

**FACULTY OF ECONOMIC SCIENCES AND MANAGEMENT  
MASTER IN BUSINESS ADMINISTRATION**

**Master's Dissertation**



**Artificial Intelligence and Automation in the accounting  
profession**

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**Open University of Cyprus**  
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## Summary

Without a doubt the function of artificial intelligence is part of our daily routine tasks because is started making them more efficient. With the same thinking now big organizations that can afford this kind of innovation are adopting the Artificial Intelligence in their software. Each sector can be benefit from the AI application, considering the nature of a such software which will be able to perform daily tasks with lower risk of errors in efficient manner also to the improving that AI have due to deep leaning algorithms and big data science. The accounting sector has been the one of the first that are facing the threat of AI because employees with lower skills and education can easily be replaced with a smart learning machine, further the research for the application in accounting domain has begun in the earliest of 1980s, but because the earliest expert systems were based on logic could easily make the same mistakes repeatedly. Taking into consideration that now finance departments have become global and digital, technology and automation can be major factor for the required work. The main scope of this paper is to develop an investigate of how this innovation of AI and RPA implementation will impact the accounting and finance sectors, what are the benefits and what detriment we can expect. The main methods that are been used for the research is through literature review by researching through valid articles and reports that have been published from big global accounting firms, accounting organizations and interviews from individuals which are expert in this sector that have been published online. The results that are shown in the below research is that the professionals can not avoid the new era of this technology and to start being creative and use the advantages that are provided, for their own benefit and taking the risk to go through this process. It is believed that in the nearest future most of the accounting organizations and finance departments will swap to the automation so they can also keep the good competition since the outcome results on various tasks will be more effective and efficient from those who still performing manual.

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## Chapter 1

### 1) Introduction





One of the most significant factors that help organizations to expand their operations and increase profitability is technology. Undoubtedly the benefits were momentous, the productivity has increase not only because the effects of technology in manufacturing but also because there is better communication in the workplace. Further the computers now can process huge amount of data and the results of an analyst can be more efficient and effective. Through the years technology has evolve and introduce in the industry the artificial intelligence and the robotic process automation. The first research for the AI technology started in 1956 and has unrolled topics like problem solving and symbolic methods. One of the first that AI has accomplished was street mapping project in the 1970s and it was used by the Defense Advanced Research Projects Agency (DARPA) which is well known because they produced intelligent personal assistant in 2003 like today's Siri and Alexa. Through the years the rise of the AI started and started to be used from big organizations in the beginning of 2000. Stephen hawking who is a Britain pre-eminent scientist believes that so far, the development of AI has proved useful, but the biggest fear is the consequences that humans will face by creating something that can match or surpass humans. His own words was that "we cannot know if we be infinitely helped by AI or ignored by it and side-lined or conceivably destroy by it ". From the business perspective artificial intelligence and automatic robotic process can easily rise due to technological maturity. Taking this into consideration lot of people started thinking how these advantages and the revolution of the AI will impact our future workforce. There are lots of theories that have different opinions around this topic.

#### 1.1 Industrial revolutions

Throughout the history people always utilize the available resources of technology for their own benefit and to take it a step further. The first industrial revolution started at the end of the 18th century where people has managed to invent steam engine that created new type of energy. After a century the second industrial revolution is started where new sources of energy has been invented such electricity and gas. In the middle of the 19th century people are facing the third industrial revolution where the nuclear energy has invented and the rise of the computers, telecommunications, and electronics. We are now going through to the biggest industrial

### **Navigating the next industrial revolution**



<b>Revolution</b>	<b>Year</b>	<b>Information</b>	
	1	1784	Steam, water, mechanical production equipment
	2	1870	Division of labour, electricity, mass production
	3	1969	Electronics, IT, automated production
	4	?	Cyber-physical systems

revolutions compare to the earliest, that already has created major changes in our lives and work (Institute of Entrepreneurship Development, 2019).

The rise of the 4th industrial revolution was in 2014 when the smart factories and online production management appeared. In 2016 the founder of the World Economic Forum Klaus Schwab gives the definition that the “4th industrial revolution creates a world in which virtual and physical systems of manufacturing cooperate with each other in a flexible way at a global level” (CORPORATIVA, 2022).

## **1.2 Artificial Intelligence (AI)**

Artificial Intelligence is not just a simple technology, it includes any type of hardware and software that involve in the machine intelligence. It can define as the industry of computer science that studies the design of intelligent computing systems which has characteristics very similar to human intelligence such as learning, understanding and problem solving.

## **1.3 Robotic Process Automation (RPA)**

Robotic process automation according to the Institute for RPA is the technology which applies into company’s computer software and configures it or a bot that capture and interprets existing applications to process a transaction manipulate data and trigger responses (SAP, 2022). Meanwhile according to Saldy robotic process automation is the technological assistant that imitates a human worker and has objective to automate tasks (Penttinen, Kasslin and Asatiani, 2018).

The main difference between the robotic process automation and Artificial Intelligence is that the first is mimic human behavior by doing tasks that are used to do by a human. On the other hand, artificial intelligence is trying to copy humans’ intelligence of understanding things communicating and even making decisions through the voice, image, and pattern recognition

## **1.4 Role and Duties of an Accountant in a Company**

A Chief Financial Officer in a company can be involved in various tasks such as the supervision the entries that are related in the accounting scale of the entity, supervision of the implementation of the strategies that are created by the management and even giving an opinion about potential investments of the company. In general, giving the nature of the job the CFO can be fully aware of the organizations activities and can provide another from another prospective what a good plan might be for an organization. Keeping also in mind that the accountants are those who prepare the financial reports are the ones who can analyze all the costs, liabilities of the organizations and giving explanation how the profits have been generated through the year. It is well known that companies every year has as target to make a better allocation of their costs so they can find possible ways for reduction which is an activity that most cases are covered by the CFO. As for the accountants that are supporting the CFO to do all the above their responsibilities are to keep all the accounting records up to date and ensure that the company have no issues with its obligations.

