA (Fung 2014, 2). The last criterion is a clear understanding of the current manual costs before RPA implementation. For a company to make a financially sensible decision to automate a task, it is paramount that they understand the entire cost structure of performing the task. This enables companies to estimate the difference between the current costs and the costs of implementing RPA (Asatiani & Penttinen 2016, 69). The decision to implement RPA can be backed by the gained financial benefits, even in a situation where management or stakeholders are unfamiliar with robotics (Fung 2014, 3).

3.2.4 The implementation of robotic process automation

There has been an increased demand of RPA tools within organisations, which can be explained by the attempt of organisations to further reduce costs and increase efficiency (Aalst et al. 2018, 269). Another important influencing factor is that RPA does not require changes in existing information systems or applications (Kaushik 2018, 23), which can save companies from investing in new expensive information systems (Aalst et al. 2018, 269). The implementation process of RPA is a quick and straightforward process, where chosen tasks are automated by configuring the software robot to perform the processes (Asatiani & Penttinen 2016, 70). Lacity and Willcocks (2016a, 25) discovered principles that help avoid the initial mistakes made by early adopters of RPA. Four action principles that organisations should follow in order to successfully implement RPA are depicted in Figure 4.

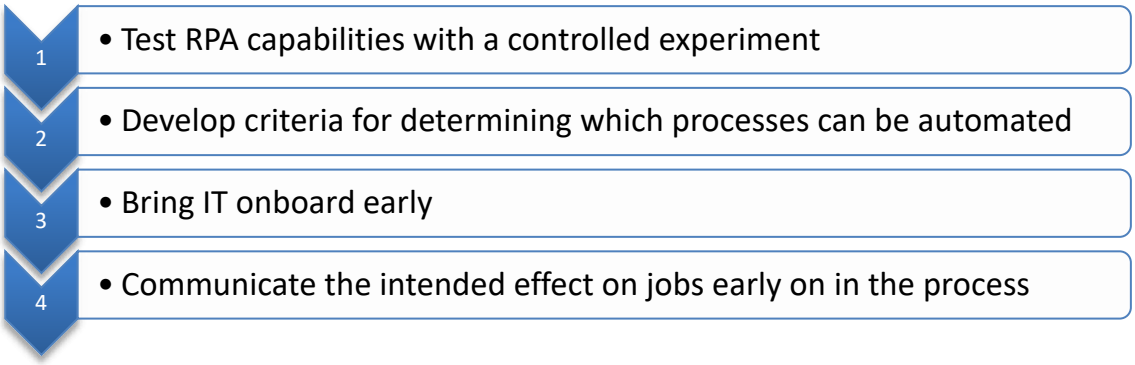

Figure 4 Four action principles for RPA (Lacity & Willcocks 2016a, 29–33)

The first action principle in Figure 4 is to test RPA capabilities with a controlled experiment. It is recommendable to create pilot trials in order to test the technical viability and also the financial value of the potential RPA. This allows companies to evaluate and compare different automation options and service providers (Lacity & Willcocks 2016a, 29–30). In addition, it is important for organisations to understand the overall potentials of RPA in order to find areas or tasks to automate (Asatiani & Penttinen 2016, 69). The second principle concerns developing criteria to determine which processes will be automated. Since RPA is a new automation technology, it can be useful to use the same criteria that would be used for outsourcing (Lacity & Willcocks 2016a, 29–30), as RPA is an alternative for outsourcing (Evans 2017, 212). Processes most suitable for outsourcing and therefore RPA, are ones with high volumes, high degree of standardisation, rules-based and mature. In the context of financial accounting, this action principle might involve going over and assessing the processes and tasks that will be automated with the accountant, who is currently performing them (Asatiani & Penttinen 2016, 69–70).

Bringing the IT department on-board early on in the implementation process is the third action principle. Usually companies incorporate IT departments into the implementation process when the project is related to IT. Despite this, the fears that IT could possibly add bureaucracy problems might be a reason for not informing the IT department. As early adopters of RPA discovered, excluding the IT department is a mistake since IT departments are usually better at analysing if the RPA software is suitable with IT security, change management policies and auditability (Lacity & Willcocks 2016a, 32–32).

The fourth principle highlights the importance of communicating the intended effects on jobs early on in the implementation process (Lacity & Willcocks 2016a, 32), which is a sensitive situation and needs to be handled with delicacy (Asatiani & Penttinen 2016, 68). In this principle the fear of technology replacing human workers is acknowledged. A typical approach to reducing or removing completely the fears of employees is to clearly communicate that jobs are not threatened. Instead the purpose of RPA is to automate structured tasks and redeploy employees for more interesting work (Lacity & Willcocks 2016a, 32). Moreover, employees should be informed on how the software robots

will be integrated with human employees (Asatiani & Penttinen 2016, 70). Even if the jobs of employees are replaced by RPA, the best practice is to clearly communicate the potential effects of RPA implementation on jobs early on. In this way employees have more time to process the news (Asatiani & Penttinen 2016, 68; Lacity & Willcocks 2016a, 33).

3.2.5 The perceived advantages and disadvantages of robotic process automation

RPA can initiate change in the work culture (Kaushik 2018, 22) and these changes can cause different kind of feelings and emotions to arise in accountants (Stensaker & Meyer 2012, 106). Accountants can perceive technological change as disruptive and disarming or instead it can function as motivation for advancing their careers (Billett 2007, 198). Furthermore, change can affect the roles accountants have in the organisation and influence their work identity as they see their responsibilities in the organisations shifting (Parker 2007, 403–404). There are both advantages and disadvantages that are evident with the incorporation of RPA, yet all of these aspects can have different reactions in people (Lacity & Willcocks 2016b, 47). The most commonly mentioned advantages and disadvantages are summarized in Table 4.

Table 4 Advantages and disadvantages of RPA

Advantages	***Disadvantages***
Decrease of manual and repetitive tasks	Fear of loss of job
Error free tasks with better quality	Affects the roles of accountants
Potential to shift competencies to more technical knowledge	Accountants might lack necessary technical skills to use RPA
Focus on more interesting and challenging work	Can affect the attitude and morale of employees negatively
Quick implementation	Lacks the reliability, which comes with success stories

The results of Lacity and Willcocks' (2016b) study showed that employees were generally positive about the changes brought on by RPA. Many employees appreciated the decreased amount of manual and repetitive tasks. The purpose of software robots is to perform repetitive tasks that are often seen as undesirable by humans. This offers an opportunity for accountants to focus on more interesting and challenging tasks, such as strategic work (Lacity & Willcocks 2016b, 41–44). More of a business partner role would be an option for accountants, where the focus of the work would be on assisting management

in decision-making (Goretzki et al. 2013, 41). The ideal situation would be to have teams of both robots and humans who function together and complement each other (Lacity & Willcocks 2016b, 41). In addition, RPA software can execute tasks error free, which increases the data quality and improves reports. The decrease of human errors reduces the amount of corrective work accountants must do, and thus, eliminating additional manual work. Furthermore, RPA can leave a reliable record of the work it has performed, which can help to find a problem if such might occur (Moffitt et al. 2018, 9).

Another advantage of implementing robots is that they can execute set tasks precisely and quickly while working continuously without the need of food breaks or sleeping like humans do (Asatiani & Penttinen 2016, 68). An example of the substantial difference in the speed of software robots is that for a task that takes multiple days for a team of humans to finish, the software robot can perform the same tasks within 30 minutes with a few humans helping (Lacity & Willcocks 2016b, 42). The implementation process can be relatively quick, taking only 2–4 weeks. Moreover, accountants are not required to learn how to use new information systems or develop extensive programming skills with RPA. Thus, software robots are flexible and easy to modify, as advanced coding skills are not needed (Asatiani & Penttinen 2016, 68).

That being said, people have a tendency to overestimate the potential negative effects, while simultaneously underestimating the positive aspects and potential advantages of technological change. Focusing on only negative aspects of RPA can cause stress and in extreme cases attempts to sabotage new technological initiatives. RPA can be perceived in a negative light since the loss of human jobs is a common perception associated with automation (Lacity & Willcocks 2016b, 41–47). This fear of job loss is understandable since the aim of RPA is to replace people by automation (Aalst et al. 2018, 269). Nevertheless, this type of widespread scepticism towards RPA places management into a challenging situation and can detrimentally affect the attitude and morale of accountants, as they contemplate which jobs will fare after the implementation of RPA (Asatiani & Penttinen 2016, 68). In addition, it could create negative meanings to accountants' work identity through the thought of being replaced (Billett 2007, 198).

Articles in media and literature worsen the scepticism. The future of financial accounting has been compared to the change that happened to the manufacturing industry through automation (Drew 2012, 76), where the work previously done by humans was replaced with robots (Fung 2014, 1). In a recent study about the future of jobs, Frey and Osborne (2017) examined how probable certain types of jobs are to be automated. The results of the study showed that bookkeeping and accounting can be computerized by 98 per cent and that the likelihood of accountants being replaced by technology is 94 per cent (Frey & Osborne 2017). Thus, computers and software robots will most likely perform financial accounting work in the near future (Drew 2012, 76). However, in the field study conducted by Lacity and Willcocks (2016b, 47), they discovered that implementing RPA

affected mostly certain parts of jobs instead of entire jobs. Furthermore, they found that the effects of RPA only decreased further hiring rather than caused layoffs of employees. The more common decision was to redeploy employees to jobs in other business activities.

A solution for the potential loss of jobs caused by RPA is for accountants to shift their competencies in order to receive new job opportunities (Asatiani & Penttinen 2016, 68). Accountants might try to transform their work identity through identity work to be more adaptable to job opportunities regarding RPA (Alvesson & Willmott 2002, 627). RPA could create new job opportunities in the management of robots, robot consulting or data analytics. However, people need to have a good knowledge of IT skills in order to move on to these new job opportunities (Lacity & Willcocks 2016b, 48). Some accountants might lack the necessary technical skills or find it too difficult to learn to keep up with these rapid changes (Drew 2015, 29), even though software robots can be programmed and used by accountants (Lacity & Willcocks 2016a, 23). Therefore, some accountants might miss the new job opportunities provided by RPA (Drew 2015, 29).

Furthermore, RPA lacks the reliability that comes with successful implementations and uses in companies. Since RPA is a relatively new automation technology, there are not enough success stories to achieve necessary credentials (Asatiani & Penttinen 2016, 68). Asatiani and Penttinen (2016, 68) consider that RPA represents a temporary solution for automation, as RPA is not able to automate all financial accounting tasks. AI and cognitive automation represent higher forms of automation that could eventually automate all financial accounting tasks.

The objective of this theoretical chapter was to provide a deeper understanding of automation and more specifically RPA, its capabilities in relation to higher forms of automation and criteria for determining the suitability of RPA for financial accounting tasks. In addition, the aim was to give a brief explanation of the implementation of RPA and discuss the effects of RPA on accountants by giving an overview of how accountants might view RPA. Thus far, the thesis has argued that RPA is suitable for financial accounting tasks, yet accountants can have varied reactions to RPA, which can have an effect on the work identity of accountants. The potential ways accountants perceive RPA with the help of the empirical study enable the analysis of the effects of RPA on the identity and roles of accountants. Thus, the next chapter will discuss more about the empirical study and how it was conducted.

4 RESEARCH DESIGN

4.1 Research approach

This study can be categorized as interpretive accounting research, which refers to understanding the social nature of accounting practices (Ryan, Scapens & Theobald 2002, 42). The meaning of interpretive approach is to understand how employees in a company perceive and interpret a phenomenon. Interpretive researchers recognise that the knowledge built is a reflection of their own goals and experience (Weber 2014, 5). Thus, a defining quality of interpretive research is that researchers recognize that they interpret the phenomenon they observe. The relationship between researcher and research object is interdependent as the research objects are influenced by the researcher and the researcher is influenced by the research objects (Weber 2014, 6–7).

Research methods are a way to acquire a systematic and specific collection of materials for the aim of attaining information to answer the research questions (Ghauri & Gronhaug 2002, 85). This study can be described as qualitative research, which is a form of scientific research and one of two main research methods (Mack et al. 2005, 1). There is an emphasis on the human perspective in qualitative research, as the purpose is to understand and describe a phenomenon, (Eskola & Suoranta 1998, 61) typically from the perspectives of the individuals involved in and affected by the phenomenon (Mack et al. 2005, 1; Ghauri & Gronhaug 2002, 86). In other words, representing comprehensively the reality of the research topic in a natural setting is a definitive characteristic of qualitative research (Hirsijärvi et al. 2004, 152).

Moreover, qualitative approach is appropriate for studies that have not been widely studied (Eriksson & Kovalainen 2008, 5) or there is a limited amount of knowledge on a certain part of a phenomenon (Järvinen 2004, 66). Qualitative research is suitable especially when the purpose of the study is to find meanings, opinions, values and behaviours that individuals associate with a phenomenon in a specific context (Lee & Humphrey 2006, 183). Qualitative method was chosen for this study, as RPA is a relatively new phenomenon in financial accounting and the intent of this study is to discover the perceptions and views of accountants.

Qualitative research comprises of numerous significances and can have varying meanings to different individuals. There is no single way to comprehend qualitative research, as it consists of multifaceted research (Hirsijärvi et al. 2004, 153). However, qualitative research can be divided into four categories by the interest of the study: characteristics of language, finding regularities, discerning meaning and reflection. This division provides a way to specify the meanings researchers associate with qualitative research in addition to focus the objective of the research (Eriksson & Kovalainen 2008, 4). This study is

interested in discerning meaning, as the purpose of the study is to understand how accountants perceive RPA and how RPA affects their work identity.

There are two main research methods: qualitative and quantitative, which can be described as opposites in some ways. Qualitative research can be described in contrast to quantitative research, which is currently the more often used methodology in scientific studies (Eriksson & Kovalainen 2008, 4). Qualitative research can be perceived as less scientific than quantitative research due to the dominance of quantitative research in business research (Eskola & Suoranta 1998, 13; Ghauri & Gronhaug 2002, 85). However, it has been suggested that qualitative research achieves a deeper understanding of the research subject (Silverman 2000, 8) and can be of better quality than quantitative research. Compared to a quantitative approach, the objective of this qualitative study is not to make definitive statistical generalizations but to shed light on the subject and help to widen knowledge on the topic (Eskola & Suoranta 1998, 13–61).

In addition to qualitative research, this study can be described as an exploratory research, where the phenomenon is not well understood. In exploratory research the ability to observe and get the necessary data to conduct the study become critical (Ghauri & Gronhaug 2002, 48–49). Exploratory research aims to clarify unknown phenomenon and find new points of view to a phenomenon. Case study is typically associated with exploratory research (Hirsijärvi et al. 2004, 129), which will be discussed in more detail in the next subchapter.

4.2 Case selection

Qualitative research is often categorized as a case study when the research emphasis is on the interpretation of the meaning of actions and text (Järvinen 2004, 68). The study can be described as a case study research, which is historically an interpretive research method. An empirical research, where the research subject is a present phenomenon happening in a genuine life situation is a definition used for case study (Eskola & Suoranta 1998, 65). The main purpose of a case study is not to generalize but to study, explain and describe the research topic (Saaranen-Kauppinen & Puusniekka 2006, 43). Moreover, it provides a way to gather detailed and intensive data from a small group of individuals (Hirsijärvi et al. 2004, 125).

