

# **THE IMPACT OF DIGITALIZATION ON ACCOUNTANTS' ACTIVITIES IN BELGIAN ACCOUNTING FIRMS**

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# ABSTRACT

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In recent years, digitalization has begun to transform our daily lives as well as the activities and professions in many sectors. The field of accountancy, whether it is corporate or fiduciary accountancy, is not spared from the digital changes. This thesis aims to understand the impact of digitalization on the profession of accountants in Belgian trustees by investigating the tools used, the opportunities and challenges brought and what makes some trustees more digital than others.

In the scope of this thesis, we carried out several studies : firstly, the interviews allowed us to understand the current situation in the sector and secondly, the online survey – for which we obtained 489 responses – allowed us to generalize our data as well as to cross-reference some variables through pivot tables in order to see what factors were influencing this trend towards digitalization in Belgian trustees.

Our results have enabled us to answer our research sub-questions and demonstrate that the accounting profession and trustees' clients are facing many changes in the age of digitalization. Many accounting firms have already taken the digital plunge (the current crisis has prompted some accountants and clients to make greater use of digital tools) and those who have not yet done so are convinced that change will come in the next few years.



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# I. INTRODUCTION

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## 1. Background

A few years ago, no one would have imagined that we would be surfing the Internet every day, communicating via social networks, sending emails... All via smartphones, tablets or even connected watches. It is no secret that digital tools are becoming more and more a part of our daily lives and even more so since the crisis that has been affecting us for over a year. These tools are used for leisure activities as well as, increasingly, in many jobs. Several professions are therefore affected by digital changes, whether cashiers by scans, teachers by online courses or accountants by new applications. In particular, the impact of digitalization on the latter profession is the focus of our thesis.

Indeed, the accountancy profession has changed considerably over a short period of time : in just 50 years, tasks that were once done on paper have been digitized on computers. And the change does not stop there : according to researchers, a whole range of new digital technologies are likely to impact the accounting profession : automation, artificial intelligence, cloud computing, Big Data and blockchain (Gulin et al., 2019 ; Janvrin & Watson, 2017 ; Jylhä & Syynimaa, 2019 ; Törnqvist & Forss, 2018). Some are pessimistic about the future of the profession such as Frey and Osborne (2017) who state that accountants would have a 98% probability of being automated and would be the 31<sup>st</sup> most exposed profession to automation while others rather believe that the profession and tasks of accountants will change. This raises the question of what changes are expected and what accountants' views on them are.

## 2. Motivations

I decided to write a thesis to answer these questions because accounting is a discipline I have always liked and the impact of digital technologies on society is a subject I am particularly interested in. Thus, I was curious to learn more about how Belgian accountants were affected by this digitalization.

After reviewing the literature, an important point to note is that it is mainly predictive and contains few empirical studies. Many researchers have argued that new technologies have some advantages/disadvantages for accountants, yet very few have verified these advantages/disadvantages with empirical data and even fewer studies have been conducted on the actual state of adoption of these technologies by accountants. As Moll and Yigitbasioglu

(2019) argue, the fact that few empirical studies have been conducted should be seriously addressed. Moreover, among the few studies that have been conducted, none were conducted in Belgium. Hence, there was a gap in the literature and the interest of our study has been confirmed.

### **3. Research question and sub-questions**

The aim of our dissertation is to understand the impact of digitalization on the profession of accountants in Belgian accounting firms. In order to do so, we divided our work into the following research sub-questions :

- 1. What are the digital technologies used in accounting firms today ?*
- 2. What are the current and/or future drivers, barriers and challenges brought about by digitalization in trustees (for accountants and their customers) ?*
- 3. Why do some trustees adopt these new digital technologies more than others ?*

### **4. Structure**

This thesis is divided into several distinct parts. In the first part, we define the key concepts of our thesis, namely accounting, accounting firm and digitalization in order to clarify what we mean by these terms - which are widely used today but sometimes misunderstood. Then, we will list the main new digital technologies that may, according to researchers, impact accountants, define them and explain the expected impacts on accountants (positive and negative) presented in the literature.

In the second part, we will explain the research methodologies we chose to adopt and why it was interesting to choose several of them. After that, we will present the results observed during our studies and then, in the third part, we will analyze them in order to best answer our research sub-questions.

In the fourth and final part, we will compare these results with existing data and statements in the literature and we will conclude based on our main research question, which is "the impact of digitalization on the activities of accountants in Belgian fiduciaries". After that, we will make some recommendations regarding this digitalization to accountants, to the European Commission and to application developers. Finally, we will state the limitations of our thesis and, based on this, we will suggest further research that could be done.

## II. LITERATURE REVIEW

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*In this chapter, we first define the key concepts of our thesis title “the impact of digitalization on accountants’ activities in Belgian accounting firms”, so accounting, accounting firms and digitalization. These concepts are so common in our everyday life that many people use them without knowing their exact meaning. It is therefore important to clarify what we are talking about when we use these terms in order to fully understand the rest of this thesis. We will then outline the main digital technologies mentioned by scholars as likely to impact or already impacting accounting, define them, explain how they could impact the activities of accountants in their everyday work, and we will investigate whether any studies have been carried out on the extent to which they have been adopted. Finally, we will devote a few lines to discuss the possible impact of Covid-19 on the future digitalization of accounting and discuss our research questions.*

### ACCOUNTING : EXPLANATIONS AND HISTORY OF THE ACCOUNTING PROFESSION

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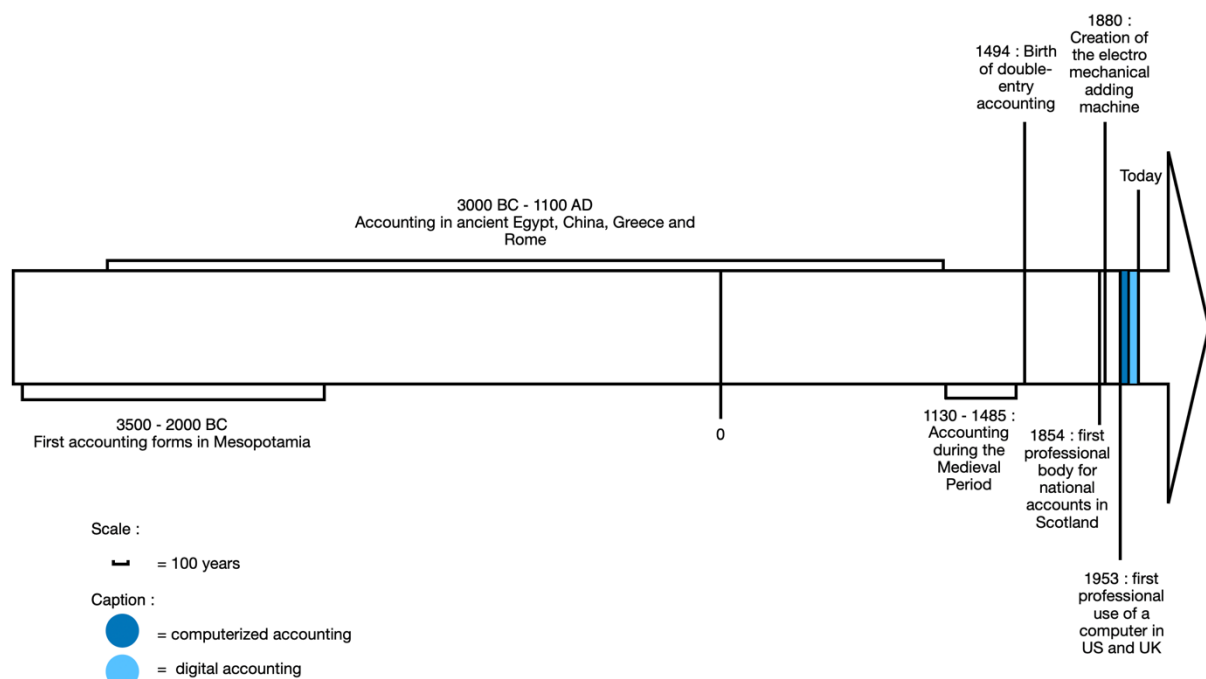
Among scholars, there are different ways to define accounting. There are those who focus only on the mathematical side of accounting (e.g. Laughlin, 1987 ; Mattessich, 2000 ; Rastall, 1909), they describe a method and precise logical processes followed by accountants to encode the data. They also only include in their definitions the quantitative side of the business, discarding the interpretation work that goes with it. This approach can thus be described as bookkeeping. Even though these authors date back to the 1900s, many of today’s dictionaries such as the Cambridge Dictionary or Investopedia continue to consider only the data recording side of the accounting profession. And then, there are those, including J.C. Duncan (1909), the AICPA<sup>1</sup>, Ghasemi et al. (2011), who view accounting as more of a statistical science. They retain the transaction recording dimension (the mathematical science side) but add to this the data analysis, interpretation and prediction sides, which help to evaluate a company’s past performances, current condition and future opportunities. Other scholars, such as Gaffikin (2006) and Janvrin and Watson (2017), complete the statistical science definition by saying that accounting’s purpose is to help humans and companies make decisions. They therefore view accounting as more of a social science.

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<sup>1</sup> American Institute of Certified Public Accountants

To summarize, it can be noted that the practices of accounting can be divided into three categories : technical operations (recording, classification and transcription of data), data interpretation to predict future situations and events, and finally more “social” operations such as interacting with customers and assisting them in their decision-making process. It is important to distinguish these three parts because we will see that a lot of scholars (and it is supported by many accountants) believe that one of the major impacts of digitalization in accounting is that accountants have and will increasingly tend to focus on interpreting data and advising customers based on these data (Gulin et al., 2019 ; Julien, 2016 ; Jylhä & Syynimaa, 2019 ; Richins et al., 2017). According to them, the first aspect (i.e. all technical operations) will tend to disappear.

Accounting has existed for a very long time. We can see on the timelines below (that we have made based on information mainly found in the papers written by Alexander (2002), Berisha and Asllanaj, (2017), Botes (2009) and Lilen (2019)) that accounting has stagnated for many years (very few changes and inventions), but has then changed dramatically in a very short period of time : it has made more progress in the last two centuries than in its overall history. Consequently, digitalization is a very recent phenomenon and a very small part of the global history of accounting.



*Figure 1 : Evolution of accounting over the years.*

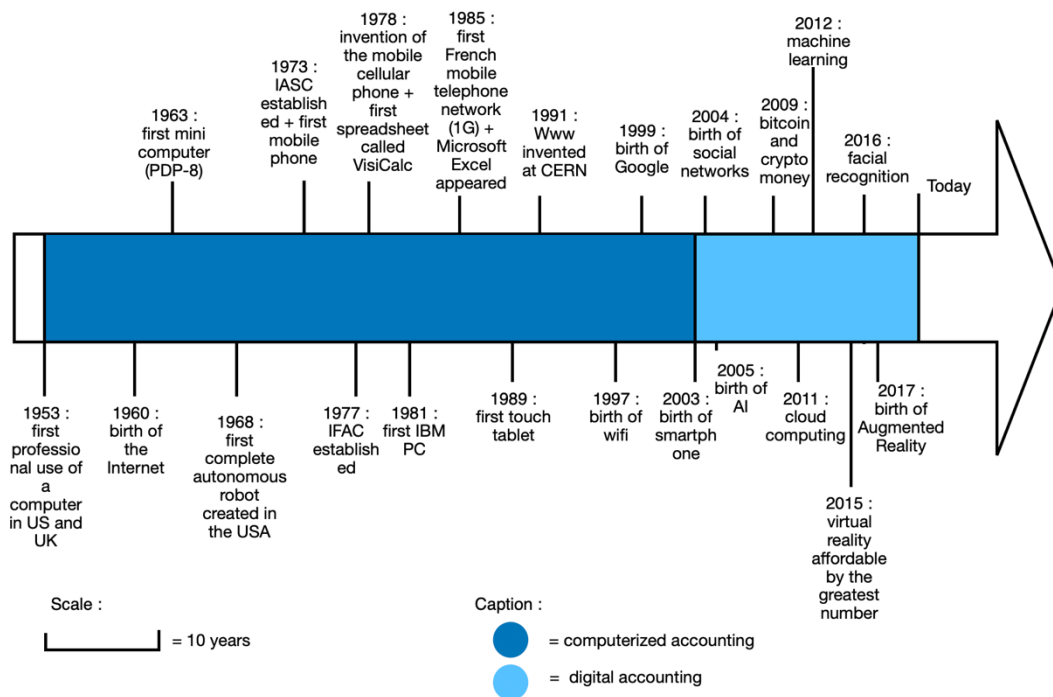


Figure 2 : Recent technological innovations that have impacted accounting.

There is much discussion and questioning about the impact of these recent changes. While some researchers argue that accountants will disappear as a result of these technological innovations (Frey & Osborne, 2017 ; Julien, 2016), others are convinced that this digitalization will never fully replace the human mind (Gulin et al., 2019 ; Jylhä & Syynimaa, 2019 ; Richins et al., 2017). All we know for sure is what the timelines indicate : accountants have subsisted through many prior innovations already.

## ACCOUNTING FIRMS / TRUSTEES / FIDUCIARIES

An accounting firm is a legal or natural person who acts on behalf of one or more other persons, putting the interests of its clients before its own (BeCompta, s.d. ; Investopedia, s.d.). Thus, according to DeMott (2006) : “a trustee relationship exists between two persons when one of them is required to act or give advice for the benefit of another person on matters within the scope of the relationship”. The words “fiduciary” and “trustee” are synonymous with the term “accounting firm” and we will use all three translations in this thesis.

The role of a trustee is mainly finance-related : managing the salaries and funds of their clients, taking care of the accounting, preparing accounting closures, financial reports and other financial tasks (Vérolet, 2019). Advice, compliance with legal standards and taxation are also part of their mission (Investopedia, n.d.). Accounting firms generally

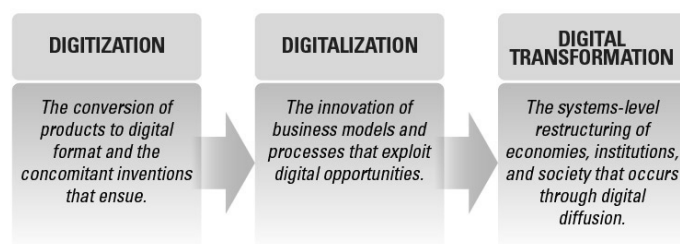
assist self-employed people and commercial or even non-commercial companies (BeCompta, n.d.), so their client base is very diverse. In summary, by "accounting firms" we refer in this thesis to small and medium-sized firms that provide accounting, legal, financial and tax services to entrepreneurs and businesses.

## DIGITALIZATION AND DIGITAL TECHNOLOGIES

### DIGITIZATION, DIGITALIZATION AND DIGITAL TRANSFORMATION : CLARIFICATION.

The term digitalization is often confused with other very similar terms : digitization and digital transformation (Unruh & Kiron, 2017). These three words, in appearance very similar, actually have different meanings, so it is important to clarify what we mean when we talk about digitalization. Digitization refers to the simple technical process of encoding and converting physical information into a digital format, it is a kind of dematerialization (Maltaverne, 2017 ; Yoo et al., 2010). In digitization, it is therefore information that is digitized (Bloomberg, 2018). Digitalization goes one step further : it is brought by digital technologies and involves more than just a technical process (digitization). Finally, digital transformation implies major changes in strategy, core competencies, or business conduct (Bharadwaj et al., 2013 ; Knudsen, 2020 ; Unruh & Kiron, 2017). Thus, digitalization lies between digitization and digital transformation.

In his paper, Savic (2019) gives an example for each term : Digitization in a business would be the digitization of paper registration forms, digitalization would be the fully digital registration process and the digital transformation would be the entire business being digital, from registration to content delivery. In summary, we can say that digitalization refers to the changes in certain processes and tasks resulting from the introduction of digital technologies and tools in a company. If the change just consists of digitizing documents or physical data into digital data, it is called digitization and if the digitalization concerns the whole company and not just one process, we will speak of digital transformation.



*Figure 3 : Definition of Digitization, Digitalization and Digital Transformation.  
Source : Digital Transformation on Purpose by Unruh and Kiron, 2017.*



It was very important to distinguish between these three terms because we have seen in the literature and in our own research process that digitization has already been, and since a long time, impacting many accountants (Brousse, 2016 ; KPMG, 2017) while digitalization has only recently started being used increasingly in fiduciaries. However, it appears that digital transformation is not, for now, relevant for accounting firms given the fact that none of them are completely digital yet – and a digital transformation implies digitalization in the whole company (KPMG, 2017). Hence, in this thesis we have decided to investigate the digitalization in accounting firms, given that investing the digital transformation, as it is not widespread, would not have given many results.

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#### DIGITAL TECHNOLOGIES IMPACTING ACCOUNTING : DEFINITIONS AND IMPACTS.

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Among the digital technologies mentioned as impacting accountants in the scientific articles are : automation (Belkadi, 2015 ; Davern et al., 2019 ; Gulin et al., 2019 ; Kaya et al., 2019), artificial intelligence (Jylhä & Syynimaa, 2019 ; Kamordzhanova & Selezneva, 2019 ; Moll & Yigitbasioglu, 2019), Big Data (Janvrin & Watson, 2017 ; Kamordzhanova & Selezneva, 2019 ; Knudsen, 2020 ; Stancheva-Todorova, 2019), blockchain (Desplebin et al., 2019 ; Rückeshäuser, 2017 ; Schmitz & Leoni, 2019 ; Törnqvist & Forss, 2018) and cloud computing (Dimitriu & Matei, 2015 ; Julien, 2016 ; Marand et al., 2013 ; Prichici & Ionescu, 2015).

In Belgium, there is little (to no) scientific data related to these technologies in accounting firms : Are they widespread ? Are they available on the market ? Are they being used by accountants ? In this study, we thus decided to keep a broader scope of new technologies that includes the technologies most frequently described in the scientific literature as likely to impact accountants. We define these technologies here below and explain what their expected advantages and disadvantages are. Subsequently, during our study, we will assess the extent to which these technologies are – or are not – adopted, known, expected to be used by the accountants we will interview.

#### **AUTOMATION and RPA**

Automation refers to the automatic execution by a machine (usually a computer) of a task that was previously performed by a human being (Madakam et al., 2019 ; Parasuraman & Riley, 1997). Robotic process automation (RPA) is an alternative to traditional process automation (Jedrzejka, 2019) which refers to software called a “robot” that performs the

repetitive work previously done by people (Willcocks et al., 2015). The robot mimics the human activities, interacts with applications on the computer and performs rule-based tasks (Tripathi, 2018). The biggest difference between RPA and automation is that the robot software can interact with other applications, just as a human would do, whereas in automation, the machine is programmed to do a repetitive task but not to interact. The advantages of RPA over traditional automation are that it is cheaper, quicker and easier to implement as well as to integrate for employees (Jovanović et al., 2019).

An example of a possible use of RPA in accounting is in an accounts payable process. Software robots log in with their own identifiers, find new invoices from suppliers, compare them with orders, request and await approvals, perform accounting data entry and other internal systems, and finally release payment at the same time as they record discounts and transfers (Jędrzejka, 2019). An example of a practical application of automation in accounting is the machines that can add new suppliers to the system without human intervention, which can also read receipts, check expenses and can alert people when a possible violation has been committed (Marr, 2018).

Automation is often believed to bring huge opportunities to accountants (Gulin et al., 2019 ; Jędrzejka, 2019 ; Törnqvist & Forss, 2018). First and foremost, scholars argue that automation of tasks allows accountants not to waste their time on repetitive actions that can be performed by software (Brousse, 2016). Machines perform the routine tasks much faster than humans do and can work round the clock (Belkadi, 2015 ; Kaya et al., 2019). The time required to prepare accounting documents and for reporting is therefore shortened. Productivity is thus supposedly higher while the cost for the firm is lower, which will allow customers to pay less money (Gulin et al., 2019 ; Jylhä & Syynimaa, 2019 ; Marr, 2018 ; Törnqvist & Forss, 2018). In addition, machines generally make fewer mistakes than humans (Jędrzejka, 2019 ; Törnqvist & Forss, 2018). Thus, the automation of accounting tasks has been reported to result in a better data quality, data relevance and data consistency (ACCA<sup>2</sup>, 2013 ; Jędrzejka, 2019 ; Jylhä & Syynimaa, 2019 ; Törnqvist & Forss, 2018). Furthermore, automation would have a positive impact on employees because they could focus on more engaging tasks : indeed, many scholars (André, 2012 ; Julien, 2016 ; Jylhä & Syynimaa, 2019 ; Stancheva-Todorova, 2019) argue that the profession will undoubtedly change and that accountants will focus much more on value-

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<sup>2</sup> Association of Chartered Certified Accountants

added consulting tasks, such as consulting in company management, asset management, risk management, in external growth, strategy, financing, etc. (Belkadi, 2015 ; Brousse, 2016). According to Gulin et al. (2019, p.509), the profession “*will transform from bookkeepers and accountants to advisors, consultants and accountants engineers*”.

