Private International Institute of Management and Technology

BACHELOR THESIS

ARTIFICIAL INTELLIGENCE: THE NEW STANDARD

A research about artificial intelligence and its role in creating management efficiencies in a financial institution

By: Anas El Hansali
Under the advisory of Mr. Mohammed Jalal Mouti

2020

45 AVENUE OULED SAID BIR KACEM SOUISSI – RABAT
TÉL : 05 37 75 67 11 FAX : 05 37 75 67 88 EMAIL: WEBMASTER@PIIMT.US
WEBSITE: WWW.PIIMT.US

Abstract

With the rapid advancements in the field of technology and the emergence of new ways to conduct work using said technology, researchers and managers all over the world are imagining new innovative ways to take advantage of the processing power it offers to create never seen before efficiencies in the ways to conduct businesses. One of the most disruptive technologies that surfaced is artificial intelligence (A.I.) A.I. can allow the automation of several repetitive, time intensive, and manual tasks that wastes too much time for companies that can be allocated to other more useful tasks.

Consequently, the aim of this research is to perform an objective review on how technology is altering how some business processes are conducted as we know by introducing new innovations that benefit both organizations and customers and how effective these methods are compared to traditional ways and how much efficiency they create. In addition, this study will look at any potential downfalls or risks emerging from using technology that may affect organizations or customers negatively in unexpected ways.

To achieve the goals of this research, the first parts are concerned with explaining the necessary background information for the reader in a literature review to derive important definitions for key concepts critical to reach the desired objectives of this study. The main ideas defined in the review include a proper explanation of the A.I. technology and its applications in businesses in a way to create value by streamlining tedious and repetitive tasks. One of the main applications we delve into is the Robotic Process Automation which, as the name implies, are bot programs that specialize in automating monotonous simple tasks like claims processing. The study also briefly explains other derivates of this technology like chatbots which are more advanced and able to learn to be able to mimic humans' speech.

Based on the above, this study adopts a case study approach to reach the results and evaluate the benefits and advantages of implementing A.I. systems in a firm. The case study in question explores the benefits realized from RPA when a bank in the U.S implements it to reduce the manual effort needed to complete certain tasks related to compliance and document checking. Analyzing the case study helped evaluate the extent of the benefits a firm (bank in this case) can gain from an RPA when automating certain tasks in the compliance department. In addition, a questionnaire is conducted to ask the experts about their opinions on the matter. Their

answers were used to confirm the results of the case study and give a better understanding to vague concepts and their reasoning.

After the analysis, the study determined that under the correct circumstances, RPA can lead to 2-3 times more efficiency in the processes it automates. This efficiency can be translated to over a million dollars in term of money, and countless hours saved for the employees. The time saved allows the employees to focus more on tasks RPA cannot automate effectively. Moreover, when it comes to the negative aspects of automating, the questionnaire revealed that companies usually reallocate their workers affected by the automation to other tasks rather than completely firing them, minimizing the impact on them. In addition, the internal environment of the workplace benefits from the saved time to foster more creativity and social interactions between workers which helps increase moral and productivity.

Finally, this research is concluded with recommendations and advices for further research on this topic as the field of technology is fast-paced, and new opportunities and standards emerge overtime. Also, the study notes that following and implementing any new technology in the workplace is not a guaranteed way to benefit the firm. Instead, a thorough research about the needs of the firm and the characteristics of the A.I. systems, as well as educating and training the staff so they understand their responsibilities is necessary and essential.

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Chapter 1

1.0 Introduction

1.1 Research Background

Finance is a term that describes the study of the systems of money, investments, and other financial instruments. Finance is a distinct branch from economics that arose in the 1940s and 1950s with the works of the likes of Markowitz, Tobin, and many others (Hayes & Segal, Finance, 2019). Finance today can be broken down into three distinct categories: (1) public finance which is involved with the role of the government in economy which includes government expenditures, revenue, and debt aspects (Jain, 1989), (2) corporate finance which deals with the sources of funding, capital structure, and ways for management to maximize the value of the firm (Kenton, Corporate Finance, 2019), (3) and personal finance which is the financial management of an individuals' finances such as budgeting and spending (Kenton, Perosnal Finance, 2019).

Traditionally, financers and investors used various models to price assets and estimate returns for a time period such as autoregressive integrated moving average (ARIMA), random walks, exponential smoothing, and moving averages (Zavadskaya, 2017). These days, technology has allowed collection of a huge amount of data, which is usually referred to as Big Data, and allowing for the creation of computing processes to analyze these data and obtain useful information to use. The use of computers to gather data and analyze them has long been used by financial institutions to detect patterns and out of the norm changes, flagging them to be further analyzed by humans. This can be tracked back to 1987 when Security Pacific National Bank in the United States set up a Fraud Prevention Task Force, applying artificial intelligence (A.I) to respond to unlawful debit card usage at ATMs (Christy, 1990).

Today, financial institutions use this technology to organize their operations and quickly exchange information. This helps create a faster, more efficient service to customers. This has allowed many new concepts and applications to emerge that have the potential to transform financial services sector. One such concept is "Fintech" which is short for "Financial Technology" which aims to "bring innovations that present a veil of convenience and simplicity" for customers (Lin, 2015). Fintech allowed for improved customer service with the introduction of chatbots which are an artificial intelligence system

that evolves and learns from its interactions with people. In addition, fintech allows for sophisticated online banking experience to the point that people can transfer money, pay bills, or buy goods at press of a button using a computer or a smartphone (Information Age, 2018). These changes kind of innovations and changes are disruptive and left an impact on this sector, and many others, and created new standards of services for banks and other financial institutions to follow.

1.2 Research Questions and Aims

According to researchers, the main purpose of implementing technology, such as software and artificial intelligence, is to automate many processes and applications in systems. These tools are called Robotic Process Automation (RPA), and can accomplish tasks more efficiently by eliminating the need for manual inputs and errors associated with that (Pimentel, 2019). A common example of this is automated customer support messages or e-mails. However, according to analyst firm Gartner, the RPA software revenue grew by 63.1% in 2018 to $846 million, which is still relatively small market but with fast growing potential (Gartner, 2019).