The case study can be classified more specifically as an intensive case study since the data will be collected from a single company. The purpose of an intensive case study is to understand and learn how a specific case works (Eriksson & Kovalainen 2008, 119–120). Intensive case studies are especially useful when the research topic is not well known (Ghauri & Gronhaug 2002, 89). In an intensive case study the interpretation of the

researcher is emphasized, as the researcher constructs and analyses the selected case. Furthermore, the focus of the research is on the experiences, perspectives and conceptions of the people that are included in the case study (Eriksson & Kovalainen 2008, 120).

In a qualitative business research the researcher-participant relationship can influence the study as the distance is often diminished between the researcher and the participants, especially in a case study. It is common to utilise existing contacts to identify research participants in business research since accessibility and suitability of the research participants are important criteria for choosing the case study. This study can be categorised as a backyard research, which depicts a situation where the case company or the interviewees are familiar with the researcher. Being an insider in a company can enhance the access and materials provided as the researcher has a relationship with the interviewees and organisation. It also improves the researcher's contextual knowledge (Eriksson & Kovalainen 2008, 51–57). In this study, accessibility was due to the researcher's former work experience in the case company. Moreover, the selection of the case company was based on suitability, since the researcher had knowledge that RPA had been implemented in some parts of financial administration.

A case study is commonly focused on one case (Eskola & Suoranta 1998, 65), which is the reasoning behind choosing one case company for this study. The case can be an intentionally chosen company or more specifically a section of a company (Koskinen et al. 2005, 154). The case company of this study is a large Finnish financial institution, which employs thousands of people within Finland and the Baltics. In this study the financial administration department was chosen for the focus of the case study. The financial administration department has about a hundred employees who work in several different teams. The teams have different responsibilities, such as partial bookkeeping, general ledger accounting or serve as technical support for other financial administration teams. All teams have specific responsibilities that do not overlap with other teams' responsibilities, which make the teams relatively independent from one another.

Selecting a case in qualitative research is important, as the selected case sets limits on the research sample in addition to the generalizability of the findings (Järvinen 2004, 74). There is a common critique with qualitative research and case studies, which is based on the belief that making generalizations from small samples is unreliable (Koskinen et al. 2005, 263). The generalizability of a case study relies on the notion that in its simplicity a versatile decomposition of a case study contains substance for generalisations (Eskola & Suoranta 1998, 65). Using comparisons to make generalisations is a common function in qualitative research (Ghauri & Gronhaug 2002, 86). Thus, this study compares accountants who use RPA to other accountants who do not use RPA in order to study the effects of RPA on the work identity of accountants. When two separate research groups with similar knowledge and backgrounds are compared, it is possible to study the impacts of a causal phenomenon (Koskinen et al. 2005, 269).

4.3 Data collection

In most qualitative research the collected empirical data is chosen for a holistic view of the phenomenon studied (Eriksson & Kovalainen 2008, 5). Interviews are the most common way to collect qualitative data (Eskola & Suoranta 1998, 85) and are a suitable data collection method for studying a new phenomenon (Hirsijärvi et al. 2004, 194). Furthermore, interviews are often the only way to discover the meanings people give to issues (Koskinen et al. 2005, 106). They are a great way to discover how interviewees view and experience the research issue, especially when asking about sensitive issues, such as work identities (Mack et al. 2005, 2). They are interactive as both the researcher and interviewees influence one another and there is a level of trust between the researcher and interviewee, as the answer given are handled confidentially (Eskola & Suoranta 1998, 85).

The empirical data was collected through semi-structure interviews, which can also be called thematic interviews (Koskinen et al. 2005, 104). Semi-structured interviews do not follow a detailed and specific format; instead the interviews have loosely specified themes that are discussed in all interviews (Ghauri & Gronhaug 2002, 101). However, the order of the themes and questions in addition to the wordings can vary between interviews (Eriksson & Kovalainen 2008, 82). The use of semi-structured interviews has increased since it gives the possibility for interviewees to speak freely, while simultaneously ensures that every interview has similar talking points (Eskola & Suoranta 1998, 86-87). Moreover, semi-structured interviews give freedom to allow the answers of interviewees to guide the interview naturally to different subtopics within the scope of the study and contain open-ended questions, which allow interviewees to give answers in their own words (Mack et al. 2005, 3–4).

Purposive sampling was used to choose the interviewees, as it can ensure that the individuals chosen have the necessary experience, characteristics and knowledge needed for the research (Silverman 2000, 104). In purposive sampling the researcher decides how many individuals to interview with specific characteristics (Mack et al. 2005, 5). In this study, eight interviewees were chosen to give a wide range of answers from different perspectives. The interviewees were selected by their backgrounds in financial accounting and various amounts of experience with RPA for the purpose of having several points of view of RPA and its possibilities in financial accounting. The chosen interviewees were contacted personally by email to inquire about their willingness to partake in this study and the interviews were scheduled during the end of the month to avoid the most critical time of making the monthly financial statements.

The interviewees all work in financial administration at the case company in diverse positions. Some of the teams within financial administration have already implemented robotics into their work, while others are not currently using robots but probably will in the future. The interviewed professionals can be grouped into two groups regarding the

use of RPA. Four of the professionals are not using RPA and four other professionals have recently been involved with the implementation of RPA and are using RPA to automate some of their work. The interviewees are briefly introduced in Table 5.

Table 5 Backgrounds of the interviewees

Interviewee	***Current position***	***Background in financial accounting and RPA***
Professional 1	Accounting Specialist	Extensive 38 years of experience in financial accounting. Currently handling the accounting of securities of an insurance company. No experience with RPA.
Professional 2	Chief Accountant	Currently handling the accounting of securities of an insurance company with 19 years of accounting experience. Brief involvement in the first robotics project.
Professional 3	Accounting Specialist	18 years of accounting experience from several companies. In the securities team handling accounting for cooperative banks. Part of a robotics development and currently using RPA with several processes.
Professional 4	Accounting Specialist	Extensive experience with securities in different companies and currently doing securities accounting. No experience with RPA.
Professional 5	Team Leader	No educational background in financial accounting, yet 17 years of work experience in accounting. Handles balancing of cash accounts. Part of several robotics projects and currently using RPA.
Professional 6	Manager	Technical finance and accounting support for financial administrations. Works on several development projects. Leading the robotics development team.
Professional 7	Accountant	One-year experience in financial accounting in the securities team. Extensive background in the Back Office with same insurance companies. No experience with RPA.
Professional 8	Accountant	Varied over 10 years of experience in different teams within financial administration. Currently using 3 software robots.

All interviewees, but one, were highly experienced financial accountants with diverse educational backgrounds. The educational backgrounds ranged from no financial accounting education to Master of Science in Economics. The positions of the interviewees were similar since all worked within the financial administration department, yet some acted in supervisory roles either as team leader or manager. The interviewees' tasks vary depending on the team they in which they work. Professionals 1, 2, 4 and 7 form the

financial accounting section of their team that specialises in securities accounting. The other interviewees were selected from several other teams to get a broad perspective of RPA and an understanding on how RPA is used in different teams. All interviewees were women, which reflects the significant amount of women in the financial administration department of the case company. The age range of the interviewees was wide as the youngest professional was in her thirties and the oldest was a couple of years from retirement.

The interviews were conducted in the case company through face-to-face semi-structured interviews. The interviews were conducted in Finnish since the interviewees were more fluent in their native language. Seven interviews were conducted during the end half of November in 2018 and the eighth interview was conducted in late December of 2018. The interviews lasted between 44 minutes to 63 minutes depending on how lengthy answers the interviewees gave, and are depicted in Table 6. All interviews were recorded with two recording devices with the consent of the interviewees in order to concentrate on the answers and reactions of the interviewees during the interviews.

Table 6 Semi-structured interviews

Interviewee	***Date***	***Duration of interview***
Professional 1	15.11.2018	44 minutes
Professional 2	15.11.2018	48 minutes
Professional 3	16.11.2018	63 minutes
Professional 4	20.11.2018	56 minutes
Professional 5	27.11.2018	58 minutes
Professional 6	28.11.2018	46 minutes
Professional 7	29.11.2018	49 minutes
Professional 8	20.12.2018	44 minutes

The interview questions and themes were constructed to be able to answer the theoretical questions thoroughly from different perspectives (Eskola & Suoranta 1998, 176). The first two interviews were conducted during the same day, which provided an opportunity to test the suitability of the interview question, themes and structure. All interviews had the same five themes, which were general information, technology and change, the role and work identity of accountants, RPA and lastly the future of financial accounting. The questions within the themes, which are shown in the Appendix, varied slightly with every interview. However, the structure of the interviews was similar in every interview. After the first two pilot interviews, the structure of the interview became more suitable and flowed better with a few minor adjustments and additions. The audio recordings were used to transcribe the interviews in Finnish within a week of the conducted interviews and later the chosen quotes were translated into English for the empirical findings.

4.4 Data analysis

Discourse analysis has gained importance and popularity in qualitative research and business research with researchers using discourse analysis to study phenomenon in the business context. Discourse analysis provides an opportunity to study social action and cultural meanings through the study of discourse (Eriksson & Kovalainen 2008, 227–228). Individuals working in organisations have a tendency to talk about what happens in organisations to other co-workers (Alvesson & Kärreman 2011, 1122). Thus, discourse often defines how individuals express opinions and discuss phenomenon (Eriksson & Kovalainen 2008, 227). Discourse is commonly used in many fields of study for the reason that it provides the best means to understand organisations (Alvesson & Kärreman 2011, 1123).

Alvesson and Kärreman (2011, 1123) mention many beneficial aspects of discourse analysis: it emphasises human interaction through communication, it captures important elements of organisational activity and it is highly suitable for empirical analysis. Moreover, the focus of discourse analysis is on how meanings are produced textually through language (Luostarinen & Väliherronen 1991, 54). The defining assumption in discourse analysis is that discourse shapes and constructs any phenomenon that is studied. The idea is that language constructs reality and not only reflects it (Alvesson & Kärreman 2011, 1122). Discourse is often separated from action and discourse is thought to be only for describing issues. However, discourse can be also used for action, as discourse both claims something about the nature of reality and constructs that reality (Jokinen, Juhila & Suoninen 1993, 41).

There are several types of discourse analysis that are used in business research. One of these is social psychological discourse analysis, which is best suited for this thesis. Social psychological discourse analysis is based on psychology and focuses on the identity of individuals and the way individuals position themselves amongst other people or teams. It provides a way to get an understanding on how individuals use discourse to figure out the world around them. Furthermore, interpretative repertoire is a key concept used in discourse analysis that refers to systematic ways of talking about a phenomenon that is shared among individuals. Interpretative repertoires can be context specific, in this case to the financial administration (Eriksson & Kovalainen 2008, 229–233).

Interviews are a common way to collect data for the social psychological discourse analysis. Moreover, it is helpful for the discourse analysis when researches conduct the interviews since it increases familiarity with the interviews and empirical data before analysis (Edley 2001, 198). Small amount of empirical data is more sensible to use with discourse analysis (Eskola & Suoranta 1998, 198), which suits well with the eight interviews conducted for this study. The transcription of interviews, which is writing down

the recorded interviews word-by-word (Hirsijärvi et al. 2004, 210), becomes highly important in discourse analysis. The conducted interviews were transcribed as accurately as possible using symbols to indicate pauses and non-verbal reactions of the interviewees since the meaning of pauses and other non-verbal communication has a greater meaning than in other analyses (Eskola & Suoranta 1998, 199). Thus, transcriptions enable the interviews to be analysed thoroughly so that accurate conclusions can be made (Hirsijärvi et al. 2004, 210).

There is no predetermined way or detailed rules to perform discourse analysis (Wetherell & Potter 1988, 177). Often the interview materials are combined and analysed by finding similarities and differences in the material with the purpose of identifying conflicts and repertoires. Repertoires signify relatively harmonious linguistic resources that include a limited amount of words or expressions. These can be concepts or a way of expressing an issue that align with respect to content (Eskola & Suoranta 1998, 199). The data analysis was begun shortly after data collection, which is typical for qualitative research (Hirsijärvi et al. 2004, 211). The data analysis was done in phases to ensure all data was accurately and thoroughly analysed to get the most relevant results. The first stage of the data analysis was repeatedly reading the transcribed interviews to discover patterns, themes and metaphors that occurred numerous times throughout the text (Eriksson & Kovalainen 2008, 233). The themes chosen for the semi-structured interviews helped to determine patterns that were context specific to a certain theme, as answers given in different themes were occasionally similar regarding perceptions and wordings.

The second phase consisted of developing categories within each theme to represent interesting central discourse and the differences in perceptions of the professionals (Joutsenvirta & Vaara 2015, 749; Vaara, Tienari & Laurila 2006, 797). The categories were based on the most frequent and recurring views and opinions of the interviewees. This allowed the researcher to gain a brief overview of the empirical data before further and deeper analysis. The categories were later refined and made into subchapters of the results chapter. Coding is essential in discourse analysis to find recurring perceptions (Erkama & Vaara 2015, 822), which was the third phase of the analysis. Coding refers to classifying features, subjects and themes that are in empirical data and assigning them a specific label, which is a code (Eriksson & Kovalainen 2008, 128). It provides a way to systematically review empirical data by splitting it into smaller sections in order to interpret them better. In addition, coding assists with managing the amount of data (Eskola & Suoranta 1998, 156–199). After coding the results were compiled with relevant quotes from the interviewees that completed and reflected the empirical findings.

4.5 Reliability and validity

Evaluating the credibility of a study is a crucial part of scientific research, for there are certain values and standards that it should strive for (Saaranen-Kauppinen & Puusniekka 2006, 24). Assessing the trustworthiness of qualitative research is especially important, as it can be considered a less scientific research method (Hirsijärvi et al. 2004, 217), as interpretation is present in the analysis of research data in qualitative research (Silverman 2000, 176). Therefore, convincing the reader of the credibility of the scientific research becomes paramount (Koskinen et al. 2005, 254). Reliability and validity are traditionally the most common measures to determine the trustworthiness of a study (Saaranen-Kauppinen & Puusniekka 2006, 25), which will also be discussed regarding the credibility of this study.

Reliability refers to the repeatability of the results of the study (Hirsijärvi et al. 2004, 216) and signifies the ability of a study to give non-coincidental results (Eriksson & Kovalainen 2008, 292). Reliability can be related to time; the consistency of results and observations must not be time dependent. Moreover, reliability can be synchronic, where the results of the research must be consistent with various methods used at the same moment (Saaranen-Kauppinen & Puusniekka 2006, 26). Validity is another concept in the appraisal of a study, which can be interpreted as the truth (Silverman 2000, 175). Validity refers to the ability of a research method, concept or measure to represents accurately the phenomenon in question (Hirsijärvi et al. 2004, 216; Silverman 2000, 175–176). Thus, validity can be understood through the logic and consistency of the interpretations or the generalizability of the results to other researched cases (Koskinen et al. 2005, 254). In other words, validity can be evaluated by considering the plausibility and authenticity of the research and empirical results (Lukka & Modell 2010, 464). However, research aims to produce new knowledge instead of focusing only on correctness, yet a scientific research needs to have credibility (Koskinen et al. 2005, 253). In this study the reliability and validity have been sought to be assured through the following several means.