Automation is also believed to bring several threats for accountants (Gulin et al., 2019 ; Jylhä & Syynimaa, 2019 ; Törnqvist & Forss, 2018). The main one is that it could eliminate jobs. Indeed, many researchers state that routine, repetitive and structured tasks that rely on simple algorithmic processing of numerical data have already been or will be automated soon (ACCA, 2013 ; Kaya et al., 2019). Some are optimistic about the impact that automation will have on the accounting profession while others are much more pessimistic. Optimists (Gulin et al., 2019 ; Jylhä & Syynimaa, 2019 ; Richins et al., 2017) believe that areas of accounting that involve high levels of interpersonal contact, the exercise of various professional judgments, analyzing and dealing with exceptions will not be automated or digitalized because robots cannot perform such tasks adequately. According to them, no software can replace human accountants anytime soon, because they are needed to analyze and interpret the information provided by technology. Pessimists, on the other hand, claim that there is a high probability for the accountant profession to face extinction because of automation (Frey & Osborne, 2017). Bertrand Delattre, director of Zefyr’s development, has stated that a third of his users no longer have certified public accountants (Julien, 2016). According to Sharif (2018), there will certainly still be a demand for accountants in the future ; however, there will, in any case, be a downsizing and it is probable that this downsizing will mostly target accountants with few qualifications. Secondly, some authors mention the reliability issues raised by automation (Jylhä & Syynimaa, 2019 ; Knudsen, 2020 ; Törnqvist & Forss, 2018). According to them, even if the automated applications are less error-prone than humans, they are sometimes subject to bugs, which reduces their reliability. A final threat raised by researchers is the fact that some organizations (more often the small ones) do not have the resources to make the investments to automate tasks (Jylhä & Syynimaa, 2019 ; Törnqvist & Forss, 2018). Therefore, they risk losing the clients who want to have the benefits offered by that system (Gulin et al., 2019).

Concerning the extent of adoption, Jylhä and Syynimaa (2019) have shown in their study that robotics and automation are used by many of the interviewed organizations. However, this study has two major problems : firstly, the study focuses on digitalization in general and does not separate the different digital technologies to see their individual advantages and disadvantages, and secondly, the interviewees were senior-level executives from accounting

firms, not accountants. Regarding RPA, other scholars state that RPA implementation is still in the early stages (Kaya et al., 2019 ; Kokina & Blanchette, 2019). Yet, in the Kaya et al. study (2019) no empirical research has been done and the Kokina and Blanchette study (2019) focuses on corporate accountants and not fiduciary accountants. In conclusion, automation and RPA are widely discussed, but it is unclear to know whether many accountants in accounting firms use them in their daily practices.

### ARTIFICIAL INTELLIGENCE (AI)

Automation is often combined with artificial intelligence (EY, 2018), which is a field of research consisting in equipping machines with the cognitive performances of a human being (language, reasoning, learning, memory...) (Kok et al., 2009 ; Sharif, 2018). Nowadays, artificial intelligence can be segmented into two parts, one called “strong” and another called “weak”. Strong artificial intelligence describes machines that would be able to reproduce 100% of the functioning of the human brain and would therefore be capable of reasoning, adapting and even having feelings. However, such a technology does not exist today. The artificial intelligence currently available can be described as “weak” as machines only perform tasks humans have programmed them to accomplish, and are neither evolutionary, independent nor conscious. In a word, they just imitate programmed human behaviour (Kok et al., 2009 ; Sharif, 2018).

Among the known techniques of AI is *machine learning* : subdomain in which algorithms learn and evolve, based on examples and experiences, to perform tasks for which they have not been explicitly programmed (D’ascoli, 2020 ; Moll & Yigitbasioglu, 2019 ; Sharif, 2018). An explicit example that Sharif takes up in his thesis is that of the Nuageo site : *“a robot that goes straight ahead, by dint of banging against the walls, will end up trying to turn and will understand that avoiding the obstacle allows it to go further”*. In this example, the machine seems to “learn”. Machine learning is often combined with automation in accounting. An example is when the software is unable to detect the shape of a particular document. In this case, the human in charge of the proper sequence of operations will show the solution to the machine. The machine will then have assimilated the shape of the document in question and will no longer have any problems detecting it (Sharif, 2018).

According to Sharif (2018), the main opportunity that machine learning has brought to accountants is the extension and the improvement of *optical character recognition (OCR)*,

*intelligent character recognition (ICR) and automatic document recognition (ACR)* possibilities. Optical character recognition refers to the ability of an electronic device to recognize and convert printed text into a form that can be used by a computer (Sharif, 2018). This avoids retyping the content of the text by hand, so it is simply scanned and, thanks to OCR, the text will appear in the form of letters, words and numbers. It is therefore a digitization that results in a text, and not in an image like traditional scans. Intelligent character recognition has the same characteristics but for handwritten documents. In the accounting field, these two technologies are particularly useful because they recognize useful information in accounting documents such as amounts to be paid, dates, etc. After the necessary data has been collected by the OCR and ICR technologies, the robot software knows how to allocate them in the accounting software. Then, automatic document recognition enables the type of document to be recognized and classified according to its type in the computer system. Thanks to machine learning, if the OCR/ACR/ICR system makes a mistake, is not able to fill in a field or detect the shape of a document, the human in charge of the smooth running of the operations will show it the solution and the system will assimilate it on its own so as not to have any problems later on. Hence, intelligent OCR, ICR and ACR technologies combined with automation further reduce the need for human intervention.

The advantages and threats of artificial intelligence are the same as for automation (Sharif, 2018). According to some studies it would appear that AI is not yet fully developed (Jylhä & Syynimaa, 2019). However, according to PWC (2018), some companies have already undertaken to extend their OCR processing modules with artificial intelligence systems.

## **BIG DATA**

Big Data refers to a very large amount of data which is too voluminous and complex to be analyzed by traditional accounting tools (Törnqvist & Forss, 2018). Big Data is traditionally characterized by a large **Volume** (very large amount of data being generated – approximately 2.5 quintillion ( $10^{18}$ ) bytes each day according to ACCA, 2013), a high **Velocity** (very fast data creation), and a big **Variety** (as the data come from many different sources – barcodes, telephone signals, digital images, personal location records, online searches, etc. – and have several types of structures : structured, unstructured and semi-structured) (Janvrin & Watson, 2017 ; Moll & Yigitbasioglu, 2019 ; Törnqvist & Forss, 2018). Other sources also mention the importance and difficulty of a high **Veracity** of the data (accuracy, reliability and thus quality) and the high

Value (profit) that can be generated by analyzing this data (Janvrin & Watson, 2017 ; Sestino et al., 2020). These are called the 5-Vs (Törnqvist & Forss, 2018).

Among the main opportunities of Big Data identified by researchers is the fact that it allows accountants to access a huge amount of data that they could not get before, the analysis of which can improve prediction accuracy and lead to better decision-making for the customers (Gulin et al., 2019 ; Zhang et al., 2020 ; Zouhri, 2019).

According to scholars, accountants will also face several issues brought by Big Data. Firstly, these new technologies are not easy to use : managing quantity, quality and accessibility of data is likely to be the biggest problem (ACCA, 2013 ; Stancheva-Todorova, 2019 ; Törnqvist & Forss, 2018). The amount of data generated by these new technologies is considerable, which means accountants will have to develop the necessary skills and learn how to use Big Data analytics instruments to extract and target relevant information (Knudsen, 2020 ; Stancheva-Todorova, 2019). In order to achieve this, internal training for workers and customers will be necessary (Belkadi, 2015 ; Moll & Yigitbasioglu, 2019 ; Törnqvist & Forss, 2018). Accounting education should also adapt to these new technologies : students need to learn how to use them at early stages and develop questioning and analytical skills with respect to the data generated (Gulin et al., 2019 ; Janvrin & Watson, 2017 ; McKinney et al., 2017 ; Santouridis, 2015). Stancheva-Todora asserts in her paper (2019) that some professional accounting bodies (such as ACCA, the Institute of Chartered Accountants in England and Wales and the Chartered Global Management Accountants) have already begun introducing new technologies into their curriculum. Nevertheless, according to some scholars, these changes have not yet reached the school curricula (Törnqvist & Forss, 2018). Accountants will also have to pay increasing attention to new laws emerging regulating the use of these new technologies (Gulin et al., 2019 ; Stancheva-Todorova, 2019). For example, regarding Big Data, the “General Data Protection Regulation” (GDPR) came into force in 2018 in the European Union (Zhang et al., 2020). Another big issue that scholars point out is data security, both in terms of possible cyber-attacks and the use and sharing of data by the companies that collect it (ACCA, 2013 ; Stancheva-Todorova, 2019 ; Törnqvist & Forss, 2018). The technology investments issue also applies to this digital technology (Törnqvist & Forss, 2018).

Concerning the current state of adoption of Big Data, according to the ICAEW<sup>3</sup> Faculty (2014), it seems to be analyzed, used and implemented in many large companies but not in smaller ones. However, no studies have been carried out to prove this, and this does not concern accountants specifically but companies in general. Thus, there are a lot of assertions about their impact in accounting but no survey has been undertaken, leaving these assertions unproved.

## **BLOCKCHAIN**

Blockchain is a database with a history of transactions (Rückeshäuser, 2017). This technology is normally associated with cryptocurrencies such as Bitcoin (Sarmah, 2018 ; Schmitz & Leoni, 2019). We can distinguish public blockchain technology (accessible to all like Bitcoin), and private one (access limited to certain people) (Blockchain France, 2016). Blockchain is characterized by three principles : high transparency (information accessible to all users), decentralization (there is no central control and governance authority, the blockchain is based on peer-to-peer relations : information is saved on all participants' servers) plus, a high security and data protection (Blockchain France, 2016 ; Desplebin et al., 2019 ; Schmitz & Leoni, 2019).

The main positive foreseen effect of blockchain technology for accountants over of traditional databases is that the former is more secure and, therefore, less subject to fraud (Desplebin et al., 2019 ; Gulin et al., 2019 ; Moll & Yigitbasioglu, 2019). The reason why blockchain is so secure is because it includes several protection mechanisms. The first is that transactions are immutable, i.e. they cannot be changed retroactively (Schmitz & Leoni, 2019). The second is that the history of transactions is kept indefinitely (Desplebin et al., 2019). The third is that cryptography is used to encrypt the data : either the same private key is used for encryption and decryption or a public key is used to encrypt the data and a private key is used to decrypt it. Thus, everyone has access to the data but not everyone knows how to decrypt it (Desplebin et al., 2019). The fourth is a protocol called “mining” which allows no transaction to be accepted before it has been validated by the majority of the miners<sup>4</sup> (by solving a mathematical problem) (Boudès, 2018 ; Desplebin et al., 2019). In order to falsify a transaction and commit fraud, more than half of these miners would have to be corrupted simultaneously : the fraud is thus easily spotted and rejected (Blockchain France, 2016). The fifth and last is that

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<sup>3</sup> *Institute of Chartered Accountants in England and Wales*

<sup>4</sup> *Blockchain users*

all network participants keep an identical copy of the register in which the information is recorded (Blockchain France, 2016). This security – if blockchain is integrated into accounting – would create much greater confidence for the customer in the accountant preparing the accounts because customers would know that the possible margin of error is much smaller than with a normal database (Desplebin et al., 2019 ; Moll & Yigitbasioglu, 2019). Moreover, thanks to public and private keys, accountants would have the opportunity to help the customer define degrees of transparency and, therefore, confidentiality for different stakeholders who do not need the same access to the accounting information. For example, financial managers and auditors need access to all accounting data, while employees working on order processing only need accounting information on inventories and suppliers (Desplebin et al., 2019; Schmitz & Leoni, 2019). Nevertheless, it is likely that some of the accountants' customers are not interested in transparency about their financial situation (Rückeshäuser, 2017).

Among the main negative foreseen effects of using blockchain for accounting records, scholars have underlined that if blockchain ever replaces traditional databases, accountants will have to learn the computer languages specific to blockchain and develop the necessary skills to manage this complex system (Desplebin et al., 2019 ; Partida, 2018). Another risk is the loss or theft of private keys that would result in a loss of transactions (Moll & Yigitbasioglu, 2019).

Many authors mention blockchain technology among the new technologies likely to impact accounting but only a few have investigated the extent of its current adoption. However, it would appear that blockchain, though not yet fully developed and not available for day-to-day accounting operations, is believed to have the potential to impact the field in a major way in the years to come (Alarcon & Ng, 2018 ; Partida, 2018 ; Törnqvist & Forss, 2018). A recent PWC study (2018) shows that 8% of the companies surveyed are already using it. Consequently, there could already be applications among Belgian accounting firms today.

## CLOUD COMPUTING

Cloud computing allows easy access via a network to a set of IT<sup>5</sup> resources such as servers, storage space, applications... (Fagroud et al., 2019 ; Leon, 2015 ; Medhioub, 2015). Users can access these resources from any place and at any time, via a computer device with an Internet connection (ACCA, 2013 ; Dimitriu & Matei, 2014 ; Mell & Grance, 2011). Cloud

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<sup>5</sup> *Information technology*



computing consists of three service models and four deployment models (Fagroud et al., 2019 ; Hamze, 2015 ; Leon, 2015 ; Medhioub, 2015).

The three types of services offered by the cloud are : SaaS (Software as a service), PaaS (Platform as a service) and IaaS (Infrastructure as a service). They are shown in the figure 4 below. IaaS provides infrastructure such as storage, memory, servers or computing services. Known examples are Apple iCloud and Google Drive. PaaS provides a complete environment for the development and deployment of applications and software. It enables programmers to develop, test, run and manage applications. SaaS is a model that provides software as a service, i.e. it provides applications and software accessible over the Internet. Thus, customers no longer have to install software and applications on their computers (Leon, 2015 ; Shukur et al., 2020). Cloud computing is therefore not the purchase of a product but the purchase of a service (Dimitriu & Matei, 2015).

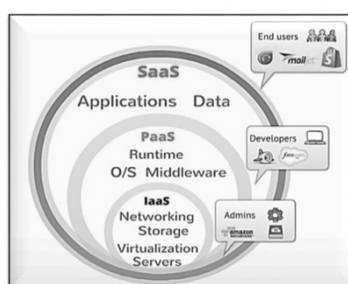


Figure 4 : Cloud computing services (IaaS, PaaS, and SaaS).

Source : Cloud Computing Virtualization of Resources Allocation for Distributed Systems by Shukur et al., 2020.

The four deployment models correspond to the type of cloud computing. It can be public (cloud service providers offer their resources to everyone, shared infrastructure), private (resources are made available to a single customer), community-based (cloud resources shared by several companies or organizations), or hybrid (allows the company combine public, private and/or community clouds) (Fagroud et al., 2019 ; Hamze, 2015 ; Medhioub, 2015).

First and foremost, among the opportunities for the accounting world underlined in the literature is the fact that thanks to cloud computing, information is available for the client and the certified public accountant in real time, without delay. They can access the data online, from anywhere in the world with a computer or a smartphone, without having to meet in real life. Thus, everything can be done virtually (Bordas et al., 2015 ; Dimitriu & Matei, 2015 ; Kamordzhanova & Selezneva, 2019 ; Prichici & Ionescu, 2015). This allows a shorter response time and faster sharing of data, accounting information and accounting analysis from and to

clients and within the company (Moll & Yigitbasioglu, 2019 ; Stancheva-Todorova, 2019). This further shortens document preparation time and consequently, as with automation, increases productivity (Dimitriu & Matei, 2015 ; Gulin et al., 2019 ; Prichici & Ionescu, 2015). Furthermore, thanks to the fact that both parties can access and modify the data online, accounting is always up-to-date (Moll & Yigitbasioglu, 2019 ; Törnqvist & Forss, 2018). This results in a better data quality, data relevance and data consistency. Therefore, it allows for better decision-making (Gulin et al., 2019 ; Jylhä & Syynimaa, 2019 ; Stancheva-Todorova, 2019). Another advantage is that the use of cloud computing is much cheaper than internal software because no major investments in infrastructure, employee training, update/maintenance costs or software licenses are required (Dimitriu & Matei, 2015 ; Prichici & Ionescu, 2015 ; Törnqvist & Forss, 2018). Companies are also less likely to suffer data loss as it is hosted on secure servers (Kamordzhanova & Selezneva, 2019). Finally, cloud computing offers unlimited data storage capacity (Dimitriu & Matei, 2014), makes it easier for companies to exchange accounting information (Marand et al., 2013) thus, creating more opportunities for partnership between these companies to offer the customer a wider range of services (Belkadi, 2015).

Nevertheless, according to scholars, cloud computing raises security and confidentiality issues (Bordas et al., 2015 ; Crozat et al., 2019 ; Yin Tong, 2019). Since, thanks to the cloud, customer data is now online, if the system is not secure enough, it is easy for malicious people to hack into it and gain access to customers' private data (Moll & Yigitbasioglu, 2019 ; Payne, 2014). Moreover, according to Dimitriu and Matei (2014), Ionescu et al. (2013) and Marand et al. (2013), due to cloud computing, accountants and their customers become dependent on their Internet connection because its interruption would force them to suspend their activity. According to these researchers, accountants also become dependent on suppliers because they are responsible for the maintenance, updates and management of the applications provided and the accountant has no control over it. Furthermore, we have seen in the automation part that applications are sometimes subject to bugs. Regarding cloud computing, if the software bugs, the accountant will not be able to access its data until the problem is resolved (Ionescu et al., 2013). But this risk is also present for traditional accounting applications, the only protection against this are paper documents (Sharif, 2018). Finally, writers point out that cloud computing, as well as automation, increase competitiveness because they are changing customer expectations : nowadays, most customers want to have access to their accounting information, dashboards and personalized advice anytime and anywhere on their tablet or phone. Moreover,

as explained before, automation allows for productivity gains, which means that customers can pay less. If competitors offer these new services and not the current accountant, customers will certainly go elsewhere (Belkadi, 2015 ; Gulin et al., 2019 ; Jylhä & Syynimaa, 2019). Instant online access to accounting information, diversification of the offer and increased productivity are therefore essential for accountants if they want to stay competitive and keep their clients.

Some authors state that real-time reporting and cloud computing do not yet play a consistent role in most accounting firms (Dimitriu & Matei, 2014 ; KPMG, 2017). However, the KPMG (2017) study focuses on corporate accountants, not on trustees and the study by Dimitriu and Matei (2014) does not include any investigation to substantiate its claims. Furthermore, Bertrand Gall, head of marketing for micro-enterprises and SMEs<sup>6</sup> activities wrote in another study entitled “Digitalisation pour le meilleur” carried out by Brousse (2016) that they had just “surpassed the number of 2000 accounting firms equipped with cloud technology” (our translation). Another survey carried out by the CSOEC<sup>7</sup> in 2015, reveals that 52% of certified public accountants use the cloud, in particular in Saas mode and for shared data space (public cloud) (ACCA, 2013 ; Julien, 2016). Hence, there are diverging assertions and a lack of empirical studies to shed light on them.

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## COVID-19, DIGITALIZATION AND ACCOUNTANTS.

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It is no secret that Covid-19 has impacted the economic activity of every country in the world. As authors Ciobanu, Sahlian and Vuță (2020) point out, the coronavirus has led to the reduction or even partial or total cessation of economic activities in many countries. In this context, several authors agree that the professional accountant has an important role to play as a business advisor (Bogasiu, 2020 ; Ciobanu et al., 2020 ; Kaka, 2020). For the analysis of the biggest risks, advice on business continuity and the identification of ways in which the company can best benefit from public support measures, accountants are now essential. According to Mr. Bogasiu (2020), the quality of the information provided by accountants is crucial now more than ever because it is on this basis that companies will make important decisions regarding Covid-19. Since new technologies greatly increase the quality, relevance and consistency of the

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<sup>6</sup> *Small-medium businesses*

<sup>7</sup> *Conseil supérieur de l'Ordre des Experts Comptables*

data provided by the accountant (Gulin et al., 2019 ; Jylhä & Syynimaa, 2019), they could be a great help during this difficult period.

New technologies are also increasingly necessary in this context. A study conducted by Mr. Kaka (2020) has shown that because of Covid-19's measures such as homeworking and social distancing, digitalization has become a necessity for accounting firms if they want to stay in business during this pandemic period and in the future. The current crisis could therefore – and even should – accelerate the adoption of digital technologies in accounting firms in the near future (Fletcher & Griffiths, 2020 ; Seetharaman, 2020). This is a hypothesis we intend to test during our empirical study : to see whether the Covid-19 has impacted the sector and possibly increased or accelerated the propensity of accounting firms to jump on the digitalization bandwagon.