Another implementation of technology is the rise of the Banking as a Service (BaaS) or label banking. Label banking allows banks to “open up their application program interfaces (APIs) to let third parties build their own financial products and services with pre-existing infrastructure” (Dolan, 2019). This allows fintech apps to provide various services to customers at their fingertips using mobile applications via the internet. Some of these services include bill payments, insurances, balance notifications, and checking accounts.

The study is purposed to conduct an objective review on how technology is changing how some business processes are conducted as we know by introducing new innovations that benefit both organizations and customers and how effective these methods are compared to traditional ways. In addition, this study will look at any potential downfalls or risks emerging from using technology that may affect organizations or customers negatively. Because of how wide and general the scope and objective of this research are, I have broken down the objectives into two main ideas:

1. To investigate the impact technology has on the efficiencies of processes in the financial sector such as the emergence of fintech applications and automation of processes.

2. To analyze the negative and positive effects of these innovations to determine if they are benefitting everyone or if there are some long or short-term consequences on any of the stakeholders involved.

All these benefits of technology in this market segment have their potential downside that may affect the behavior of people and how they interact with banks and other financial services, as well as the rise for potential risks caused by frauds, hacks, and other security risks. This raises several questions to answer which will comprise the findings of this study. These questions are:

1. What are the technologies used to innovate the financial market segment such as banking?
2. How does this technology innovation affect firms' bottom line and processes?
3. Does these technologies benefit firms in the long run?
4. Is there any negative impact that may affect consumers or other companies?

1.3 Justification of the Research

Artificial Intelligence has seen significant advances in recent years with its integration in many fields today such as health care, science, or business and finance. Artificial intelligence systems have the "ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation" (Kaplan & Haenlein, 2018). These traits allow these systems to achieve remarkable results with stunning accuracy as it adapts and learns gradually, until eventually, only limited amount of input would be needed from humans. A.I algorithms allow for quick problem solving that would take humans long time to solve. Since the early days of Artificial intelligence, researchers have implemented a step-by-step algorithms ,imitated by humans' logic, in A.I to allow it to solve basic problems or make logical deductions (Russell & Norvig, Artificial Intelligence: A Modern Approach, 2003).

With these benefits it is no wonder there is a wide implementation of A.I in many fields these days. One of the most important fields that utilize this technology is businesses. Businesses use A.I to simplify and streamline many of its complicated procedures, such as planning, that would take humans a long time with many possibilities for errors. This branch of A.I allows for the realization of strategies or action sequences that are complex and optimized depending on the business' goal (Ghallab, Nau, & Traverso, 2016). Moreover, A.I has changed how companies and banks handle their

finances and allowed for new opportunities and ways of conducting business. For example, using Robotic process automation (RPA), an A.I is taught and trained to process transactions, monitor compliance, handle customer support, and audit processes automatically without human interference (Taylor, 2018). This will greatly help firms reduce costs and increase efficiency, which ultimately increases profits.

As a business student and a future leader, surviving in today's vigorous and highly competitive markets requires understanding the new trends, methods, and technology to manage businesses and avoid pitfalls caused by lagging behind competition. That is why it is important to stay ahead of the curve and understand this emerging technology that has the potential to reshape how markets function and work. Such example is the emergence of Fintech which uses technology to provide customers with banking services. However, innovation is still bound by ethics and laws. Which is why utilizing this technology correctly to avoid any potential harm is important. For example, A.I can discriminate against humans if not configured properly. Rob Peterscheck, a principal consultant at Small Scale A.I, is concerned that A.I discrimination is possible. An "AI that is judging résumés has the effect of simultaneously training the AI that's writing résumés," This feedback loop allows the A.I to learn constantly learn from mistakes to the point that if a human writes one it's instantly rejected by the A.I. Thus, understanding the concepts of A.I, both its benefits and potential harm, is important to correctly implement it in a way that benefits all parties involved (Johnson, 2019).

1.4 Methodology Outline

The methodology chapter will discuss the practices and methods used to conduct this research and obtain information. The overall approach for this research combines mixed methods but consists mostly of qualitative data that will be used to describe, interpret, and gain insight into certain trends. The quantitative data will be used to identify patterns, measure, and generalize.

For this research, the primary data and information about the subject was collected through analyzing scientific documents made by other researchers in this topic to explain the necessary background of this research complemented by various case studies to illuminate certain points and make a stronger argument. Moreover, reports and information from research sites and several corporate and financial institutions (such as banks) were studied and used to bolster case studies points of view.

Secondary data was mostly obtained from the internet using traditional search engines (such as Google) and more focused research search engines. Using these methods, information was gathered from interviews conducted by newspapers and other medias of professionals in the fields of technology and business. Also, digital libraries and databases provided many information that was analyzed for this research including reports from various academic journals and slide decks from research and intelligent firms explaining digital trends in fintech and how it is affecting the industry.

Using these data gathered, an analytical approach is used to make sense of information and create a framework in which the research is based on to determine the effects of these technologies and changes on how businesses and banks act and how they are affected by it. Also, case studies will be used as a basis ground to answer the key research questions of this study mentioned previously:

1. What are the technologies used to innovate the financial market segment such as banking?
2. How does this technology innovation affect firms' bottom line and processes?
3. Does these technologies benefit firms in the long run?
4. Is there any negative impact that may affect consumers or other companies?

Following a code of ethics is utmost importance when conducting a research so that no one is harmed in any way by when conducting the research. This is achieved by communicating honestly and clearly, avoiding misleading information, avoiding representing data and findings in a biased way and maintaining a high level of objectivity, acknowledging the work of others and properly citing them to their respective authors, and protecting the privacy of participants involved in the research.

1.5 Thesis Outline

This paper is divided into five organized chapters: introduction, literature review, methodology, results, conclusions and recommendations. The foregoing chapter provides the necessary background information and establishes the grounds for the following chapters to give the reader a general knowledge of what the paper is about. Chapter 2 constitutes of the literature, such as books and journal articles, on the topic of the research. Literature review aims to analyze and evaluate the literature and identify the key points and patterns to showcase knowledge critical to the research to

help reach accurate results. Chapter 3 will explore the methodology used in this research to help pave the way for the results chapter and reach a research hypothesis. In this research, the methodology chapter will present a case study of the impact of artificial intelligence technology on a firm's processes and workflow. Analyzing the case study and comparing the results with the data before will help make sense of the findings in a way that will make understanding them better.