## **1.5 Current Situation**

Even though that are companies are using this kind of algorithms such Google and Amazon the finance industry is still at the earliest stages with only 5% are using the AI and approximately



20% are adopted the robotic learning automation. Organizations with such nature of work are suffer from inefficient process because currently they are using spreadsheets which have a heavily involvement of manual work and high potential of errors and data from different working units which make it harder to coordinate (PricewaterhouseCoopers, 2017). Automation in general turned out extremely useful to all the industries due to pandemic Covid 19 which force most organizations to close and therefore to adopt the remote work and “work from home”. Such digital transformations are not something new the pandemic force organizations to accelerate the process for a more digital environment. Going digital still has other issues such untrain staff for such tasks or IT cloud disfunctions and does not mean that can solve all the problems that were cause of the pandemic (*The rise of accounting automation during COVID-19 and beyond*, 2021), but now the data of an organization can be viewed and process anywhere which was a boon to the financial industries. In the recent years the automation has grown more than just the basic accounting tasks and prioritizing more complex like accounts payable, invoicing and revenue recognition (Gupta, 2021).

### **Role of COVID 19**

During the pandemic most organizations have decreased their productions and operations however the accounting profession became more important and competitive. The changes on regulatory and legal prospective that create extra workload has forced the accountants to involve more the technological tools and rely on them due to the time pressure and demand accuracy. Additionally, the adoption of electronic content became necessary such as invoices, receipts and bank statements which reduce the work of filling actual papers. Companies that were able to adopt such automations before COVID 19 were experiencing less problems on keeping a steady workflow and keep their productivity because of their comfort using such innovations (*How RPA can help on COVID-19 Contingency planning?* 2022). It is estimated that soon more than 85% of software will performed in cloud from remote servers and this is also having to do with the remote working that most business adopted during Covid-19. The global pandemic also has it impact in the role of the auditors, due to the isolation, the part where the auditors need to collect the necessary evidence was going through a challenge. So the auditors who wanted to continue performing find an alternative solution which is called virtual audit utilization which includes complementary, supplementary technology and AI video assessment tools (Appelbaum, 2021).

## **Chapter 2**

### **2) The Scenarios for the future with Artificial Intelligence**

According to Maridakis (Makridakis, 2017) there are four type scenarios for the future with the artificial intelligence:

**The optimistic:** Which will be a future with Genetics, Nanotechnology, and robotics where everything change and allowed humans to focus on knowledges and memory capacities. This is believed because the robots will do all the work for us, and we will have the opportunity to invest more on our selves

**The pessimistic:** As machines become more intelligent and social problems became more complex, more likely humans will let robots take the most important decisions instead of them

because of the better results. Eventually if this carry on the result will be that everything will be control by the robots and humans will depend on them because they will be afraid to make their own decisions and choices. It is believed that when we are at the point where all work is done by robots, people will lose their motivation to work. Additional according to Harari in his book conclude with the phrase “Nonconscious but highly intelligent algorithms may soon know us better than we know our selves”.

**The pragmatics:** Which most of them believe that the future implications of the artificial intelligence are negatively, concerned with its dystopian consequences. But we could learn to use the power of the machines for our own advantage and improve our skills and be always ahead of computers. Further in the worst-case scenario we can use a chip for each artificial intelligent software/device when they are starting to get control or going ahead of humans to stay inaction.

**The doubters:** This group do not believe that the robots or anything that was invented by humans will be able to threat them. The human intelligence and expertise are not possible to be replicated as long we are using our brains. Additionally, the artificial intelligence will not be able to be as creative as humans or make unpredicted decisions because is not in their nature.

## **2.1 General Uses of Robotic Process Automation**

Over the recent years we can see a high interest in Robotic Process Automation where this term amalgamates robotics and make them act like humans in specific work tasks. This is a new technology comprising software agents that can be referred as bots which are here to minimize the manual tasks that are handle by humans through a range of computer application. The operational efficiency it is addressed in terms of untighten humans from time reducing tasks. The main industries that are more likely to adopt the RPA are the Healthcare Industry due to the high volume of sensitive data with the scope to reduce the tasks of the back-officers with the advantage of shorter waiting times in a hospital. Another sector is Manufacturing because the adoption of the RPA helps to strengthen supply chain procedures and decrease the gap between daily administrative operations and the hand assembly manufacturing.

### **Chapter 3**

#### **3) Literature Review**

From recent research that PwC global has made it illustrates that automation will affect organizations in 3 waves by the 2030, firstly the algorithm automation which are simple tasks that includes computation and analysis of structure data in variety areas. Second is augmentation wave that are the repeatable tasks such as filling forms and exchange of information and the last wave which is autonomy waves and focus on physical labor, problem solving and responsive actions. The overall result of this report was that technology will help to an increase of economy therefore many tasks will be replaced by AI and robotics but in the long run will not lead to an actual job displacement but may change the nature of jobs significantly. Furthermore, the jobs that may be affected are depending by the nature of the work and by the profile of the worker in each industry such as the education, age, and gender.