Reliability relies strongly on the study being able to be replicated. This can be challenging for qualitative research, as the research phenomenon can evolve and change over time (Koskinen et al. 2005, 258). According to Silverman (2000, 188) having the original form of the research material available, well documented criteria for choosing data sample and having multiple exemplary instances of the phenomenon reported are ways to determine the validity of qualitative research. In other words, a detailed description of how the study was conducted enables repeatability and validity (Hirsijärvi et al. 2004, 217; Eskola & Suoranta 1998, 214). The research process of this study has been described as transparently and accurately as possible in the previous subchapters. The data collection through semi-structured interviews is explained in detail and the data analysis is reasoned and described.

The credibility of a research with data collection through interviews can improve by conducting a preliminary interview to test the interview frame (Saaranen-Kauppinen & Puusniekka 2006, 26). In this study the first two interviews were exploratory interviews to discover the functionality of the interview structure. The interview frame was later modified to achieve more comprehensive results, which included asking the same question from different perspectives with the purpose of improving the accuracy of data collection through multiple observations (Koskinen et al. 2005, 255).

The sufficiency of empirical data influences the credibility of a research. Saturation is a term used in qualitative research to determine the sufficiency of empirical data. Saturation is based on the notion that empirical data reaches a point of saturation, where the information acquired begins to repeat itself and additional data does not give further information or perceptions of the phenomenon (Eskola & Suoranta 1998, 62–216). In this study, sufficient empirical data was achieved by conducting multiple interviews. It became clear during the last interview that there was no additional information of the phenomenon to be acquired, as the same opinions and insights began to reoccur. In addition, the collected data was recorded and later transcribed, which can strengthen the reliability of the research, as readers can examine the raw data that the researcher has interpreted into empirical findings (Saaranen-Kauppinen & Puusniekka 2006, 26), which are presented in the next chapter.

5 EMPIRICAL FINDINGS

5.1 The impacts of new technologies and change on accountants

Financial accounting has gone through several major changes in the last couple of decades. The technological developments and diverse changes have had immense impacts on the work and personnel of companies. Advanced technology became available to financial accounting with the construction of computers, which enabled the shift from transactions being done on paper to electronic transactions that are quickly generated on computers. The interviewees have seen the vast changes in financial accounting throughout their extensive careers and many mentioned the shift to paperless financial accounting as the biggest change in their careers. However, technological change does not always reach all parts of financial administration and financial accounting equally, even when it is available. For example, the case company has experienced many changes in certain areas of financial administration, while other areas have had no change at all.

The ability to handle change varies between people and is influenced by several personal and external factors. It is a personal choice either conscious or unconscious of how one reacts to the possibility of change in a work environment. Accountants can perceive change as advancements and improvements or as threats to their own role in the organisation. For the most part accountants have happily accepted previous technological advancements and dealt with them well, as they have brought enormous relief to their work. Financial accounting work has shifted to less manual tasks and into more interesting and analysing work with every technological development, which has made financial accounting work more meaningful and enjoyable to accountants. In addition, changes due to technological development have created variation to the otherwise relatively repetitive work.

> *"When I began working we had to print 5200 papers daily. There has been immense amount of changes that have brought alleviations to our daily work."* (Professional 5)

> *"I have been very pleased with the changes that automation has brought since it has made the work more meaningful and added reliability. You have a better feeling after a workday knowing that everything went right and you can leave work in a good mood. It brings delight to the content of the work and it leaves time for other more important work."* (Professional 7)

Nevertheless, there is a possibility that accountants consider changes as threats since they can change the role of accountants or the very least the methods and processes of performing a task. Thus, it is often necessary for accountants to realize that the methods and ways they have previously used to perform tasks have become out dated, which can be difficult to admit. Furthermore, individuals can resist change as a consequence to their negative perceptions and due to the fact that change requires individuals to move outside of their comfort zone. Then again, everyone has their own level of receptiveness to change and a pace they are ready to move towards a new and different situation. The unwillingness of accountants to accept change can be problematic to organisations, as it can cause issues in regards to the successful implementation of development projects.

> *"I think it is a completely personal question, but I think it is never easy. (...) I think that many perceive change in a positive way. However, it is still very challenging. And there are of course many individuals who consider change as scary and do not want to accept it."* (Professional 6)

The resistance to change can be caused by previously mentioned personal factors. However, in many cases the resistance to change is not due to the personality or opinion of an individual but instead the cause of external aspects. Interviewees mentioned previous implementation problems with new technology and information systems, as a cause for the hesitant reception of new technological advancements. Adopting a new technology-based tool is not always well planned out and might cause problems for accountants in the form of additional work. At times, the implementation process and especially the testing phase, is rushed, which causes accountants to work more in order to supplement the unfinished system or application. The previous bad experiences with new technology and development projects can cause accountants to be more reluctant to accept new development projects, such as RPA or AI.

> *"I have to mention that there have been many growing pains when we have implemented something new. There have been occasions where they have not worked after implementation so we have had to do several remedial tasks to make it work, which has been more work than before the implementation."* (Professional 3)

Active involvement of accountants in development projects can be beneficial for individuals as well as organisations. Individuals are more informed when they are involved in the development, which can shift their perceptions from negative to positive. Several interviewees have been heavily involved and have actively pursued a role in development projects in order to influence development processes and their outcomes. Involvement in

previous development projects increased interviewees interest in future developments. Furthermore, participation in development can encourage accountants to embrace the changes instead of resisting them.

> *"Some people who see the change as a threat can teach others to think about situations in new ways. It is important to involve also them in the change. All kind of uncertainty, where you can hear whispers but you are not directly informed about some change causes speculations that often lead to resistance to change."* (Professional 3)

Reluctance of new development project and change is often seen as undesirable in organisations. However, it can be beneficial to involve individuals who challenge the project to bring another point of view to the conversation. This can ensure that the development project actually bring real benefits to the company and that all the phases in the implementation process are performed thoroughly, which in turn increases the likelihood of a development project being successful.

5.2 The use of RPA in financial accounting

RPA is one of the most recent technological developments changing the field of financial accounting and financial administration, which is why the case company decided to begin a RPA project to automate its functions. Accountants who were in the development project saw RPA as exciting and fascinating and considered the implementation process successful. Furthermore, the implementation went smoothly and quickly, taking only three months to implement after the idea was first introduced. The financial administration department was introduced to RPA when the first robotics project was launched by the initiative of management. The project began with a general survey of what types of processes could be automated with RPA. All teams in financial administration were asked to provide ideas of their own tasks that could be automated with RPA. The project team was aware that accountants might focus on RPA replacing them and decided to instead ask accountants what their most unappealing tasks were. The project team was pleasantly surprised with the amount of ideas produced, as they exceeded the target amount.

The collective ideas were analysed and evaluated to decide which tasks would be automated with RPA. Saved time and cost of automation were the most important criteria for choosing which tasks to automate in the case company. The development team calculated the amount of hours spent on these tasks, and based on the time saved they noticed that a significant benefit could be gained with RPA. Decrease of human made mistakes was also a contributing factor for the decision to implement RPA, as RPA can perform

tasks more accurately than people. In addition, increased job satisfaction was considered to be a further benefit of RPA since people are more effective when they enjoy their work. However, the benefits needed to exceed the costs of RPA in order to justify the investment.

> *"It was very free because we did not want to restrict the creative thinking in any way so that accountants would not think about the robots replacing them. We started with asking what kind of work do you do, what is boring, what do you do often and where do you find lots of repetition. (...) We started the project by thinking from the cost benefit perspective. Often time saving is the main criteria. Then we also have to take into account that we get processes more effective, decrease mistakes so that job satisfaction grows."* (Professional 6)

After choosing certain tasks to automate, the development project proceeded in a logical and structured manner consisting of the preliminary investigation, testing and production phases. Other experts joined the development team to assist with the implementation process. The experts consisted of IT personnel who were capable of writing the code for the software robots and another expert who was educated in recording processes precisely. Accountants showed programmers step by step what they wanted the software robots to do and in what order and the process was then thoroughly recorded. This process was called a preliminary investigation, which enabled the software robots to be programmed. The preliminary investigation was followed with the testing phase, where the programmers wrote the software codes for the robots. The programmers altered the code during the testing phase based on the advice given by accountants to get the desired result. After the testing phase the software robots were ready for production, where the software robots began to perform the tasks in the real work environment.

The case company at the time of the interviews had implemented six software robots into two teams of financial administrations. The six processes saved the most time from accountants and presented the best financial gain for the company. Accountants who currently use the software robots were eager to automate more tasks in the future after they experienced successful RPA implementations. However, companies' resources are limited, which restricts the amount of tasks that can be automated. Mainly the current high cost of RPA, especially the maintenance cost, is the largest restricting factor that is in the way of more RPA projects. Evidently, if the costs of maintenance decreased substantially, it would create more possibilities for further RPA investments.

> *"We discovered that all of the financial accountants from one team did the same task daily for four hours and the process was exactly the same every*

> *time. That was the first good example of RPA that we got into production."* (Professional 6)

> *"There are a lot more tasks that could be automated. We have a list of what still could be done. The list could be endless but then the cost of RPA is limiting."* (Professional 5)

The software robots currently functioning in the financial administration department of the case company are performing various tasks with diverse levels of importance and risk on behalf of accountants. One simple and low-risk task that was automated involved downloading basic information for an information system by opening the program twice a week. The reason behind the automation was that it saved accountants significant amount of time. Another software robot downloads a report daily from an information system for two banks, which was a slightly more critical task, as other individuals were dependent on receiving the report on time. RPA was used to automate more difficult and critical tasks as well in the case company, for example two software robots were utilised to automate specific transactions within a time window. In addition, RPA can move between several information systems with two software robots in production comparing different transactions of cooperative banks from one accounting information system to another. Accountants then receive a report of what the robot has done and if there are some transactions that need to be corrected manually by accountants.

> *"Some people in the RPA meetings were shocked that these types of tasks were still being done manually and confused by why they had not been automated yet. If the same people have been doing the exact same tasks, then it is difficult to even question if there is a more effective and better way to do the tasks."* (Professional 3)

Several tasks that were automated seemed simple and they could have been automated sooner, which became evident in the RPA meetings. After the selected tasks for RPA were presented, the IT experts were shocked that these types of simple tasks were still being done manually and had not yet been automated. Thus, the financial administration department had been potentially overlooked for previous development project. The interviewees expressed that there is definitely potential for more RPA in financial accounting, yet it can be difficult for accountants to recognize possible improvement if they have been performing the tasks routinely for a long period of time. This is why accountants might not even recognize that they are occasionally behind on developments.

5.3 The effects of RPA on the roles and work identity of financial accountants

5.3.1 The view of accountants on their role and work identity

The interviewees all mentioned how important financial accounting is to any company and highlighted the important work accountants do, which signifies a strong social identity. Furthermore, they thought the importance of financial accounting should be emphasised and brought up more, as financial accounting is the culmination of the events that happen in a company. Businesses are led by numbers, which highlights the significance of financial accounting, as decisions are made based on the financial accounting information. When asked to describe the role of accountants the interviewees' answers varied from more positive descriptions to slightly negative ones. Thus, the perception of the role of financial accounting in a company varies depending on who is asked in a company.

One interviewee stated that it is the responsibility of accountants to recognise the importance of their own role as accountants and embrace it and many considered financial accounting as work that should be proud of. Furthermore, financial accounting work brought joy to many, as they truly enjoyed their work. Accountants perceive many benefits about working as an accountant, which reflect their own work identity. Even though others might consider financial accounting consisting of routine and manual work, the interviewees described their work as diverse and interesting. In addition to the versatile type of tasks, the number of tasks per day varies quite a lot, which makes the work more exciting.

Several mentioned the satisfaction of finding a solution to a problem or finding the transaction that made the accounts unbalanced as one of the many benefits of being an accountant. The love of numbers became one the reasons that the interviewees described as a requirement for being an accountant. Furthermore, most interviewees portrayed the role of accountants using words with positive connotations. The words used were quite similar to one another, which indicates that most accountants see the work identity and role of accountants in a similar way. Meticulous, precise and ability to handle stress were the most mentioned illustrative words to describe accountants. Therefore, the work identity of accountants consists of the notion of being thorough and having a great attention to detail, while simultaneously understanding the big picture.

> *"I think the work is interesting and fun. If there is a cent missing from somewhere and I find it, I get such a feeling of success and joy."* (Professional 5)

> *"They (financial accountants) are meticulous, precise and diligent."* (Professional 2)

The work identity of the interviewees varied from embracing being accountants proudly to not considering themselves accountants. In general the interviewed accountants had a strong work identity, which was based on knowing their own importance and having extensive knowledge in financial accounting. Interviewees mentioned that there was a distinct divergence between accountants who truly enjoy numbers and find joy in the financial accounting work compared to others who simply consider financial accounting as work. Therefore, the work identity of accountants does vary between individuals even in the same organisations. One interviewee did not yet feel that she was a true accountant since she had significantly less work experience than others. Another interviewee revealed that she does not consider herself an accountant even with extensive work experience in financial accounting. Both interviewees compared themselves to other team members and explained that there is a difference between their own work identity and co-workers'.

> *"It is easy to tell between people who consider financial accounting as their passion and others who just perform their job." (Professional 8)*

> *"In my opinion, I have never been an accountant. (...) I am not as strictly precise as some other accountants."* (Professional 2)

> *"I do not have a deep understanding and expertise so it is hard for me to discuss issues related to financial accounting. I definitely consider myself an apprentice. (...) It will take at least a year or two to even say that I am halfway an accountant."* (Professional 7)

The perception that most accountants have about how other people view financial accounting and accountants is significantly different than the perception accountants have of themselves. It is evident that some people that are not familiar with financial accounting underestimate the difficulty of the work. This can cause others to belittle the role of accountants and also express this directly to accountants. Financial accounting can be seen as necessary work that needs to be done in any company, yet others do not think of it as either difficult or interesting work.

This negative image people have of accountants has a possibility of influencing the work identity of accountants. Even though the majority of the interviewees enjoyed their work and felt proud of being accountants, some accountants still described the role of financial accounting in a negative light. The constant underestimation of accountants and

hearing others talk about financial accounting in a negative light is detrimental to the work identity of accountants. A couple of interviewees recognized that image of accountants does influence their own description of accountants. The work identity of accountants needs to become even stronger so that the opinion of others does not affect their own work identity.

> *"One person said that accountants could be laid off and another person said that you could pick any person from the streets and they would be able to handle financial accounting work. (...) The role of financial accountants is a grey foot soldier and someone mandatory who works in the background of a company. The work is not very glamorous. (...) I guess the opinion of others does affect my own view."* (Professional 1)

There is a clear difference between the views of accountants and others on the role of accountants and its importance. It can be a consequence of several influencing factors, which means that there is not a definitive answer for the separation of views. The interviewees mentioned some reasons that might be the cause. However, even the interviewees had a difficult time thinking of reasons, as they had never thought about it before. The lack of understanding the work that goes into making financial statements and financial accounting in general can cause the difference in perceptions between accountants and other individuals. Another explanation was the obligatory nature of financial accounting, which makes it a necessary task that must be done in organisations.