## SUMMARY, CONCLUSION AND RESEARCH QUESTIONS

Several studies have been carried out on the impact of digital technologies on accounting. Some scholars have investigated the opportunities and negative impacts of automation for accountants, the practical applications it has, and the extent to which it is being adopted by accountants (Frey & Osborne, 2017 ; Gulin et al., 2019 ; Jędrzejka, 2019 ; Knudsen, 2020 ; Stancheva-Todorova, 2019). Others have done the same with artificial intelligence (ICAEW, 2018 ; Sharif, 2018), Big Data (Janvrin & Watson, 2017 ; McKinney et al., 2017 ; Törnqvist & Forss, 2018 ; Zouhri, 2019), blockchain (Boudès, 2018 ; Desplebin et al., 2019 ; Rückeshäuser, 2017 ; Schmitz & Leoni, 2019) and cloud computing (Dimitriu & Matei, 2014 ; Julien, 2016 ; KPMG, 2017 ; Prichichi & Ionescu, 2015). It is interesting to note that these technologies are all interconnected and that to significantly improve all parts of the business, a combination of all these solutions would be positive (Moll & Yigitbasioglu, 2019). They are therefore complementary and not in competition. A summary table of the main technologies mentioned in the literature as likely to have an impact on accountants and the positive and negative effects they could have on them can be found below :

	<b>Positive foreseen effects for accountants (in general)</b>	<b>Negative foreseen effects for accountants (in general)</b>	<b>Extent of use</b>
<b>Automation</b>	<ul style="list-style-type: none"> <li>➤ Higher productivity</li> <li>➤ Lower costs for the firm and the customers</li> </ul>	<ul style="list-style-type: none"> <li>➤ Possible job cuts</li> <li>➤ Reliability issues</li> <li>➤ Financial investments needed</li> </ul>	<ul style="list-style-type: none"> <li>➤ Automation : widely used.</li> <li>➤ RPA : not widely used.</li> </ul>

	<ul style="list-style-type: none"> <li>➤ Fewer mistakes → better quality</li> <li>➤ Employees can focus on more engaging tasks</li> </ul>	<ul style="list-style-type: none"> <li>➤ Increase competitiveness</li> </ul>	
<b>Artificial Intelligence</b>	<ul style="list-style-type: none"> <li>➤ Same as for automation</li> </ul>	<ul style="list-style-type: none"> <li>➤ Further reduce the need for human intervention</li> <li>➤ + Same as for automation</li> </ul>	<ul style="list-style-type: none"> <li>➤ Still in the early stages of development but already used in OCR/ACR/ICR.</li> </ul>
<b>Big Data</b>	<ul style="list-style-type: none"> <li>➤ Improve prediction accuracy and thus decision-making</li> </ul>	<ul style="list-style-type: none"> <li>➤ New skills required</li> <li>➤ Security issues</li> </ul>	<ul style="list-style-type: none"> <li>➤ Analyzed by large companies but not by smaller ones.</li> </ul>
<b>Blockchain</b>	<ul style="list-style-type: none"> <li>➤ More secure in terms of the accuracy of transactions than traditional database</li> <li>➤ Greater customer confidence</li> <li>➤ Allows the setting of degrees of transparency and confidentiality</li> </ul>	<ul style="list-style-type: none"> <li>➤ New skills required</li> <li>➤ Loss or theft of private key = loss of transactions</li> </ul>	<ul style="list-style-type: none"> <li>➤ Not yet fully developed and not available for a current application.</li> </ul> <p>VS</p> <ul style="list-style-type: none"> <li>➤ Few companies are already using it.</li> </ul>
<b>Cloud computing</b>	<ul style="list-style-type: none"> <li>➤ Productivity higher</li> <li>➤ No physical presence needed</li> <li>➤ Accessibility everywhere at any time</li> <li>➤ Better quality</li> <li>➤ Lower costs</li> <li>➤ Infinite storage capacity</li> <li>➤ Easier cooperation</li> <li>➤ Less risk of losing data</li> </ul>	<ul style="list-style-type: none"> <li>➤ Dependent on Internet and supplier</li> <li>➤ Security problems (hacking)</li> <li>➤ Increase competitiveness</li> </ul>	<ul style="list-style-type: none"> <li>➤ Do not yet play a big role for most accounting firms.</li> </ul> <p>VS</p> <ul style="list-style-type: none"> <li>➤ A lot are using it.</li> </ul>

An important point to note is that the literature is very predictive. Many argue that new technologies have some advantages/disadvantages for accountants but very few verify these advantages/disadvantages with studies and even fewer searches have been carried out on the actual state of adoption of these technologies by accountants. Thus, as demonstrated by Moll and Yigitbasioglu (2019) and as we also have noticed during our readings, only few empirical studies have been done. Among the few studies on some of these technologies' impact on

accountants, few are relevant for our topic. The Wilson and Sangster study (1992) showed that accountants working in industry use computers more than those in accounting firms. However, this study is not complete, as it was designed to compare computer use between the two groups and not automated tasks at the level of accounting firms, and it focuses only on computer use and not on automation in general. Moreover, the study dates back to 1992, consequently things have certainly changed since then. The same argument applies to the study by Rouquette and Cases, which dates from 1999. Sharif's study (2018) (mainly on automation) is interesting but not representative enough as far as trustees are concerned, since only one of the respondents worked in a trustee. The study by Chukwudi et al. (2018) includes a study that investigates the effects of artificial intelligence in accounting firms, but the firms surveyed are auditing firms, which is not the same thing. The study made by Jylhä and Syynimaa (2019) is very interesting but interview senior-level executives from accounting firms and not accountants.

Moreover, among the few empirical and relevant studies that have been conducted (such as those of Ionescu et al., 2013 and Törnqvist & Forss, 2018), none have been carried out in Belgium. Another argument justifying the interest of our study is that none of the articles we found includes a study on all technologies together. Some studies have been carried out on one type of technology or on digitalization in general (such as the study of Jylhä and Syynimaa, 2019) but no one – at least in the articles we found – has ever investigated in the same study the different advantages, impacts and disadvantages that each of the digital technologies can have on accountants.

The question that arises from our research is therefore :

**“How does digitalization impact the activities of accountants in Belgian  
accounting firms ?”**

In this thesis, we decided to focus on accountants working in accounting firms because it is in these firms that financial investments in digital technologies will have the most direct impact on accountants and their clients. The financial investments for digitalization in businesses are mainly made to increase profitability, the benefits brought to accountants and their clients often being only secondary. Moreover, recent studies – such as those of KPMG (2017), Fernandez and Aman (2018) or Kokina and Blanchette (2019) – have already been carried out on the impact of digitalization on accountants working in

companies (i.e. corporate accountant). Hence, it was interesting to investigate its impact on accountants who do not work in businesses but in trustees.

To address our main research question, we intend to study these different sub-questions :

1. *What are the digital technologies used in accounting firms today ?*
2. *What are the current and/or future drivers, barriers and challenges brought about by digitalization in trustees (for accountants and their customers) ?*

We investigate these questions, which remain very broad, in order to understand the current global situation in the sector and to understand if there are any discrepancies between what is presented in the literature and what is actually used in terms of technological applications by accountants in fiduciaries. We have also added an additional sub-question because we believe that, if there is a causal link between adoption and some characteristics of trustees, it is something that could be of real interest to digitalized and non-digitalized accounting trustees as well as to application developers who will have access to our work :

3. *Why do some trustees adopt these new digital technologies more than others ?*

In order to answer these different sub-questions, we first intend to conduct qualitative interviews with nine accountants working in accounting firms, which will help us draw up a quantitative questionnaire that we will send to as many Belgian trustees as possible. We also intend to participate in the 12<sup>th</sup> edition of the “Forum for the Future” that will take place from 24 to 27 November 2020. These methods are further described in the next section.





### III. EMPIRICAL RESEARCH

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*For our study, we have chosen to combine a qualitative approach with a quantitative one. Indeed, according to Ulmer and Wilson (2011) and Corbin and Strauss (2008), these two methods are complementary and must be used together in order to have diverse opinions and points of view. In our thesis, it was even more of an interest to combine the two methods as there are few empirical studies that have been conducted in the literature regarding the impact of digitalization on the activities of accountants in accounting firms. Moreover, none have been conducted in Belgium. Hence, there was a data gap and combining a qualitative study – which helped us to understand broadly what the situation was in the sector – and then a quantitative study – which allowed us to have a more global view and to generalize – seemed to us to be a real added value to fill that gap.*

*In this chapter, we will first present our qualitative methodology, so the research methods we used, the population studied, and the samples chosen. After that, we will present the results of these studies. We will then do the same for the quantitative part. Afterwards, we will analyze the results of the two methods in order to answer our main research question and sub-questions.*

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#### METHODOLOGY – QUALITATIVE PART

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##### RESEARCH METHODS

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We decided to start with the qualitative approach because this method provides very rich information (Queiros et al., 2017) and, as we are not accountants, we wanted to have a more comprehensive understanding of how accountants currently face digitalization and therefore, allow them to give us all the information they deem necessary on this subject.

Firstly, we had the opportunity to participate in the 12<sup>th</sup> edition of the Congress "Forum For the Future". In this case, the qualitative method was more observational as the presentations consisted mainly of listening to the testimonies of accountants and chartered accountants and taking notes. This congress is viewed as an important meeting place for the economic professions in Belgium : chartered accountants, chartered tax accountants, tax consultants, auditors, financial directors... all were there to exchange their experiences. There were also developers who presented their products, which helped us get a clearer picture of the software

available for accountants. This year's theme was : "Accountant : entrepreneur at the service of entrepreneurs" and there were a lot of sessions concerning digitalization, which allowed us to gather a lot of information on this topic.

Secondly, we had the opportunity to do a ten-week internship at BDO Belgium – an international network of firms providing audit, tax and accounting services. As the accounting department at BDO can be associated with the activities of accounting firms and is in the process of being digitalized, we also had the opportunity to observe in a practical way how the digitalization process works.

Thirdly, we conducted nine semi-structured interviews (the profiles of the respondents are presented on the following page) in which there was a set of predefined open questions to which respondents were free to answer as they wished. In these interviews, respondents spoke about all the things they thought were important about the subject of our thesis, and we responded to them and sought to learn more. Our interview guide (which can be found in Appendix 1) was therefore the main questions asked and answered, but there were many other questions depending on the interviewees' responses. As a result, we were able to learn a lot about our main research questions – especially about what digitalization means for accountants, what tools they use, what technological developments are important for their work practices, what fears and opportunities they have towards them... – as well as about many others that we had not thought of – particularly about the influence of consumers on this digitalization of accounting firms, which is a topic that is not widely covered in the literature.

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#### SAMPLE OF THE INTERVIEWS

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We wanted to have a sample that was as representative of the study population as possible. Hence, the criteria for the interviews were defined as follows. First, it was necessary to be an accountant or chartered accountant ; second, to work in an accounting firm ; and third, to be located in Belgium.

For the sake of a complete overview, we wanted to interview as many digitalized trustees as few or no digitalized trustees (so as trustees who use a lot of the digital technologies mentioned in the literature review as trustees who use few). To do so, we used websites as some sort of indicator of the extent to which accounting firms were digitalized : we assumed that the most digitalized trustees had a highly developed website that promoted this digitalization (this is often one of their selling points) while the trustees with very little digitalization had no

website or at least did not mention this digitalization. Thus, we tried to diversify our sample on this basis : we contacted trustees with both 'types' of websites to ask if they would be willing to answer our questions.

For a perfect understanding, the qualitative interviews were conducted in French and English. Given the current situation with Covid-19, the respondents were contacted by email and the interviews were conducted by video conference. We managed to carry out nine interviews that lasted between 15 and 75 minutes. The profiles of the people who took part in these interviews are as follows :

<b>Name (fictive)</b>	<b>Trustee</b>	<b>Function</b>	<b>Region of the trustee</b>
Alain	Patrick Joye	Accountant and founder	Walloon
Dominique & Fanny	Beuken	Accountants	Walloon
Jean-Yves	THG Eupen	Certified chartered accountant	Walloon
Lucie	Huynen	Chartered accountant, tax advisor and founder	Walloon
Martin	Seco & Partner'S Consulting	Chartered accountant, tax consultant and manager	Walloon
Martine	Bureau D.S .	Accountant and founder	Walloon
Michael	ARICKX C. SPRL	Certified accountant and manager	Brussels-Capital
Pascal	Amarris Direct	Certified chartered accountant, director and co-founder	Brussels-Capital

## PRESENTATION OF THE RESULTS – QUALITATIVE METHODS : INTERVIEWS, INTERNSHIP AND FORUM FOR THE FUTURE

### DIGITAL TECHNOLOGIES USED BY ACCOUNTANTS

During our qualitative interviews and the Forum For the Future, it became very clear that for accountants, digitalization most often involves automating the accounting process by :

- 1) digitizing paper documents (and eventually becoming completely paper-less) as well as by
- 2) using accounting and other applications (especially management software) that are in the cloud (or sometimes internal to the trustee). Indeed, accountants argue that innovative technologies in accounting "*are no longer hardware but rather consist of a rental service*" (Dominique, Beuken employee). While listening to the Forum For the Future sessions, it appears more clearly that software used by accountants can be divided into six main categories :

Type	Characteristics	Examples of software	Firms who use them
<b>Accounting software</b>	Cloud accounting software often includes pre-accounting (exchange platform where the client deposits its documents), accounting and post-accounting (reporting tool with tables, ratios and indicators) while internal accounting software often only includes the accounting dimension.	<i>WinBooks</i>	- Bureau D.S., - Magecofi-Atecofi - M.A.T.S.
		<i>BOB Demat</i>	- Seco & Partner'S Consulting
		<i>BOB 50</i>	- ARICKX C. SPRL, - Huynen, - Amarris Direct - Patrick Joye - Beuken
		<i>Mythg.be</i>	- THG Group
		<i>Exact Online</i>	- BDO
		<i>Octopus</i>	
		<i>WinAuditor</i>	
		<i>Yuki</i>	
		<i>Horus</i>	
<b>Management software</b>	These programs are designed to help accountants to respect legal obligations (overview of deadlines, tasks to be completed, generation of customizable reports...).	<i>Silverfin</i>	- Seco & Partner'S Consulting, - BDO
		<i>Admin-IS</i>	- Seco & Partner'S Consulting.
		<i>FID-Manager</i>	- Beuken
		<i>Admin-Pulse</i>	
		<i>Admin-Consult</i>	

<b>Customer relationships software</b>	These platforms generally allow clients to send documents to accountants and sometimes to consult their current accounting situation in the form of tables, graphs, etc. Accountants have access to clients' documents and can exchange messages with them.	<i>Skwarel</i>	- <i>Amarris Direct</i>
		<i>"Le classeur virtuel"</i>	- <i>ARICKX C. SPRL</i>
		<i>Billtobox</i>	
<b>Reporting and forecasting software</b>	They allow analysis through the generation of indicators such as dashboards as well as forecasts through the generation of budgets or business/financial plans.	<i>Emasphere</i>	- <i>Seco &amp; Partner'S Consulting.</i>
		<i>HannaH</i>	- <i>Beuken</i>
<b>Invoicing software</b>	They assist the accountants in the entire invoicing process, from the preparation of an estimate to the sending of UBL invoices via PEPPOL <sup>8</sup> .	<i>Koalaboox</i>	- <i>Beuken</i>
		<i>Billit</i>	
<b>Codabox</b>	It allows bank statements, social secretariat files (salaries), etc. to be automatically encoded in the accounting software.		<i>All the accounting firms interviewed use it (but not with the same frequency).</i>

According to some CEOs who were present at the Forum For the Future, in particular those of FID Manager and Syneton, many applications used in Belgium are solutions developed by Belgian companies. This can be explained by the fact that it is very important when developing a new product, to take into account the specific expectations and needs of its users (here : the accountants). This implies being close to the market and its specificities. Belgium is considered by developers of international solutions as a small and very complex market given

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<sup>8</sup> PEPPOL is the abbreviation for Pan-European Public Procurement On-Line, and is a secure network set up by Europe on which files, such as an electronic invoice in UBL format, can be sent. It should make it possible to generalize the dematerialization of commercial transactions between public authorities and their suppliers. The advantage for accountants is that invoices processed by PEPPOL can be automatically encoded in the accounting system.

the complexity of its accounting rules compared to other countries (such as the Netherlands). This market has, therefore, mainly interested Belgian development firms.

A lot of interviewed accountants use an online platform, whether it is Exact Online, Skwarel, Horus, FID-Manager, Admin-IS, Silverfin or even their own platform such as “Mythg” or “Le classeur virtuel”. The ones who do not use online accounting software still have internal accounting software : BOB – the most common among the interviewees, BoCount – used at BDO... According to Fanny (Beuken employee) :

*“Internal applications are programs that are installed internally on the accountants' computers but in which it is necessary to connect to an online session to access the data. In the cloud software, customers can directly deposit their documents themselves, whereas in the internal software, customers have to send the invoices to their accountant and the accountant has to transfer manually these invoices to the consumers' files on the program”.*

In a lot of accounting software there is an OCR mechanism that includes the machine learning which recognizes the important fields of the documents such as the supplier, the amount excluding VAT... and proposes an encoding in the accounting. The employee only has to check if the encoding proposal is correct, modify it if it is not (as errors are still quite common) and then, validate the proposal. Furthermore, all the interviewees use CodaBox (for some or all of their customers) which is a system that allows automatic encoding in the accounting of bank statements sent by the bank (Codas files) and pay slips sent by the social secretariat (Sodas files), which speeds up the accounting process even more.

The accounting firms often combine several types of applications, since *“they are all specialized in one area”* (Martin, manager of Seco & Partner'S Consulting). In addition to this, accounting and management software are often designed for accountants and not necessarily for clients, which is why they are often complemented by customer relationships and reporting software like Billtobox or Skwarel that are easier for clients to use and understand. The communication between these software programs via API is therefore essential for accountants in order to allow the exchange of information. In particular, this API connection allows reporting and management software to connect to the accounting software even if they are installed internally in the accounting firm (and thus, not in the cloud). Hence, the accountants can *“keep their internal accounting programs that they are used to while digitalizing themselves*

*and offering additional advantages to clients*” (Pascal, director and co-founder of Amarris Direct).

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#### DRIVERS OF DIGITALIZATION

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It appears that the accountants who implemented these new technologies did so for two main reasons : because of the benefits it could bring them and their clients, and because they believed that the traditional accounting profession as we saw it before is doomed to die. According to Dominique (Beuken employee), they could continue *"to work in the traditional way but it could only be for a few years, no more. People must evolve with the times"*.

The biggest advantage of digitalization is, according to the interviewees, the time saving, and therefore the higher productivity brought about by the automation of the encoding process. We have observed during our internship that the platforms make it possible to link the customer's purchases/sales invoices to the encoding and, thus, the accountants no longer have to search in folders to find the document when there is a check but can find it directly on the encoding line in the purchase or sales journal. This increases productivity even more.

Some decide to take more clients with the time saved and/or to devote this saved time to *"do other things that have more added value"* (Martin, manager of Seco & Parter's Consulting), such as advice and analysis. According to Jean-Yves (certified chartered accountant at the THG Group), advice *"involves translating changes in legislation, rules in force, etc. in order to take out information concerning the client in particular and make it understandable to him"*. Therefore, the accounting profession is changing and turning more and more towards accompanying clients in their choices and ensuring that accounting is not just an obligation but a tool that really serves them through analysis, interpretation and reflection. Those who have taken the plunge are quite happy to be able to devote themselves to this aspect of their job, which is, in their opinion, much more rewarding. And those who have not yet fully done so are convinced that they will become fully digital in the medium term (within five to fifteen years).

Among the other benefits of digitalization, some accountants mention the space saving resulting from the elimination of paper and, thus, from the elimination of cumbersome files. Others also point out the increased usefulness during this lockdown because digitalization has enabled them to continue working from home. Furthermore, the fact that *"since it is a machine that works, reliability is more important"* and that *"when documents are in the cloud there is*

*much less chance of losing them, for example if there is a fire in the office we always have a copy online*" are other important advantages raised by Dominique (Beuken employee). Finally, another positive point brought about by these digital applications is that *"there is no more rush at the usual deadlines, the work is spread uniformly throughout the year"* (Michael, ARICKX C. SPRL manager) so it allows to ask questions directly to customers who remember the operations because they are recent. This results in a better analysis as the data are more reliable and up-to-date.

The big advantages of digitalization for the consumers are that it *"allows to be closer to customers, more available for them and more attentive to their needs"*, it *"makes the relationship with them more human"* and *"increases the frequency of contact with them"* (Pascal, Amarris Direct co-founder). Hence, they *"feel more involved because there is more collaboration"* (Michael, ARICKX C. SPRL manager). Other positive aspects of this digitalization for clients are *"the visualization of the accounting situation and the submission of accounting documents at any time, anywhere"* (Pascal, Amarris Direct co-founder) and therefore the *"ease of not having to travel"* (Fanny, Beuken employee) as well as the fact that *"by scanning their documents, they keep them at home and can always consult them"* whereas before *"once the documents have been submitted to the accountant they no longer had them"* (Michael, ARICKX C. SPRL manager).