According to one of the latest studies of KPMG around the topic of automation, more than 95% of chief executive officers have positive thoughts for the technological upgrade while the remaining's believe that is a threat. Considering the big percentage of the positive thoughts is possible that at some point all the finance departments will adopt in the changes, and it is also expected new levels of maturity in operations of finance. KPMG set a goal of the financial planning and analysis that requires a lot of time and a lot of manual work that can be very easily automated. As a result, the service that is provided from the finance team could have various changes and it might be more involved in the strategic and analytical part of the organization. Additionally, another critical aspect in this new change will be the data scientist who are responsible to prepare data for the machines (KPMG, 2019).

From an article that was published by Sinead Colreavy which is an FS partner at Ernst and Young is very positive with the transformation to virtual software Bot, especially on the tax deadlines where people consume time in exporting, converting and reconciling. The RPA-BOT can learn how to do these activities and save time of the reviewers and the processors (Zesty, 2017).

The Institute of Chartered Accountants in England and Wales (ICAEW) points that in 2021 lots of organizations in the UK invested in digital transformations and technologies and based on government records at the end of 2021 approximately 30 billion were invested in new technologies. Taking into account those figures the organizations that adopted RPA across all sectors are approximately 20% which has increased 7% comparing 2020. Based on ICAEW lots of users may not even realize that are using some elements of RPA in their daily tasks such as online uploads and storage of documents in 'cloud' (ICAEW, 2022).

Considering the CPA Journal that was published in 2018 is emphasizing in the application of RPA in public accounting practice, with the interest in the taxation department, assurance services and advisory. In nature taxation has complicated calculations regarding the tax returns and the tax differences which with the help of the automation the level of mistake is minimized, but still needs the review from an expert (Miklos, 2018).

Another well-mentioned research was the one of Yuval Noah Harari who believes that not only jobs will have enormous changes but also social and educational systems. The reason is that automation cannot be avoided so it's better to adopt and be prepared. Based on his thoughts it will be better if automation stays in the routine jobs and let humans to be more creative. Moreover, the education system should be upgraded in order for the students to equip with better knowledge and more improvement skills so they can be ahead of robots. But still an automated environment at work requires lifelong learning and studying by humans. Something similar can be supported by Giselle Rampersad which she believes that the AI technology can be something challenging to human nature because people will need to improve skills like problem solving and critical thinking which can be gained by work-integrated learning. She has made research that measures the skills of the participants before and after the work-integrated learning (WIL). It then undertakes confirmatory factor analysis to compare pre and post placement capabilities.

More specifically in the accounting and finance industry based on the article of Marios Spanicciati the technology of robotic process automation (RPA) cannot be a completely threat for the accountants in the recent future but it can release them from the boring day to day tasks and

improving the time efficiency. The software will have real time access to financial data as a result the reporting and analysis can be done continuously and simultaneously (Spanicciati, 2019). In terms of forecasting strategic point of view organizations should include in their annual budget significant amounts for the modification of the RPA systems and for the ongoing support (Kaya, Turkyilmaz and Birol, 2019).

Another international organization that is heading towards to the application of robotic process automation is Alter Domus, where is specialized in alternative investments. The benefit on the new era is not only for the customer prospective but also for the employees of the organization. Firstly, the management of the organization started the research about this technology and how can suit the organization in 2018 with purpose to improve performance, find new ways to solve problems and achieve their targets. The main advantages the company expecting to have, is to enhance customer satisfaction, rationalize and simplify process, generate new revenues, and improves decision making. Based on their publishment the company will use the new technology to replace the strenuous processes that their partners are facing with more upgrade that are defined by speed and accuracy. Additionally, payments will be safer with the help of automation to extract from the invoice information and prepare the payment instructions with increased quality and security by looking dynamic behavior patterns. Those payments will need the final approval by the authorized person. Furthermore, the company ensure that performance is optimized to reduce the scope of human error in quarterly reporting. Lastly the company will be to convert accounting reports in a format that is readable to clients' systems. For the internal reporting of the company the big advantage is that they will be able to prepare accurate budget in the beginning of each year that will include all the direct and overhead costs based on historically data. This will help the employees to the creation of purchase requisitions and purchase orders from the beginning of the year that is based on the budget. Moreover, the approval process will be reduced since most of the expenses are already calculated. Additionally, as it is expected and mentioned in previous theories the finance team will be release from the day-to-day tasks so they can control the entries that the bots are handling and have more time to improve their data analytic skills which are necessary (Domus, 2021).

Considering on the recent PWC reports about the return on investment (ROI) regarding AI initiatives most probably dismiss the below factors

#### **Discounting the uncertainty of benefits**

Lack of calculations may happen because a simple ROI for the project where only consider the hard investments and material returns. A more complex factor that is not considering in most cases is the estimate of error and the cost of making mistakes since real world situations can be messier that the training environment.

#### **Computing ROI based a certain point in time**

Another mistake that probably can happen is to compute the ROI of the AI project based on a point in time which is one year after the implementation so they can compare with the previous years the results on the revenue and on the expenses. Unfortunately, software may deprecate faster than expected due to continues improvements of technology and to outdate some of the

features of the software. It is more accurate to measure the AI's performance in more frequent basis.

### **Treating each AI project individually**

This is a common mistake that companies can make, treating each AI project individually rather than considering all the projects as a portfolio (PricewaterhouseCoopers, 2021).