> *"The reason for this difference is simply because financial accounting needs to be done so it is mandatory. If there were no standards and mandatory regulations for financial accounting, it would probably not be done as it is only an expense item here."* (Professional 1)

> *"It is probably that others do not understand what accountants do daily."* (Professional 4)

In conclusion, accountants consider their own role in a company to be very important, yet other people can belittle their role. Most accountants have a strong work identity and enjoy their work, while others do not consider themselves accountants. In addition, some are more influenced by the negative perceptions of others, which has a detrimental effect on their own work identity. There is a significant distinction between the way accountants and other people view financial accounting work. The difference can be explained by a lack of understanding of the nature of the work or considering it simply mandatory yet

uninteresting work. However, there are no definitive answers that can explain the variation of perceptions among accounting professionals and others.

5.3.2 The influence of RPA on the work identity of accountants

The introduction of RPA into financial accounting evoked relatively strong emotions from accountants whether it was positive or negative. Accountants had a mixture of reactions to the first announcement that the RPA project would begin. This included healthy suspicion and a lot of excitement. In general the interviewees were positive about the introduction of RPA into financial accounting. Some of the accountants recognized the advantages of RPA from the first moment they heard that RPA would be implemented into financial accounting.

> *"My first reactions was wow this is a good thing. I knew that it would make the work easier. I would not have to download excel sheets from different accounting information systems because RPA would provide them for me."* (Professional 8)

Especially the accountants, who currently use software robots as part of their work, were extremely pleased with the decrease of manual tasks as a result of software robots. Two financial administration teams had a big change in their daily work with several software robots, which they were more than pleased to accept. This great reception was due to the great benefits to their work provided by the adoption of RPA. The manual tasks that were considered unpleasant by the accountants were reduced with RPA. Moreover, the work identity of accountants became stronger with RPA as they considered their work more meaningful and more interesting with RPA than before. Furthermore, the work of accountants who were not using RPA was considered dull in comparison by the interviewees who used RPA.

> *"I do see the work without RPA boring and I hope that the accountants with no RPA find other aspects of the job rewarding and they enjoy the work."* (Professional 3)

Accountants who use RPA considered themselves exactly the same professionals as before without RPA. However, they also felt as though they were privileged to be able to use RPA when others did not have the same opportunity. In other words, they were part of a work group that they valued and respected more than other work groups. RPA can be seen as a new challenge and a possibility to keep up with the changing field of financial

accounting and can give accountants a new sense of relevance. Some accountants positioned themselves as more technically inclined in order to be involved with RPA development. Furthermore, one interviewee had changed jobs within financial administration with the promise of being part of the robotics development. This type of identity work was apparent with interviewees who were using RPA. Being able to use RPA was seen as one of the greatest benefits of being an accountant for those interviewees who used RPA.

> *"I took on a new challenge with this new position. I knew the RPA project was coming and I could be a part of the development team and see the testing phase. It was a major reason why I wanted to change to this new position. (...) In that sense I am maybe not a forerunner but I consider myself very lucky to use RPA."* (Professional 3)

Interviewees, who were in the RPA development team, mentioned that they had experienced some resistance to change from other accountants. These individuals were afraid that the software robots would completely replace them, which was not the case in this company, as no one lost their job with RPA. The loss of jobs was the most frequently mentioned reason for the resistance to change. Furthermore, several accountants were unaware of what RPA was and what it could automate. This limited knowledge of RPA caused some of the negative reactions towards RPA. The unknown consequences of RPA on the work of accountants made them more suspicious of RPA, since it presented a possible threat to their work identity.

The resistance to RPA was due to accountants experiencing a disruption to their work identity. The way for accountants to balance this disturbance and secure their work identity was to directly oppose RPA. In several cases the RPA development proposals were strongly objected directly in the RPA project meetings. These strong negative reactions were often either from people who were not directly impacted by RPA or who simply did not understand the great benefits of RPA. The individuals who lacked the understanding of RPA and what type of tasks it could automate had a perception that RPA could automate all financial accounting work. It is understandable that they felt more intimidated of RPA when thinking it had the abilities of AI. Fortunately, accountants learned during the RPA development process its abilities.

> *"We have experienced some resistance to change during the meetings. This is something I am still working on to make people understand that it is not the end of the world."* (Professional 5)

> *"I understood during the RPA project that software robots do not have the ability to do anything unless it is specifically told what to do."* (Professional 8)

Another reason for the fear and uneasiness towards RPA mentioned by the interviewees was the refusal to acknowledge that robots could do their work that they themselves thought of as difficult and important. The accountants tried to reason that their tasks could simply not be automated. This was particularly the case if a person had done the same manual and repetitive tasks for several decades. The realisation that the work that you consider important can be easily done by a robot with no sort of thinking abilities can have a huge impact on the work identity of accountants. In these cases the importance of communication was highlighted in order to control the situation and limit the possible detrimental effects on accountants, their work identity and confidence.

> *"I would like to bring up that you have to be very delicate in these situations. If a person has been doing the same task daily for the majority of their day, it is extremely unpleased to declare that this task is completely unnecessary. If it is not managed with subtlety, then it can have detrimental effects on work motivation and job satisfaction."* (Professional 6)

RPA can have an effect on how others perceive accountants in addition to having a direct impact on accountants. This is for the reason that technology and technological advancements including RPA create more interest in people than traditional financial accounting. Having a robot perform financial accounting tasks can make financial accounting as a job seem more interesting for people who do not completely understand the job. Moreover, the increased interest in financial accounting due to RPA can shift the perception that other people have of accountants and thus the image of accountants. In other words, the incorporation of interesting technology-based tools can improve the image people have of accountants.

> *"My friends are not interested in my work but now they were really interested when I told them a robot does some tasks."* (Professional 5)

In addition to perceptions, roles of accountants will inevitably shift in some manner, which will be discussed further next. This means that the job descriptions of accountants will be different to current ones. Job descriptions determine job titles in most organisations, which indicates that the shift in roles will possibly affect job titles. Job titles play a significant role in the work identity of accountants.

> *"I think that others' perceptions will not change, if the job title remains the same. Financial accountant is pretty old fashioned. Our job titles should be accounting agent or something like that so that financial accountants would have a new exciting image."* (Professional 3)

> *"Definitely the job titles should change, if the roles change. Financial accountants are associated with only bookkeeping but the work can be so much more."* (Professional 8)

Therefore, changing job titles can either strengthen or hinder the work identity of accountants. The effect on work identity depends on what value is associated with the new job titles and if accountants consider the new job title an accurate representation of their new role. The job title financial accountant is traditionally associated with manual bookkeeping, which is why the current job title does not reflect all the responsibilities and tasks accountants from the opinion of the interviewees. Furthermore, new job titles can further improve the way others perceive accountants.

5.3.3 The shift of financial accountants' roles due to RPA

RPA will have an impact on the roles of accountants in addition to their work identity. Currently the use of RPA is limited to two teams and six processes, which has only shifted the roles of accountants slightly. The accountants who use RPA had not noticed a difference with the amount of work they are doing, which means that they have had time to focus more on the responsibilities they do have instead of rushing through manual work. However, the fact that the roles have only shifted marginally is not an accurate indicator of the real impact of RPA on the roles of accountants, as the interviewees all agreed that the roles of accountants would shift as a result of using RPA more extensively in financial accounting. Nevertheless, some interviewees using RPA considered their role to have changed significantly already with the six software robots.

> *"The job description has become mostly clarification work. There are more and more accounting errors and mistakes, which we have to correct by finding out what is causing the mistakes."* (Professional 8)

> *"Financial accounting work has changed to more of a counsellor role and for the support of the CEO. The job description has changed significantly."* (Professional 5)

The impact that RPA has had on the roles of accountants in the case company has caused the work to shift from traditional and manual tasks to more intelligent work. Many interviewees agree that the work has become more investigative in nature, where the focus is on finding the errors that RPA points out. This is a consequence of RPA automating processes that compare accounting data in order to highlight the mistakes or differences in transactions. For accountants the time they formerly used to compare transactions is now used to correct the errors found by RPA. Another view is that the role of accountants has shifted to more of an advisory or business partner role, where the focus is on providing support for management level. However, the interviewees viewed that RPA could have a larger impact on the roles of accountants. After RPA is implemented comprehensively into financial accounting the roles of accountants are expected to change more radically. However, there are varying views of how the roles will eventually shift. Many interviewees envisioned their roles to shift to mostly an analysing role, which has already begun. Their work would consist mainly of solving unexpected issues and inconsistencies that RPA would indicate, since RPA does not have the ability to perform exceptions.

> *"Manual work will decrease but at the same time transaction volumes will increase. A possibility is that the work will be mostly resolving problems."* (Professional 7)

> *"RPA does not have the ability to think so it would leave accountants the responsibility of interpretation. Now it feels like people do not have time to analyse the numbers properly because they are quickly trying to get their check lists done."* (Professional 3)

The difference with the current situation would be that all manual routine work would be done by RPA, which would leave accountants to only work on the accounting problems found by RPA. Moreover, the volume of transactions is constantly growing, which increases the number of accounting errors and mistakes that need to be sorted out by accountants. Currently accountants spend most of their workday trying to get all their manual tasks done, which does not leave time to analyse the produced reports and figures. Therefore, this role shift would be perceived as a beneficial change as accountants would work on tasks that bring joy and excitement.

A consequence of the work of accountants becoming more analytical is that management accounting and financial accounting work might combine. This would mean that accountants' responsibilities would widen to incorporate creating reports for management to guide their decision-making. Thus, working alongside management as in the role of business partner. Currently there are different accountants working as management ac-

countants and financial accountants. However, this might change with the further implementation of RPA. There is a chance that with more RPA, the amount of people working in financial administration might decrease, which might lead to larger areas of responsibilities for the remaining accountants. Furthermore, the work of accountants has already shifted to advisory tasks for management, which is traditionally seen as the work of management accountants.

> *"Maybe more of a controller type of work will combine into financial accounting at some point."* (Professional 6)

Accountants will have more time during their working days, as RPA will perform a portion of their current tasks. Interviewees perceive that there are many possibilities and opportunities where to focus the freed up time. Developing financial accounting further with other types of automation and streamlining was a possibility. Accountants could use the time to familiarize themselves with other aspects of financial accounting by changing tasks and responsibilities with co-workers or develop their technical expertise. Another view is that accountants will receive more tasks and responsibilities from other departments within the case company. However, this can be unlikely in the long run as many departments are experiencing automation and streamlining.

> *"Thinking about what could be done differently so more development tasks. Also we will get more work from other departments, as RPA does more manual work"* (Professional 8)

> *"It is absolutely possible to shift to a more technical role. But then it begs the question of what is the official job description. Are you then an accountant or a technical aid of an accountant?"* (Professional 5)

The technical element that RPA brings to financial accounting due to RPA development projects has a possibility to change the work to more technical tasks, such as monitoring RPA or being involved in creating software robots. All the interviewees were in agreement that the roles and tasks of accountants have a possibility to change. Some evaluated that there would be more technical work for accountants, which would be most likely related to either building software robots or inspecting the work done by software robots. Some envisioned accountants being the ones to write the software code of the robots, which is currently considered the work of specific teams within the IT department. However, all professionals did not agree, as some considered it unlikely that accountants would begin to perform technical work due to RPA. Furthermore, there was a point made

about how far the roles of accountants could shift before the work would be no longer considered financial accounting.

> *"I think it is a good observation that implementing RPA does not necessarily mean that the roles will shift to more technical."* (Professional 6)

> *"I find it easy to change know-how. I enjoy challenges and learning new competencies. I think it is personal thing; some do not like learning technical things. Maybe it is difficult for some."* (Professional 8)

The willingness to shift roles to something new can vary between accountants. For some the prospect will be challenging while others will embrace the change and take on the new challenge. The ability to adapt to new environments and tasks will be critical with RPA, as accountants will be given new types of tasks either other financial administration tasks or technical ones. However, the case company can ease the transition to new roles by holding educational courses and in-depth training sessions.

5.4 The advantages and disadvantages of RPA in financial accounting

5.4.1 Job satisfaction

One of the main reasons RPA was implemented into financial accounting was that it saved significant amount of time for accountants, as they no longer had to perform certain time-consuming tasks. The interviewees considered manual and routine tasks poor use of their extensive financial accounting knowledge and time, as it took time away from more important and interesting work. Before RPA, some accountants had to enter transactions for slightly less than 200 cooperative banks weekly or daily at a certain time or spend many hours daily comparing data from two accounting information systems. In this case, most of the time was spend on comparing the data and doing manual work, which left little to no time to actually correct the accounting errors and analyse the transactions. Thus, RPA enabled accountants to use the time previously spent on manual tasks instead on more challenging and important tasks. In other words, accountants could prioritize their time for the essential and intelligent tasks.

> *"Our time was wasted on tasks, such as performing transactions in the system. You just press a button and wait until it finishes. Now with RPA we*

> *have time for the actual thought process of financial accounting."* (Professional 3)

The result of accountants being able to focus on more important work was increased job satisfaction. The interviewees all stated or envisioned that the work of accountants who use RPA is more enjoyable. RPA replaces the most undesired and boring tasks, which means that the work that remains the responsibility of accountants becomes more interesting as a whole. Thus, job satisfaction increases significantly when accountants perceive their own work as more interesting and meaningful than before. In addition, being able to work from home occasionally during the workweek was important to the interviewed accountants. Certain accountants were required to be at work during specific days of the month in order to complete manual tasks of getting financial transactions recorded for all the cooperative banks. Fortunately, RPA was able to perform the transactions for all banks, which enabled accountants to gain more flexibility in their work hours and ability to work from home. This among other factors contributed to the higher job satisfaction of accountants.

> *"Doing manual tasks is boring work, which does not motivate anyone. I would rather use the know-how for something else."* (Professional 3)

Moreover, accountants now have the possibility to learn new skills and competencies, with the surplus of time created by RPA. Additional learning gave increased value to the work and created more variation to the daily tasks of accountants. Accountants had many opportunities of how to use the saved time, which included exchanging tasks within coworkers to create lateral learning and give thorough orientations to one another of the new tasks. This would be especially beneficial for the financial administration in the case company, as the teams and individuals have certain daily responsibilities that are rarely performed by other team members.

> *"Even I pressed enter button to start the robot and I could see how it moves. I understood the logic behind the robot and why in some places there needs to be added a stop so that the robot checks something. There needs to be a broader understanding of things outside the usual financial accounting work."* (Professional 5)

Furthermore, being part of the RPA development project, accountants had the possibility to learn new technological skills and knowledge. During the implementation process accountants could see how software robots are programmed, which enabled them to

learn abilities outside their usual financial accounting competencies. This is a great possibility and resource for companies since employees gain more capabilities and the ability to learn new competencies.

5.4.2 Quality of financial accounting work

RPA can have a positive effect on the quality of financial accounting work through several perspectives with the main contributing factors being less human made mistakes, increased reliability and less time spent performing tasks. The quality of financial accounting work is based on the accuracy of the end results and is especially important, as organisations have a legal obligation to provide financial statements that represent the genuine financial situation of the organisation. Despite this, financial accounting mistakes are common and they are usually related to manual work, such as entering transactions by hand. In order to minimise the risk of human made mistakes, the accountants have certain revisions that are done regularly. Revisions include comparing the figures of the latest month to the previous couple of months with the aim of detecting large differences between months. The difference can indicate that a mistake has been made, which can then be fixed. However, even with revisions and controls some mistakes are never noticed, which decreases the accuracy of the financial information.