The preceding 2 chapters make up the steppingstones for chapter 4, the results. This chapter combines and reports the major findings and how they relate to the subject and objective of this thesis and the questions posed by the study. The results will be analyzed to use in the next chapter, conclusions and recommendations. Using this information, the final chapter will summarize the mains points of the study and display the study's main findings from which recommendations for action or further study will be derived.

Chapter 2

2.0 Literature Review

2.1 Introduction to Literature Review

This chapter is started off by introducing the reader and providing a starting point to demonstrate the type of literature explored and their relevance to the subject, and a summary of the content of the chapter and what the reader will expect reading forward.

The first section of this chapter will help the reader understand the technical words by explaining their definitions in order to help them comprehend the thesis without any problems or obstacles. The first subtitle section will contain terminology and other definitions related to technology side of this research such as A.I (Artificial Intelligence) and Fintech. The second sub section will explain how this research uses financial terminologies and their meanings such as BaaS (Banking as a service).

The following section details the literature about the history of artificial intelligence. This section is divided into 3 parts. The first part explains the origin of A.I. from the coining of the term by John McCarthy to differentiate this area from other research fields. Second sub section handles the uses of

A.I. in different aspects of life, from healthcare, manufacturing, to financing which is the focus of this research. The third sub section will explore the shortcomings of this new technology and the opinions of experts on their effects in the long-term.

Next, we will explain how new technology and advances in A.I. paved the way for ways to improve and automate many processes of different businesses, including financial services. And finally, the last section summarizes what was mentioned previously at this chapter and provide a concise explanation of key points.

2.2 Working Definition Terms

There are several uncommon terms that we will encounter during this study that may not be known to non-experts. In order to get rid of any reading obstacle and make this paper easier to understand, these terms will be defined. The meanings and definitions of these terms will be according to their meaning in the context of this research where they appear. The following table contains terms and their definitions organized in alphabetical order for easier referring when needed.

Table 1: A Summary of Working Definitions of Uncommon Terms Used in This Paper

Term or Acronym	Definition in the Context of This Paper
Algorithms	Algorithm in technology is “a detailed series of instructions for carrying out an operation or solving a problem. Algorithms follow a step by step process to solve a problem. In addition to this, they are used to process data, calculations, and other mathematical operations (Techopedia, n.d.).
Artificial Intelligence (A.I.)	A.I. refers to intelligence showed by machines or computers, this is mostly demonstrated by its ability to perceive its environment and maximize its chance of effectively achieving its goals (Poole, Mackworth, & Goebel, 1998). A.I. exhibit the ability to mimic humans’ cognitive functions that allows it to learn and solve various problems through different methods. A computer should possess the following to be considered intelligent: natural language processing, knowledge representation, automated reasoning, and machine learning (Russell & Norvig, Artificial Intelligence. A Modern Approach, 2016).
Corporate	A corporation is a legal entity separate from its owners in a sense that it has its own set of laws, regulations, and taxes. Corporations have most of the rights and responsibilities that individuals possess (Kenton, Corporation, 2019`).
Ethics	Richard William Paul and Linda Elder in their book define ethics as "a set of concepts and principles that guide us in determining what behavior helps or harms sentient creatures" (Paul & Elder, 2006). This definition can be applied to intelligent machines because they make decisions that may benefit or harm people in unintended way.
Financial Institution	A financial institution is a firm or company specialized in the business of dealing with monetary transaction such as loans, investments, currency exchange, and other financial products. Financial institutions comprise of a broad range of business operations within the financial services sector including banks, trust companies, insurance companies, brokerage firms, and investment dealers. Most people have

	at least had an ongoing or periodic need of a financial service such as loan for a car (Hayes, Financial Institution (FI), 2019).
Fintech	Financial technology, or fintech for short, is the use of innovative technology in order to contend with traditional financial delivery of financial services. The focus of it is harnessing technology to improve financial activities, such as the use of smartphones to make transaction or investing, or cryptocurrencies (Schueffel, 2016).
Information asymmetry	In contract theory and economics, information asymmetry, or information failure, deals with the study of decisions in transactions where one party possesses greater material knowledge than the other party. This asymmetry creates a disturbance in the balance of power in transactions, which can sometimes cause the transactions to go wrong. For example, adverse selection, moral hazard, and monopolies of knowledge are all occur because of information asymmetry (Palgrave Macmillan, 2018).
Machine Ethics	Machine ethics is concerned with adding moral behaviors to machines, especially those using artificial intelligence to make decisions. This includes any dilemmas they might encounter, enabling them to function in an ethically responsible manner through their own ethical decision making and without biases (Moor, 2006).
Machine Learning	This term is often attributed to Arthur Samuel, an American pioneer in the field of artificial intelligence who coined the term in 1959. This concept aims to answer the question: “how can computers learn to solve problems without being explicitly programmed to do so”. This is done by scientifically studying algorithms and statistical models that computer systems use to execute a specific task without using specific instructions, instead, it relies on patterns and inference to make these decisions alone (Koza, Bennett III, Andre, & Keane, 1996). Machine learning is regarded as a subset of artificial intelligence. Machine learning algorithms work by building a mathematical model based on sample data, known as "training data", to “teach it” in order to make

	predictions or decisions without being explicitly programmed to perform the task (Bishop, 2006).
Portfolio	A portfolio is a group of financial assets such as bonds, stocks, currencies, commodities, or cash, that are clustered together. Portfolios are held by investors, companies, or managed by financial institutions. Portfolios have different purposes depending on their owners' objectives and goals (Chen, What Is a Portfolio?, 2019).
Robotic Process Automation	Robotic process automation (RPA) is the use of software with artificial intelligence (A.I.) and machine learning capabilities to handle high-volume, repeatable tasks that previously required humans to perform (Techtarget, n.d.). This allows the mimic of human workers in different fields, such as customer support.
Stakeholder	A stakeholder is any party that has an interest in a firm and affects or can be affected by its business either internally or externally. Internal stakeholders include shareholders and investors, employees, customers, and suppliers. External stakeholders include the government and the community that is affected by the company's actions (Chen, Stakeholder, 2020).