Having also in mind the journal publishing of Ernst and Young who is of the organizations that handling and delivered projects for the implementation of RPA across 20 countries and supporting existing failures of implementation we can see some common mistakes that can lead to the failure of the RPA project. Firstly, the organizations are considering this project as an IT led and not as a business led. Most organizations thinking that is related to technology and a confusion is created and they forget that they main purpose of this project is to give to the team the necessary virtual assistance. In this case it should have similar treatment with a new joiner that require patience and clear instructions of the tasks that will be handle by them. Because the virtual assistance is working with algorithms in order to perform correctly and gain a good understanding a good communication and cooperation with the team and the IT department is required and not only from one of those departments. Also keeping the implementation process more that it is require, before an organization started performing with an RPA system, they are working also in a testing environment where they can test all the possible scenarios that are adopted in the business operations. Some organizations tend to work for a long time in the testing environment to ensure that all the promises of the new assistance can be happen in the real work scenario as a result will create a gap between the production mode and the testing mode and decrease the motivation of the employees who are testing for a very long time. Another aspect of failure is by not treating the robotic as change program from the beginning to the end but rather as a series of automated programs. Due to the fact that wrong explanations are provided of how the assistance will start operating, those who were performing manual are rushing to get involved in more exiting tasks and do not make the necessary checks on the virtual assistance records. Further by targeting the RPA on the wrong process such a highly complex tasks that is require human intelligence and knowledge. It is very common for the companies to want to save costs and take advantage of the new assistance so they might use it in the wrong areas of the business (Zesty, 2018).

### **3.1 Impact of Artificial Intelligence on the Market**

Some of the experts and prominent figures are Elon musk and Bill Gates who both share their concerns for the dangers they see from the advert of artificial intelligence. Considering their background and their achievements we cannot ignore their theories around this topic. Elon Musk who is the founder and CEO of Space X and co-founder of tesla has expressed fear that artificial intelligence is a realistic threat to humanity. The major issue he illustrates that people already started losing their jobs to machines and that artificial intelligence will rapidly take out humans. In one of his interviews, he claims that adopting AI is like “Summoning the demon” because after a certain point world will not be able to escape from the intelligent of AI and it will become deathless (Dutta, 2021). The co-founder of Microsoft Bill Gates also has the same concerns and

believes with Elon Musk but also, he believes it can also be promising. One of his biggest concerns is the use of AI in warfare and weapon systems. The promising part according to Bill Gates is the advance tools of artificial intelligence can help to build new generation of tools in health solutions (Clifford, 2019). Based on the international Monetary Fund the workforce is automating faster than expected and over 80 million jobs will be displaced in the next five years but also these innovations will create more than 95 million new jobs which will be more advanced and interesting that will require analytical thinking, creativity, and flexibility. This scenario it is supported because many of today's demanding occupations did not exist 10 years ago but has created due to technological developments. It is believed that approximately 60% of children now entering primary school are expected to have a job that currently is not exist (ZAHIDI, 2020).

It cannot be ignored the publication of Mitra Best who is the technology impact leader at PWC, US. Even if we consider that AI can be very beneficial to the users is not always like that, AI has not always achieved the potentials. According to Mitra through the years lot of examples good technology goes bad with a good example in lots of industries where mortgage algorithms charging to borrowers' higher interest rates (PricewaterhouseCoopers, 2021)

As reported by the ACCA global the accountants should not feel fear for new technologies like AI that will destroy their jobs. It is better to consider the bots as the professional partners and take advantage from them. The ACCA global supports also that manual work on spreadsheets, data manipulation and the repetitive tasks should be handled by bots because the time that an accountant spends is not worth it. Parallel to the above support, Matt Weston the managing director at Rober Half UK also add that bots can free accountant and concentrate to higher value strategies that will bring more revenue to the company. One of the best benefits that have against robots is that AI cannot replace the human ability to make good professional relationships with clients and colleagues. Human element is the one that create empathy, vision and cooperation which are necessary factors in the workplace (ACCA, 2022).

### **3.2 Factors that affecting the implementation of Artificial Intelligence**

Even if technology is constantly improving the transition from the traditional stage to the widespread use of artificial intelligence can take more time than expected, most probably such innovations should be included in the long-term budget of a company. The most crucial factors that affect how fast a company can be fully equip with the new software are the below.

**Technical Capabilities:** To complete specific activities firstly the technology must be adopted into the requests of the organization and then to be evaluated and to integrated into the system

**Development Cost:** The costs that will burdens the company can influence the management decisions if the investment will be able to cover the extra costs. Each project is deferent from the other and this depends on the nature of the business, it might be a new software but also it might require need hardware such a sensors, cameras and materials that can activate specific movements of the machine. Such costs are higher than the salaries of the existing required employee.

**Market Potentials:** The characteristics of the market, quality, quantity demand and supply of skills are elements that will determine if automation is required within an organization. Most probably automation is essential in countries with higher production and more service providers such as North America and Western Europe compared to other countries with lower demand and the costs of the transformation is not worth it.

**Competitors in the Industry:** It is well known that most of the organizations have competitors all around the world with the help of technology, everybody now can order online or seek for a service provider online. To be able to compete in the industry you need to innovate and try to provide the best outcome to the consumer.

**Profitability:** The most important factor that will affect the decision on a company is profitability, because if the artificial intelligence can be more profitable than the employees in the long term with less exposed to errors and potentially higher quality it will trigger the interest of the company.