> *"Manual work does cause the most mistakes in financial accounting. Accountants notice them, when they compare the figures with the previous month and if there is a difference, it is resolved. We do have checkpoint to minimise mistakes. However, the smallest mistakes and differences in financial accounting do not get caught in the checks."* (Professional 3)

RPA produces more accurate results by reducing the amount of accounting mistakes, as RPA follows a strict process with no exceptions or distractions. There are less human made mistakes with RPA, which decreases the corrective work that is needed in order to fix the mistakes made. In other words, the accuracy of the financial accounting tasks increases and the amount of checks and revisions to ensure the accuracy of the results decrease when RPA performs tasks.

> *"RPA probably ensures that the work is more correct."(Professional 1)*

> *"RPA brings reliability and it leaves time to sorting out the messes. Maybe there would be no mistakes, as the work would not contain manual work."* (Professional 7)

Reliability is another advantage of RPA for the reason that it consistently performs the tasks it has been programmed to do. Humans can be unreliable occasionally and are more likely to forget about tasks compared with RPA. One accountant admitted that especially standalone tasks, which were not part of any kind of financial accounting process, were difficult to remember to perform. The automation of these necessary but separate tasks helped to reduce the workload of accountants and allowed them to concentrate on other tasks and simultaneously increase financial accounting reliability. However, RPA can encounter problems, as it does not always function perfectly, which will be discussed further in chapter 5.4.4. In addition to reducing human made mistakes and increasing reliability, RPA can perform financial accounting tasks in a fraction of time compared to humans.

> *"The robot does the work in two minutes. It took people with good luck one and a half hours and with back luck all day."* (Professional 5)

> *"With RPA people can develop some other aspects of their work, such as think of ideas how to automate manual tasks in other ways that were not automated with RPA."* (Professional 2)

RPA can function at a quicker pace than humans with no need for breaks or interruptions. This gives financial accountants the possibility to increase accuracy of financial information by developing and improving processes that are not yet automated with RPA. All types of automation and advancements create more accurate reports, which lead to higher quality financial accounting.

5.4.3 Potential loss of jobs

The reduction of personnel is often associated with any technological development. Thus, being replaced or even losing their job was one of the greatest disadvantages of RPA from the perspective of accountants. RPA can replace human workers like many other technological developments, which means that in the process of implementing RPA there is a possibility that people will lose their jobs. This fear of losing a job is based on the purpose of RPA, which is to increase effectiveness by automating processes with software robots.

RPA does replace certain accounting tasks and consequently has the ability to affect the amount of accountants needed in an organisation. Especially interviewees who were not using RPA considered it very likely that some accountants would be fired. Moreover, the interviewees who did not completely grasp the capabilities of RPA considered that it would eventually replace most accountants. Despite this, the interviewees who were more

knowledgeable on RPA understood that RPA was not able to replace all accountants, as a majority of their job required human judgement. In conclusion, the tasks that can be replaced and performed by RPA are routine and manual tasks. Therefore, only a portion of financial accounting tasks can be automated with RPA.

> *"People can fear that there becomes less financial accounting tasks for humans."* (Professional 2)

> *"I think that a lot of people do not think or they are afraid that RPA can do everything. However, it cannot do all financial accounting tasks. The tasks have to be sensible, concrete and concise so that a software robot can automate them."* (Professional 5)

In the case company this fear and disadvantage was not realised, as all accountants kept their jobs after RPA was implemented. The accountants who used RPA were either given more tasks to perform or alternatively had more time to concentrate on the tasks that were otherwise rushed, when the routine and manual tasks took up all their time. However, the case company is constantly developing new ideas and projects to use RPA on other processes and tasks.

> *"RPA did not take anyone's job it only took away a manual part of specific people's job."* (Professional 1)

Implementing more RPA into financial accounting can force the case company to consider reducing personnel in financial administration, if RPA performs the most time-consuming tasks. It is a disadvantage from the perspective of accountants, yet from the perspective of the organisation it is an advantage since processes will become more efficient and costs will reduce. A possibility to resolve the situation without firing accountants is to not hire new accountants when previous accountants retire. However, this is only an option when RPA is implemented for financial accounting tasks one at a time over a longer period.

> *"The accountants are getting older so then with RPA there is no need to hire new accountants to replace the retired ones. That is if the organisation does not want to fire people straight away."* (Professional 2)

> *"Of course there will be some jobs that will become redundant. These types of routine tasks with a lot of saving and entering data will disappear and they will be replaced with other kinds of work. It will be a big demand for people's capacity and ability to learn."* (Professional 6)

The reality is that some accountants will lose their jobs due to RPA. Nevertheless, most of the interviewees did not see RPA as a threat since they were adamant that new jobs would be created to replace the jobs that became redundant. Having the ability to learn new competencies and expertise to shift to another type of job can be a challenge for accountants if they have done similar financial accounting tasks for their entire career. An alleviating factor is that it is probable that the financial accounting work will change and the roles will shift instead of financial accounting disappearing as a job for humans.

5.4.4 Trust and uncertainty of RPA and loss of financial accounting knowledge

The trustworthiness of RPA can be a concern for accountants when considering RPA, as a machine that cannot think will perform financial accounting tasks. The concern is based on the potential inability of RPA to complete the tasks and the possibility of the robot to produce incorrect results. One of the greatest disadvantages of RPA from the perspective of the interviewees is the possible malfunction of software robots. A dysfunction of RPA can result in the tasks being performed incorrectly or not being done at all. Although there is always a possibility of disturbances and malfunctions, they happen seldom if RPA is programmed correctly. The interviewees had experienced malfunctions with the recently implemented RPA, which did slightly increase distrust towards RPA.

> *"The biggest challenge with RPA is when they do not work. There can be disturbances in the environment, which in turn causes RPA to malfunction. (...) This has happened with our software robots. However, these disturbances are exceptions. "* (Professional 8)

RPA cannot be trusted to work completely autonomously, without occasionally testing its work by humans due to the risk of malfunction. Increasing reliability of RPA by creating new types of routine tasks, which relate to the control of software robots, can ease the doubts of accountants. The case company was aware of the possibility of malfunctions and decided to regularly check that RPA was functioning correctly. Accountants needed to ensure the reliability of software robots by applying quality checks. The purpose was to verify that the software robot is performing its tasks as programmed and is producing the correct accounting results. However, accountants can experience these new types of routine tasks as unpleasant work since the decrease of routine tasks was one of the primary reasons for the adoption of RPA.

> *"RPA will bring along other types of routine tasks, such as inspections that the robot is doing what it is supposed to do. These might not be very motivating."* (Professional 4)

Even though some might consider these new revision tasks tedious, they are essential as functioning software robots can experience disturbances. There are several reasons that can cause a software robot to malfunction with some relating to the code of a software robot and others to external factors, such as problems with information systems. Regardless of the cause of the malfunction, the checkpoints ensure that the errors are found and corrected quickly. Fortunately, RPA can be programmed to produce update reports that are sent to accountants regularly or alternatively error reports in case of a malfunction, which can decrease the amount of revisions and control points. Not receiving a regular update report gives an indication that the robot is facing problems. In addition, receiving an error report when the software robot encounters an issue or is not programmed to handle certain transactions increases the trust in software robots. In these situations, RPA produces a clear report that highlights the tasks that need to be resolved by accountants and in some cases can pinpoint exactly which section needs revision instead of accountants trying to find the problem in hundreds of transactions.

> *"Another important phase in the implementation process when constructing the software robot is that the robot can produce an error list of everything that it cannot handle or where it does not know how to proceed so that people can find a solution."* (Professional 6)

Furthermore, accountants can begin to rely heavily on RPA to function effectively when more financial accounting tasks are automated. Nevertheless, accountants must be able to perform the tasks manually when these disturbances occur. This can prove to be more challenging after the use of RPA, as accountants are not performing the manual tasks regularly. In addition, organisations might not have sufficient amount of accountants or allocated time to perform the task and to compensate for the disturbance.

> *"A disadvantage of RPA is when they encounter disturbances. Then it is highly probable that the organisation has adapted to not doing those tasks anymore. There might not be enough resources allocated to perform a certain task."* (Professional 6)

> *"RPA can take people further away from extensive financial accounting knowledge. It can be very difficult especially for new accountants to completely understand financial accounting tasks, if robots always perform them. It is a shame, if the expertise is lost"* (Professional 2)

Moreover, many interviewees mentioned the loss of extensive financial accounting knowledge as a potential risk with the increasing incorporation of RPA. Therefore, there is a possibility that by using RPA accountants lose some financial accounting expertise. However, it is unlikely that accountants will lose their expertise, if they enjoy and are passionate about their work. Thus, the responsibility of keeping the expertise is with accountants. On the other hand, the greater risk is with new accountants. They might have never done certain tasks that have already been automated, which indicates that eventually extensive financial accounting knowledge might be lost.

5.5 The perceived future of financial accounting

It is evident that changes in financial accounting are becoming more frequent, which is due to the increasingly better functioning accounting information systems and continuous technological developments. The amount of new technology-based tools that can influence the field of financial accounting has increased immensely. Moreover, the speed of change due to technological advancements has grown, which is why the pace of technological change is predicted to increase rapidly within five to ten years.

The world is constantly changing with new technological developments emerging continuously, which means that there will always become better ways to automate or perform financial accounting tasks. The forms of automation will change over time and there will be a wide range of technology-based tools to use in the automation of financial accounting tasks. The percentage of tasks that RPA will perform will probably increase in addition to a possibility of AI replacing the tasks that RPA is not able to automate. The interviewees had different views about the future of financial accounting. However, all were in agreement that the automation used in financial accounting would significantly multiply. RPA will be used to automate more tasks in financial accounting, especially after previous successful implementations.

> *"There has been a development trend, which has reflected on my job. The course of development has increased in speed greatly. There are new innovations, such as digitalization and Internet of things, which means that there is a need to change in a completely different cycle than five years ago."* (Professional 6)

> *"We are definitely going towards digitalisation. It will be more of using automation, such as robots and artificial intelligence, and following processes that they do."* (Professional 7)

The large amount of information available and the need to get accurate information immediately puts a strain on financial accounting and its processes and it is likely to intensify in the future. Therefore, financial accounting processes must become more efficient to be able to give relevant information to management and help decision-making. This will push organisations to implement more RPA and introduce AI into financial accounting processes to make the processes streamlined. However, financial accounting tasks need to be automated gradually and meticulously to ensure the functioning of the automation tools. Therefore, prioritizing becomes important to decide where the automation should start from and to develop a plan on how the field will be automated further. Organisations will also have to allocate more resources to automate a significant amount of financial accounting tasks with RPA and AI.

> *"I see that in the future we must be faster and more effective. We have to get the work done correctly the first time and get them done earlier than we are now. (...) The future automation of financial accounting is based on allocated resources so in a way it is in the hands of management. Even though personnel push development ideas, management has the final say of what will be automated."* (Professional 4)

The abilities of AI are unknown for many accountants, as they have not yet been used in the financial administration department of the case company. Even considering how AI would impact their work can be confronting to accountants. Many imagine AI will replace all accountants, as AI can automate tasks that involve knowledge and decision-making. The case company does not currently have AI in use in financial accounting. However, they are in the beginning stages of testing if AI could be able to automate some financial accounting processes. This implies that the use of AI in financial accounting will arrive in the near future and sooner than most accountants imagine.

> *"AI will probably perform all financial accounting tasks in the future. Luckily it is not my problem because I will be retired."* (Professional 1)

> *"It is hard for me to begin to understand AI but I do think it can be utilised in financial accounting."* (Professional 6)

Automation will have an impact on the workforce in financial accounting, as machines replace human workers. Most interviewees recognised that the amount of financial accounting jobs will diminish rapidly, as financial accounting is automated further. Software robots will perform more manual tasks, which decrease the workload of accountants and eventually lead to fewer people required to perform the remaining tasks. RPA is able to automate only the manual and routine tasks of financial accounting. Therefore, the effect of RPA on the workforce is limited. However, AI could in theory perform all financial accounting tasks and consequently replace all humans in financial accounting.

> *"If more accounting tasks can be automated, then there will be no longer need for so many people in financial accounting."* (Professional 4)

> *"Humans will not disappear completely from financial accounting. The nature of the job will change but there needs to be know-how and an understanding of the process in relation to the laws and standards."* (Professional 7)

Further automation, either by RPA or AI, will evidently affect the amount of people needed in financial accounting. However, interviewees were not in agreement on the notion that RPA and AI would decrease the amount of accountants needed in financial administrations. Some considered that number of accountants would stay the same regardless of further automation. The reasoning behind this opinion was that there would be more job opportunities and tasks, such as monitoring RPA and AI. Other interviewees recognized that there would be some loss of jobs in the future, yet stated that human accountants would remain, as their extensive financial accounting knowledge will be needed.

6 DISCUSSION

The purpose of this research was to study RPA in the context of financial accounting by focusing on the effects on roles and work identity of accountants. The emphasis of the research was on the perspective of accountants and the aim was to compare RPA users to non-users to find similarities and differences in their work identities. Furthermore, the intent was to discover how accountants view the future automation of financial accounting as it relates to their work opportunities and role in the organisation. The results of the empirical data are presented through themes that give a description of the present state and potential future of RPA in financial accounting. The aim of the discussion is to relate the findings and observations of the empirical study to the previous academic research mentioned in the theoretical framework of this thesis. This is structured by presenting each research question for discussion.

The first research question of the study is how does RPA affect the work identity and roles of accountants. The answer to this question was approached as carefully as possible by asking neutral questions about their role and feelings about themselves and others as accountants, because work identity can be a sensitive subject to people. Alvesson and Willmott (2002, 620) mention how important work identity is in organisations since it has an impact on how people feel, act and perform tasks in the work environment. The objective was to first determine the work identity of the interviewers to form a baseline and then discover if RPA changed or affected their work identity. The finding that accountants in a similar role in the organisation have different work identities was aligned with previous literature (Parker 2007, 403–404). This became evident as the findings showed that some interviewees do not consider themselves accountants, while others were proud of their profession and passionate about their work.

The social identity of accountants, which is how individuals define themselves as members of the accounting profession (Brouard et al. 2017, 227; Taylor & Scapens 2016, 1077), was valued and considered in high regard by accountants. All accountants considered their role as accountants critically important in the organisation. They argued their opinion by rationalizing that all organisational activities go through financial accounting and the decisions made in organisations are based on the numbers provided by accountants. Interestingly, accountants recognized that other professionals were unaware of the importance of financial accounting. Accountants acknowledged that others see financial accounting work as undesirable, which was also discovered by Morales and Lambert (2013, 231) in their study about dirty work. The image of accountants mentioned by the interviewees was mostly negative with others describing accountants as replaceable and uninteresting. This negative image of accountant reinforces the similar findings discovered by Richardson et al. (2015, 44).

Dirty work, which is undesirable or demeaning work, was recognized as the reason for the negative image of accountants by Morales and Lambert (2013). Interviewees were well aware that dirty work was an element of financial accounting with many seeing repetitive manual tasks as tedious. Moreover, dirty work was considered a disadvantage of being an accountant by most interviewees, yet some actually enjoyed performing tasks that others considered dirty work. Thus, demonstrating the heterogeneous nature of the work identity of accountants. However, most accountants saw the dirty work as a minor component of their responsibilities with most financial accounting work being interesting and rewarding. Therefore, the image of accountants was based fully on dirty work, while for accountants it formed only a small part of an otherwise respectable profession.