2.3 History of Artificial Intelligence

2.3.1 Origin of Artificial Intelligence

Artificial intelligence has been a long-studied subject by researchers. This field was born at a workshop in Dartmouth College in 1956 (Crevier, 1993) where the term was coined by John McCarthy to distinguish it from other fields of science. Since then, researchers worked to create and develop the foundations for this field like algorithms and neural networks. The applications for this new technology were at first simple and limited, because of the computational power of that time, to basic applications such as solving word problems in algebra and proving logical theorems. In early 1980s, A.I. applications became sophisticated enough to create systems that

stimulate the knowledge and analytical skills of humans, which was a drive for increased funding to researchers to further improve this technology and derive more useful applications for it in different fields (Russell & Norvig, Artificial Intelligence. A Modern Approach, 2016). The road to today continued to be full of obstacles and periods of slow progress, until the early 2000s when A.I. began to be used for logistics, management, and other areas. Russell and Norvig explained that this is mainly due to increased computational power offered by new hardware and equipment which allowed for even more complicated algorithms and neural networks to work efficiently.

A.I. is a promising tool in different fields, this is why it has been a subject of heavy study by researchers. Most researchers believe that A.I. can increase efficiency of many core processes in businesses and allow better and accurate decision making if applied and integrated correctly, and there have been many studies that work toward that. In this thesis, we will mostly focus on the works related to finance and business process optimization.

Optimizing business processes is an on-going task in every business, and the emergence of A.I. has opened new ways to further optimize them. Researchers like Ronald Rust and Ming-Hui Huang argue that A.I. is a major source of innovation in the service sector. However, they look at the possible elimination of human jobs as a disadvantage. The researchers proceed to clarify that there are some functions an A.I. system cannot process well, while the A.I. can accomplish the mechanical and analytical easily, the intuitive and empathetic parts should be handled by human employees. The fundamental idea of their theory is that A.I. job replacement occurs at the task level, rather than the job level (Huang & Rust, 2018). Many researchers agree with this idea and believe that A.I. is not ready to handle things independently. Instead, they suggest looking for innovative ways for human and A.I. integration. While some threat to human jobs will still exist, the human factor is still necessary for a successful system.

There is no shortage of work related to A.I. and its applications in the field. However, this is a field that the only constant in it is change, it keeps evolving and shifting to different ideas and methods all the time, so in order for one has to stay updated on the changes that occur to stay in the cutting edge. In this thesis the focus would be on the recent phenomenon of fintech, its processes, advantages, and disadvantages. We will as well tackle in

understanding the ethical parts of certain behavior related to it, which is an important part in A.I. ethics.

2.3.2 Applications of Artificial Intelligence

Since the coining of the artificial intelligence term by John McCarthy in 1956 researchers have been exploring different ways to apply it in different fields from health, to businesses and finance. One of these applications is Robotic Process Automation (RPA). Researchers Santiago Aguirre and Alejandro Rodriguez from Pontifical Xavierian University conducted a case study examining the effect of using RPA to automate rules-based business processes that involve routine tasks, structured data and deterministic outcomes in terms of speed, costs, and error reduction mainly in back and front office activities in businesses.

Their case study was conducted on a Colombian Business process outsourcing (BPO) company. RPA was conceived by some analysts as a technology that can create new opportunities for these businesses. RPA was used on a process for generation of payment receipt. Usually, the process begins when the customer communicates with the call center and requests a payment receipt, this request is then received by the front office and a case is created on a customer relationship management (CRM) system for it. Then, a back-office employee opens the case and copies and pastes the ID of the customer and generates the payment receipt requested as a PDF file. Subsequently, the employee sends an email to the customer with the payment receipt attached and closes the case on the system.

Using RPA, where the back-office activities are assumed by artificial intelligence software. RPA's gets into play after the case creation on the CRM by a human employee, the A.I. retrieves information from the CRM, copies the customer ID and pastes it in the accounts receivable systems, and then it generates the payment receipt, creates the email, sends it to the customer, and lastly it closes the case in the CRM system.

Evaluating the results, the researchers used case duration and productivity as metrics to determine the efficiency and benefit of the RPA implementation over the period of one week. They concluded that because the second group (with RPA) has only front office employees, because RPA handled the back-office processes, the main benefit realized is productivity improvement reflected in 21% more cases handled by the front office employees, which is

expected. This means that the company can increase its capacity by 20% on this business process. However, measuring the mean case duration revealed that the group with RPA has only 9 seconds less duration than the group without RPA, which is about 2% improvement to non-RPA group. The researchers contributed this small gain to the back-office tasks being relatively easy that humans are able to perform them fast or even faster than the A.I. with the main difference being that one A.I. can do the work of several employees simultaneously.

This case study showcased that RPA can be beneficial in high volume and standardized tasks that requires a large human labor force. While this showed a positive gain for implementing this technology, results should vary from industry to industry and from task to task. In addition, human creativity still cannot be replaced by this system, making it a bad application in tasks that require creativity, interpretation skill, or decision making and judgment.

Because of the potential of this technology and its capability to be a disruptive force that will transform how processes are managed and how processes are conducted, big names started to adopt artificial intelligence into their pipelines and worked on integrating it into their work environment. An example, Hitachi, Ltd, a Japanese multinational conglomerate company headquartered in Chiyoda, Tokyo, Japan, wants to respond to the changes occurring in the financial business environment. Hitachi wants to develop internet of things (IoT) and A.I. applications. To do this, Hitachi conducted a study on “how to use technology for measuring and analyzing human behavior to improve the quality of financial institutions’ services and innovate work styles”. This study involved a trial conducted with the Bank of Tokyo-Mitsubishi UFJ. The trial examined 40 office workers from the planning department and observed the differences in action types on days of high and low business activities, and it was found that data on productivity improvement could be extracted (Kumagai, Tsuji, & Omori, 2016).

Hitachi developed ID card-type wearable sensors for this study to measure the action of people in group and connecting it to A.I. software. This connection allows the A.I. to learn or study the creation of management support systems that present quantitative tips and advices on working styles that yield most results and increase productivity. This may prove to be more efficient way of managing workers compared to traditional methods of management.