### **3.3 Changes in the accounting profession**

Is not easy to predict the exact changes that the profession will have, in order to be able to understand and make some estimations we need to understand how businesses would be in the future. One significant change can be the limitation of fixed costs and convert into variable cost so the companies will be flexible to adopt in the upcoming changes. Big data now will be more important and will not be analyze with just a sample as it is used, but all will be analyze giving better results for more reliable decisions, not only for future opportunities but also for potential threats that can be avoid. Depending on the business model, the markets and the industry accountants will be able to concentrate on the corporate strategy by taking advantage of the new technology and giving the ability to have access to real time financial data. Considering that the last decade the technological progress lead most of the companies to operate internationally it is expected that the next decade with the artificial intelligence to see the innovations that are expected.

### **3.4 Changes in management accounting**

Significant changes in the management accounting also with the application of artificial intelligence. Through the new working practice most probably the organization structure will be affected also, simultaneously with the reduction of direct labor. Most probably the structure will be more horizontal due to the lower position will be replace by the bots and the existing employees will need to change position. Additionally, significantly increase will be monitor in the depreciation expense due to the higher amount of the intangible assets that a company will have. Also, the company needs to consider on their yearly budget extra amounts on their operating expenses that will spend for improvements and updates that will require. Considering those modifications, the cost allocation that is recharged to the clients should change to reflect the new reality. The traditional way of the cost allocation to clients it was calculated based on the time of each accountant was spending to make the necessary work required. Also, for more accurate costing method the amount was also calculated based on the experience, skills, and level that each accountant has. Now that the artificial intelligence will do some of these tasks and the

time required will be less from an accountant most probably it should change to fixed cost rather to variable (Shimamoto, 2018).

### **3.5 Robotic Process Automation in auditing**

The automation in the auditing industry has been a topic of academic research for the last decades, where some examples are computer assisted audit tools (CAAT) (Langmann and Kokina, 2021). The main goal of the automation has been the reduction of latency that is occurring throughout the test the auditors do for the business performance. Based on Vasarhelyi the conceptualized audit automation it is believed that will be consist in four areas which are the automation of staged data collection and data delivery, automation of labor-intensive tasks, automation of decision making and automation decision implementation. However, all the four stages are not easily to be implemented due to the nature of the tasks (Vasarhelyi, 2010). After a decade Vasarhelyi has upgrade the theory that introduce, with Huang who also claims that the audit RPA in practice can be implemented in four stage framework and provide the outcomes of a pilot project that automates the confirmation process. Firstly, the process starts by the RPA logging into the audit platform and sending all the necessary requests for confirmation, extracting the trial balances and the general ledgers, and downloading the final confirmation. Then to test the accuracy of the results the same process can be performed manually. The feasibility of the RPA implementation for specific audit task is to show the reduction of the hours spent of each process and to detect the audit risk (Huang and Vasarhelyi, 2019).

In general auditors can highly benefit from the AI because of their purpose to identify errors on the business records, according to KPMG publication the robots in their audit procedures have already been beneficial. Few years ago, were most of the work was done manually it wasn't possible for the auditors to overview and check all the tasks and records but just a sample, now with new technology the analytical power of the auditor is much better and can analyze 100% huge datasets. It is easier to highlight anomalies and anything that needs further examination. The areas that are changing now in the audit are the reporting and monitoring audits, managing audit quality and providing audit alerts. The most significant area that has improved is the collection of audit evidence which helps the auditors to enhance risk assessment procedures. But because still new technology is not intelligent itself fundamentals of the audit will remain the same because professional skepticism and human judgment are required (KPMG, 2021).

### **3.6 Benefits of robotic automation implementation**

Having technology be your side can help you achieve tasks easier rather than performing manual, automation can easily perform the day-to-day process that require time and require more attention due to the manual procedure. Robotic process automation can provide a competitive advantage by supporting the finance team to meet the challenges that come across them.

**Flexible and easily programmable:** Firstly, such software is flexible and easily programmable. employees that are motivated from the job are always seeking for new opportunities to challenge their self and approve that they have the skills for more complex tasks. Taking an example in the accounting industry the bank reconciliation which an everyday task can easily be made from an AI software through the automation process and save time to the employees for more advance



tasks and to give their attention to more value-added activities, such the reporting and the reviewing parts (*Robotic Process Automation to Aid Accounting and Finance Departments*, 2020).

**More accurate data:** Secondly the business can have more accurate data because with automation most of the tasks that used to perform manually can now perform in the correct time and create changes withing the required time. Furthermore, reduce the risk of the human errors which are very normal to happen. Be eliminating the manual process gives the opportunity to the business to have monthly accurate reports with the right expenses and incomes that occur during the specific period. With such report every month can also help the management to proceed to better decisions and keep track of the annual budget that was set in the beginning of the year. Another significant aspect is the intercompany reconciliations especially in big international organizations. Accountants need to make sure that their accounts are balance, which few years ago the work was done manual among spreadsheets doing cross-checking. Because of the time consuming these exercises are not happening as frequent as it needs. With the assist of technology, the cross-checking will do automatically and will be able to outline any discrepancies In addition, if a software can proceed with the bookkeeping of invoices this can help to faster payments of the business suppliers, which is very often that delay of payment can create lack of trust between the two business.

**Data Security:** Another worth mentioned benefit is the security of the data because the manual accounting tasks mostly done by spreadsheets that have minimal security, lack preventive controls, and increase the risk of cyber-attacks (*Top 5 Benefits of Accounting Automation*, 2021).