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## OBSTACLES TO DIGITALIZATION

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The main obstacle to digitalization, according to all the interviewees, is the lack of client demand. This obstacle is particularly present in trustees who have mainly SMEs and self-employed people as clients because this type of clientele generally *"does not have the time or the capacities to scan all their documents themselves or they are not equipped to do so"* (Alain, Patrick Joye founder). Therefore, accountants with this type of client believe that they would not save time by digitalizing their activities – and would even lose time if they had to scan all their clients' documents themselves. The reasons that influence the tendency of clients to want digitalization or not are, according to the accountants : their age (the youngest are more likely to accept it than the oldest), their number of years in the career and the number remaining (those who have been in the profession for a long time find it difficult to change their habits), their type of activity (for the tertiary sector it is usually easier and for the manual sector it is generally more complicated), the distance they live away from the trustee and the frequency with which they travel abroad (those who live far away and travel a lot on business are more likely to send



their documents in digital format) as well as the level of digitalization of their suppliers (those who have very digital suppliers who send everything in digital format are more inclined to this digitalization as they do not have to scan). One way to address the reluctance of some consumers, which has been implemented by many trustees who regularly use the digital tools, is to give clients who were already there before the switchover (but not new ones) the choice of whether or not to work with these tools, while trying to convince them by showing them the benefits. Some accountants even *“digitize the documents of clients who do not want to use digital platforms to be able to show them how it works with their own accounting situation so that it speaks to them more”* (Jean-Yves, certified chartered accountant at the THG Group). Besides, the coronavirus is said in the highly digitalized trustees to have pushed some clients who did not want digitalization to have jumped the gun, while in the less digitalized trustees they did not see a big change.

Another important barrier is the employees’ – both older and younger ones – reluctance. According to Martin (manager of Seco & Partner’S Consulting) :

*“This resistance comes mainly from the fact that human beings like their habits and comfort : when we do something we know well, even if there are mistakes, shortcomings, slowness, we know, we are used to it. And change requires training, making efforts and going outside one's comfort zone, and human beings do not like to”.*

Nevertheless, once digital technologies are installed and once the employees have become accustomed to them, many are satisfied and no longer imagine themselves working without them. However, it is often the manager who decides to implement digitalization, and we notice that, when they are less comfortable with digital technologies, the trustees are much less digitalized.

Important barriers are also the applications themselves. Some accountants have the impression that some online and internal software programs are not yet fully developed : that there are sometimes bugs and that the OCR is not reliable enough. According to them, it is not yet able to recognize the right fields when there are a lot of different invoice formats and it sometimes puts the amounts in the wrong accounts. Consequently, they do not fully trust computers and check everything anyway, which they consider to be a waste of time. Others do not feel that their main tasks could be done by these applications. Firstly, *“with the self-employed and SMEs, the purchase invoices are quite complicated : there are a lot of overheads*

*and these costs are all very different and therefore require a look and reflection from the accountant*” (Lucie, Huynen founder). Secondly, *“the documents brought in are often messy : things are missing, there are sometimes duplicate invoices, documents that do not concern the accounting, etc. so the accountants have to sort them out”* (Alain, Patrick Joye founder). What emerges from these two points is that these tasks are difficult to do by machine so that accountants do not feel that they would save time by using more digital tools. On top of that, some accountants are afraid that *“if clients have access to their accounting situation online they will be able to modify data which would result in a huge mess”* (Dominique, Beuken employee). It is important to note that all of this only concerns accounting software and not management software or Cudas mandates which are considered to be very useful and bring a huge time saving to accountants.

Furthermore, the fact that there is *“little possibility of customization and individualization according to the client”* (Alain, Patrick Joye founder), the lack of opportunities to test the programs before committing to them completely, the lack of training that goes with the implementation of the software and thus, the impression of not using 100% of its capacities, the lack of listening from and contacts with some developers and the fact that once accountants have signed with a developer it is perceived to be really complicated to change are other big obstacles to this digitalization. Other accountants are also afraid of having an Internet failure when the data are in the cloud. However, this risk can be reduced by using several Internet providers : *“If ever there is a failure at one provider, the connection automatically goes to the other”* (Dominique, Beuken employee). In addition to this, the fear of viruses and, therefore, data loss is also highly present among the interviewees.

The final obstacles to digitalization are the need for time, energy and money to digitalize practices. However, trustees who have already taken the digitalization plunge qualify this by saying that the benefits that digitalization brings far outweigh the time and money needed to implement it. Consequently, it is worth the cost according to them.

All the interviewees from the trustees who use rarely the digital tools say that if their clients would ask for digitalization and would agree to scan their documents themselves, the trustees would make more use of digital technologies because, in this case, it could save them huge amounts of time. As in all markets, it is customer demand that drives change and it seems that, today, the demand for digitalization is not strong enough to remove the barriers perceived by some trustees.

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## CHALLENGES OF THESE NEW DIGITAL TECHNOLOGIES

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For most accountants, it is clear : digitalization will never replace an accountant, the human link and the empathy he can have towards his clients. According to Fanny (employee at the trustee Beuken) :

*"Digital tools should only be tools for communicating documents and accounting situations. It is an aid to advise, but it can never become the only means of communication with clients. Advice and the human link will always be essential".*

However, some people mention a *"probable reduction in staff"* (Dominique, Beuken employee) – and some like Jean-Yves (certified chartered accountant at the THG Group) or Michael (ARICKX C. SPRL manager) have, indeed, already reduced it. *"The accountants' competencies will change"* (Michael, ARICKX C. SPRL manager) and *"the job loss is likely to affect those who are not able to broaden their skills"* (Dominique, Beuken employee). Firstly, *"accountants will need to be more technical, understand computers and know how to analyze the data generated by digital tools to check that they are consistent and accurate"* (Michael, ARICKX C. SPRL manager). Secondly, *"they will have to be a bit extrovert to be able to explain data to clients in a language they understand and it is a problem since they are often introverted people"* (Jean-Yves, certified chartered accountant at the THG Group). Thirdly and finally, accountants *"are starting to be required to do marketing"* (Jean-Yves, certified chartered accountant at the THG Group), especially to promote online sites, notably via Google Ads and natural referencing.

The accountants of small accounting firms of 2-3 people are also very likely to lose their jobs *"because these trustees will not be able to keep pace with the time and financial means needed to implement the digitalization"* (Jean-Yves, certified chartered accountant at the THG Group). And without digitalization in the long term, the trustees are said to be doomed to disappear according to some speakers of the Forum For the Future.

Another important challenge of technologies such as OCR processing lies in the automation of the encoding task : some AI-based software could theoretically process invoices without any intervention from the accountant. However, today, employees can still accept and validate the proposed figures for entry into the accounting system. Thus, they retain control over the data, which is an important advantage for them. Nevertheless, some *"employees have not yet understood all the importance of having a much closer relationship with the customer"*

*and of being more proactive : they are still in the pattern of saying to themselves : there is no VAT, so I do not have to go and see”* (Martin, manager of Seco & Partner’S Consulting). This can be a problem because the client loses many of the benefits mentioned above (such as having a more up-to-date accounting situation).

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## CONCLUSION OF THE QUALITATIVE PART

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To conclude this qualitative section, we have decided to summarize the drivers, obstacles and challenges of digitalization mentioned by the accountants during our interviews, as well as observed during the Forum For de Future and our internship, in a table below. It can be seen that among the drivers are mainly an improvement of the accountant's daily work as well as a facilitation of the clients' life. There are also several obstacles, the main ones being the lack of demand from customers, the fact that the applications are perceived as not being fully efficient and the need for time and money to implement digital technologies. The main challenge raised by the interviewees is the need for accountants to be able to adapt themselves at the risk of losing their jobs if they do not.

<b>Drivers</b>	<ul style="list-style-type: none"> <li>• Time saving and higher productivity</li> <li>• Supporting documents linked to software entries</li> <li>• Fewer folders so space-saving</li> <li>• Useful for homeworking</li> <li>• The work is spread uniformly throughout the year so no more rush at the usual deadlines and ability to ask questions directly to customers</li> <li>• More reliable and up-to-date data</li> <li>• Less chance to lose documents thanks to the online copy</li> <li>• More advice so more rewarding for the accountants</li> <li>• More consumer support so closer to them and better collaboration</li> <li>• Clients can submit their accounting documents at any time, anywhere</li> <li>• Reduction of trips to the accounting firm for clients</li> </ul>
<b>Obstacles</b>	<ul style="list-style-type: none"> <li>• Lack of client demand / time / capacities / material</li> <li>• Employees’ reluctance because they like their habits</li> <li>• Manager’s reluctance</li> <li>• Applications not yet fully developed</li> <li>• Impression that applications cannot do some tasks</li> <li>• Perception among accountants that these technologies do not save them time</li> <li>• Little possibility of customization of the applications</li> <li>• Lack of possibilities to test the software programs before committing</li> <li>• Lack of training to accompany the implementation of these technologies</li> <li>• Lack of listening from some developers</li> </ul>

	<ul style="list-style-type: none"> <li>• Difficult to change application once installed</li> <li>• Need for time, energy and money to digitalize</li> </ul>
<b>Challenges</b>	<ul style="list-style-type: none"> <li>• Possible reduction in staff</li> <li>• New skills are emerging in the accounting profession</li> <li>• Need for accountants to be more proactive so that clients can take full advantage of digital technologies.</li> </ul>

## METHODOLOGY – QUANTITATIVE PART

### FROM THE QUALITATIVE STUDY TO THE QUANTITATIVE ONE

This qualitative part reinforced our belief that a quantitative study would be a real added value for our thesis. Indeed, in addition to the lack of empirical studies in the literature, we noticed during our interviews, the Forum for the Future and our internship that the views of accountants were very scattered in Belgium : some fiduciaries use digital technologies very regularly and are very convinced, others do so less regularly depending on the wishes of their clients and others do so very rarely and are quite skeptical about this digitalization. As the profiles are very different, it was almost impossible to generalize and conclude on the representativeness of these profiles in the population studied – i.e. accountants working in accounting firms in Belgium. We therefore naturally decided to carry out an online questionnaire based on the information gathered during our qualitative study.

We included all technologies, benefits, obstacles and challenges mentioned in the conclusion of the qualitative part in our quantitative questionnaire to see if the not-interviewed trustees shared the same views as those we interviewed and those at the Forum For the Future. We also included in the survey a range of technological tools not mentioned during the interviews, such as virtual diaries, scanners, social networks, etc., so as not to include only the digital technologies mentioned in the theoretical part of this thesis and not to bias the answers obtained (digitalization can mean something different for one respondent to another). Our questionnaire also contained demographic questions such as the number of employees working in the trustee, the type of clientele of the trustee, etc. in order to answer our third sub-question : “Why do some trustees adopt these new digital technologies more than others ?”.

Since we do not speak Dutch fluently, the sample selected for the qualitative part was restricted to accountants or chartered accountants who speak French or English. We therefore had a sample of accountants for our interviews from the Walloon region and the Brussels

Capital region only, none from the Flemish region. Thus, it was even more important to test the results obtained on a larger scale and then, to send the questionnaire translated into Dutch to Dutch-speaking people in order to have a representative sample of accountants in Belgium and not only in Wallonia and Brussels. This is what we did, as the questionnaire was offered in two languages : French and Dutch.

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## RESEARCH METHOD

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After we took into account the data from the qualitative part and completed them in order to best answers our research sub-questions, we obtained an online questionnaire on Google Form with 16 questions that had mostly predefined answers (multiple choice questions) to make the analysis easier. This type of method is the most widely used because it allows high representativeness of the entire population and more generalizable data than the interview (Queiros et al., 2017), which is what we were seeking to achieve. However, we had to be careful that, in this type of method, the reliability of the data obtained is very dependent on the structure of the survey and the accuracy of the answers provided by the respondents (Queiros et al., 2017). Therefore, the survey was first sent to some acquaintances to comment on the structure and was modified accordingly. They also timed themselves so that filling in the survey did not take too long, because if the survey is too long, people often give up before the end. The average time taken to complete our survey was 10 to 15 minutes. Furthermore, we offered to send respondents our thesis, once completed, or a summary of the results of it, so that they would have an incentive to respond.

Once the questionnaire was ready, we sent it by email to 421 trustees' email addresses that we could find on the Internet as well as to the professional accountants who participated in the “Forum For the Future” and to the “Espace innovation” club, which is a club of Belgian accountants. We also contacted the Royal Society of Accountants and Chartered Accountants of Belgium and we could very fortunately benefit from their support to share our survey to their 6,000 members. We were also fortunate that Mrs. Debraz agreed to forward our survey to the audience of the tax and accounting seminars organized by HEC which took place from January to March 2021 and that Mrs. Tilkin accepted to mention our survey among the requests from students to the alumni network in the HEC Alumni newsletter. Thanks to all those people who related our survey and to all the accountants who took the time to answer it, we managed to obtain 489 answers, 290 from the Dutch survey and 199 from the French survey. We will present the results in the following section.

## RESULTS – QUANTITATIVE PART : ONLINE SURVEY

### PRESENTATION OF THE RESULTS

*In this section, the results of our online survey will be presented with a description of each question. We have produced graphs and tables showing the results of both questionnaires in English – for consistency with the language chosen in this thesis. The analysis of the results in relation to our research sub-questions will be carried out in the next chapter of the thesis.*

1. In which region is your trustee located ?

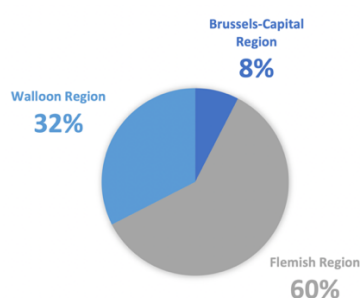


Figure 5 : Regions of the respondents

2. What is your profession ?

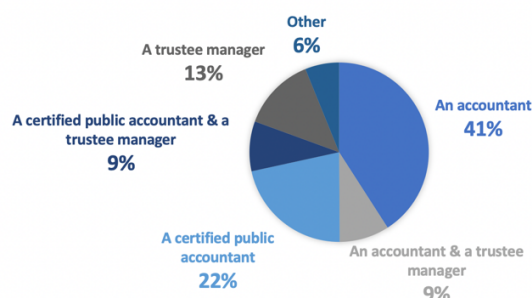


Figure 6 : Professions of the respondents

These responses allow us to state that the respondents to the online survey were part of the population studied. Indeed, all regions are represented : most respondents who answered the survey came from the Flemish region (293 responses obtained). The second most represented region is the Walloon region (159 responses obtained), followed by the Brussels-Capital region (37 responses obtained). This is positive because in our interviews we only interviewed people from the Walloon Region, so here we have the Flemish Region well represented. However, the Brussels-Capital region is under-represented in our responses and it will be difficult to draw significant trends based on this region. Furthermore, the majority of respondents are either accountants or chartered accountants. Only 19% of the respondents were not accountants, of which 13% were fiduciary managers and 6% were trainees, accounting assistants and other staff members. Consequently, all of the respondents are knowledgeable about accounting.

3. How many employees work in your trustee ?

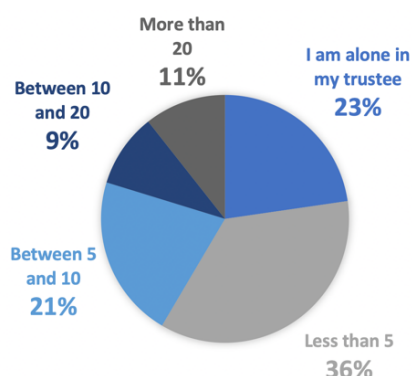


Figure 7 : Number of employees in the trustees

4. Is your accounting firm part of a group or independent ?

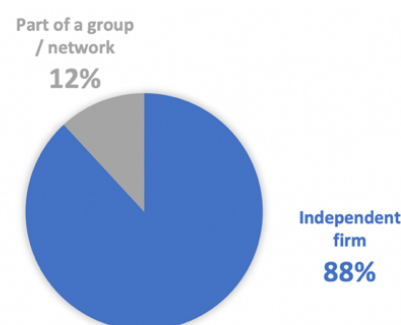


Figure 8 : Types of trustees

Based on these results, it can be assumed that the majority of respondents to our survey come from small fiduciaries since more than half of the respondents (59%) have less than 5 employees in their trustees and more than three-quarters of the respondents (80%) have less than 10 employees. In addition to this, it can be seen that the majority of respondents work in independent accounting firms, very few work in accounting firms that are part of groups.

5. What is your estimate of the proportion of the following types of clients within your trustee's client base ?

	0-20 %	20-50%	50-70%	70-100%
The self-employed	29,04%	45,60%	17,59%	7,77%
Very small businesses	29,86%	50,31%	14,31%	5,52%
Small and medium-sized enterprises	32,52%	37,01%	23,72%	6,75%
Large companies	94,89%	3,89%	1,02%	0,00%

Figure 9 : Proportion of trustees' clients

We can notice that large companies are a small part of trustees' clients we interviewed (almost all respondents indicate a presence in their client base of less than 20%). This may be related to the fact that the majority of respondents are mainly independent structures with few employees as mentioned in the previous paragraph. It can be assumed that a large group is more likely to choose a fiduciary that is part of a larger structure. Regarding the other clients (self-employed, very small businesses and small and medium-sized businesses), the trend for the various groups is the same everywhere : their most frequent proportion is between 20 and 50 percent. These customers are present to a smaller extent (between 0 and 20%) among about 31% of the respondents and to a larger extent (between 50 and 70%) among about 19% of the



respondents. There are, therefore, no major differences between these three client categories and it will certainly be difficult to draw any major conclusions about their impact on the trend towards the digitalization of accounting firms.

#### 6. Do you use the following technologies in your trustee ?

	I do not know	Yes, regularly	Yes, rarely	No, but I am considering it in the short term	No, but I am considering it in the long term	No and I don't see it happening
Printer	0,61%	86,71%	12,07%	0,00%	0,00%	0,61%
Scanner	0,00%	98,36%	1,64%	0,00%	0,00%	0,00%
Virtual diary	9,82%	63,19%	4,91%	2,45%	2,66%	16,97%
Website	0,61%	62,99%	10,63%	7,16%	4,70%	13,91%
Social networks	1,84%	40,49%	23,93%	4,91%	5,11%	23,72%
Customer extranet	6,95%	28,83%	14,31%	15,54%	13,70%	20,65%
Electronic invoicing system	1,43%	69,73%	5,73%	7,36%	5,93%	9,82%
Scanning of paper documents	0,20%	80,16%	10,22%	3,68%	2,45%	3,27%
Internal software	0,41%	94,48%	2,04%	0,00%	0,82%	2,04%
Data storage in the cloud	1,23%	75,26%	7,16%	2,04%	4,09%	10,22%
Accounting software in the cloud	1,64%	58,90%	7,77%	5,32%	8,18%	18,20%
Other software in the cloud	4,70%	62,58%	9,41%	3,68%	5,11%	14,52%
Business Process Automation	1,23%	57,06%	13,09%	8,18%	8,79%	11,66%
Robotic Process Automation	29,86%	21,47%	7,77%	6,13%	11,86%	22,90%
Artificial intelligence	19,22%	31,49%	9,41%	6,75%	10,22%	22,90%
Big Data	42,54%	4,50%	5,93%	5,32%	12,47%	29,24%
Blockchain	42,33%	2,45%	4,09%	5,11%	13,29%	32,72%

*Figure 10: Extent of adoption of technologies*

From this table, it is clear that basic technological tools such as printers, scanners or in-house software (e.g. Office suite software) are widely used within the respondents' fiduciaries. Amongst the digital technologies, it can be noted that everything related to cloud computing (applications in the cloud or storage in the cloud) is also regularly used within the accounting firms (75% of the respondents indicate to regularly store data in the cloud computing and 59 and 63% of the respondents state to regularly use accounting and other software in the cloud). The automation of processes is also quite common (57% do so regularly and 13% rarely).

On the other hand, when it comes to robotic process automation, Big Data or blockchain, they are not widely used and are even relatively unknown to respondents (42% of respondents are not aware of Big Data or blockchain among the digital technologies available to accountants). Furthermore, when they are known but not used, very few firms consider implementing them in the short or long term and many do not even consider it at all.

It can be noted that artificial intelligence is reported as being used regularly by only 31% of respondents, whereas around 60% of respondents report using cloud-based software regularly. This raises the question of whether : either the applications used do not include OCR with machine learning (which is uncommon today), or the respondents are not aware that this is considered artificial intelligence. In the latter case, one might think that these people

answered "I do not know", which, by adding up the "I do not know" and "Yes regularly" categories for this digital technology, would give a more logical proportion between the number of people using regularly cloud-based applications (about 60%) and artificial intelligence (about 50%) .