2.3.3 Shortcomings of Artificial Intelligence

The field of A.I. applications in businesses is a significant one with many ideas and theories. And like many other fields, it is never short on debates between researchers and academics. One of the most debated aspects of this subject is the dependency of A.I. influenced decisions, and its impact on the internal and external environments of businesses. Andreas Kaplan and Michael Haenlein argued that A.I. will have implications for any kind of organization externally and internally. Internally, A.I. can help conduct a multitude of tasks faster and at a lower cost. Externally, it can impact and help manage the relationship between other companies and customers. However, the researchers defined 3 common traits that organizations should look out for that affects their internal and external environment when using A.I to conduct some of its functions: confidence, change, and control (the 3 Cs). These terms can be summarized in the following table:

Table 2: Summary of the Three Traits That Affect Internal and External Environment When Using Artificial Intelligence

	Internal	External
Confidence	Managers got to convey confidence with respect to their employees in a fast, ever evolving work environment	Consumers need to put confidence in the abilities and recommendations of an organization's AI systems
Change	Employees need to be always changing, adapting, and evolving to improve their functions and skills through lifelong learning	Competitors need to be monitored and outperformed permanently by use of better hardware or data
Control	Machines need to be controlled to avoid autonomous decisions and implicit biases managers can prevent	Government and states need to control the ecosystem of managers, employees, machines, consumers, and competitors

Adapted from Table 2. The three Cs of organizational implications of AI by Andreas Kaplan and Michael Haenlein (2018, p.8)

Another aspect that got constant attention is effect of A.I. on human jobs. Ming-Hui Huang and Roland T. Rust explored this portion of the subject to understand the causes and how to counter this side effect of A.I. The researchers built a framework that consists of four intelligences that explain the skill requirements for different intelligence tasks. At the lowest level, mechanical intelligence concerns the routine and repeated tasks that require minimum learn or adaptation (Sternberg, A Triarchic View of Giftedness: Theory, 1997). Analytical intelligence includes the ability to process information to solve problems and learn from it, this includes logical reasoning and mathematical skills (Sternberg, 1999, 2005). Intuitive intelligence involves the ability to think creatively and adjust effectively to new and different situations (Sternberg, 1984, 1999, 2005). And lastly, Empathetic intelligence is the ability to recognize and understand other peoples' emotions, respond appropriately emotionally, and influence others' emotions (Goleman, 1996).

These four intelligences for four different tasks are summarized in the following table:

Table 3: Summary of the Four Intelligences with Four Tasks as Examples

Job	Call Center Agents	Tax Accountants	Physicians	Psychiatrists
Intelligences				
Empathetic intelligence	Empathize with customers (calm customer down)	Empathize with clients (commiserate with clients who must pay a high amount of tax)	Empathize with patients (tell a patient she/he has cancer)	Empathize and communicate with patients for emotional support and solutions
Intuitive intelligence	Understand why customers complain (contextual understandin g)	Understand the sources of the high tax and creatively find ways to minimize taxes	Understand the symptom and diagnosis	Understand from diagnosis symptoms and come up with solutions for patients
Analytical intelligence	Analyze customer problems	Figure out which tax rules applied to which client's particular situation	Analyze clinical decision support system	Analyze conversation
Mechanical intelligence	Scripted responses to basic customer issues	File tax returns annually and routinely	Listen to heartbeat, check pulse, and read/write medical records (e-medical records systems)	Keep conversation notes

Adapted from Table 1. Intelligences, Nature of Tasks, Job Replacement, and Service Implications by Ming-Hui Huang and Roland T. Rust (2018, p.3).

We can notice that most academics when researching for new ways to implement A.I. in businesses look at the implications it may have on organizations functions, internal and external stakeholders, and long-term effects. The degree of the impact of A.I. on businesses and how they do their work is an area of debate. Some of them focus on how A.I. can affect the relationship between organizations, their internal work environment, and customer interactions. For instance, Andreas and Michael work we mentioned before explains that A.I. is still a fuzzy subject and its effects and implications need to be understood before heavily implementing it in businesses. Then, they proceed to describe its impact on external and internal stakeholders and how to mitigate its negatives. For example, managers need to adopt a style that engraves confidence in employees at a time when A.I. can fundamentally transform the work functions in exceptional ways. Change is hard and will be often accompanied by many obstacles to face, thus preparing for it and incorporating employees in the change process is crucial for success.

Other researchers, like Ming-Hui and Roland we mentioned before, approach another angle of this problem: the effect on human jobs. Ming and Roland explain how it is important to clarify the four types of intelligence needed to perform different jobs. The impact of A.I. on these jobs differ by the type of intelligence needed to perform it. While their explanation and reasoning are excellent, their base of research and theory is limited to service work only which is not fully applicable to other sectors such as manufacturing or product development. In addition, the service sector in itself differs from field to field. Also, other attributes such the culture, laws, and workplace environment can affect the impact of artificial intelligence. Consequently, it is important to take into account all possible variables to reach a precise conclusion.

2.4 Research Gap

From the aforementioned research about A.I, we can deduce that artificial intelligence systems can easily outperform humans in certain tasks, but they differ in the way they think from humans. This limits humans' abilities to control and predict such systems which can be vital in establishing trust and confidence in the technology and not make it appear more dangerous than useful, as trust is an important factor in determining the success of the technology and the tools it provides. In addition, a displacement of human

jobs and the changes associated with it that may affect the tasks humans do and their effect on the organization's workflow, functions, and culture. For example, while an A.I system can easily make forecasts and develop financial models based on simulations. However, it lacks the skills needed to understand human emotions, negotiation with others, and assist customers.

Like any disruptive technology, A.I can have a substantial impact on jobs. This disruption can be in the form of lost jobs, especially those routine jobs that require little knowledge and can be easily automated like customer support systems which help customers with simple requests. This shifts jobs into more of a knowledge and decision-making role, eliminating in the process many jobs and rendering many jobless. This can influence economies in many ways. For example, economies that are an outsourcing destination for simple jobs may suffer and many jobs will be lost. Additional study to better understand the wide effect of such disruptive innovation is necessary which can help us better plan for it.