The individual work identity and the collective social identity of accountants were clearly affected by the image accountants had. Other professionals' perception of accountants' role impacted how accountants saw themselves and also financial accounting as a profession. Forming a work identity is a continuous process, which is based on individuals associating with groups with social identities that align with their preferred values and preferences (Walsh & Gordon 2008, 48). However, due to the impact of the negative image on the social identity of accountants, the values of the group might not align with the work identity accountants' desire. Therefore, causing accountants to have doubts of their own work identity. This became evident through the interviews, as the discourse some interviewees used to describe accountants had negative connotations. Furthermore, after a moment of reflection, accountants acknowledged their own senses of self were influenced by the negative perception that others had of accountants.

The implementation of RPA into the financial administration department of the case company brought out varying initial reactions, as the capabilities of RPA were unclear to most accountants. Many previous studies found that new technologies can have a detrimental impact on work identities, as experiencing disruptive changes can marginalise their role and work identity due to their work being threatened (Alvesson & Willmott 2002, 623; Billett 2007, 198). This was experienced in the case company, as some individuals resisted change by directly opposing the implementation of RPA. This resistance and fear was partly due to some accountants finding it difficult to admit that robots could perform their work, which they considered important. Furthermore, the individuals who opposed RPA were often not directly impacted, yet feared that eventually it would affect their position. However, most accountants understood eventually that RPA would eliminate dirty work since the purpose of RPA is to reduce manual, repetitive and structured processes (Lacity & Willcocks 2016b, 43). Thus, the fears of the unknown and eventual use of a new technology-based tool cause more disturbances to work identity than the actual implementation of one.

Then again, some accountants reacted positively towards RPA and understood the benefits it would bring to the work of accountants. The accountants who began using RPA

were pleased with the change, especially the ones who were involved in the RPA development and gained a deeper understanding of the capabilities of RPA. Furthermore, there was a clear positive effect with the use of RPA on the work identity of the accountants using RPA. The accountants considered themselves fortunate to be using RPA especially compared to the ones not utilising RPA. This is aligned with Billett's (2007, 198) insight that disruptive and sudden changes can have a positive influence on the morale of employees.

Moreover, the changes can provide motivation for accountants to advance their careers and to shift their competencies in order to adapt to the changes (Billett 2007, 198). The empirical findings showed that some accountants were actively positioning themselves as more technically inclined. In addition, it was observed that accountants changed positions and roles to be part of the RPA development process. Roles are associated with a social status, which can cause accountants to attempt to work towards a certain role to achieve higher esteem (Goretzki et al. 2013, 45). Thus, conscious identity work was apparent before and during the RPA implementation, as accountants attempted to transform their own work identity (Alvesson & Willmott 2002, 627), which can be also called proactive identity formation (Ashforth 1998, 217–221). Through the motivation and career progression, the change can bolster accountants senses of self and cause a positive shift in the work identity of accountants Billett's (2007, 198).

The roles of professionals can change due to the alterations of the understanding of what type of tasks, positions and goals belong to a specific group of professionals (Goretzki et al. 2013, 45). Implementing RPA evidently has a possibility to change the roles of accountants since software robots can perform some of their tasks. In the case company the roles had only shifted slightly due to only six processes being performed by RPA. The role change that was perceived by accountants, as a consequence of RPA, was towards more of an investigative role focusing on correcting errors that RPA cannot solve. In other words, some manual tasks were replaced with more analysing work.

However, the roles are expected to change more significantly when RPA is implemented more comprehensively into financial accounting, yet there are multiple varying predictions on how the roles will change. The most common view was that the role would be more analytic in nature and potentially cause management accounting and financial accounting to combine. Another suggestion was that accountants would have a more technical role, which was also suggested in previous literature (Asatiani & Penttinen 2016, 68; Lacity & Willcocks 2016b, 48). This technical role would most probably relate to RPA regarding the management of robots, robot consulting or data analytics (Asatiani & Penttinen 2016, 68). However, some interviewees agreed with Drew (2015, 29) by finding it very unlikely that accountants would suddenly have the willingness or capability to move towards more technical work.

The second research question has to do with the advantages and disadvantages of RPA in regards to the work identity of accountants. The aim was to study, which aspects of RPA strengthen and which threaten the work identity of accountants. Answering this research objective was approached by discovering the advantages and disadvantages that RPA brought to financial accounting through the perspective of the interviewees. Thus, enabling the analysis of the impacts of different aspects of RPA on the work identity of accountants. The introduction of RPA can cause different reactions from accountants ranging from very excited and concentrating on the benefits of RPA to perceiving RPA as a threat.

Lacity and Willcocks (2016b, 47) observed that professionals had a tendency to overestimate the negative impacts of technological change and underestimate the positive. However, this empirical study showed that accountants using RPA were more vocal about the benefits of RPA, while accountants not using RPA were more hesitant about RPA by focusing on the potential negative aspects. Therefore, the emphasis on either the negative or positive effects was related to the use of RPA, which is an interesting finding. This indicates that the work identity of accountants who did not yet use RPA was more threatened by RPA, as they saw their responsibilities in the organisation possibly diminishing (Parker 2007, 403–404).

The first advantage of RPA consistently mentioned by the interviewed professionals was increased job satisfaction. Before RPA, accountants felt their expertise and extensive financial accounting knowledge was wasted on dirty work. The decrease of manual, routine and repetitive tasks (Lacity & Willcocks 2016b, 47) i.e. dirty work enabled accountants to focus on more important and challenging work (Hopper et al. 2007, 119–120). Thus, making accountants feel as though their responsibilities were closer to what they aspired to be as professionals, which was similar to the central life interest mentioned by Alvesson and Willmott (2002, 625). Another reason for the increased job satisfaction was the opportunity to learn new expertise relating to RPA. Learning new technological expertise was a form of identity work, which transformed work identity to become closer to the desired one (Goretzki & Messner 2018, 1) and enabled better job opportunities (Alvesson & Willmott 2002, 627).

Furthermore, accountants perceived benefits of RPA in the quality of financial accounting work through heightened speed in performing tasks, less human made mistakes and increased reliability. Similar RPA advantages were found in Lacity & Willcocks' (2016b) study. However, the interviewees talked about a reduced amount of human made mistakes with RPA, while Lacity & Willcocks (2016b) discussed RPA as error free in performing assigned tasks and processes. Moreover, the reliability is another advantage of RPA for the reason that it consistently performs the tasks it has been programmed to do.

The interviewees mentioned that they had easily forgettable tasks that were dependant on their own memory, which were automated with software robots. Accountants might not want to highlight that they occasionally make mistakes or forget to perform a task, as the social identity of accountants is described as precise and detail oriented. The formation of accountants' work identity through social processes sets a limit to the amount of freedom accountants have to choose which identities to associate with, as accountants have to incorporate representations of social groups into their work identity (Howarth 2002, 158). Therefore, making mistakes can consequently threaten or cause disturbances in the work identity of accountants as their individual work identity becomes unaligned with the social identity of accountants. Thus, the implementation of RPA enforced the work identity of accountants to align with the social identity.

RPA can be perceived in a negative light since the loss of human jobs is a common perception associated with automation (Aalst et al. 2018, 269; Lacity & Willcocks 2016b, 41). There was a similar finding in this empirical study, as some accountants felt threatened by RPA and were frightened that they might replace all human accountants. Thus, RPA can be perceived as disarming or marginalising (Billett 2007, 198), which makes it more challenging for accountants to secure their work identity (Alvesson & Willmott 2002, 623). Especially accountants who were unaware of the capabilities of RPA were the most afraid of being replaced. However, the accountants, who were more knowledgeable about the inability of RPA to automate tasks requiring thinking abilities, understood that all financial accounting work could not be replaced by RPA. Moreover, this fear did not actualize in the case company, as all accountants in the financial administration department kept their jobs. This finding enforces Lacity and Willcocks' (2016b, 47) discovery that RPA affects only certain parts of jobs instead of entire jobs and that RPA decreased hiring and outsourcing instead of increased layoffs.

The case company is constantly developing new RPA projects to make financial accounting more efficient, which means that eventually the possibility of reducing the amount of accountants will grow. The interviewees in addition to Silverman (1966, 4) suggested a way to resolve the reduction of personnel through attribution, where new accountants are not hired to replace retired ones. Furthermore, most accountants were adamant that there would be new jobs created to replace redundant jobs. That being said, roles and job descriptions would change consequently, which would affect accountants work identity, as they might no longer be associated with the social identity of accountants. Moreover, this shift in the role of accountants could cause accountants to define their roles in the organisation differently in addition to shifting their work identity (Parker 2007, 406). Learning new competencies and expertise can be requirements for shifting to a new position, which can be challenging for accountants if they have always worked in financial accounting. Thus, accountants might lack the necessary technical skills to keep

up with the level of technical expertise needed in future jobs (Drew 2015, 29), if the new jobs are related to RPA.

Previous RPA literature did not mention many disadvantages of RPA other than the potential fear felt by employees due to the potential job loss. The empirical findings showed that accountants were concerned about the trustworthiness of RPA and mentioned it as a disadvantage since the malfunction of software robots had realised in the case company. However, the malfunctions were an exception and happened seldom. Creating quality checks to ensure the correct functioning of the software robots was done to increase reliability of software robots and increase the trust of accountants toward RPA. Nevertheless, accountants might perceive the new tasks as counterproductive since the reason for implementing RPA was the decrease of manual and repetitive processes. These tasks diminish the beneficial effects of RPA on accountants' work identity for the reason that it increases dirty work. Additionally, interviewees mentioned that accountants could begin to rely on the software robots to function correctly (Quinn & Strauss 2018, 3), which can cause the financial accounting expertise to diminish.

The third and last research question relates to the future of financial accounting. The aim was to discover how accountants perceive RPA and future automation in financial accounting, as it relates to their future role and work opportunities. The interviewees were simply asked how they see the future of financial accounting and the answers had similar elements and ideas, yet there were some distinct differences as well. In addition, the ability of accountants to deal with technological development that would change how accounting is done was studied by discovering how interviewees dealt with previous developments. The future is impossible to predict with certainty and made prediction of future work environments can change. Then again, the perceptions give an idea of the feelings and thoughts of accountants, as they consider their future as accountants. The interviewees considered that financial accounting will develop and change in the close foreseeable future and the pace of new changes will increase due to continuous technological advancements, which enforces previous literature (e.g. Smith 2017, 22). The collective perception was that financial accounting would have more automation. However, the empirical findings showed that accountants had somewhat different views of how the field of accounting would change and its impacts on their future work opportunities.

It is clear that RPA will be utilised more in the future based on the constantly growing demand (Aalst et al. 2018, 269). The empirical findings showed that all accountants agreed that RPA would be implemented more comprehensively into financial accounting in the near future. However, RPA can only automate very rudimentary financial accounting tasks, which limits the amount of RPA that can be used in financial accounting (Mancher et al. 2018, 36). Another limiting factor mentioned was the costs of RPA, which was the reason that only six robots were at the time of the study utilised in the case com-

pany. Therefore, organisations must allocate more resources to the automation of financial accounting in order to make financial accounting more efficient and to survive and hopefully prosper in the increasingly competitive economy (Kloviene & Gimzauskiene 2014, 60).

The forms of automation will likely change over time and there will be more technology-based tools available to automate financial accounting tasks. In addition to RPA, accountants mentioned AI, as one of the potential forms of automation that could be used in financial accounting. AI enables the automation of financial accounting tasks requiring human judgement and decision-making (Kaizer et al. 2018, 14). In other words, AI could automate the rest of the financial accounting tasks that RPA is not able to automate. The abilities of AI were unknown to most accountants, which made considering how AI would impact their work confronting to most accountants. However, the case company has already begun testing the possibilities of AI. Thus, AI along with RPA will automate a significant portion of financial accounting work currently done by humans.

Frey and Osborne (2017) researched how probable it is for different occupations to be completely replaced by computers and automation. The results of the study showed that bookkeeping and accounting can be computerized by 98 per cent and that the likelihood of accountants being replaced by technology is 94 per cent. These results give an indication of how significantly the field of financial accounting will be automated in the future. Most interviewees recognised that the amount of financial accounting jobs will diminish rapidly with further automation of financial accounting, which is aligned with the view of Aalst et al. (2018, 269). However, only a couple of interviewees believed that financial accounting work could be completely automated. Other interviewees did not envision that there would be a significant reduction of the amount of accountants, as they believed that new jobs and positions would be created to replace the redundant ones.

The future will inevitably bring along changes in the roles of financial accountants and how financial accounting is done. Thus, accountants will have to prepare themselves for change and eventually deal with the possibility of job loss or a significantly different role. Dealing with a sudden change in the work environment can be challenging for accountants (Parker 2007, 406). The empirical findings revealed that there are many ways to deal with change as well as many ways to resist change. Most interviewed accountants have been pleased with the significant changes that have happened during their careers in financial accounting since they have made the work more enjoyable. Therefore, accountants will most likely be able to deal with the upcoming changes as well.

In regards to the future roles of accountants, the interviewees had various views of what kind of new roles accountants would have. Nevertheless, it was clear that the roles of accountants would change. The willingness to shift roles to something new can vary between accountants (Goretzki et al. 2013, 45). For some accountants the prospect of changing roles will be challenging, while others will embrace the change and take on the

new challenge. The ability to adapt to new environments and tasks will be critical with future automation as accountants will be given new types of tasks either other financial administration tasks or technical ones.

7 CONCLUSIONS

There are several theoretical contributions to be made from this study based on the conducted empirical research and the theoretical framework that relate to the research questions. Firstly, the work identity of accountants is heterogeneous and is clearly affected by the image and social identity of the accounting profession. The social identity of accountants is strong as they see the role of the accounting profession in the organisation to be important and critical to the success of the company. Nevertheless, the heterogeneous nature of individual work identity of accountants is evident with some accountants not considering themselves as accountants and others being very proud and passionate about their profession. Other professionals perceive financial accounting tasks as demeaning dirty work, which can impact the way accountants describe themselves. Thus, the image of the accounting profession has a clear negative impact on how accountants see themselves through the social identity of the accounting profession.

Secondly, the relationship between the work identity of accountants and RPA is evident, yet complex and the effect of RPA on accountants depends on the use of RPA and knowledge of its capabilities. The accountants using RPA considered their work identity was impacted beneficially due to RPA, which was achieved either through conscious identity work or unconsciously as a consequence or RPA. Then again, accountants who did not work with RPA felt more threatened and experienced disturbances in their work identity. Thus, there is an obvious impact between RPA and work identity. However, the connection is not coherent, as accountants had two opposite effects on their work identity. Moreover, RPA has the potential to improve the current relatively poor image of accountants, which in turn can improve the social identity of the accounting profession. The improved social identity can add value and more meaning to the part of work identities that comes from being a member of the accounting profession.