**Reduce Costs:** Robotic process automation improves cost saving by replacing human workforce in tasks that require high concentration, additionally reduce time processing of the specific tasks. Approximately the reduction of the cost compared to time saving can reach to 50%. Furthermore, some of those crucial tasks can be process anytime with the bots where no extra data will affect the procedure, it can be during the weekend or overnight. In the short term it is cheaper for an organization to have the payroll expenses of an employee but for long term it might be more profitable a bot rather a human

**Engage skills and knowledge:** Because the accountants cannot fully replace the better respond to them is adopt as quickly as possible and start engaging new skills. Firstly, their professional skills and professional quality should be upgraded continually. Secondly, management skills that will be very useful in the long-term due bot assistance and decision-making skills which now the accountant with the more assistance will have more time to view the hall picture of the management accounts and be able to make decisions (Chukwuani and Nnenna, 2020).

For instance, in Romania they have already adapted such methods while robotic software in accounting firms to decrease the hours spent on the repetitive tasks such as the process of submitting periodical tax return, the robotic coworkers can log in do all the necessary process by downloading data from the software, submit the forms and at the end send the tax return to the clients (Smeureanu and Diab, 2020). Also, the employees can request any tasks that are linked to

the software while they are out of office by sending a message to a specific address with the request, as an example is to send a trial balance to a customer or statement of account.

Is not always easy to understand the customer behavior and their needs in order to create the correct deliverables that match their requirements. In the past this for a service provider to understand the needs of each client some face-to-face communications were set up and then conversations via email which create lots of data to handle. Now with automation the clients can solve some of their queries by contacting the artificial intelligence assistant which can be available all the time and relief the professionals from lot of reporting

### **3.7 Challenges of robotic automation implementation**

Unfortunately, such automation has also limitations that can cause damages to an organization. One of the limitations is that robotic coworkers cannot deal with out of ordinary situations or exceptions and is ideally to be manage by human employees who interact with the robots (van der Aalst, Bichler and Heinzl, 2018).

Additionally, it requires more time to explain to a software how to proceed rather to a the time that requires for a human because it is more complicated. To set a machine to do some of the daily tasks the employees need to create rules for each task with the appropriate requirements in each rule. If the requirements are not set correctly the RPA will end up doing mistakes or not doing any of the tasks. So, to be more sufficient, the software to be ready for use needs a good team that is combined with the IT employees and accountants so they both but their knowledge. Because of lack of this combination almost half of the recent RPA project fails (*Robotic Process Automation to Aid Accounting and Finance Departments*, 2020). It is also supported by the EY that almost half of the RPA implementations projects was not successful because companies have underestimated the costs and the time that is required where possible reasons for that are issues that arise from the IT department (EY, 2017). One of the most crucial prerequisites is the design before the implementation, because RPA is not able to improve as it operates. When the design process is poorly with activities that are not relevant and poor analysis most probably the implementation will fail. All the tasks, responsibilities and testing must be documented and be clear to the responsible party. The hardest part on the design process is to create a highly detailed list of all the actions an employee performs to complete a particular task were all the paths and workflows need to be included in clear form. If the above are not completed with success robots encountering an unforeseen case and exceptions will appear in every task that is performed by them (Deloitte, 2017). The better review and testing the overall implementation of RPA will succeed with the return on investment be as expected. Additionally, the bad design and bad algorithms process may sometimes not affect fully the implementation, but the errors will appear when the software is operating as a result to provide wrong results and lead to financial losses as an example overdue payment will lead to extra fees. A single robot may be able in the future to replace few employees but if a business fully depend on a robot will cause additional operational risk concertation. It is better to start the automation with lower complexity process because overlooked design process faults will lead to unwanted results. It is preferable the decisions for the automation to be driven and initiated by knowledgeable business units such as finance and not just the IT.

Furthermore, with the innovation of RPA is not easy for lots of companies to swift to a machine to do such operations for them before they know that they work properly, because of the costs that smaller companies may not be willing to invest such amount of money. So, it's more likely the big four companies in accounting to take the first step to invest in something less conservative not only because of the amount of money that is required but because they have the appropriate IT department and serves that can support this software (*The robots are coming - implications for finance shared services* | ACCA Global, 2015).

### **3.8 Role shifting in RPA require new skills and competencies**

Now that the some of the accountant tasks will be process by an automate system it is require from the accountants to develop additional skills that are not fully related to the accounting process but more in the IT and technological procedures. Even those who are not fully involved in the new accounting procedures should have a solid understanding of the RPA process including its application possibilities and limitations because of the requirements that they will ask from the finance team. This argumentation it is supported by the Institute of management accountants (IMAE) that the accountants should be able to understand the applications of an RPA software and all the implication should be accompanied with tutorials for the education of the employees (Institute of Management Accountants, 2022).