In the information we have covered, the research on A.I benefits on how it can improve some business processes and increase efficiency, as well as fintech implementations shed the light on an interesting topic that has the potential to be the next big thing. Yet there are still some gaps that needs filling. Such gap is how the studies and findings we mentioned do not cover every culture setting and not every economy, different countries may have different culture and different economy, some can be focused on manufacturing, others on agriculture, etc. These systems may require different steps to implement or result in different outcomes when applied on these different situations. In addition, each field is different, and within the same field each company or organization may operate differently and have different functions, after all that is how they try to create a competitive advantage. Applying the theories we looked through here may require certain adjustments to accommodate the disparities that exist.

2.5 Summary of the Literature Review

Artificial intelligence is a term that has been coined by John McCarthy to distinguish it from other fields of science. A.I is defined as intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and other living creatures. Many researchers worked to create and develop the foundations for this field like algorithms and neural networks, and from then, the aim was to find practical applications in many

different fields, from medical, to finance and banking, and businesses. The focus in this research is on businesses and financial institutions. Some of these applications are RPA (Robotic Process Automation). RPA is a software tool that produces a list of actions to automate a task. It allows the automation of rules-based business processes that involve routine tasks, structured data and deterministic outcomes in terms of speed, costs, and error reduction mainly in back and front office activities in businesses (Aguirre & Rodriguez, 2017). RPA has many usages that aim primarily to streamline routine processes to increase efficiency and speed and reduce costs. One of the most prominent use of this technology is customer support automation. Companies can use RPA to provide automatic replies to customers for simple inquiries such as asking for payment receipts or other simple information. Because these processes are simple, they can be automated to eliminate the human factor and increase speed and efficiency which are especially important to keep customers satisfied and provide them with timely answers for their simple requests. However, more complicated, sensitive, and non-routine requests still need human intervention because an RPA system cannot handle these tasks, yet.

A.I has helped revolutionize the financial sector with new innovations. One of the recent innovations is the emergence of fintech. Fintech is a portmanteau of the words financial and technology. This term refers to new technology that aims to improve, automate, and enhance the delivery of financial services such as loans, insurances, etc. Fintech innovations can help businesses and consumers better manage their financial operations and processes by utilizing specialized software algorithms and functions. Fintech aim to provide faster and better services compared to their competitors in classic financial service providers, because of this, fintech can pose a threat to them and may force them to adapt these advanced methods or risk falling behind (Kagan, 2019).

Fintech applications and innovations include cryptocurrency, blockchain technology, robo-advisors, insurtech, open banking, and many others. Blockchain, for example, which is a distributed, decentralized, public ledger, is a more secure and record-keeping technology compared to traditional methods. Blockchain spans across thousands of computers which makes it theoretically impossible to manipulate, because for one to change one entry all similar entries on every connected computer needs to be edited as well.

These unique characteristics of this technology provides many benefits for businesses that want to utilize it. Such benefits include enhanced efficiency,

better security, traceability, better audit, etc. However, there is no identifying information about users who make transactions which raises the question: how can you trust blockchain or the network of computers upholding it?

Banks stand to benefit the most from blockchain technology due to their nature of their processes. For example, because banks do not operate outside of their business hours, if someone wants to deposit their check on Friday's evening they would have to wait until Monday until the procedure finishes. However, with blockchain this would not happen. Utilizing blockchain can reduce the wait time to mere minutes, eliminating the long wait times the customers (and businesses) face (Reiff, 2020).

Chapter 3

3.0 Methodology

3.1 Strategy

Artificial Intelligence has seen significant advances in recent years with its integration in many fields today such as health care, science, businesses, and finance. A.I systems have the "ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation" (Kaplan & Haenlein, 2018). These characteristics allow these systems to achieve various goals with stunning accuracy as it adapts and learns over time from data, until eventually, only limited amount of input would be needed from humans. A.I algorithms allow for quick problem solving that would take humans long time to solve. Since the early days of A.I, researchers have implemented a step-by-step algorithms, imitated by humans' logic, in A.I to allow it to solve basic problems or make logical deductions (Russell & Norvig, 2016).

Because of its novelty and importance in the modern world of businesses, it is important to study and understand how it is applied to businesses to aid in their core processes and functions. Businesses use A.I to simplify many of its complicated procedures, such as planning, that would take humans a long time with chances of errors. This branch of A.I allows for the realization

of strategies or action sequences that are complex and optimized depending on the business' goal (Ghallab, Nau, & Traverso, 2016).

For this thesis, business owners, managers, and employees of firms that utilize A.I. in their daily work are good candidates to question and obtain useful information that will aid us in developing the main theory and understanding the impact A.I. has. Due to the nature of this work, data should be gathered on a business level. So, studying a handful of businesses using case studies should provide sufficient information for this thesis. Firms will be chosen depending on their usage of A.I. systems, like RPA and other systems. Newer study cases will be preferred over old ones, due to the rapidly changing nature of this technology.

For this thesis, I aim to measure two key parameters:

1- Efficiency and value: this parameter involves measuring how effective the implemented A.I. systems in term of increased output or reduced process time. The results are compared to efficiency before implementing the A.I system to reach meaningful results. For example, using an A.I management support system and comparing the productivity of workers before and after using the system can provide useful data to determine the efficiency of such systems in businesses.
2- Human behavior and reaction to these systems: this involves measuring the trust managers have for these systems. In addition, measuring how these systems affect the employees' creativity and see if hinders or increases it.

The major collection method that will be used is analyzing and researching case studies for firms utilizing these systems. In addition, e-mailing some business leaders or admins in companies with experience with such systems will provide great up-to-date information for this thesis. The questions that will be asked must be purposeful and concrete. They will mainly be closed questions to make it easier to analyze. The main thing I need to know when asking these questions is if the information obtained correlates with the results of the analyzed case study, this could increase the confidence of the results obtained from the studied case. As a result, the answers obtained can be used to reinforce my points further. However, some of the information can be obtained from already existing sources, but the main advantage is that the information obtained from the questionnaire is up to date.

3.2 Design

The research for debate into A.I and fintech was collected through documentary analysis including case studies, which are complemented with other information from official reports, intelligence from analytical firms, and corporate websites. In addition, supplementary information will be included from informal interviews with professionals in this field that will help strengthen and improve the quality of research. This will help give an insider view on certain systems and processes that will complement the analysis on the case studies and explain certain behaviors.