Thirdly, the shift of accountants' roles due to RPA depends on the amount of RPA used in the finance function. The empirical results showed that accountants' roles change slightly to focus on more analysing work when RPA is used to automate a small amount of manual and routine tasks. That being said, it is highly probable that as RPA is utilised more the amount of tasks left for accountants will diminish and cause a larger shift in the roles of accountants. A possibility is that accountants will incorporate more management accounting work or alternatively move towards certain technical work relating to RPA monitoring or building, when RPA is used more extensively (Asatiani & Penttinen 2016, 68). Therefore, the roles of accountants will change due to RPA, yet the extent of the shift depends on the amount of RPA implemented. Moreover, there are many possibilities of how accountants' roles might shift due to RPA.

There are several advantages and disadvantages of RPA, which can have an effect on the work identity of accountants. The reactions of the interviewed accountants revealed

that accountants using RPA concentrated more on the benefits of RPA, while accountants currently not using RPA felt more threatened by RPA. Therefore, the positive or negative perception of RPA is related to the use of RPA. The clear advantages of RPA for accountants are increased job satisfaction and better quality work with significantly less mistakes. The decrease of manual, routine and repetitive tasks (Lacity & Willcocks 2016b, 47) i.e. dirty work made accountants feel as though their responsibilities were closer to what they aspired to have. Therefore, RPA can improve the value associated with accounting work and positively affect the work identity of accountants. Furthermore, identity work can be used to transform accountants' work identity to get better job opportunities and involvement with RPA use (Alvesson & Willmott 2002, 627).

The disadvantages of RPA relate to potential job loss in addition to uncertainty of RPA. The possibility of losing their job can cause fear in accountants (Aalst et al. 2018, 269) and potentially make them resistant to RPA. RPA can be perceived as disarming or marginalising (Billett 2007, 198), which makes it more challenging for accountants to secure their work identity (Alvesson & Willmott 2002, 623). However, RPA only affected parts of the job instead of entire jobs (Lacity & Willcocks 2016b, 47). In addition, accountants saw the possible malfunctions of RPA as a reason for distrust towards RPA and as the biggest disadvantage. Malfunctions of RPA can cause difficulties for organisations, as accountants are no longer accustomed to performing the tasks. Moreover, accountants were required to do quality checks for RPA to make the process more reliable. These tasks diminish the beneficial effects of RPA on accountants' work identity for the reason that it increases dirty work. Therefore, the advantages and disadvantages of RPA have an impact on the work identity of accountants, yet the effects can impact the work identity of accountants in different ways. In conclusion, the possibility of losing their job can threaten work identity and malfunctions can decrease the beneficial elements effects of RPA to the work identity of accountants.

The future of financial accounting is quite impossible to predict with certainty. However, previous academic literature in addition to the empirical research predicts that there will be more automation in financial accounting. Moreover, the speed of change in financial accounting due to new technological advancements will increase further, which means that organisations will need to assign more resources toward automation to keep up with the extremely competitive environment (Kloviene & Gimzauskiene 2014, 60). Future automation will include more RPA to automate the remaining rules-based and deterministic processes, while AI will be able to automate more challenging financial accounting tasks that require human judgement and decision-making. Therefore, a combination of RPA and AI will in theory be able to completely automate financial accounting work.

The computerizing of financial accounting is seen as highly probable by academic literature and most accountants (e.g. Frey & Osborne 2017), yet other accountants consider

it a small possibility. This implies that accountants are not completely prepared for the future automation and its potential impacts on their work opportunities. The future will most likely include a reduced amount of accountants to some extended, where some accountants will lose their jobs or alternatively move on to other jobs. Moreover, the roles of financial accountants will change, yet it is still unclear how they will change. However, only time will tell how much the financial accountants and the financial administration department will be affected by future automation.

This study aims to provide useful insights and knowledge for organisations and financial accountants in addition to providing theoretical contributions. The empirical findings highlight the importance of recognizing the effects RPA can have on the feelings, thoughts and actions of accountants, which consequently have an impact on organisations. The results indicated that accountants, particularly those who understand the abilities of RPA and use RPA, benefit from RPA through higher job satisfaction. In addition their perception of RPA is far better than those who do not understand RPA. Therefore, involving accountants in the development process of RPA, while giving them enough information of what RPA is capable of automating, can bring additional benefits to organisations that are beginning an RPA project.

Organisations must understand how to foresee the different reactions of accountants towards RPA and find a way to alleviate any suspicions and opposition. A solution for controlling the range of reactions to emphasise positive impacts in the changing field of financial accounting is to stabilise the work identity of accountants. This could be achieved through internal training of accounting staff, which focuses on strengthening the work identity of accountants. The purpose would be to strengthen accountants' work identity by emphasising that financial accounting expertise, which is a part of the work identity of accountants, will remain important and necessary despite the implementation of RPA. Furthermore, the internal training could facilitate the conceptual realization that RPA will change the way financial accounting is performed. Therefore, organisations would stabilise the work identity of accountants while simultaneously preparing them for the eventual changes caused by RPA.

There are limitations in this study similarly to any research (Biggam 2015, 194) and it is important to attempt to decrease limitations throughout the research process in addition to being transparent with limitations (Dudovskiy, 2016). One of the limitations present in most qualitative research is the problem of generalizability (Koskinen et al. 2005, 263). However, the purpose of qualitative research is to understand the phenomenon instead of making widely generalizable conclusions (Eskola & Suoranta 1998, 13–61). The empirical study is an extensive case study, which is highly context-specific and the data is collected from one Finnish case company with a relatively small sample size of financial accountants within the same department. Therefore, the findings of the study can only be generalized to a certain extent with the support of literature. In addition, the selection of

the interviewees was subjective, which in turn might not represent generalizable views and perceptions. Another limitation concerns the limited amount of previous academic research of RPA in the context of financial accounting as well as work identities to form a complete literary foundation for the research.

The phenomenon of RPA is relatively new especially in the context of financial accounting, which is why it needs to be studied further to create a comprehensive picture of the subject. There are several possibilities for further research globally and in Finland. This study was conducted in a Finnish case company, where Finnish work environment and culture affect perceptions of accountants. It would be of interest to replicate this study in another country and culture to discover if the perceptions of Finnish accountants are generalizable globally. Alternatively the study could be conducted with multiple case studies to get a broader picture of the phenomenon within one country or culture.

Another suggestion for further research would be to conduct a quantitative research to re-enforce the conclusions made in this study. However, conducting a quantitative research from the human view while focusing on effects on work identity could be challenging. Therefore, a combination of both qualitative and quantitative methods in a research would give a more comprehensive picture of the phenomenon. Moreover, the amount of RPA used in the case company of this study was in its beginning stages. In order to get a more accurate and extensive picture of the effects of RPA on accountants' work identity, the phenomenon should be researched in a company with extensive use of RPA.

8 SUMMARY

The accounting field is evolving, as technology based tools are able to do the work previously done by humans (Drew 2012, 76). RPA is the one of the newest tools that enables the automation of financial accounting tasks by mimicking the work of humans (IRPAAI 2018). Advances in technology can cause a certain degree of uneasiness, even fear, particularly in organisations, which are resistant to change (Drew 2015, 29) or alternatively they can be perceived as a positive development. Furthermore, the phenomenon of RPA in financial accounting is relatively new and has not been comprehensively researched (Moffitt et al. 2018, 1), especially the relationship between people and RPA (Aalst et al. 2018, 271).

Thus, this study takes an alternative perspective of studying the new phenomenon of RPA by using identity theory as a way to discover the impacts of RPA on accountants from the human view. Identities are important to understand in organisations, especially in times of uncertainty (Brouard et al. 2017, 225), as they affect how accountants perform their tasks (Alvesson & Willmott 2002, 620). The purpose of the study is divided into three research questions: How does RPA affect the work identity and roles of financial accountants? Which aspects of RPA strengthen or threaten the work identity of accountants? How do financial accountants perceive future automation, as it relates to their future work opportunities or role in the organisation?

The aim of the theoretical framework was to combine previous literature in order to study this relatively new phenomenon that is RPA and to use identity theory to interpret the empirical findings from a new perspective. The literature review of this study is divided into two sections that consist of elements relating closely to the purpose of the study. The first section gave a brief introduction to financial accounting, the tasks and processes of accountants in addition to identity theory including work identity and social identity, as they relate to accountants. Furthermore, automation and RPA were presented to gain insight on the phenomenon affecting the work identity of accountants. RPA was defined and compared with AI to gain a better understanding of the capabilities of RPA and the criteria used for determining the suitability of tasks for RPA were explained. In addition, previous literature of the advantages and disadvantages of RPA was presented and the implementation of RPA was briefly examined.

The qualitative study was conducted through semi-structured interviews with eight financial accounting professionals with various experiences with RPA from one case company. The collected empirical data was analysed using discourse analysis, more specifically social psychological discourse analysis. The methods and methodology were chosen to collect detailed, multifaceted data and create reliable and valid empirical findings that could later be used as a foundation for further research on the topic.

The empirical findings indicate that RPA does affect the work identity and roles of accountants in various ways. Firstly, it was discovered that the work identity of accountants is heterogeneous regarding how they view themselves as financial accounting professionals. In addition, the findings showed that the image of accountants was relatively negative due to the amount of dirty work in financial accounting, which impacted the work identity of accountants negatively. Secondly, it became clear that the accountants using RPA perceived RPA in a positive way, as they felt their work was more enjoyable and had more value in addition to less dirty work. The accountants that were not directly affected by RPA tended to focus more on the negative aspects of RPA and felt threatened by RPA. Thirdly, the roles of accountants only shifted slightly to incorporate less manual work and more analysing work. However, it was clear that with further and more comprehensive use of RPA, the roles of accountants would be impacted more drastically.

The results of the empirical analysis revealed that there are several advantages and disadvantages of RPA that have various effects on the work identity of accountants. The main advantages of RPA were increased job satisfaction and higher quality financial accounting work, which improved the positive meanings with accountants' work identity. The most highlighted disadvantages were potential job loss and the distrust towards RPA through malfunctions, which threaten the work identity of accountants. Furthermore, interviewees predicted the future of financial accounting to include more automation by both RPA and AI. There were mixed perceptions of future work opportunities of accountants, as some believed the amount of accountants would significantly decrease, while others considered the amount of accountants to remain the same for the reason that new positions would replace the redundant ones.

There were several theoretical contributions made in regards to the research questions. There is a clear relationship between work identity and RPA. However, the connection is not coherent, as accountants had two opposite effects on their work identity, which were dependant on the use and knowledge of RPA. RPA can improve the value associated with accounting work through image and positively impact the work identity of accountants. The roles of accountants change due to RPA, yet the extent of the shift correlates to the amount of RPA implemented. The advantages and disadvantages of RPA have an impact on the work identity of accountants, yet the effects can impact the work identity of accountants differently. Potential job loss and distrust have negative impacts on work identity and increased job satisfaction in addition to better quality accounting work have a beneficial impact on work identity. Previous academic literature in addition to the empirical research predicts that there will be more automation in financial accounting, which includes RPA and AI. Moreover, there will be a reduced amount of accountants through either redundancies or new job descriptions.

REFERENCES

Aalst, W. Van der. – Bichler, M. – Heinzl, A. (2018) Robotic process automation. *Business & Information Systems Engineering,* Vol. 60(4), 269–272.

Alexander, D. – Nobes, C. (2001) *Financial accounting: An international introduction*. Prentice Hall, Harlow.

Alvesson, M. – Kärreman, D. (2011) Decolonializing discourse: Critical reflections on organizational discourse analysis. *Human Relations,* Vol. 64(9), 1121–1146.

Alvesson, M. – Willmott, H. (2002) Identity regulation as organizational control: Producing the appropriate individual. *Journal of Management Studies*, Vol. 39(5), 619–644.

Anagnoste, S. (2018a) Setting up a robotic process automation center of excellence. *Management Dynamics in the Knowledge Economy,* Vol. 6(2), 307–322.

Anagnoste, S. (2018b) The road to intelligent automation in the energy sector. *Management Dynamics in the Knowledge Economy*, Vol. 6(3), 489–502.

Angeloni, S. (2016) Cautiousness on convergence of accounting standards across countries. *Corporate Communications,* Vol. 21(2), 246–267.

Asatiani, A. – Penttinen, E. (2016) Turning robotic process automation into commercial success – case OpusCapita. *Journal of Information Technology Teaching Cases,* Vol. 6(2), 67–74.

Ashforth, B. (1998) Becoming: how does the process of identification unfold? In: *Identity in organizations: building theory through conversations*, eds. D. Whetten – P. Godfrey, 213–222, Sage Publications, CA.

Ashforth, B. E. – Harrison, S. H. – Corley, K. G. (2008) Identification in organizations: An examination of four fundamental questions. *Journal of Management*, Vol. 34(3), 325–374.

Atkinson, A. – Kaplan, R. – Matsumura, E. – Young, S. (2007) *Management accounting* (5th ed.). Pearson/Prentice Hall, Upper Saddle River, N.J.

Bhimani, A. – Horngren, C. T. – Datar, S. M. – Foster, G. (2008) *Management and cost accounting* (4th ed.). Prentice Hall/Financial Times, Harlow.

Bhimani, A. – Willcocks, L. (2014) Digitisation, "Big data" and the transformation of accounting information. *Accounting and business research*, Vol. 44(4), 469–490.

Biggam, J. (2015) *Succeeding with your master's dissertation: a step-by-step handbook*. McGraw-Hill Education, UK.

Billett, S. (2007) Exercising Self Through Working Life: Learning, Work and Identity. In: *Identities at work*, eds. A. Brown – S. Kirpal – F. Rauner, 183–210. Springer, Dordrecht.

Brouard, F. – Bujaki, M. – Durocher, S. – Neilson, L. C. (2017) Professional accountants' identity formation: An integrative framework. *Journal of Business Ethics,* Vol. 142(2), 225–238.

Brown, A. (2015) Identities and identity work in organizations. *International Journal of Management Reviews*, Vol. 17(1), 20–40.

Burke, P. – Reitzes, D. (1981) The Link between Identity and Role Performance. *Social Psychology Quarterly*, Vol. 44(2), 83–92.

Coombs, H. – Hobbs, D. – Jenkins, D. E. (2005) *Management accounting: Principles and applications*. SAGE Publications, London.

Corporate Finance Institute (2018) Accounting cycle. <https://corporatefinanceinstitute.com/resources/knowledge/accounting/accounting-cycle/>, retrieved 11.11.2018.

Davies, C. (2017) Robots in the back office. *Communications Law*, Vol. 22(2), 62–65.

Drew, J. (2012) Generation Next. *Journal of Accountancy*, Vol. 213(6), 75–79.

Drew, J. (2015) Keep pace with tech changes. *Journal of Accountancy*, Vol. 220(4), 20.

Drew, J. (2018) Paving the way to a new digital world. *Journal of Accountancy*, Vol. 225(6), 32–37.

Dudovskiy, J. (2016) *The Ultimate Guide to Writing a Dissertation in Business Studies: A Step-by-Step Assistance*. Pittsburgh, USA.

Edley, N. (2001) Analysing masculinity: interpretative repertoires, ideological dilemmas and subject positions. In: *Discourse as Data: A Guide to Analysis*, eds. M. Wetherell – S. Taylor – S.J. Yates, 189–228. Sage, London.

Empson, L. (2004) Organizational identity change: Managerial regulation and member identification in an accounting firm acquisition. *Accounting, Organizations and Society*, Vol. 29(8), 759–781.