### **3.9 Phases for the application of an RPA software**

A company to take full advantage of this innovation they need to go through a correct application process, based on a study of the Ernst and Young approximately 50 percent of the projects had failed (*Can robots help your business be more human?* 2020). Firstly, the organization need to see the vision of the organization, what objectives have for the future and what are the main tasks that they need to automate. After that they must create a budget where they need to consider the cost of buying, the cost of the appropriate equipment such as laptops, servers, IT department either outsourcing or crating department to the business and the loss that they might face until the employees gain the require skills and knowledge to start working with it. Then the organization will be able to choose the right RPA software which is best suited to the needs of the organization. After the selection the application process begins firstly with the training of the stuff which may take a few months because the stuff will be split in parts so the day-to-day process will be handle normally. After the training period end the testing period will take place where the employees will work also in a testing environment with hypothetically situations so they can understand how they can set the software in the production environment. Testing the design of the automated control includes standard process which covers the coding and configuration settings. Then the development phase will start where the bots are set to the production environment, and it is now essential for the automation tool to achieve the desired outcome. The organization now needs to make control activities to mitigate the risks that the software bot is designed ineffectively and create posting errors. Once the above-mentioned stages are final the IT departments and the finance team will ensure that the bots are operating as first designed. Then the implementation process begins, and the companies must anticipate the effects of the RPA on their IT assessment. The IT team needs to be aware of three sectors, first the access security where the team must ensure that RPA bots when interacting with core systems

will not give access to unauthorized users. Second the system change sector where they are responsible for the software development lifecycle development activities, that may change through the years of use of the RPA bots. Final sector will be the data center and network operations that will ensure the integrity of the information that is process, store and communicate by the relevant aspects of the IT department and privacy from third parties that are involved in the organization. The last phase is the monitoring phase where the RPA bots are been monitored their effectiveness at the business and that is following the correct auditing protocols. Over the time the organizations if ensure that the bots are operating effectively may reduce the monitoring process (Deloitte, 2018).

### **3.10 Examples of implementing Artificial Intelligence in Accounting and auditing**

Many counties trying to keep the competition in the recent years by doing research of the implementation of Artificial Intelligence and it is becoming surprisingly stronger the push of its usage in academia. This also affect accounting firms which are also deploying resources at their disposal to get into the evolvement of Artificial Intelligence service solutions for their international range of clients. Due to the high costs that are required it cannot be affordable for all the entities to involve in this research. The accounting firms that are leading in the implementation of artificial intelligence in the accounting and auditing firm are well known as the big four accounting firms which are the PWC, KPMG, Deloitte, and Ernst and Young. Some of the most important breakthroughs of the above-mentioned entities that had through the implementation are the below

**Deloitte Touche Tohmatsu Limited:** In the beginning of 2016 Deloitte make an agreement with Kira systems to create a new era in the workplace with the application of machine learning. Then Deloitte brings a cognitive tool with name Argus that is mainly designed for auditing. GRAPA is a personal assistant application that is created by Deloitte which assist in the audit procedure by comparing their selected risk strategy to previous ones. This database works with approximately 10000 cases. Furthermore, Deloitte has plans into using machine learning to assist with the integration of data and structuring. This will be combined with smart virtual assistants that they can chat with staff in order to give them guide through accounting and auditing standards rules and laws.

**Ernst & Young:** Is also getting in the competition and started using machine reading and even take it a step further by using drones that help for more accurate data in the inventory observation and real time analysis. Additionally due to new regulations that are appear that are related to the accounting field decides to take advantage of Artificial Intelligence also and instead of going through all the preexisting contracts and check what needs to be change, is extracting that information with the relevant AI tools and someone just need to validate the results. Furthermore, the tool GLAD is developed by EY with the purpose of detecting fraudulent journal entries and providing reasons for the detection and using such technology for the fraud detection to boost the productivity of the professionals.

**Klynveld Peat Marwick Goerdeler (KPMG) International Limited:** This accounting firm has created a new concept which is called KPMG Ignite and is mostly related to a portfolio of

Artificial Intelligence products and capabilities. KPMG which has a different view and sees the AI as an entire ecosystem it is collaborating with the Microsoft so they can provide to their customers with innovations such as sale intelligent engine, intelligent underwriting engine and digital solution hub. KPMG advocates implementing a broad set of AI capabilities on a single platform. In that platform they have use special computing technology and also, they have developed a new process of risk assessment which is consist of complicated algorithms and mathematics that can illustrate four-dimensional risks. Another major aspect that many accountants are struggle and KPMG manage to automate is the VAT and TAX submission forms which again is consists with calculation tables, detection of errors and highlighting of any abnormal condition

**Pricewaterhouse Coopers:** It is able to provide a large range of analytics and data solutions, by implementing Robotic process Automation the firm can settle for all the clients their filling status, review their management accounts and transform this data for vat and tax submissions. PwC also create a partnership with a well know company in the tech field the H2O and they made the GL.ai robot so they can put the Artificial Technology into the accounting. This robot uses machine learning to take as must details as possible and learn from the PwC global so it will be prepared to making conclusions similar to a professional auditor. Additionally, they also introduce the cash.ai that is very useful to all the fields that are related to auditing the cash of a client like bank reconciliation, getting bank confirmations letters that the balance is correct and converting foreign currencies into the most preferable. In the case for analyzing accounting journal entries and detection of errors PwC has create Halo that is converting this manual job into more automated (Rizvan, 2021).

## **Chapter 4**

### **4) Ethics and Ethical issues in Artificial Intelligence**

Over the last decade it is obvious that AI systems are upgrading from just helpful tools to autonomous part of a team where the ethical impact need to be monitored also. Is it appropriate for a bot to decide without considering moral, legal and social consequences of their decisions? So big organizations such as google decide to take an action and to formulate principles that will guide and delimit the application of new technologies in society (Whittlestone *et al.*, 2019).

The ethical issues that appear from the artificial intelligence as a work assistant are a lot, below we will identify the most important:

**Data security and privacy:** As mentioned earlier the AI performance depends on historical data and to have improvement in the quality of service in the areas such banking and telecommunication, AI use personal and private data. The malicious use of data such as leaking of personal details is serious ethical issue.