The first part of the data gathering is documentary sources. These sources consist of case studies, official reports, newspapers, websites, etc. Case studies will be the core of the data gathering and analysis, cases are chosen depending on several key properties to insure they will be beneficial in our research. First, the case needs to be relatively new. A new case study will ensure that the information is still applicable and useful these days, since A.I., and tech in general, evolve amazingly fast, making it necessary to make sure the information is up to date. Secondly, since each industry and each field are different. A tech firm may operate differently than a pharmaceutical firm, their processes and resource allocation differ from each other, for example, both companies have different marketing strategy and they need different systems to meet their goals, the tech company may implement a system to target tech savvy people on social media for their products, while the pharma company won't need such a thing because it serves patients and hospitals. This is why for this research we will focus on fintech and systems that affect general processes and functions.

After finishing with the case studies, further complementary information will be used to fill any holes left in the research. Sources for this information include official reports, such as statistical reports or financial reports, newspapers, and websites. For example, Business Insider, an American financial and business news website founded in 2009 and owned by the German publishing house Axel Springer SE, offers intelligence and analytical data for many fields. Such information includes reports on businesses eco systems, A.I. in finance, and other analytics. These reports provide essential information that will help give further explanations that will help with analyzing the case studies.

Sometimes when analyzing a case study, we may fail to understand certain mechanisms or misinterpret findings. This is where the role of asking the

professionals comes into play. These professionals, managers, and decision makers engage with these environments we are studying on a daily basis, they know these things because they work with it. Their expertise and knowledge can be extremely helpful with our research, thus asking them is a great tool to further improve the quality of the work.

When it comes to asking the experts and professionals, we need to know who should be asked. To answer this question, we need to know several things. First, what is the appropriate population we should ask. This thesis deals with A.I. and technology systems that aims to improve processes and increase efficiency for the firm, thus people with positions that are responsible for managing, monitoring, and implementing these systems are more suitable to answer these questions. This includes people in jobs such as COO (chief operations officer), IT managers, human resources, etc.

Now that we understand which type of people are good candidates to be asked and questioned, we need to know how many we need to have good confidence in the information we gather. Usually, since we are asking people with experience and knowledge, we will not need that many candidates compared to doing a survey, for example. Therefore, two candidates would be enough to provide us with accurate information that will help articulate and overcome any obstacle we meet during the analysis of the case studies.

The questions we aim to ask our candidates intend to achieve these goals: clear any misconception we have from the case studied, measure the general agreement on certain concepts, understand how these systems and associated changes affect the work environment, the effect on human employment, the confidence and trust in A.I. systems.

After laying out the objectives of the questions, now we can structure them appropriately to ensure that they achieve their marked goals. The questions are as the following:

1. Did the implemented A.I. systems achieve their desired goals of increasing productivity and efficiency? And how? If yes, by how much did productivity increase? Also, how long since these systems have been implemented?
2. Is there any effect on the work environment (employees' creativity, moral, etc.) that you noticed because of the implementation of these

systems? If yes, what are these effects? Are they positive or negative?

3. Do these systems endanger human employment opportunities? If yes, which type of jobs are more endangered?
4. Do you trust in these systems? If humans and A.I. have conflicting answers, which would you trust more?

The candidates will be contacted via e-mail as a primary communication tool. At first, they will be asked if they would like to take part in the questions. Upon acceptance, the questions will be sent to them with instructions on how the questions are expected to be answered and will be encouraged to ask if they encounter any problem. Since rushing people would yield negative results, a deadline will not be enforced. However, delayed replies will be met with a kind notice to remind them on the questions they agreed to answer.

Privacy is an important principal that should be always taken into account, this is why the answers collection procedure will be totally confidential and individual's data are not shared with anyone and not used for any other purpose than helping with this research. This confidentiality can help the candidates feel more open and safer which will encourage them to provide better quality answers.

When all the responds from the candidates are received, we will begin analyzing their answers to their questions and devise the information needed to complement the research. Since the questions are multilayered and more complex, the analysis will be difficult and will take more time compared to simple close ended questions that end with a yes or no. Because of this, sometimes there can be a doubt in the meaning of an answer or simply a vague answer that does not fulfill its purpose. If an obstacle is met with one of the candidates' answers or not understood well, they will be contacted to ask for further elaboration.

After this phase of collecting and evaluating, a simple "thank you" e-mail will be sent as an appreciation for their time, effort, and contribution to the research.

Being ethical in research is important, that is why ethics standards must be held during every stage of research, including this stage. Certain ethical pitfalls may arise during the process of collecting and analyzing the

candidates' answers. For example, sharing information about the respondents without agreement is a violation of their privacy and can cause harm. Also, some of the answers may not be in support of our theory and conflict with it which may open room for bias and neglecting these answers to avoid weakening our position. This bias should be avoided and all answers, no matter how unliked they are, must be considered while developing this theory.

3.3 Case Study: Ernst and Young LLP Implementing RPA for a U.S Bank

All the information for this case study was obtained from Automation Anywhere public data.

This case study was conducted on a U.S bank that collaborated with Ernst and Young to solve a problem it faces. Ernst & Young Global Limited Liability Partnership (or EY for short), a multinational professional services firm (such as consulting) headquartered in London, England, The United Kingdom. Ernst and Young is one of the biggest in its field in the world. The company offers "assurance, audit, tax, financial, and business advisory services to automotive, financial, government, entertainment, mining, real estate, technology, and telecommunication industries. EY serves customers worldwide." (Bloomberg, n.d.).

In this case, a top-30 U.S bank was spending a significant amount of money and time on manual effort on various rule-based, repetitive, and error-prone mortgage processes. Some of these tasks included document ordering, data entry, and data verification.

To solve this problem, Ernst and Young resorted to automate these tasks for the bank by implementing a Robotic Process Automation system in place. This system aims to increase productivity, eliminate errors, improve data quality, and reduce regulatory risk within its mortgage banking operations group (Automation Anywhere Inc., 2017).

The implementation period took two months in which EY collaborated with the client (the bank) on how to take advantage of the RPA system, and helped the client identify other opportunities in which RPA can help save millions of dollars in term of efficiency savings.