Endsley, M. R. (2017) From Here to Autonomy: Lessons Learned From Human–Automation Research. *Human Factors: The Journal of Human Factors and Ergonomics Society*, Vol. 59(1), 5–27.

Eriksson, P. – Kovalainen, A. (2008) *Qualitative methods in business research*. Sage, London.

Erkama, N. – Vaara, E. (2010) Struggles over legitimacy in global organizational restructuring a rhetorical perspective on legitimation strategies and dynamics in a shutdown case. *Organization studies*, Vol. 31(7), 813–839.

Ertel, W. (2011) *Introduction to Artificial Intelligence*. Springer, London.

Eskola, J. – Suoranta, J. (1998) *Johdatus laadulliseen tutkimukseen*. Vastapaino, Tampere.

Evans, G. (2017) Disruptive technology and the board: The tip of the iceberg 1. *Economics and Business Review*, Vol. 3(1), 205–223.

EY (2016) Robotic process automation in the Finance function of the future. <https://www.ey.com/Publication/vwLUAssets/EY_-_Robotic_process_automation_in_the_Finance_function_of_the_future/$FILE/EY-robotic-process-automation-in-the-finance-function-of-the-future-2016.pdf>, retrieved 21.2.2019.

Frey, C. – Osborne, M. (2017) The future of employment: How susceptible are jobs to computerization? *Technological forecasting and social change*, Vol. 114, 254–280.

Frohm, J. – Lindström, V. – Stahre, J. – Winroth, M. (2008) Levels of automation in manufacturing. *Ergonomia - an International journal of ergonomics and human factors,* Vol. 30(3), 1–28.

Fung, H. (2014) Criteria, Use Cases and Effects of Information Technology Process Automation (ITPA). *Adv Robot Autom*, Vol. 3(3), 1–10.

Ghauri, P. – Gronhaug, K. (2002) *Research methods in business studies: A practical guide* (2nd ed.). Financial Times Prentice Hall, Harlow.

Giddens, A. (1991) *Modernity and Self-Identity*. Polity Press, Cambridge.

Goretzki, L. – Messner, M. (2018) Backstage and frontstage interactions in management accountants' identity work. *Accounting, Organizations and Society*, 1–20.

Goretzki, L. – Strauss, E. – Weber, J. (2013) An institutional perspective on the changes in management accountants' professional role. *Management Accounting Research*, Vol. 24(1), 41–63.

Hallikainen, P. – Bekkhus, R. – Pan, S. L. (2018) How OpusCapita Used Internal RPA Capabilities to Offer Services to Clients. *MIS Quarterly Executive*, Vol. 17(1), 41–52.

Heinzelmann, R. (2018) Occupational identities of management accountants: The role of the IT system. *Journal of Applied Accounting Research*, Vol. 19(4), 465–482.

Hirsijärvi, S. – Remes, P. – Sajavaara, P. (2004) *Tutki ja kirjoita* (10. osin uud. laitos.). Tammi, Helsinki.

Hlaciuc, E. – Vultur, P. – Cretu, F. – Ailoaiei, R. (2017) The Interface between Financial and Management Accounting. *USV Annals of Economics & Public Administration*, Vol. 17(2), 103–110.

Hopper, T. – Northcott, D. – Scapens, R. (2007) *Issues in Management Accounting* 3rd edition. Prentice Hall, London.

Howarth, C. (2002) Identity in whose eyes?: the role of representations in identity construction. *Journal for the theory of social behaviour*, Vol. 32(2), 145–162.

Institute of Robotic Process Automation and Artificial Intelligence (IRPAAI) (2018) Definitions and benefits. < https://irpaai.com/definition-and-benefits/>, retrieved 14.9.2018.

Järvinen, P. (2004) *On research methods*. Opinpajan kirja, Tampere.

Jokinen, A. – Juhila, K. – Suoninen, E. (1993) Diskurssianalyysin aakkoset. Gumme- rus, Jyväskylä.

Joutsenvirta, M. – Vaara, E. (2015) Legitimacy struggles and political corporate social responsibility in international settings: a comparative discursive analysis of a contested investment in Latin America. *Organization studies*, Vol. 36(6), 741–777.

Kaizer, Q. – Ponce, S. – Steinhoff, J. (2018) Welcome to the new school: How intelligent automation is shifting the way we view competencies and professional development. *The Journal of Government Financial Management,* Vol. 67(2), 12–19.

Karreman, D. – Alvesson, M. (2001) Making newsmakers: Conversational identity at work. *Organization Studies*, Vol. 22(1), 59–89.

Kaushik, S. (2018) Critical parameters for successful process automation. *Software Quality Professional,* Vol. 20(4), 22–32.

King, B. A. – Hammond, T. – Harrington, J. (2017) Disruptive technology: Economic consequences of artificial intelligence and the robotics revolution. *Journal of Strategic Innovation and Sustainability*, Vol. 12(2), 53–67.

Kirpal, S. – Brown, A. (2007) The much Vaunted "Flexible Employee" – What Does it Take? In: *Identities at work*, eds. A. Brown – S. Kirpal – F. Rauner, 211–240. Springer, Dordrecht.

Kloviene, L. – Gimzauskiene, E. (2014) Development of accounting system according to an information technology. *Review of Economic Studies and Research Virgil Madgearu,* Vol. 7(2), 59–74.

Koskinen, I. – Peltonen, T. – Alasuutari, P. (2005) *Laadulliset menetelmät kauppatieteissä*. Vastapaino, Tampere.

Lacity, M. – Willcocks, L. (2016a) Robotic Process Automation at Telefonica O2. *Mis Quarterly Executive*, Vol. 15(1), 21–35.

Lacity, M. – Willcocks, L. (2016b) A New Approach to Automating Services. *MIT Sloan Management Review*, Vol. 58(1), 41–49.

Lahti, S. – Salminen, T. (2014) *Digitaalinen taloushallinto*. Sanoma Pro, Helsinki.

Lantto, A. – Sahlström, P. (2009) Impact of International Financial Reporting Standard adoption on key financial ratios. *Accounting and Finance*, Vol. 49(2), 341–361.

Lee, B. – Humphrey, C. (2006) More than a numbers game: Qualitative research in accounting. *Management Decision,* Vol. 44(2), 180–197.

Leppiniemi, J. – Martikainen, T. – Virtanen, K. – Kinnunen, J. (2000) *Yrityksen talous-hallinnon perusteet*. KY-palvelu, Helsinki.

Lovell, H. (2014) Climate change, markets and standards: The case of financial accounting. *Economy and Society,* Vol. 43(2), 260–284.

Lukka, K. – Modell, S. (2010) Validation in interpretive management accounting research. *Accounting, Organizations and Society,* Vol. 35(4), 462–477.

Luostarinen, H. – Väliherronen, E. (1991) *Tekstinsyöjät.* Vastapaino, Jyväskylä

Mack, N. – Woodsong, C. – MacQueen, K. M. – Guest, G. – Namey, E. (2005) *Qualitative Research Methods: A Data Collector's Field Guide*. Family Health International, USA.

Madegowda, J. (2007) *Management accounting*. Himalaya Pub. House, Mumbai.

Mancher, M. – Huff, C. – Grabowski, R. – Thomas, J. (2018) DIGITAL FINANCE: THE ROBOTS ARE HERE. *The Journal of Government Financial Management,* Vol. 67(1), 34–41.

McMenamin, J. – Petty, W. (1999) *Financial Management*. Routledge, London.

Miihkinen, A. (2008) Efficiency of authoritative disclosure recommendations: Evidence from IFRS transition disclosure in Finland. *Journal of Financial Regulation and Compliance*, Vol. 16(4), 384–413.

Moffitt, K. – Rozario, A. – Vasarhelyi, A. (2018) Robotic process automation for auditing. *Journal of Emerging Technologies in Accounting,* Vol. 15(1), 1–10.

Morales, J. – Lambert, C. (2013) Dirty work and the construction of identity. An ethnographic study of management accounting practices. *Accounting, Organizations and Society*, Vol. 38, 228–244.

Murthy, G. (2009) *Financial accounting*. Himalaya Pub. House, Mumbai.

Parasuraman, R. – Sheridan, T. – Wickens, C. (2000) A Model for Types and Levels of Human Interaction with Automation. *IEEE Transactions on systems, man, and cybernetics, part A: Systems and humans*, Vol. 30(3), 286–297.

Parasuraman, R. (1997) Humans and automation: Use, Misuse, Disuse, Abuse. *Human Factors and Ergonomics Society*, Vol. 39(2), 230–253.

Parker, S. K. (2007) `That is my job': How employees' role orientation affects their job performance. *Human Relations,* Vol. 60(3), 403–434.

Parminder, J. – Vickerstaff, B. (2014) *Financial accounting*. Routledge, London.

PWC (2016) Accountants today. <https://www.pwc.com/my/en/assets/press/1608-accountants-today-automation-impact-on-accounting-profession.pdf>, retrieved 21.2.2019.

Quinn, M. – Strauss, E. (2018) *The Routledge Companion to Accounting Information Systems* (First edition.). Taylor and Francis, London.

Richardson, P. – Dellaportas, S. – Perera, L. – Richardson, B. (2015) Towards a conceptual framework on the categorization of stereotypical perceptions in accounting. *Journal of Accounting Literature*, Vol. 35, 28–46.

Roberts, J. (1991) The possibilities of accountability. *Accounting, Organizations and Society*, Vol. 16(4), 355–368.

Russell, S. J. – Norvig, P. (2009) *Artificial intelligence: A modern approach* (3. ed.). Pearson, NJ.

Ryan, B. – Scapens, R. W. – Theobald, M. (2002). *Research method and methodology in finance and accounting* (2nd ed.). Thomson, London.

Saaranen-Kauppinen, A. – Puusniekka, A. (2006) KvaliMOTV – Menetelmäopetuksen tietovaranto. <http://www.fsd.uta.fi/menetelmaopetus/>, retrieved 23.8.2018.

Salin, E. – Winston, P. (1992) Machine Learning and Artificial Intelligence. *Analytical chemistry*, Vol. 64(1), 49–60.

Schwartz, S. – Luyckx, K. – Vignoles, V. (2011) *Handbook of Identity Theory and Research*. Springer, New York.

Sheridan, T. – Verplank, W. (1978) Human and computer control of undersea teleoperators. DTIC Document, Cambridge.

Shukla, P. – Wilson, H. J. – Alter, A. – Lavieri, D. (2017). Machine reengineering: Robots and people working smarter together. *Strategy & Leadership*, Vol. 45(6), 50–54.

Silverman, D. (2000) *Doing qualitative research: A practical handbook*. Sage, London.

Silverman, W. (1966) The economic and social effects of automation in an organization. *The American Behavioral Scientist (Pre-1986)*, Vol. 9(10), 3–9.

Sittle, J. – Wearing, R. (2008) Financial Accounting. SAGE Publications, Los Angeles.

Smith, S. S. (2017) Sustainability: How accountants can add value and deliver results. *Management Accounting Quarterly*, Vol. 19(1), 19–30.

Steinhoff, J. C. – Lewis, A. C. – Everson, K. E. (2018) The march of the robots. *The Journal of Government Financial Management*, Vol. 67(1), 26–33.

Stensaker, I. G. – Meyer, C. B. (2012) Change experience and employee reactions: developing capabilities for change. *Personnel Review*, Vol. 41(1), 106–124.

Sveningsson, S. – Alvesson, M. (2003) Managing managerial identities: Organizational fragmentation, discourse and identity struggle. *Human Relations*, Vol. 56(10), 1163–1193.

Tajfel, Henri (2010) *Social Identity and Intergroup Relati*ons. Cambridge University Press, Cambridge.

Taylor, L. C. – Scapens, R. W. (2016) The role of identity and image in shaping management accounting change. *Accounting, Auditing & Accountability Journal*, Vol. 29(6), 1075–1099.

Vaara, E. – Tienari, J. – Laurila, J. (2006) Pulp and paper fiction: On the discursive legitimation of global industrial restructuring. *Organization Studies*, Vol. 27(6), 789–810.

Vagia, M. – Transeth, A. A. – Fjerdingen, F. A. (2016) A literature review on the levels of automation during the years. What are the different taxonomies that have been proposed? *Applied Ergonomics,* Vol. 53(Part A), 190–202.

Vedder, R. – Guynes, C. (2016) The challenge of botsourcing. *Review of business information systems,* Vol. 20(1), 1–4.

Walsh, K. – Gordon, J. (2008) Creating an individual work identity. *Human Resource Management Review*, Vol. 18(1), 46–61.

Warren, D. – Moffitt, K. – Byrnes, P. (2015) How Big Data Will Change Accounting. *American Accounting Association*, Vol. 29(2), 397–407.

Watson, T. J. (2008) Managing identity: Identity work, personal predicaments and structural circumstances. *Organization*, Vol. 15(1), 121–143.

Weber, R. (2004) The Rhetoric of Positivism Versus Interpretivism: A Personal View 1. *MIS Quarterly*, Vol. 28(1), 3–12.

Wetherell, M. – Potter, J. (1988) Discourse analysis and the identification of interpretive repertoires. In: *Analysing Everyday Expection: A Casebook of methods,* eds. C. Antaki, 168–183. Sage, Newbury Park.

Wilson, R. – Sangster, A. (1992) The automation of accounting practice. *Journal of Information Technology*, Vol. 7(2), 65–75.

Zhang, C. – Dai, J. – Vasarhelyi, M. (2018) The Impact of Disruptive Technologies on Accounting and Auditing Education. *CPA Journal*, Vol. 88(9), 20–26.

APPENDIX

The interview themes and structure

Background information

Could you tell me about your background and how you ended up in this job?

What is your educational background?

How much work experience do you have in financial accounting?

How long have you worked in this company?

What is your job title?

Could you tell me about your current position and job description?

What are the advantages and disadvantages of your job?

What do you feel is the most time consuming and/or manual part of your job?

Which part of your job is at most risk for human error?

Technological change

How has financial accounting work changed over the years?

Has your own job changed while you have worked in financial accounting?

Has your role changed due to technological changes?

How have you and others experienced the change?

The role and work identity of financial accountants

What do you think financial accounting signifies to a company?

How would you describe the role of accountants?

What words would you use to describe yourself as an accountant?

How do you think others view the role of accountants?

Do you think the view of others relies on old views of financial accounting?

Why do you think the view of others is different to your own view?

Do you think the perception of others will change when more technology is incorporated into financial accounting?

How would you describe the work of financial accountants who use RPA to those who do not?

Robotic process automation

Do you have experience with RPA?

What was your first reaction when you heard about RPA?

What criteria were used to evaluate processes that were automated?

What kind of work do you think could be automated with RPA?

What software robots are currently in use and what tasks do they perform?

What are the advantages of RPA?

What are the disadvantages of RPA?

How has RPA affected your work?

What impact does RPA have on the role of financial accountants?

Do you think the work will change?

Do you think the job titles should change, if the tasks change?

The future of financial accounting

How do you perceive financial accounting will be like in the future?

What do you believe the automation of financial accounting will consist of?

What will the job descriptions of financial accountants be in the future?

How much work do you think that technology (RPA and AI) could automate in financial accounting?

Do you believe that with further RPA or AI, the size of the financial administration department will change?