**Unemployment:** Maybe now Artificial Intelligence is not ready to fully replace a human, but this concern cannot be disappear considering the rapid evolution of technology where is heading to highly exposed market towards automatization. Thinking of what tesla is already creating self-driving cars but still need the human-driver supervision, maybe in the next decade the driver will not be necessary so professional drivers can be exposed to unemployment.

**Decision Making:** The use of algorithms to make decisions and accurate predictions in private and public sectors most probably is something that we cannot avoid in the future. Such algorithms are possible to improve predictions but also it might be a discrimination against specific groups for which insufficient data are available.

**Wealth Inequality:** Another significant ethical issue that is also mentioned in the world economic forum is how the wealth created by machines will be distributed. Considering that the machines will generate the same profit as the employees, when the software is fully depreciate the individuals who have ownership if AI driven company will have more profit. Hence this will create a gap between wealthy and poor.

**Lack of self-actualization and dignity:** Such automations have improved our lives without a doubt and providing us more time because they handle trivial activities. Unfortunately, the consequences in the future might not be as useful as we thought because some parts of human nature are disrupting such loss of skills and loss of cultural. Moreover, humans are interacting more with machines rather than humans as the chat assistants. Now is started by machines to trigger the reward centers in human brain through ads and games that are based on algorithms optimization to create content that will get humans attention. This can be only beneficial if software directing humans' attention in actions that are good for humanity (Mardanghom and Sandal, 2019).

Some parts of future automations will not be implemented because of the threat to human autonomy and capabilities. The figures are sometimes vague and hide behind complex problems that require careful decisions. Public participation may require adequate representation of all groups whose interest are threatened by the development of technology. As artificial intelligence now is covering more part in the accounting professions, the professionals in the industry need to provide the required guidance so the implementation will be in ethical manner. The Association of chartered accountants suggested to determine from the outset how artificial intelligence will be implemented, priority should be given to critical thinking and implementing knowledge that is relate to awareness and understanding of AI applications that will ensure its ethical and long-term use through observations.

## Chapter 5

### 5) Methodology

On the thesis it is illustrated the upcoming changes in the accounting profession after the implementation of the Artificial Intelligence and Robotic process automation. Finding reliable and valid articles around the topic was the priority before to use them in thesis. The main database that i used to collect the most data is through the world wide web search engines where I could find lot of related articles that guide me through. The type of data that are collected for the research are qualitative data and secondary data are used to interpret the existing data and give some possible conclusions. The main challenge that I had as a researcher was to check the credibility of the articles because anyone is able to publish misleading information. Since is one major topic I choose to emphasize on what is already analyzed by big organizations such as Ernst and Young, PWC, KPMG and Deloitte and individuals of the industry such Elon Musk that are well known in the public and they share these articles from their platform. Additionally other

related reports from accounting organizations such as ACCA and ICAEW were very useful to give explanations around the topic. Another resource that I have use are journal articles that have been published from big organizations that are heading towards to this implementation, Because the topic is related to technology the resources that I used were published after 2017 so they can be linked with today's features. The main keywords that were used on the internet research were Artificial Intelligence in accounting, Robotic process automation in accounting, industrial revolution, and the name of the abovementioned organizations. The reason I choose the qualitative data is to be able to use theories that many relevant have published and gain more understanding to this topic and be able to create a clear conclusion.

## **Chapter 6**

### **6) Conclusion**

Upon exploring the topic from multiple research projects, technology has been very helpful throughout the years for the humans considering the achievements that have been accomplished, such as international trade, more resources in education, more advanced tools in healthcare and many other. Without a doubt technology have been very helpful in the accounting profession by replacing paperwork, manual calculations and traditional accounting work with spreadsheets, formulas, and friendly use software. In summary of the above literature review that is based on the effect that the Artificial Intelligence and Robotic process automation will have on the accounting profession we can see lots of innovations have been introduced and creating new type of team structures. Firstly, the accountants have been released from the repetitive tasks that were time consuming and couldn't provide them with any new experience and knowledge and give them time for more value-added tasks that can be beneficial for their professional skills such as planning strategies of the organization and decision making for the yearly budgets. Additionally with a good implementation of automated software it can reduce future costs of the business and give the opportunity for new resources of revenue that can be used to expand the organization and create new career opportunities. Also the companies that are already proceed to implementations and how they take the advantage of the new era of technology so far. Unfortunately, this also creates the question if those advantages can replace the human intelligence and skills by the artificial intelligence. It is obvious that this cannot be answer with full certainty because of the fast growth of technology with the outcome of meaningful arguments on how artificial intelligence should be developed. Considering the ethical side of the topic that by replacing humans with bots we started giving the bots more value from humans and it is more likely that will lead to organization's plans are dependent on the bots' decisions and on their skills. Nevertheless, based on the articles that have been published from big accounting and audit organizations such PWC and Deloitte the plan of applying new technologies in a business is not to replace humans but provide them with bot assistance that can only take advantage of them, because even though technology has make big steps is not yet possible to fully rely in their selection of choices and human knowledge and judgement is always required. Since most of the bots are doing their tasks based on historical data it is possible that bots are also make mistakes on unexpected situations and human touch is still necessary for higher risk decisions and alternative situations. Concluding the best scenario is to accept that technology already covers a big part of the accounting tasks, and this cannot change due to revolution of technology, and in

order a business to succeed must be able to adopt with the changes in their external environment and cooperate with the technology to provide the best outcome.



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