#### 7. Do you use one or more of these accounting software ?

	Survey in French	Survey in Dutch
Sage BOB 50 (not in cloud, 1982, WL)	45,23%	6,90%
Sage BOB Demat (in cloud, 2015, WL)	14,07%	3,10%
Horus (cloud or not, 2018, WL)	14,07%	0,34%
Winbooks (cloud or not, 2000, WL)	48,24%	16,21%
Yuki (in cloud, 2009, EU)	3,02%	19,66%
Exact Online (in cloud, 1984, FL)	14,57%	36,55%
Octopus (in cloud, 2002, FL)	2,51%	28,97%
Wings (cloud or not, 2010, FL)	0,00%	8,28%
Venice (not in cloud, 1985, FL)	4,02%	7,59%
Adsolut (not in cloud, 1987, EU)	31,16%	67,59%
Bocount (cloud or not, FL)	7,04%	0,00%
ADIX (not in cloud, 1999, WL)	3,52%	0,00%
Allegro (cloud or not, 1986, WL)	3,52%	0,34%
Visual Concept (not in cloud, 1980, WL)	0,50%	0,00%
Winauditor (in cloud, 1984, WL)	2,51%	1,03%
Accowin (not in cloud, 2006, WL)	0,00%	1,03%

Figure 11 : Accounting software used by accountants in Belgium<sup>9</sup>

An important point to note here is that the software programs mentioned as being most used by the trustees in the French survey and in the Dutch survey are not the same. In order to understand what these differences depend on, we have added the following information to the graph : whether the application is in the cloud, in-house or both, in which year it was developed and the region in which its head office is located<sup>10</sup>. It can be seen that respondents in the French survey are more likely to use software programs whose head office is in Wallonia (WL) while respondents in the Dutch survey are more likely to use applications whose head office is in Flanders (FL) or even outside Belgium (EU). One can assume that this is either because communication with the developers in their respective regions is easier (after-sales service may be better when the software headquarters is close to the trustee and when the developer speaks the same language as the accountants), or because software developed in a certain region is easier to use for people in that region (cultural, software-related differences between both regions...). Another hypothesis is that the canvassing of trustees by representatives may be

<sup>9</sup> Here, percentages are given as a proportion of the number of responses per questionnaire so respectively 199 and 290 responses and not 489 responses as in the other figures.

<sup>10</sup> We found these information on the applications' websites.

more intensive around the headquarters of the software and therefore, trustees may have heard more about the applications from their regions.

An interesting point to note is that many respondents – whether French or Dutch – still use software programs that are not in the cloud : 45% of French respondents say they use BOB 50 and 68% of Dutch respondents report using Adsolut. However, only 10% of the respondents in the French survey indicate that they do not combine BOB 50 with other cloud software and 16% in the Dutch survey indicate that they do not do so when using Adsolut. Thus, the majority of respondents are still using software in the cloud in combination with in-house software. It is also noticeable that most applications developed after the 2000s almost all have a cloud version and that some software programs developed in the 1990s have evolved, adapted to technological developments and now offer one as well.

It can also be noted that only 3 respondents indicated that they do not use any accounting software, out of the 489 responses obtained (so 0,61 %). This shows that applications are, nowadays, very much a part of the work of accountants, whether it is in the cloud or in-house.

#### 8. Do you use any of the following other software ?

	Survey in French	Survey in Dutch
Codabox (FL)	69,35%	70,34%
Management software		
FID-Manager (WL)	33,67%	20,34%
Sofisk (BXL)	41,21%	31,38%
Admin IS (FL)	8,54%	26,21%
Admin Pulse (FL)	6,03%	12,41%
Admin Consult (FL)	7,04%	22,76%
Silverfin (FL)	13,07%	30,69%
Dia Client (WL)	2,51%	0,00%
Winprest (WL)	3,02%	2,41%
First (BXL)	1,01%	1,38%
Customer relationships software		
Skwarel (BXL)	7,54%	1,72%
Billtobox (EU)	9,55%	14,14%
Reporting and forecasting software		
Emasphere (WL)	2,01%	0,69%
HannaH (WL)	30,15%	9,66%
Bright Analytics (FL)	0,00%	1,38%
Invoicing software		
Billit (FL)	1,01%	19,66%
Basecone (EU)	0,00%	10,34%
Koalaboox (WL)	30,15%	4,14%

*Figure 12: Management, reporting, invoicing, forecasting and other software used by accountants in Belgium<sup>11</sup>*

<sup>11</sup> Here, percentages are given as a proportion of the number of responses per questionnaire so respectively 199 and 290 responses and not 489 responses as in the other figures.

Here, we can see that some software programs are used almost identically by French and Dutch speakers. The non-accounting software most widely used by respondents is Codabox, which allows invoices, pay slips and bank statements to be sent directly to the accounting software : it is used by about 70% of the accountants who responded to the surveys. Another software that is widely used, both in the French survey (17% of the total respondents) and in the Dutch survey (19% of the total respondents), is Sofisk, an application that assists in the preparation of tax returns for individuals, companies and legal entities. It can also be noted that many accountants in both regions use FID Manager, a software package for management and assistance in meeting legal obligations.

However, there are still some differences between the regions : French-speaking accountants use more HannaH (a financial forecasting program) and Koalaboox (an invoicing and payment software), while Dutch-speaking accountants use more Silverfin (a software to assist in fulfilling legal obligations), Syneton software (Admin IS, Admin Consult and Admin Pulse, which are management applications) and Billit software (an invoicing program). Once again, as in the results of the previous question, it can be seen that the differences between the software programs used are linked to the head office in which they are situated : French-speakers tend to use more software with headquarters in Wallonia (HannaH and Koalaboox being applications with headquarters in Liège) whereas Dutch-speakers tend to use more software with headquarters in Flanders (Silverfin and Billit being based in Ghent and Syneton in Antwerp).

In addition to this, only 32 out of 489 respondents (6,54%) indicated that they do not use any software other than accounting. Other applications (reporting, forecasting, management,...) are therefore also very useful to accountants in their daily work.

9. Do you agree or disagree with the following benefits brought about by digital technologies ?

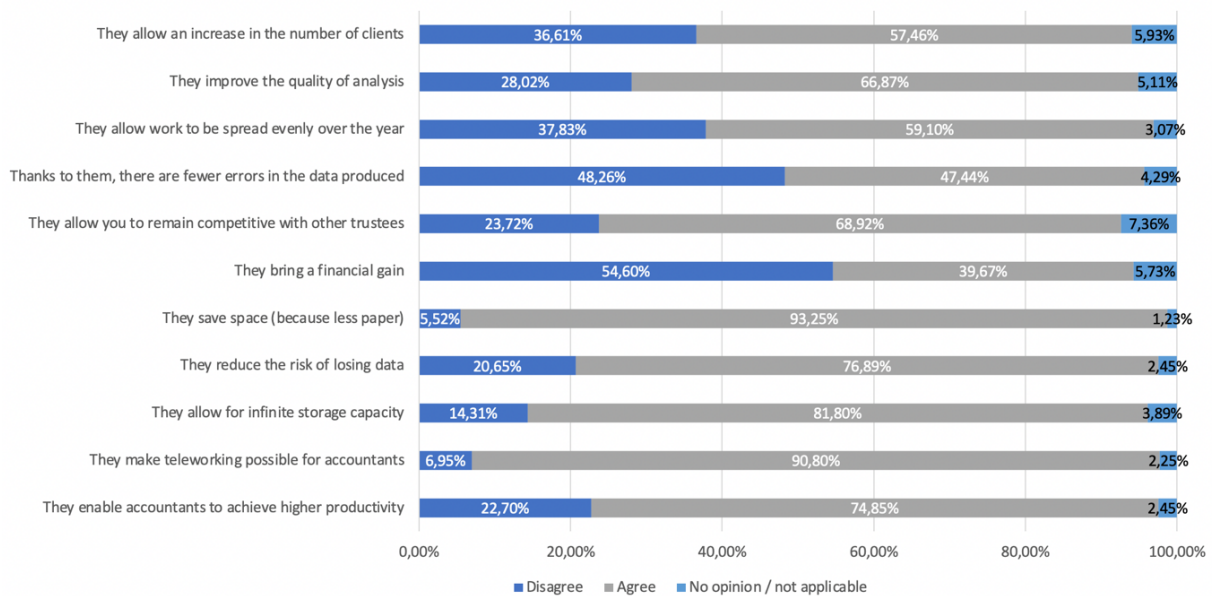


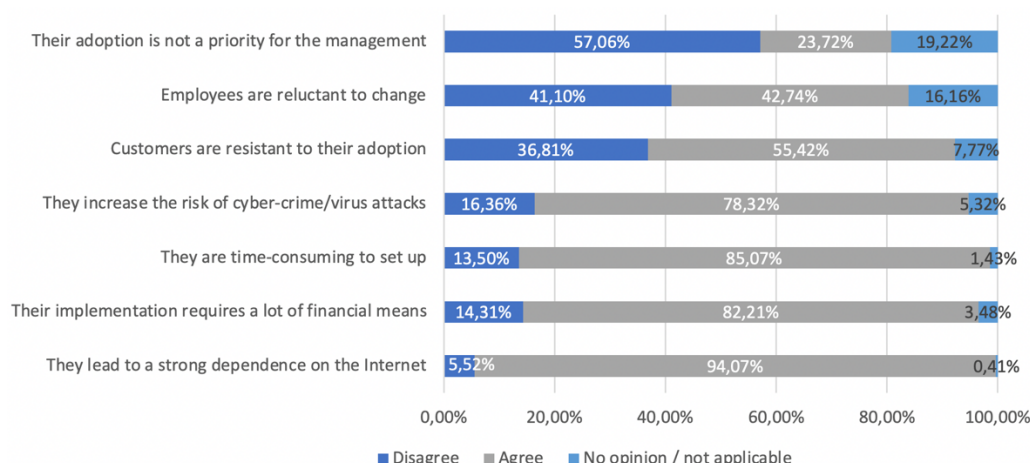
Figure 13: Benefits brought about by digital technologies

It clearly appears that, for most proposals, accountants agree more than disagree when it comes to consider the advantages brought about by digitalization. The benefits that most people agree with are that digital technologies save space (93% agree), that they allow for infinite storage capacity (82% agree) and that they make homeworking possible (91% agree). Accountants also agree that they allow for greater productivity (75% agree) and that they reduce the risk of losing data (77% agree). In addition to these major benefits, 69% of respondents believe that digital technologies are a necessity to remain competitive with other fiduciaries. Consequently, we can say that there is a high degree of conviction in our sample regarding the interest of new technologies for the accounting profession.

However, for some benefits, respondents are less unanimous : regarding the fact that digitalization would bring a financial gain to the fiduciary, 55% of respondents do not agree against 40% who agree and concerning the fact that digitalization would allow fewer errors to be made, 48% of the respondents do not agree against 47% who agree. Thus, it is very tight. It can be assumed that the moderation of these results in terms of financial gain is due to the fact that some have been using digital tools for some time and may be starting to see a financial gain, while a lot of others are just starting out, have incurred significant costs during implementation and therefore, consider that they are losing more money than they are making with these tools. Concerning the fact that fewer errors are made, it can also be assumed that

some OCRs are more efficient than others and that those who use fairly efficient OCRs that make few errors in the encoding proposal consider that digital technologies reduce the risk of errors, while those using applications with poorly performing OCRs or even without OCRs (which is still rare today) do not agree with this statement.

#### 10. Do you agree or disagree with the following barriers to the adoption of digital technologies ?



*Figure 14: Barriers to the adoption of digital technologies*

We can note that most of the proposed obstacles are indeed considered as hindering the adoption of digital technologies by the participants in the study. Some of the issues that everyone agrees with are that digitalization leads to a strong dependence on the Internet where 94% of the respondents agree, that it requires a lot of financial means and time to adopt (82 and 85% of respondents agree) and that it increases the risk of viruses and attacks aimed at data theft (78% agree).

Only two barriers get a majority of no agreement/not applicable : the fact that employees are reluctant to change gets a score of 41% no agreement and 16% not applicable and the fact that their adoption is not a priority for management gets a score of 57% no agreement and 19% not applicable. While few respondents agree that these two barriers hinder the adoption of digital technologies in Belgian accountancy firms, 55% of respondents agree that the reluctance of consumers to use digital technologies is actually a barrier to digitalization.

However, if we create a pivot table (figure 15) by cross-referencing the respondents' answers (agree/disagree) with the degree of adoption of these technologies, we can see that the adoption of digital technologies is much less widespread among those who answered that



employees, management and clients were an obstacle than among those who answered that this was not the case. This would support the hypothesis that those who responded that they did not agree did so because it was not applicable in their trustee, but that when it is, it is indeed a significant barrier to digitalization. Employees and management would therefore be less often resistant than consumers, as there is more disagreement than agreement regarding these obstacles.

		Do you use the following technology in your trustee : Artificial intelligence (machine learning, etc.) ?		
Do you agree or disagree with the following statement: "Digital technology adoption is not a priority for management"?		Yes, regularly	Yes, rarely	No
Agree		12.10%	8.30%	79.60%
Disagree		42.04%	11.80%	46.16%

		Do you use the following technology in your trustee : Cloud-based accounting software ?		
Do you agree or disagree with the following statement: "Employees are reluctant to the adoption of digital technologies"?		Yes, regularly	Yes, rarely	No
Agree		45.69%	12.37%	41.94%
Disagree		67.36%	4.94%	27.70%

		Do you use the following technology in your trustee : Automation of the accounting process from document submission to encoding ?		
Do you agree or disagree with the following statement: "Customers are reluctant to the adoption of digital technologies"?		Yes, regularly	Yes, rarely	No
Agree		46.18%	17.65%	36.17%
Disagree		70.90%	9.44%	19.67%

Figure 15 : Level of adoption of digital technologies based on agreement or disagreement that employees, management and customers are barriers to digitalization in fiduciaries.

## 11. What is your general impression of accounting and other cloud-based software ?

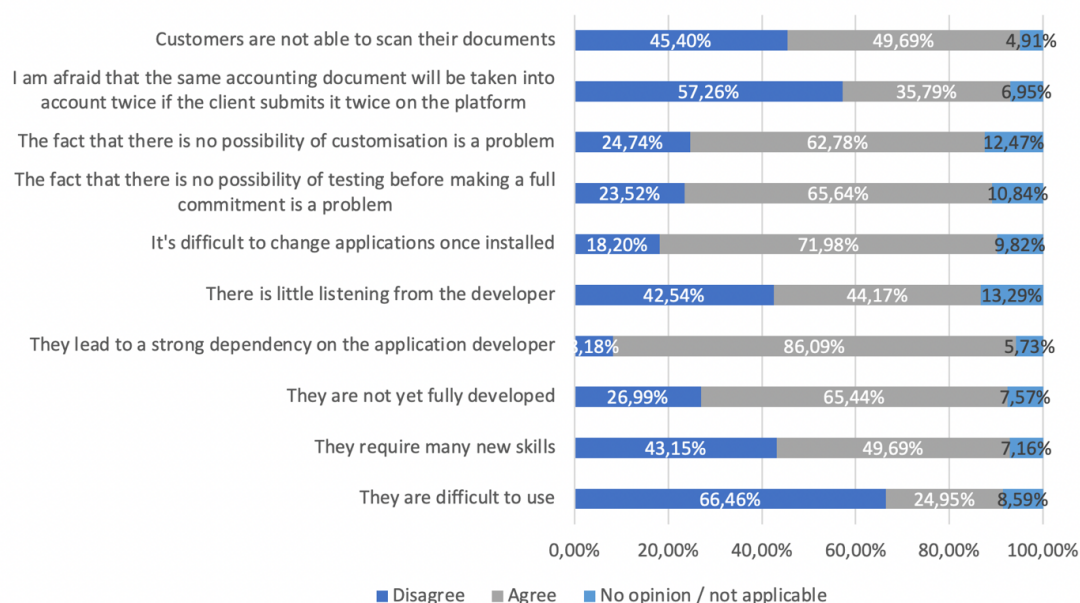


Figure 16: Impressions of accountants about cloud-based software

Here, opinions are divided. More than the majority of respondents agree that the following proposals are problems : the lack of possibility to adapt the program to their own trustee (63% agree), the lack of testing possibilities before committing completely (66% agree), the high dependency on the supplier (86% agree), the difficulty to change the application once one has been chosen (72% agree), plus the fact that the applications and their OCR are not yet fully reliable and, therefore, that these software programs are not yet fully developed (65% agree).

Consequently, it can be said that while accountants see the benefits of digital technologies, most are also well aware of the barriers to adoption and the current issues surrounding them. However, the majority of respondents do not agree that these applications are complicated to use (66% disagree) or that there is a risk of encoding the same document twice (57% disagree) and we were not able to validate the inability of customers to scan their documents, the lack of listening by developers and the fact that these applications require new capabilities as these proposals received about the same number of votes for agreement as for disagreement.

12. What percentage of these different tasks do you feel you currently have in your job ?

	0-10 %	10-20 %	20-30 %	30 - 40 %	more than 40 %
Encoding	26,38%	17,18%	18,00%	16,77%	21,68%
Analysis of the accounts to provide advice to clients	5,32%	16,97%	29,65%	22,09%	25,97%
Analysis of laws/regulations to tailor them to the client	14,93%	26,58%	29,24%	12,88%	16,36%
Contact with clients	3,89%	21,47%	24,34%	24,13%	26,18%
Helping clients to use digital technologies	43,15%	28,43%	15,75%	6,13%	6,54%

*Figure 17: Main tasks of the accountants today*

Regarding the encoding, there is more or less the same proportion in all the proposed percentages. Hence, it can be clearly seen that encoding has not disappeared today : it is less present in some trustees but still very present in others. Regarding the analysis of accounts and contacts with clients, the majority of respondents fall into the categories 20 to more than 40% (more than three-quarters of respondents indicate that they are in these categories) : it represents therefore a large part of their daily tasks, even nowadays. The same observation can be made for the analysis of laws but in the categories 10 to 30% (here, more than 50% of the respondents indicate having this proportion). When it comes to helping customers to use digital technologies, just under half feel they have less than 10% of this task and a quarter feel they have between 10 and 20%. So, it is not a very common task for accountants today.



13. How do you think this percentage will develop in the medium term (10 years) ?

	0-10 %	10-20 %	20-30 %	30 - 40 %	more than 40 %
Encoding	39,47%	26,38%	15,54%	9,20%	9,41%
Analysis of the accounts to provide advice to clients	2,86%	7,98%	22,29%	29,24%	37,63%
Analysis of laws/regulations to tailor them to the client	5,93%	16,77%	29,65%	21,88%	25,77%
Contact with clients	4,09%	17,59%	23,52%	23,11%	31,70%
Helping clients to use digital technologies	25,97%	25,77%	21,27%	13,09%	13,91%

Figure 18: Main tasks of the accountants in ten years

From this table, it is noticeable that when asked to project themselves into the future, most respondents believe that encoding will decrease (the 0-10% and 10-20% shares increase considerably while the 20 to more than 40% shares decrease). For the other tasks mentioned, the 0-10% and 10-20% ranges are decreasing in favour of those above 30%. The analysis of accounting, legislation and client relations should, therefore, become the main tasks of accountants in the next 10 years. In addition, accountants believe that, in the future, they will have to invest more in advising clients on the use of digital technologies.

14. Do you agree/disagree with the following statements regarding your customers' perceptions of digitalization ?

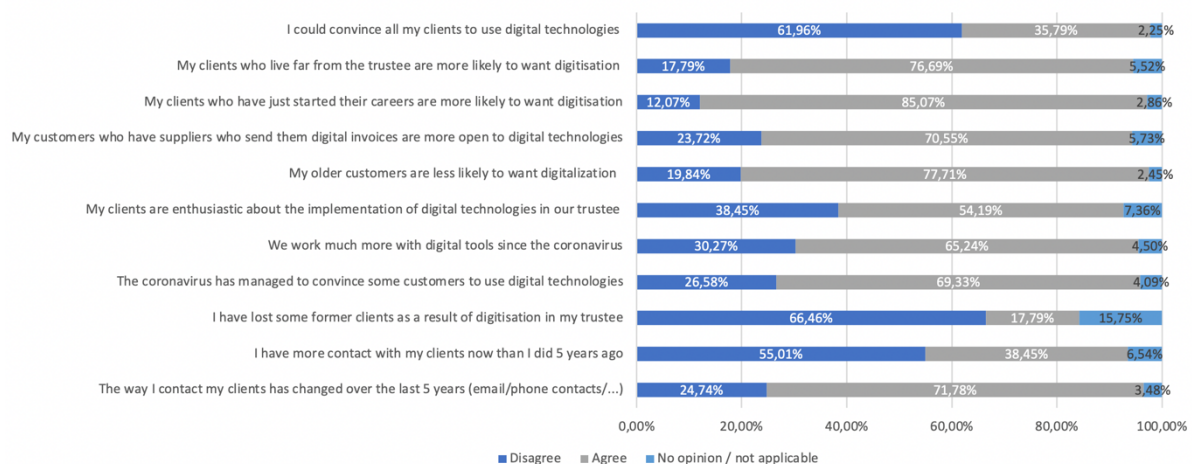
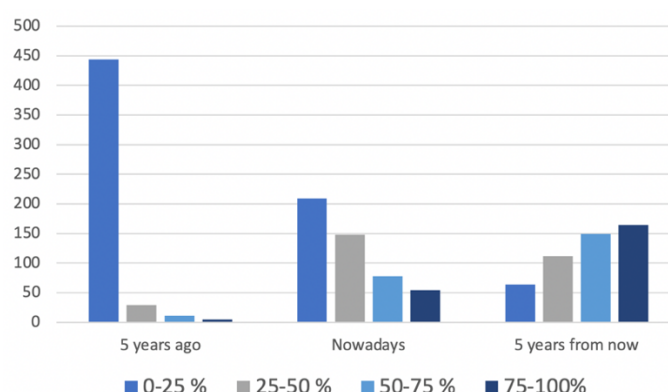


Figure 19: Customers' perceptions of digitalization

Concerning customers' perceptions of digitalization, the opinions are almost all in the same direction. We note that respondents agree that their clients who have just started their business are more likely to use digital tools (85%), that older consumers want digitalization less than younger ones (78%), that when they live far from the trustee, clients want more digitalization (77%) and that when their suppliers send them their invoices digitally, consumers are more open to this digitalization (71%). They also agree that the way they contact their

customers has changed over the last 5 years (72%), that the coronavirus has succeeded in convincing some customers to use digital technologies (69%) and that they have been working much more with digital tools since the coronavirus (65%). They also find – but to a lower extent (54%) – that clients are enthusiastic about the introduction of digital technologies in their fiduciary. On the other hand, the majority agree that they have not lost any former clients as a result of the digitalization of their trustee (67%), that they could not convince all their clients to use digital technologies (62%) and that they do not have more contact with their clients than they did 5 years ago (55%).

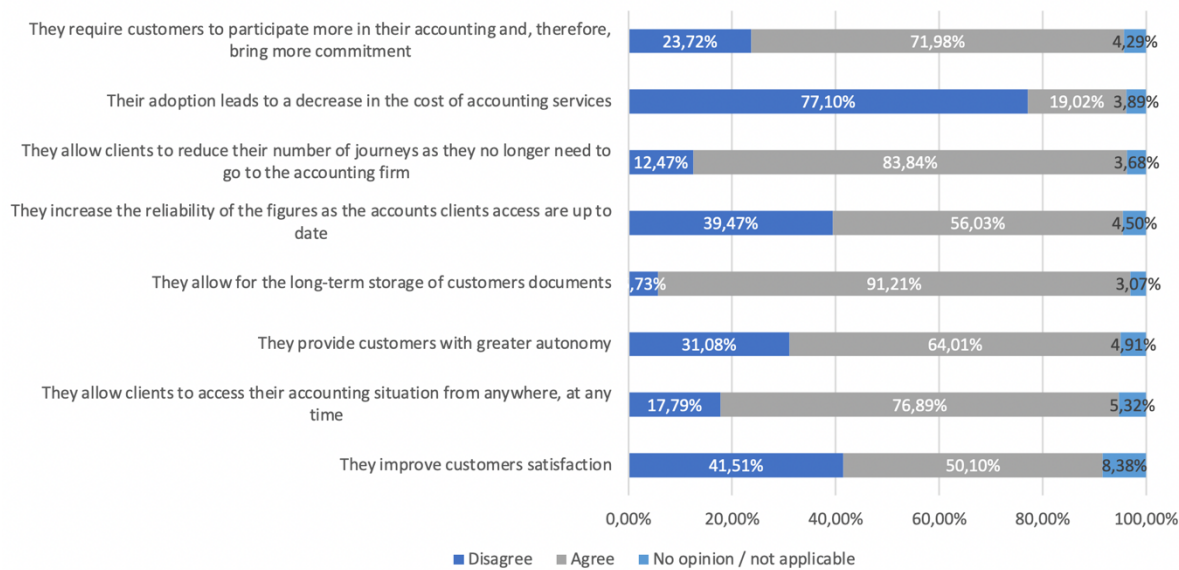
15. In percentage terms, what is the share of client files whose processing is fully automated (from the sending of the accounting documents by the client to the encoding in the accounting software) ?



*Figure 20: Share of client files whose processing was/is/will be fully automated*

This graph is quite revealing in terms of the accountants' projections for the past, present and future. It can be seen that, five years ago, very few files were fully automated (more than 90% of respondents agree that it was between 0 and 25% of files). Today, the majority of respondents agree that it is between 0 and 50% of files (43% indicate the first range and 30% the second). Regarding accountants' projections for the future, most think that files will be increasingly automated : 34% of respondents think that automation will occur for more than 75% of files and 30% think that it will occur for 50-75% of files.

## 16. Do you agree or disagree with the following benefits brought by digital technologies to customers ?



*Figure 21: Benefits brought by digital technologies to customers*

Respondents recognized that most of the listed benefits are indeed benefits brought about by digitalization for customers. Some benefits are almost unanimously agreed, such as the fact that digitalization allows for long-term storage of documents (91% agree) or that it reduces the number of trips to the accounting firm (84% agree), while for other benefits respondents are less unanimous such as the fact that it increases customer satisfaction (50% agree vs. 42% disagree) or the fact that digitalization increases the reliability of figures as the accounting is more up to date (56% agree vs. 40% disagree). The only "benefit" where a large majority agrees to say that it is not a real benefit is the fact that digitalization will reduce the cost of services billed to clients : 77% of respondents disagree. This is quite logical because when accountants were asked whether digitalization would bring financial gain to their fiduciary, more than the majority did not agree (see question 9). A reduction in the cost of services invoiced to clients is not possible without a reduction in costs in the fiduciary. In addition, the applications used have to be paid every month and they are quite costly. So, it will certainly not be the trustee who will bear this cost, but the consumers.

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## CONCLUSION OF THE QUANTITATIVE PART

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To conclude this quantitative part, it can be said that there is generally a high degree of adoption of numerical tools among Belgian fiduciaries, a fairly high degree of adoption of digital technologies such as cloud computing, automation and artificial intelligence and a minimal degree of adoption of Big Data, RPA and blockchain. Accountants also expect this digitalization to expand in the future and believe that their profession will continue to evolve. Overall, accountants are fairly aware of the potential benefits of digitalization and most see the advantages that digital technologies could bring to them and their clients, but they are also fairly aware that there are some disadvantages and challenges to adoption and use.

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## DIFFERENCES BETWEEN QUALITATIVE AND QUANTITATIVE RESEARCH

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It is important to note that we noticed some differences between the two studies regarding the benefits of digital technologies as well as the barriers to digitalization. One example of a benefit mentioned in the interviews that was clearly not validated by the online survey is that these digital technologies allow fewer mistakes to be made. This may be explained by the fact that, as the OCR of the software is not yet good enough, the risk of making mistakes if the accountant does not check properly increases. Many obstacles concerning the problems of the applications mentioned during the interviews could also not be validated by the online survey, such as the fact that there is little listening from the developers, that the applications are difficult to use and that they require many new skills. All accountants interviewed also agreed that the biggest obstacle was a lack of willingness and reluctance from clients to adopt digital tools in the trustee. However, the online survey showed that just over half of the respondents agreed with this, the obstacles that most people agree on being the cost and time needed to set up and the dependence on the Internet once set up (obstacles that appeared to be secondary during the interviews).

Hence, we can say that the online survey proved to be very useful. Indeed, if we had stopped at the interviews, we might have believed that the answers given by the respondents concerning the drivers/barriers to digitalization represented the point of view of all accountants in Belgium. Nevertheless, we realized from the quantitative study that, for some opinions, this was not the case.

## IV. ANALYSIS OF THE RESULTS OF OUR STUDIES IN RELATION TO OUR RESEARCH SUB-QUESTIONS

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*The aim of our empirical study was to answer the following research sub-questions :*

- 1. What are the digital technologies used in accounting firms today ?*
- 2. What are the current and/or future drivers, barriers and challenges brought about by digitalization in trustees (for accountants and their customers) ?*
- 3. Why do some trustees adopt these new digital technologies more than others ?*

*Our two studies (the qualitative and quantitative ones) have enabled us to gather quite a lot of information to answer these questions. However, each of them gave us different views on the different sub-questions. In particular, the interview and observation part allowed us to understand the general situation in the sector at the moment and to collect a lot of information that we did not necessarily expect, while the quantitative part allowed us to obtain generalizable figures, to find some differences between regions and to be able to cross-reference some data through pivot tables. In this section, we will bring together the results of our two studies in order to best answer our research sub-questions.*

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### WHAT ARE THE DIGITAL TECHNOLOGIES USED IN BELGIAN ACCOUNTING FIRMS TODAY ?

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During our research we realized that Belgian fiduciaries use very frequently a lot of basic technological tools such as printers, scanners, internal software, websites... Moreover, a lot of them digitize their paper documents. Digital technologies – which are, as a reminder, cloud computing, automation, RPA, artificial intelligence, Big Data and blockchain – are not all equally widespread among firms.

Cloud computing is used by the majority of interviewees and respondents to the survey : accountants store a lot of data on it and they use cloud-based software in their daily tasks. The applications used are mainly accounting, management, customer relationships, reporting, forecasting and invoicing software as well as CodaBox. However, nowadays there are still many accountants who use in-house and not cloud-based accounting software such as BOB 50, Adsolut or Bocount. The big difference between cloud-based and in-house software is that in-house applications are not accessible by clients : neither can they file documents, nor can they consult their accounting situations (either in graphical or basic form). However, a large majority of those who use in-house software combine it with other software in the cloud to

make life easier for themselves and to provide an optimal experience for clients. Indeed, according to some interviewees, each type of software has a target audience depending on its particular role : accounting and management applications are, for the most part, more designed for accountants while customer relationships and reporting software programs are more designed for customers.

The combination of the online questionnaire and the interviews has been a real added value in answering this sub-question as each method allowed us to make different findings on the subject. Thanks to our online questionnaire, we were able to interview accountants from all the regions of Belgium, which had not been possible in our interviews, and this enabled us to realize that there were discrepancies between the Flemish and Walloon regions, particularly in terms of the type of software used : Flemish accountants are more likely to use software with headquarters in Flanders, while Walloon accountants are more likely to use software with headquarters in Wallonia. This suggests that either the developers are only targeting accountants in their respective regions (cultural, proximity, language or other differences) or that there is a problem between their software programs and their business strategies. Our interviews and observations allowed us to extend the answer to this sub-question to a topic we did not expect to address specifically : the nationality of the developers of the software used by accountants. Indeed, according to some speakers at the Forum For the Future, the applications used are mainly software developed in Belgium (with a few exceptions) since Belgian accounting rules are quite complex, so software needs to be adapted and therefore, it is necessary to have developers who know all the specificities of these rules which is more the case for Belgian developers than for foreign ones (or at least it requires less research work).

Artificial intelligence is present in most accounting applications (in the cloud or even in-house) in the form of machine learning included in the OCR which will allow the software to better and better recognize the different fields on invoices from the same supplier : on the first invoice the software will not recognize anything, the accountant will have to show it, and then, as the cases are encountered, it will recognize the fields better and better on its own. Hence, it will learn. However, accountants are not always aware of using artificial intelligence in their work and this is understandable because it is only a small part of the capabilities of artificial intelligence (it is limited to teaching OCR to locate text zones on an invoice) and this part is not yet very efficient and thus, not very reliable : there is always a verification work by the accountant that must be done regarding the encoding proposals by the OCR – especially for

purchases where it is often necessary to break down the total amount in several different accounts.

Many people also report that they regularly work in an automated way. This is due to the two digital technologies mentioned earlier : the fact that the client can now upload his documents to the cloud platform himself and that the OCR proposes the encoding to the accountant. When the accountant is asked to estimate the proportion of fully automated client files 5 years ago, today and in 5 years' time, it can be seen that there are many more today than 5 years ago but also many fewer than in 5 years (according to their estimate). It can be assumed that this increasing automation will be due to the increasing performance of OCR in software, which will be more and more reliable, reducing the share of human verification to a single check on the first invoice of a supplier encountered. After that, the program should be able to locate the fields on the invoices independently and correctly. Accountants are, therefore, well aware that their job will continue to evolve.

Concerning Big Data and blockchain, their possible applications in accounting firms are unknown to many respondents and interviewees : none of the accountants interviewed are currently using them and very few accountants indicated that they were using them in the online survey (which was closed to predefined responses so we could not investigate further what the applications were). Regarding Robotic Process Automation, it is reported as being used regularly by more than a fifth of the respondents to the online survey, whereas during our interviews nobody had heard of it. This raises the question of whether the applications include these "robots", which is not mentioned on their websites – even though this should normally be one of the developers' selling points – or that respondents confused robotic process automation with automation.

To sum up, the only digital technologies that are used a lot in Belgian fiduciaries today – and it seems they are even more so since the coronavirus – are cloud computing, artificial intelligence and automation. These three digital technologies are dependent on each other : automation is possible thanks to the machine learning present in the OCR and is further enhanced when the accounting applications used by accountants are in the cloud and not in-house at the trustee. Big Data and blockchain are still far from being used in reality, there are almost no concrete applications in Belgian fiduciaries today, and Robotic Process Automation is only in the early stages of adoption among Belgian trustees.

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## WHAT ARE THE CURRENT AND/OR FUTURE DRIVERS, BARRIERS AND CHALLENGES BROUGHT ABOUT BY DIGITALIZATION IN TRUSTEES (FOR ACCOUNTANTS AND THEIR CUSTOMERS) ?

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### DRIVERS – ACCOUNTANTS

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Accountants see a lot of benefits for their fiduciaries in digitalization. Among the advantages is an increase in productivity thanks to : increased automation, assistance in fulfilling legal obligations available on management software, the fluidity of financial encoding due to the automatic import of bank statements via Codabox and, finally, thanks to the link existing in the applications between encoding and supporting documents. This higher productivity leads to an increase in the number of clients and an improvement in the quality of analysis (as accountants have more time for this part). In addition, digital tools allow for a more even distribution of work over the year (as documents are sent as they come in and not all at once), a space-saving (as documents are digitized), a reduced risk of data loss (as everything is backed up on a server), an infinite storage capacity (no limit to storage as long as you can afford to pay for it) and the homeworking (as everything is digitized, working from home is possible which has been a very important advantage during the coronavirus lockdown).

In addition to these benefits, most interviewees believe that digitalization is the future and that all trustees will have to adapt at some point. We can therefore refer to the adoption curve of an innovative product – also known as the Rogers curve – to say that there are several profiles of trustees : Innovators (those who adopted digital technologies first because they like new things), Early Adopters (opinion leaders, second to adopt the innovation), Early Majority (adopted the innovations after reflection without being a leader), Late Majority (trustees who adopt innovations only after the majority has demonstrated interest) and Refractors/Laggards (adopt the innovation after everyone else because they fear any evolution). Hence, the digital technologies have not all reached the same trustee profiles so far. In view of the data collected during our studies, we were able to determine the profiles of trustees to which the technologies have reached today :

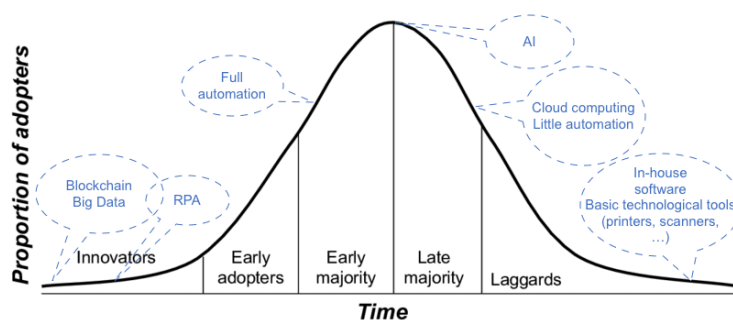


Figure 22 : Adoption curve of digital innovations among Belgian fiduciaries today.



It seems that accountants mainly decide to adopt digital tools in order to respond to their clients' requests and/or to bring them benefits. Indeed, when customers want digitalization, fiduciaries listen to them and generally offer them digital tools whereas when they do not want it, accountants do not force them. The tendency of customers to want digitalization depends on their number of years in the business (those who have just started are more open), their age (younger clients want it more than older ones), the distance of their workplace from the fiduciary (those who live far away are happier to have digital tools at their disposal) and the level of digitalization of their suppliers (the more suppliers send invoices in digital format, the fewer clients are reluctant to digitalize).

One of the benefits of digitalization for clients is that they are more autonomous : they can file their documents and consult their accounting situation from anywhere at any time and do not have to travel to the fiduciary. Moreover, their documents are saved on the platforms on a long-term basis so they can always consult them, unlike before when they brought their documents to their accountant in paper format. In addition to this, it is expected that the coding part of the accountants' work will be increasingly reduced, freeing up time to analyze client data, advise them and help them with their choices, resulting in better client support and follow-up. On top of that, thanks to the fact that it is up to them to file their documents on the platform, clients are more involved in their accounting situation, the relationship with the accountant changes : it is more of a collaboration.

There are several barriers to the adoption of digital technologies in fiduciaries. These include the fact that they increase the risk of viruses and cyber-criminal attacks and that their implementation requires significant time and financial resources that trustees may not have. In addition to this, when the employees or the management are reluctant to digitalize, it is a big obstacle to the digitalization in trustees.

There are also many barriers to this digital transition related to cloud-based applications. Accountants feel that these applications do not allow enough customization and that the developers do not provide sufficient testing opportunities before fully committing to the implementation of the software in the fiduciary. Furthermore, they feel that once you have chosen an application, it is difficult to change if it is not suitable, which makes the lack of

testing possibilities even more problematic. Accountants also feel that their use leads to a strong dependence on the application developer (who is responsible for updates) and a strong dependence on the Internet (in case of a breakdown, accountants would not be able to work). In addition to this and as mentioned above, they find that the OCR of the accounting applications is not yet reliable enough and thus, that these applications are not yet fully developed for optimal use. We can add to this – following the many current debates on the subject – that data storage in the cloud is very polluting so the increased use of cloud-based software could have a negative impact on the environment.

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#### BARRIERS – CUSTOMERS

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If employees and managers are obstacles to digitalization when they are reluctant to use digital tools, so are consumers, and it appears that the latter are quite often reticent. Indeed, some clients do not necessarily see the benefits of digitalization for them and consider that it would bring them more work because, if it is true that thanks to digitalization the client is more involved in his accounting, he must have the time to participate more and therefore, to scan his documents himself and put them on the cloud platforms, which is not the case for everyone. Moreover, some are not equipped to do this (if they have to scan each document one by one with a traditional printer it takes them too much time) and others are not comfortable with digital tools and do not know how to use them.

However, as mentioned earlier, most accountants listen to their existing clients, they do not want to force those who do not want digital tools but still try to convince them by showing them the benefits of digitalization. This strategy seems to have worked for many fiduciaries as very few accountants report having lost former clients as a result of the digitalization of their accounting firms. Thus, this is a barrier that can easily be overcome with tolerance, time and support : accountants must take the time to show their clients the benefits of digital tools and how to use them to get the most out of them (which accountants do not do much of nowadays).

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#### CHALLENGES – ACCOUNTANTS

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When accountants look to the future, the majority agree that coding will decrease as more and more files will be fully automated and this coding will be done almost entirely by the software. They therefore believe that analyzing the accounting created by the software to provide advice to clients, analyzing laws to interpret them and to highlight the important information for each client, and speaking with customers will increasingly be part of their main

tasks (these tasks are already very much present today). Consequently, the skills required to do this job are changing : accountants need to be good computer specialists in order to be able to use and train their clients in the use of these digital technologies, as well as good translators of numerical situations and legal documents into meaningful terms for their clients. It is likely that accountants who can only encode and not analyze, and who will not be able to evolve, will have totally disappeared within 10 years. Thus, accountants must be adaptable.

A major advantage of digital technologies mentioned earlier is that they allow work to be spread evenly over the year and no longer have a rush a few weeks before VAT declarations. However, accountants will have to – and already do if they are using cloud-based accounting software – learn to go to these platforms more regularly to validate the encoding proposal made by the OCR for the documents submitted by the clients.

Finally, another important challenge is the need for fiduciaries to digitalize in the long term in order to remain competitive with others. Indeed, the more digitalized fiduciaries there will be in Belgium and the younger the clients will be (as older people will, at some point, retire), the more likely it is that the clients' demand for digitalization will increase. Fiduciaries that refuse this digitalization or do not have the financial means or the time to implement it, run a high risk of losing their customers who want this digitalization to the highly digitalized fiduciaries. However, it should be noted that this risk is not imminent because, for the time being, there are still many clients who do not want this digitalization – as already mentioned – and it can be assumed that the demand for accounting services exceeds the supply as there are enough jobs for everyone.

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#### WHY DO SOME TRUSTEES ADOPT THESE NEW DIGITAL TECHNOLOGIES MORE THAN OTHERS ?

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By analyzing the data collected via the online survey with Excel and creating pivot tables (some of them can be found in the Appendices), it was possible to see that several independent variables influenced the answers given by the respondents.

Firstly, it can be noted that there are differences between the Walloon region and the Flemish region (Appendix 2). Respondents from the Flemish region use digital technologies more regularly than respondents from the Walloon region. This could be due to the fact that they feel that their clients are more enthusiastic and therefore, less resistant to the adoption of digital technologies in their trustees than respondents from the Walloon region. In addition, they are more in agreement with the benefits of digitalization (to their fiduciary and their

clients), so they see the potential gain more and are, perhaps, more inclined to adopt it. Furthermore, it can be seen that Flemish accountants currently have much less coding and much more contact with clients in their daily work than Walloon accountants and, when they look to the future, the current gap is maintained. Hence, it can be said that the Flemish are a little more advanced than us in the use of digital technologies.

Secondly, we can see that the answers diverge depending on whether the accounting firm is part of a group/network or whether it is independent (Appendix 3). It can be seen that, overall, groups use basic digital tools such as virtual diaries or websites more regularly than independent firms. And when it comes to digital technologies such as cloud computing, automation or artificial intelligence, regular use is also higher among groups (it is twice as high in the French survey and remains higher but to a lesser extent in the Dutch survey). This could be due to the same reasons as for the differences between the regions : groups generally agree more with the benefits proposed in our questionnaire as being brought about by digital technologies and less with the proposed problems of applications and, on top of that, they perceive their clients to be more enthusiastic about digitalization than accountants in independent firms. Moreover, as in the previous finding, the proportion of coding in the activities of accountants working in group fiduciaries is lower (according to their estimates) and the proportion of analysis and advice is higher than the ones of accountants working in independent firms. Respondents working in trustees that are part of a group also estimate that five years ago they had, that they have now and will have in five years' time more fully automated files than those in independent firms.

Thirdly, the frequency of use of digital technologies increases with the number of employees present in the trustees (Appendix 4) : the more employees there are, the more frequently digital technologies are used. This rule applies to all levels except for the one "between 10 and 20" which distorts the trend. It can be seen that the level of enthusiasm of clients and the level of agreement with the benefits brought to their fiduciary and their clients are, again, likely to impact on this variation in frequency.

Fourthly, it is also noticeable that the more enthusiastic their clients are about implementing digital technologies in the fiduciary, the more the trustees use digital tools such as cloud-based applications, automation and artificial intelligence (Appendix 5). This is another indication that accountants are listening to their clients' demands. However, it should be noted that, even when accountants do not agree with the fact that their clients are enthusiastic, they

still use these digital tools. Consequently, they listen to their clients but still try to go for digitalization and convince them smoothly – as said before. We also noticed (Figure 15) that customers were not the only human barrier to digitalization : the more employees and management are reluctant to use digital tools, the fewer fiduciaries adopt them.

Fifthly, we note that the more accountants agree with the advantages and the less they agree with the disadvantages, the more regularly they use digital tools (Appendix 6). Thus, we can conclude that if accountants have preconceived negative ideas about these tools, they are less likely to adopt them in their daily work practices, which is quite logical. We can thus ask ourselves : “What is the reason for this tendency to agree or disagree with the advantages and disadvantages proposed ?”. It can be seen that, overall, the higher the share of coding in the accountants' daily tasks, the less they agree with the proposed advantages. One might think that this is because they do little other work (analysis, contacts and advice to clients) and that consequently, they only see the fact that digital technologies threaten them. However, we were unable to demonstrate this because we did not find any trend in the answers given between the increase in the percentage of coding and the decrease in the percentage of other tasks. Furthermore, we discovered that the more regularly accountants use the digital tools, the more they see the advantages (while remaining aware of the disadvantages). In other words, some accountants who did not see certain advantages are convinced once they adopt the technologies in their daily practices. For some advantages, the responses of those who rarely use digital tools are closer to those of accountants who do not use them plus, they see even more disadvantages. This is quite logical since the OCR learns from the documents it encounters : if it encounters few, it is therefore quite likely that it will be less efficient and that accountants will thus be less convinced.

We can conclude that, in our quantitative study, it appears that five variables are likely to influence the level of digitalization in Belgian accountancy firms : the region, the structure of the firm (group or independent firm), the number of employees in the firm, the level of enthusiasm of clients/employees/management for digitalization and the balance between the advantages and disadvantages that accountants see in this digitalization. When firms make more use of digital tools, they have less coding, more analysis and more contacts with clients than those who make less intensive use. Moreover, their share of fully automated files 5 years ago, today and in 5 years' time is higher than that of less digitalized accounting firms.

As suggestions for further investigation, we could propose to carry out studies on why the Flemish region is more digitalized than the Walloon region (it could be due to the fact that they have more subsidies, that they started this digitalization earlier than us, to the fact that they use more these digital technologies even outside work, to cultural differences...) ; why groups are more digitalized than independent firms (perhaps they have more budget to do so and therefore, they can better train their employees or they may be pushed to do so by a parent company outside Belgium, in a more digitalized country) ; why structures with more employees are more digitalized than those with fewer employees (the likelihood that there are young employees who want this digitalization or that some of these employees are requesting this digitalization could be greater) ; why some customers are more open to the digital tools than others (we already identified some variables, i.e. age, number of years in business, number of digital invoices received, etc. but there could be others as the sector of activity) ; and why some accountants see the benefits of these digital technologies more than others and are therefore more inclined to adopt them (perhaps, as with consumers, age matters, or the more they participate in events like Forum For the Future, the more aware they are of the benefits, or perhaps their education has something to do with it). Another independent variable not tested in our quantitative study that is likely to influence the level of digitalization is the number of years the trustee has existed. It is probable that the newer the trustees are, the more they use digital tools, whereas the older they are, the more they are accustomed without these digital technologies and the less they adopt them.

## V. DISCUSSIONS

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*In this last chapter of the thesis, academic implications are first drawn by comparing the literature review part with the empirical research we conducted. Then, we make a general conclusion based on our main research question: "What are the impacts of digitalization on the activities of accountants in Belgian accounting firms ?". In addition, we propose some recommendations to fiduciaries, to the European Commission and to the developers of the applications so that the digitalization can be done in the best possible way. Finally, some limitations of our studies and suggestions for further research are mentioned.*

### ACADEMIC IMPLICATIONS

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During our research, we realized that our studies validated many of the advantages/disadvantages presented in the literature as being brought to accountants by digital technologies, were less categorical about others and invalidated a presumed important advantage. Among the validated advantage we can, for example, note the validation of the fact that cloud computing allows accountants and their clients to access data online, from anywhere at any time, mentioned by several researchers (Bordas et al., 2015 ; Dimitriu & Matei, 2015 ; Kamdordzhanova & Selezneva, 2019) and that it allows for infinite storage capacity (Dimitriu & Matei, 2015). In addition to this, we were able to validate the fact that automation allows for higher productivity, an advantage that had been noted in several scientific articles (Belkadi, 2015 ; Kaya et al., 2019) as well as the fact that this automation will allow accountants to focus on more engaging tasks such as analysis and customer support (Belkadi, 2015 ; Brousse, 2016 ; Gulin et al., 2019) : these tasks are, in fact, already a large part of their daily work.

However, it should be noted that most of the benefits of automation presented in the articles could be generalized to the three digital technologies (automation, artificial intelligence and cloud computing) and could not really be separated. Indeed, it appears that the automation of the accountants' work is brought by the artificial intelligence present in the OCR (encoding proposal) and by the software on the cloud computing (scan by the customers of their documents). If trustees do not use cloud applications, automation is much lower and if internal applications do not have machine learning in their OCR, there is no automation possible. There are therefore a huge number of articles that separate the impact of these three digital technologies on the accounting profession (Fernandez & Aman, 2018 ; ICAEW IT Faculty,

2018 ; Jędrzejka, 2019 ; Zhang et al., 2020), which – after our research – does not seem to be the best thing to do.

Some disadvantages, threats and challenges were also confirmed. These include the fact that increasing automation could threaten some jobs, especially those of accountants who can only do coding and not analysis and customer care – for whom jobs are not currently threatened (ACCA, 2013 ; Gulin et al., 2019 ; Kaya et al., 2019 ; Sharif, 2018). Or that automation – but in our research this has been validated to digitalization in general and thus, again, to the three digital technologies mentioned above – is costly. Hence, those who do not have the means to implement it risk, in the long run, losing the customers who want the benefits it brings (Gulin et al., 2019 ; Törnqvist & Forss, 2018). However, this should be qualified and it should be emphasized that this is a long-term risk and not a current risk as pointed out by Belkadi (2015) and Jylhä & Syynimaa (2019).

The fact that machines make fewer errors than humans and thus, the quality of accounting is better with automation mentioned by Jędrzejka (2019), Törnqvist and Forss (2018) and Jylhä and Syynimaa (2019) could not be validated or invalidated for lack of majority agreement. This advantage will certainly be considered correct in the future when OCRs are more efficient and do not make errors in the recognized fields, but some are not sufficiently efficient today to convince a majority of accountants of this advantage.

In addition to this, an important point to note is that many researchers mention a financial gain from automation (Gulin et al., 2019 ; Jylhä and Syynimaa, 2019 ; Marr, 2018) and from cloud computing (Dimitriu & Matei, 2015 ; Prichici & Ionescu, 2015 ; Törnqvist & Forss, 2018). Accountants currently do not believe in this at all. Rather, they see the cost involved in the implementation and do not think they can save money afterwards.

Finally, we were not able to validate the benefits of Big Data and blockchain mentioned in the articles we had read (Janvrin & Watson, 2017 ; McKinney et al., 2017 ; Payne, 2014 ; Richins et al., 2017 ; Zouhri, 2019) because the accountants from whom we obtained views had never heard of them in the digital technologies available to accountants. While we were therefore unable to validate their impacts, we were able to gather data on their extent of adoption among accountants in Belgium, which is close to zero. The results of our quantitative study also allowed us to assess the level of adoption of the other fourth digital technologies (automation, RPA, cloud computing and artificial intelligence) with figures, which was missing in the



literature. We could determine that automation, cloud computing and artificial intelligence are already well established in Belgian trustees while RPA is only in the early stages of adoption.

We were also able to supplement this literature with a whole series of advantages, disadvantages and challenges for both accountants and clients – which researchers do not mention much in the literature. In order to synthesize the results obtained (the validated literature and the new data provided), we decided to start again from the table presented in the conclusion of our literature review and to adapt it to the results of our research :

	Drivers		Obstacles / challenges		Extent of adoption among Belgian trustees
	Accountants	Clients	Accountants	Clients	
<b>Automation</b>	<ul style="list-style-type: none"> <li>Higher productivity → Employees can focus on more engaging tasks (analysis, advice,...) → More clients can be taken</li> <li>Allow to stay competitive</li> </ul>	<ul style="list-style-type: none"> <li>→ Quality of analysis improved and customers more followed by accountants</li> <li>Long-term storage of documents</li> </ul>	<ul style="list-style-type: none"> <li>New skills required, job is changing</li> <li>Possible job cuts</li> <li>Increase competitiveness</li> <li>Dependent on Internet and software's supplier</li> <li>Lack of customization of software</li> <li>Lack of testing possibilities</li> <li>Difficult to change applications once installed</li> <li>OCR not fully reliable</li> </ul>		<ul style="list-style-type: none"> <li>Full automation: not widely widespread (used by less than 15% of trustees)</li> <li>Automation : widespread (used by more than 60% of trustees)</li> <li>RPA: not widely used (by approximately 20% of trustees)</li> </ul>
<b>AI (machine learning)</b>	<ul style="list-style-type: none"> <li>Space-saving</li> </ul>				<ul style="list-style-type: none"> <li>Still in the early stages of development but OCR already used (by approximately 50% of trustees)</li> </ul>
<b>In-house accounting software</b>					<ul style="list-style-type: none"> <li>A lot are still using it (more than 80% of Belgian trustees)</li> </ul>
<b>Software in the cloud computing (accounting management reporting forecasting customer relationships ...)</b>	<ul style="list-style-type: none"> <li>Even higher productivity</li> <li>Less risk to lose data</li> <li>Work spread evenly over the year</li> <li>Accessibility everywhere at any time from any device</li> <li>Infinite storage capacity</li> </ul>	<ul style="list-style-type: none"> <li>More autonomy</li> <li>Accessibility everywhere at any time</li> <li>Less journey to the accounting firm</li> <li>Accounts more up-to-date</li> </ul>	<ul style="list-style-type: none"> <li>Security problems (hacking)</li> <li>Financial investments and a lot of time needed</li> <li>Customer, manager, employees sometimes reticent</li> <li>Training courses needed</li> </ul>	<ul style="list-style-type: none"> <li>Must scan the documents themselves in cloud accounting software → takes time and requires appropriate equipment</li> <li>Requires a change in their habits</li> </ul>	<ul style="list-style-type: none"> <li>A lot are using it (more than 60% of Belgian trustees)</li> </ul>

	○ No physical presence needed				
<b>Big Data</b>	?	?	?	?	○ Used by a minority of Belgian trustees (close to zero)
<b>Blockchain</b>	?	?	?	?	○ Used by a minority of Belgian trustees (close to zero)

Our empirical research therefore allowed us to validate and invalidate a whole series of positive and negative points brought about by digitalization among Belgian fiduciaries, as well as the level of adoption of these digital tools among them. Our studies also allowed us to realize that the differentiation made in our literature review between the coding part of accounting and the statistical and social parts as well as between digitization, digitalization and digital transformation was of great importance. Indeed, accountants expect that the coding part of their work will decrease considerably over the next 5 years while the statistical and social parts will increase and become their main tasks. Furthermore, we could see that digitization is already very much embedded in the daily practices of accountants, that digitalization is starting to be adopted by the majority of Belgian fiduciaries and that digital transformation is still only a dream.

Finally, the hypothesis raised by Fletcher and Griffiths (2020) and Seetharaman (2020) that Covid-19 could accelerate the adoption of digital technologies in trustees seems to be true in Belgium : many accountants feel that they have been working more with digital tools since the coronavirus, in particular because this containment would have made it possible to convince some previously reluctant clients to use them.

To summarize, most of the advantages, disadvantages and degrees of adoption of automation, artificial intelligence and cloud computing presented in the literature also apply to Belgian fiduciaries but could have been further explored and should not be singled out as these digital technologies are often combined. Furthermore, the articles talking about the impact of Big Data and blockchain are currently not relevant for Belgian fiduciaries, as these technologies are not yet available for application in the profession.

## GENERAL CONCLUSION

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The aim of this thesis was to understand the impact of digitalization on the activities of accountants in Belgian fiduciaries. Through our studies and the answers to our research sub-questions, we have come to realize that numerical tools have already changed the work of accountants in recent years and that they have already had to adapt to the digitization and applications that are now part of their daily lives. However, this change does not stop there : our results indicate that a whole range of digital technologies are now increasingly part of the daily work of accountants in Belgium : cloud computing, artificial intelligence and automation. These digital tools are grouped in the applications (accounting, management, reporting...) used by accountants in their day-to-day work.

Accountants are well aware of the benefits of digitalization for themselves and their clients and therefore the value of adopting it. However, they also see some drawbacks and challenges. The advantages include increased productivity, a more even distribution of work over the year and fewer repetitive tasks for accountants, and greater autonomy for clients. However, the majority of Belgian accountants indicate that the tools used are not yet fully developed to fully facilitate the accountant's work, that the transition requires significant time and financial resources and that some clients are resistant or unable to accommodate to this digitalization.

Some fiduciaries have chosen to take the digitalization step more quickly than others who are still in the reflection phase. During our empirical research, we were able to identify some factors influencing the level of digitalization of Belgian fiduciaries such as the region where the fiduciary is located, the willingness of clients, employees and management to digitalize and the type of fiduciary (part of a group or independent).

To sum up, even if digitalization is not equally widespread among all accounting firms in Belgium, it is at the heart of discussions among accountants. They are all interested in it and know that, at some point, they will have to adapt and that their profession, while clearly not going to disappear, is bound to evolve.

## RECOMMENDATIONS TO TRUSTEES, EUROPEAN COMMISSION AND SOFTWARE DEVELOPERS

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In view of the results of our searches, we felt it was important to make some recommendations to trustees with no / little / a lot of use of digital tools, to the European Commission and to the developers of the applications – who have all the keys in hand to facilitate the digital transition of Belgian accounting firms.

Firstly, we would like to address to fiduciaries who are not yet using cloud-based software. First of all, it appears from our interviews that some accountants who use in-house software really feel that their clients would not want to / could not scan their documents themselves if they switched to cloud-based software. This makes some sense because, on in-house applications, there is no real advantage for clients : their accounts are not visible online at any time and from any place, so they do not really have access to more up-to-date figures – which, according to our research, is one of the big advantages of cloud platforms for them. Hence, they do not have an incentive to take their time and / or invest in hardware to do that. Then, they need to be shown the benefits of cloud platforms : one solution is for accountants to (initially) scan documents for clients and put them on the online platforms to show clients the benefits with their own accounting situation, which is more meaningful for them. However, as with the trustee profiles, it can be argued that there are several customer profiles : innovators, early adopters, early majority, late majority and refractors. It is therefore likely that, in all fiduciaries, there are some clients who are open to this digitalization. The key is to target the innovators and early adopters and the rest will follow. It is, anyway, unlikely that all clients will take the plunge into digitalization overnight.

Furthermore, if trustees using in-house accounting software would like to keep this software but still offer their clients some of the benefits of the cloud, we advise them – based on the observations we made during the For the Future Forum – to complement this in-house program with management, reporting or client communication software. These applications can be linked to in-house software via API connections, which allows a first step towards online applications while keeping the tools that employees are used to. However, it should be noted that some in-house applications have very poorly performing OCR with machine learning (or no OCR at all, but it is less common). If these software programs do not evolve, accountants, if they want to remain competitive / if they want to become more efficient, will have to change applications at some point.

In addition to this, the introduction of new digital tools in the fiduciary must be done smoothly and with a fairly high degree of support : both for clients and employees. Indeed, even if training represents a fairly high cost for the accounting firm, we noticed in our interviews with accountants that, when it was not implemented, employees did not manage to use 100% of the software's capabilities (so some of it is paid for nothing) and often found it underperforming. In addition to this – and as mentioned above – it is with support and by showing customers the advantages that digitalization has for them that accountants can, in the medium term, convince them. And an unconvinced employee will not be able to convince his customers. As we saw during our internship at BDO, raising employee awareness also involves anchoring digitalization in the company's strategy and team teaching : in fact, monitoring employees, holding weekly meetings so that they can ask questions, take stock of their progress, the overall state of their clients about this digitalization, etc., are very important for employees to feel involved and really change their practices. To sum up, simply giving employees a computer with a new program without training, follow-up and support is far from sufficient : if it is to do that, it is better to do nothing.

Secondly, we would like to address accountants who have applications that include OCR with machine learning but do not use them because they find it inefficient. As mentioned in our thesis, these OCRs learn as they encounter documents, so it is normal for them to perform poorly if you rarely use them. We have noticed that some periods of the accountants' work are very busy while others are less busy. Consequently, we advise accountants to use this tool, to train it, when they have more time to devote to it : it, indeed, takes time in the beginning but it seems, with our interviews, that it really saves time later on.

Thirdly, we have some recommendations for the developers of the applications used by accountants (whether online or in-house). First of all, when we go to their sites and when we listen to the different sessions of the Forum For the Future, the main impression is that their marketing is directed at accountants, which is important. However, we have seen in our research that it is essential for trustees to convince their clients to use these tools (especially when it comes to cloud-based accounting applications) so that they are actually useful to accountants. Hence, it is necessary for application developers to do PUSH marketing by canvassing their clients' clients (i.e. accountants' clients), which would give trustees' customers an overview of the benefits and would perhaps make them more interested in this digitalization, which would help non-digitalized fiduciaries to jump on the digitalization bandwagon. This push marketing could be done by adding a trustees' customers marketing section on the websites of the

application developers or by setting up demonstration sessions of the tools at some conferences where self-employed people, NPOs and companies are present.

It also appeared to us that the lack of possibility to test the applications before committing to them is a real barrier for accountants in their path towards digital change. It would therefore be a real plus for them if developers offered a test file that they could try out for a few weeks free of charge or even the digitalization of a single client file to see, in practice, what the change requires. It is clear from all the studies we have carried out that the application developers hold many of the keys to the successful digitalization of Belgian fiduciaries. There is still work to be done but, if they listen to accountants and adapt to their demands, the speed of adoption of these digital technologies should only accelerate.

Fourthly, we would like to make a recommendation to the trustees who are already strongly on the way to digitalization. It would be a real added value for the trustees who do not use often the digital tools if they could share their experiences with them : the inconveniences they have experienced, the benefits they have gained, the number of times they have suffered from potential financial problems due to the introduction of digital technologies... A marketing strategy for application developers could also be to propose to trustees who have adopted their tools and are happy with them, to share their experiences with trustees who are hesitant and, in return, to offer them discounts on software rental. In addition, the "Espace Innovation" club, which allows Belgian accountants to share their experiences, is full, with new registrations on a waiting list. Hence, accountants seem to be interested in this type of club and it would be interesting to increase the number of places available or to create others.

Fifthly and finally, we would like to make a recommendation to the European Commission for a legislative proposal. We had left a space in our quantitative survey where accountants could put comments. It appeared to us that many were wondering why there was no European standardization regarding the format of sales invoices. Indeed, if there was a single format, a single and identical place for all the essential elements (required by Directive 2014/55<sup>12</sup>), the OCR would be much more efficient : it would only need to be shown once for all the suppliers where the fields to be inserted in the accounting entries are (this could be set directly by the application developers), which would increase the share of automation in the trustees.

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<sup>12</sup> <https://eur-lex.europa.eu/legal-content/FR/TXT/?uri=CELEX%3A32014L0055>

Our final piece of advice is as follows : It is true that digitalization and change in general can be frightening and that there are a number of obstacles, such as the high cost and time required to implement it. It is often easier said than done but the change is worth it : it appears that many trustees who have embarked on frequent use of digital tools and who have given themselves all the means to succeed are happy with it. We therefore advise trustees, who have not already done so, to take the plunge.

## LIMITATIONS AND RECOMMENDATIONS FOR FURTHER STUDIES

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First of all, it should be noted that the impact of digitalization on the activities of accountants in Belgian fiduciaries is a very broad topic and we could not cover all points of view. Our first thought was to ask fiduciary clients whether they agreed with what the accountants had attributed to them in our qualitative interviews : their feelings towards digitalization and the advantages/opportunities and disadvantages it brings them. However, this question is so broad that it could be the subject of another whole thesis, so we abandoned this idea, but it could still be researched further by someone else.

In addition to this, we were able to draw several conclusions from our quantitative study about why some trustees were more inclined to digitalization than others. However, from these findings emerged many other questions as mentioned on page 60 of our thesis, and these questions could also be the subject of further research.

Another important point to note is that we sent the survey to our colleagues at BDO (where we did our internship), so it is likely that there is an over-representation of BDO employees among the respondents from groups in the French survey, which could skew our data somewhat.

Furthermore, the interviews on which we based our online questionnaire were only conducted with Walloon and Brussels accountants. Consequently, we can assume that the Flemish accountants' point of view, as less investigated at the beginning, was less represented and perhaps the questionnaire was less meaningful for them.

Moreover, we know that from a purely marketing research point of view, normally for a sample to be considered representative of the population studied, it is necessary to be able to estimate the total number of people present in this population. However, there is no list with an exact number of accountants present in Belgium, the number mentioned by the Institute of

Belgian Accountants (more than 6.000) including only their members and therefore, being only a part of the total number of accountants present in Belgium. Hence, we can assume that 489 responses is a sufficient number to be representative of the overall population, but without being able to prove it with figures.

Finally, according to Queiros et al (2017, p.382), in a quantitative study the “*reliability of data is very dependent on the quality of answers and on the survey' structure*”, the structure is very rigid and does not allow capturing “*the emotions, behavior and changes of emotions of respondents*”. Indeed, we were not able to investigate answers that seemed odd (such as the fact that a lot of accountants who do more than 40% of coding also do more than 40% of analysis and have more than 40% of contact with clients, which is mathematically impossible), or to try to understand what the applications of certain digital technologies were (more than a fifth of the respondents mentioned using RPA on a regular basis and a few people mentioned using Big Data and blockchain, which would have been interesting to know more about).



## VI. APPENDICES

### APPENDIX 1 : INTERVIEW GUIDE

1. What does digitalization mean to you in your professional practice ?
2. What digital technologies have you implemented in your trustee ?
3. Why have you implemented these technologies ? Or what is holding you back from implementing these technologies ?
4. Have your employees been (or are) reluctant to introduce the technology ?
5. Have your customers been (or are) reluctant to introduce the technology ?
6. What are the advantages of this digitalization for you ?
7. What do you see as the obstacles to this digitalization ?
8. Do you have good relations with the sellers of these new technologies ? (if applicable)
9. I have read articles on Google Scholar saying that the digital technologies impacting accounting are cloud computing, artificial intelligence, automation, robotic process automation, blockchain and Big Data. What do you think about this ?
10. Are you afraid for the future of the accounting profession with this digitalization ?

### APPENDIX 2 : PIVOT TABLES : REGIONAL DIFFERENCES

Do you use the following technology in your trustee : Cloud-based accounting software ?	Yes, regularly	Yes, rarely	No
Brussels-Capital Region	56.76%	8.11%	35.14%
Flemish Region	62.46%	9.22%	26.28%
Walloon Region	52.83%	5.03%	40.88%

Do you use the following technology in your trustee : Other software in the Cloud ?	Yes, regularly	Yes, rarely	No
Brussels-Capital Region	70.27%	5.41%	18.92%
Flemish Region	66.21%	9.90%	19.45%
Walloon Region	54.09%	9.43%	31.45%

Do you use the following technology in your trustee : Automation of the accounting process from document submission to encoding ?	Yes, regularly	Yes, rarely	No
Brussels-Capital Region	70.27%	2.70%	27.03%
Flemish Region	58.70%	12.97%	27.30%
Walloon Region	50.94%	15.72%	31.45%

Do you use the following technology in your trustee : Artificial intelligence (machine learning, etc.) ?	Yes, regularly	Yes, rarely	No
Brussels-Capital Region	29.73%	13.51%	29.73%
Flemish Region	33.45%	7.85%	42.66%
Walloon Region	28.30%	11.32%	37.11%

Figure 23 : Differences in the frequency of use of digital technologies between regions

Do you agree/disagree with the following statement : My clients are enthusiastic about the implementation of digital technologies in our trust company ?	Agree	Disagree
Brussels-Capital Region	59.46%	35.14%
Flemish Region	60.07%	34.81%
Walloon Region	42.14%	45.91%

Do you agree or disagree with the following advantage brought about by digital technologies: "they allow work to be spread evenly over the year"?	Agree	Disagree
Brussels-Capital Region	59.46%	35.14%
Flemish Region	62.80%	36.86%
Walloon Region	52.20%	40.25%

Do you agree or disagree with the following advantage brought about by digital technologies: "they reduce the risk of losing data"?	Agree	Disagree
Brussels-Capital Region	75.68%	24.32%
Flemish Region	78.84%	19.45%
Walloon Region	73.58%	22.01%

Do you agree or disagree with the following advantage brought about by digital technologies: "they improve the quality of analysis"?	Agree	Disagree
Brussels-Capital Region	67.57%	24.32%
Flemish Region	69.62%	26.96%
Walloon Region	61.64%	30.82%

*Figure 24 : Accountants' views on digital technologies by regions*

What % of this task do you feel you currently have in your job: Encoding?	0-10%	10-20%	20-30%	30-40%	more than 40%
Brussels-Capital Region	8.11%	16.22%	8.11%	35.14%	32.43%
Flemish Region	39.59%	20.82%	15.70%	11.26%	12.63%
Walloon Region	6.29%	10.69%	24.53%	22.64%	35.85%

What % of this task do you feel you currently have in your job: Analysis of accounts to provide advice to clients?	0-10%	10-20%	20-30%	30-40%	more than 40%
Brussels-Capital Region	5.41%	18.92%	29.73%	32.43%	13.51%
Flemish Region	5.12%	15.36%	29.69%	20.48%	29.35%
Walloon Region	5.66%	19.50%	29.56%	22.64%	22.64%

What % of this task do you feel you currently have in your job: Analysis of laws/regulations to tailor them to the customer?	0-10%	10-20%	20-30%	30-40%	more than 40%
Brussels-Capital Region	18.92%	32.43%	24.32%	16.22%	8.11%
Flemish Region	13.31%	22.87%	31.40%	13.99%	18.43%
Walloon Region	16.98%	32.08%	26.42%	10.06%	14.47%

What % of this task do you feel you currently have in your job: Contacts with customers?	0-10%	10-20%	20-30%	30-40%	more than 40%
Brussels-Capital Region	10.81%	18.92%	32.43%	21.62%	16.22%
Flemish Region	2.05%	17.06%	24.23%	24.23%	32.42%
Walloon Region	5.66%	30.19%	22.64%	24.53%	16.98%

*Figure 25 : Current distribution of accountants' work by regions*

What % of this task do you think you will have in your job: Encoding?	0-10%	10-20%	20-30%	30-40%	more than 40%
Brussels-Capital Region	37.84%	27.03%	18.92%	10.81%	5.41%
Flemish Region	49.49%	21.16%	11.26%	8.19%	9.90%
Walloon Region	21.38%	35.85%	22.64%	10.69%	9.43%

What % of this task do you think you will have in your job: Analysis of accounts to provide advice to clients?	0-10%	10-20%	20-30%	30-40%	more than 40%
Brussels-Capital Region	5.41%	5.41%	21.62%	40.54%	27.03%
Flemish Region	3.41%	8.53%	21.84%	26.28%	39.93%
Walloon Region	1.26%	7.55%	23.27%	32.08%	35.85%

What % of this task do you think you will have in your job: Analysis of laws/regulations to tailor them to the customer?	0-10%	10-20%	20-30%	30-40%	more than 40%
Brussels-Capital Region	5.41%	13.51%	29.73%	32.43%	18.92%
Flemish Region	6.48%	16.38%	29.01%	21.50%	26.62%
Walloon Region	5.03%	18.24%	30.82%	20.13%	25.79%

What % of this task do you think you will have in your job: Contacts with customers?	0-10%	10-20%	20-30%	30-40%	more than 40%
Brussels-Capital Region	10.81%	8.11%	35.14%	21.62%	24.32%
Flemish Region	1.71%	11.95%	22.87%	25.60%	37.88%
Walloon Region	6.92%	30.19%	22.01%	18.87%	22.01%

Figure 26 : Future distribution of accountants' work (in 10 years) by regions

### APPENDIX 3 : PIVOT TABLES : DIFFERENCES BETWEEN GROUPS AND INDEPENDENT FIRMS

Do you use the following technology in your trustee : Cloud-based accounting software ?	Yes, regularly	Yes, rarely	No
Independent trustees	53.82%	7.73%	38.45%
Trustees which are part of a group	87.39%	6.06%	6.55%

Do you use the following technology in your trustee : Other software in the Cloud ?	Yes, regularly	Yes, rarely	No
Independent trustees	59.70%	9.56%	30.74%
Trustees which are part of a group	75.39%	7.03%	17.58%

Do you use the following technology in your trustee : Automation of the accounting process from document submission to encoding ?	Yes, regularly	Yes, rarely	No
Independent trustees	52.83%	13.22%	33.95%
Trustees which are part of a group	82.91%	12.06%	5.03%

Do you use the following technology in your trustee : Artificial intelligence (machine learning, etc.) ?	Yes, regularly	Yes, rarely	No
Independent trustees	28.42%	9.83%	61.75%
Trustees which are part of a group	48.18%	9.03%	42.79%

Figure 27 : Differences in the frequency of use of digital technologies between the types of trustees



Do you agree/disagree with the following statement : My clients are enthusiastic about the implementation of digital technologies in our trustee ?	Agree	Disagree
Independent trustees	51.43%	40.57%
Trustees which are part of a group	60.79%	33.21%

Do you agree/disagree with the following statement : I could convince all my clients to use digital technologies ?	Agree	Disagree
Independent trustees	34.67%	62.45%
Trustees which are part of a group	44.12%	55.88%

Do you agree or disagree with the following advantage brought about by digital technologies: "They allow you to remain competitive with other trustees"?	Agree	Disagree
Independent trustees	66.81%	25.20%
Trustees which are part of a group	83.39%	11.09%

Do you agree or disagree with the following advantage brought about by digital technologies: "They allow work to be spread evenly over the year"?	Agree	Disagree
Independent trustees	57.00%	39.65%
Trustees which are part of a group	64.85%	29.15%

Do you agree or disagree with the following statement about cloud-based software: " they require many new skills"?	Agree	Disagree
Independent trustees	50.14%	41.29%
Trustees which are part of a group	35.76%	62.24%

Do you agree or disagree with the following statement about cloud-based software: "they are not yet fully developed"?	Agree	Disagree
Independent trustees	66.69%	24.74%
Trustees which are part of a group	58.30%	37.70%

Figure 28 : Accountants' views on digital technologies by types of trustees

#### APPENDIX 4 : PIVOT TABLES : DIFFERENCES DEPENDING ON THE NUMBER OF EMPLOYEES IN THE TRUSTEE

Do you use the following technology in your trustee : Cloud-based accounting software ?	Yes, regularly	Yes, rarely	No
I am alone in my trustee	45.57%	4.47%	49.97%
Less than 5	58.25%	5.94%	35.81%
Between 5 and 10	61.51%	13.03%	25.46%
Between 10 and 20	53.14%	7.94%	38.92%
More than 20	83.95%	7.22%	8.83%

Do you use the following technology in your trustee : Other software in the Cloud ?	Yes, regularly	Yes, rarely	No
I am alone in my trustee	43.19%	8.82%	48.00%
Less than 5	64.19%	7.61%	28.20%
Between 5 and 10	71.72%	9.37%	18.91%
Between 10 and 20	48.92%	18.82%	32.25%
More than 20	83.26%	3.99%	12.75%

Do you use the following technology in your trustee : Automation of the accounting process from document submission to encoding ?	Yes, regularly	Yes, rarely	No
I am alone in my trustee	42.34%	13.74%	43.92%
Less than 5	50.23%	12.89%	36.87%
Between 5 and 10	66.64%	18.15%	15.21%
Between 10 and 20	53.92%	12.16%	33.92%
More than 20	89.63%	6.37%	3.99%

Do you use the following technology in your trustee : Artificial intelligence (machine learning, etc.) ?	Yes, regularly	Yes, rarely	No
I am alone in my trustee	19.05%	10.85%	70.09%
Less than 5	29.39%	8.42%	62.19%
Between 5 and 10	33.99%	14.58%	51.43%
Between 10 and 20	22.94%	4.61%	72.45%
More than 20	61.52%	9.60%	28.88%

Figure 29 : Differences in the frequency of use of digital technologies depending on the number of employees in the trustee

Do you agree/disagree with the following statement : "My clients are enthusiastic about the implementation of digital technologies in our trustee" ?	Agree	Disagree
I am alone in my trustee	40.03%	50.31%
Less than 5	51.70%	40.69%
Between 5 and 10	63.78%	30.38%
Between 10 and 20	44.71%	44.80%
More than 20	70.51%	24.73%

Do you agree or disagree with the following advantage brought about by digital technologies: "They improve customer satisfaction"?	Agree	Disagree
I am alone in my trustee	37.99%	49.69%
Less than 5	46.83%	45.96%
Between 5 and 10	57.98%	36.18%
Between 10 and 20	44.31%	46.86%
More than 20	72.04%	13.59%

Do you agree or disagree with the following advantage brought about by digital technologies: "They enable accountants to achieve higher productivity"?	Agree	Disagree
I am alone in my trustee	68.74%	27.75%
Less than 5	73.08%	22.58%
Between 5 and 10	77.61%	20.92%
Between 10 and 20	68.63%	31.37%
More than 20	94.39%	5.61%

Do you agree or disagree with the following statement about cloud-based software: " They are not yet fully developed"?	Agree	Disagree
I am alone in my trustee	54.66%	29.40%
Less than 5	66.27%	26.79%
Between 5 and 10	68.19%	27.44%
Between 10 and 20	84.51%	13.82%
More than 20	65.59%	29.65%

Figure 30 : Accountants' views on digital technologies depending on the number of employees in the trustee

## APPENDIX 5 : PIVOT TABLES : DIFFERENCES DEPENDING ON CUSTOMERS' ENTHUSIASM FOR DIGITAL TECHNOLOGIES

Do you agree or disagree with the following statement: "My clients are enthusiastic about the implementation of digital technologies in our trustee"?	Do you use the following technology in your trustee : Cloud-based accounting software ?		
	Yes, regularly	Yes, rarely	No
Agree	76.37%	5.65%	17.98%
Disagree	48.10%	6.37%	45.53%

Do you agree or disagree with the following statement: "My clients are enthusiastic about the implementation of digital technologies in our trustee"?	Do you use the following technology in your trustee : Other software in the Cloud ?		
	Yes, regularly	Yes, rarely	No
Agree	72.99%	7.71%	19.30%
Disagree	49.22%	12.62%	38.16%

Do you agree or disagree with the following statement: "My clients are enthusiastic about the implementation of digital technologies in our trustee"?	Do you use the following technology in your trustee : Automation of the accounting process from document submission to encoding ?		
	Yes, regularly	Yes, rarely	No
Agree	79.95%	8.82%	11.23%
Disagree	27.59%	18.99%	53.41%

Do you agree or disagree with the following statement: "My clients are enthusiastic about the implementation of digital technologies in our trustee"?	Do you use the following technology in your trustee : Artificial intelligence (machine learning, etc.) ?		
	Yes, regularly	Yes, rarely	No
Agree	48.10%	12.47%	39.43%
Disagree	15.72%	4.18%	80.11%

Figure 31 : Differences in the frequency of use of digital technologies depending on the enthusiasm of the trustees' customers

## APPENDIX 6 : PIVOT TABLES : DIFFERENCES DEPENDING ON ACCOUNTANTS' PERCEPTIONS OF THE ADVANTAGES AND DISADVANTAGES OF DIGITAL TECHNOLOGIES

		Do you use the following technology in your trustee : Cloud-based accounting software ?		
Do you agree or disagree with the following statement: "Accounting and other cloud-based software are not yet fully developed"?		Yes, regularly	Yes, rarely	No
Totally agree		49.63%	9.03%	41.34%
Agree		58.36%	8.86%	32.78%
Disagree		74.18%	5.52%	20.30%
Totally disagree		87.50%	0.00%	12.50%

		Do you use the following technology in your trustee : Other software in the Cloud ?		
Do you agree or disagree with the following statement: "There is little listening from cloud application developers"?		Yes, regularly	Yes, rarely	No
Totally agree		55.32%	10.35%	34.33%
Agree		59.54%	12.80%	27.66%
Disagree		71.40%	7.76%	20.84%
Totally disagree		74.83%	0.00%	25.17%

		Do you use the following technology in your trustee : Automation of the accounting process from document submission to encoding ?		
Do you agree or disagree with the following statement: "Digital technologies enable accountants to achieve higher productivity"?		Yes, regularly	Yes, rarely	No
Totally agree		74.25%	7.91%	17.84%
Agree		51.26%	18.16%	30.59%
Disagree		51.60%	13.31%	35.09%
Totally disagree		20.00%	10.00%	70.00%

Figure 32 : Differences in the frequency of use of digital technologies depending on accountants' perceptions of drivers, brakes and challenges of digital technologies

		Do you agree or disagree with the following statement: "Digital technologies allow work to be spread evenly over the year"?	
What % of this task do you think you will have in your job: Encoding?		Agree	Disagree
0-10%		67.44%	30.23%
10-20%		63.10%	33.33%
20-30%		56.82%	43.18%
30-40%		58.54%	41.46%
more than 40%		50.12%	43.36%

		Do you agree or disagree with the following statement: "Digital technologies give customers greater autonomy"?	
What % of this task do you think you will have in your job: Encoding?		Agree	Disagree
0-10%		69.77%	25.58%
10-20%		67.86%	28.57%
20-30%		62.50%	35.23%
30-40%		64.63%	29.27%
more than 40%		54.56%	38.39%

		Do you agree or disagree with the following advantage brought by digital technologies: "Thanks to them, there are fewer errors in the data produced"?	
What % of this task do you think you will have in your job: Encoding?		Agree	Disagree
0-10%		58.91%	40.31%
10-20%		55.95%	36.90%
20-30%		46.59%	51.14%
30-40%		45.12%	50.00%
more than 40%		27.48%	65.47%

Figure 33 : Differences in the level of agreement with drivers, brakes and challenges of digital technologies depending on the % of encoding in accountants' daily tasks.



		Do you agree or disagree with the following statement: "Thanks to digital technologies, there are fewer errors in the data produced"?	
Do you use the following technology in your trustee : Cloud-based accounting software ?		<b>Agree</b>	<b>Disagree</b>
Yes, regularly		58.49%	39.54%
Yes, rarely		35.58%	58.33%
No		38.41%	56.63%
		Do you agree or disagree with the following statement: "Digital technologies allow work to be spread evenly over the year"?	
Do you use the following technology in your trustee : Other software in the Cloud ?		<b>Agree</b>	<b>Disagree</b>
Yes, regularly		64.33%	33.44%
Yes, rarely		55.27%	44.73%
No		53.14%	41.12%
		Do you agree or disagree with the following statement: "Digital technologies enable accountants to achieve higher productivity"?	
Do you use the following technology in your trustee : Automation of the accounting process from document submission to encoding ?		<b>Agree</b>	<b>Disagree</b>
Yes, regularly		80.66%	18.76%
Yes, rarely		77.83%	22.17%
No		56.43%	34.92%
		Do you agree or disagree with the following statement: "Digital technologies are not yet fully developed"?	
Do you use the following technology in your trustee : Cloud-based accounting software ?		<b>Agree</b>	<b>Disagree</b>
Yes, regularly		63.39%	34.84%
Yes, rarely		80.45%	15.71%
No		65.68%	16.57%

*Figure 34 : Differences in the level of agreement with drivers, brakes and challenges of digital technologies depending on the frequency of use of digital technologies.*

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