Ernst and Young solution for the bank consists of solving the three main problems the bank faces: flood certification orders, address verification, and mortgage quality assurance/quality control. First of all, because of the repetitive nature of flood certification orders ordered daily, the team responsible for them usually spends several hours to order each flood certificate, then wait for it to be returned by the assigned vendor, and then enter the data points into the system (Automation Anywhere Inc., 2017).

After applying the solution of RPA, the bots automatically order the flood certificates, gather data from the returned files, and input the data points into the record system. Because of this, now the analysts will save a lot of time which allows them to focus on more important work rather than spending the majority of their time ordering and sorting the whole work manually which is tedious.

Secondly, address verification is important part in the bank's mortgage processes. At the early stages of a loan cycle, the bank must check each address in the system of record against the United States Postal Service (USPS) website to confirm that it matches the official records. And here where it gets repetitive. Because of the previous, for every loan there is an analyst that navigates to the address look-up tool, compares the addresses, and attaches a screenshot to the loan file. Due to the large number of loans and addresses that need verifying, this task can easily get repetitive and in the process is prone to errors resulting from human mistakes that can cause problems throughout the whole life cycle of a loan process.

After implementing the RPA, this task has been completely automated. The address comparison does not need human input anymore. However, incorrect addresses that do not match will be flagged to and handled by an exception processing team.

Thirdly, mortgage QA/QC takes a toll on the team in term of time spent, as the assigned team usually spends hours each day just to gather the necessary loan documents and compare them with various data points across many sources. But after implementing the A.I system of RPA, the gathering and comparing part got completely automated which helped produce efficiency in the process. This allows the reviewers to save time and effort helps them focus their efforts on identifying and resolving any inconsistencies found (Automation Anywhere Inc., 2017).

Chapter 4

4.0 Findings

4.1 Case Study Findings

The table below summarizes the findings of this case study:

Table 4: Summary of the Ernst and Young Case Study with their Bank Client

Case Study: Ernst & Young LLP				
Challenges and issues to be addressed	**Implemented Solution**	**Duration of implementation process**	**Results**	**Changes in processes due to RPA**
Significant amount of manual effort on many processes	An enterprise-grade Robotic Process Automation (RPA) solution with the ability to operate within the existing IT infrastructure and applications landscape	2 months	Two to three times more efficiency	
Much effort spent on repetitive tasks	Professional training for staff and employees to allow for fast deployment and ease of use		Over 1 million Dollars annual savings	

Manual mortgage processes that are prone to error such as document ordering, data entry, and data verification			100% reduction in errors	
Flood certification orders				RPA bots order the flood certificate and gather data from the returned PDF file. After that, they input required data into the system of record, saving human analysts the time to focus on other matters.
Address verification				RPA bots handle and automate the address verification process and flag incorrect inputs to be fixed by the processing team

Mortgage quality assurance and quality control (QA/QC)				RPA bots automatically retrieve and present the necessary loan documents to the QA/QC reviewer, evading the repetitive and administrative processes and saving time.

4.2 Questionnaire Findings

The questionnaire pointed us to the right direction and very much provided answers to our questions and cleared the areas that we had suspicions and doubts about. For instance, the jobs loss reported by the questionnaire is less significant compared to our first hypothesis and it is discovered that not everyone is laid off, and instead they are allocated to other jobs that are similar but cannot be automated, in which the employees adapt to.

The table below summarizes the findings from the questionnaire:

Table 5: Summary of the Questionnaire Results.

Questionnaire Results

Answer #1

- Artificial intelligence and machine learning systems achieved most of their desired results in increasing productivity and efficiency.
- Some of the results achieved include: reduction in costs and expenses, eliminating errors that result from human mistakes, and save employees' time to allocate to other tasks.
- Benefits from these systems range from a solid 20% to an outstanding two times the perrformance gains.
- The benefits and performance gains were aquired over the average period of 1 year.

Answer #2

- No negative impact on the social environment at work was reported.
- The time and effort saved by A.I. automation has infact improved the work environment and helped fuel more creativity and productivity for employees.
- It is important to note that in order to benefit from the time saved, employees must allocate the time saved into other productive tasks that increase value for the firm, and not stretch their current work to fill the free time gained. An adage known as Parkinson's Law.

Answer #3

- There is an impact on human jobs imposed by artificial intelligence automation.
- Most of the jobs affected are those that are routine and repetitive or those that require little analytical and intuitive intelligence. For example: data entry keyers and low level customer support that help customers with small non-complicated issues.
- The impact on jobs is not as big as expected as most of the employees affected by the automation get reassigned to other tasks that cannot be automated and adapt to it.

Answer #4

- In general, the trust in artificial intelligence automation is high.
- Information obtained through artificial intelligence is considered accurate, and it is prefered over results obtained by humans.
- Unless an experienced and knowledgeable person challenges these results, or there is conflict between what is observed and A.I., they are not challenged immediately.

Chapter 5

5.0 Conclusions

5.1 Results Analysis

In the literature review section of this thesis we realized that artificial intelligence in businesses aim to increase efficiency of many core business functions and processes to allow for better decision making and reduction of mistakes which in turn reduces costs and saves time (Russell & Norvig, Artificial Intelligence. A Modern Approach, 2016). Taking this into account when analyzing our major findings, we notice that in Ernst & Young LLP (E&Y) case study the Robotic Process Automation (RPA) system managed to successfully achieve its desired goal of increasing performance. RPA is a software tool that produces a list of actions to automate a task. It allows the automation of rules-based business processes that involve routine tasks, structured data and deterministic outcomes in terms of speed, costs, and error reduction mainly in back and front office activities in businesses (Aguirre & Rodriguez, 2017).

We can link these gains in performance to from RPA to the automation of many repetitive tasks that do not require any intuitive or empathic intelligence to function properly. Researchers Ronald Rust and Ming-Hui Huang explain this to the limitation of artificial intelligence in certain areas of intelligences needed to properly accomplish tasks, the A.I. can accomplish the mechanical and analytical easily, the intuitive and empathetic parts should be handled by human employees (Huang & Rust, 2018). The RPA system in E&Y automates the low-level mechanical intelligence which concerns the routine and repeated tasks that require minimum learn or adaptation (Sternberg, A Triarchic View of Giftedness: Theory, 1997).

Another aspect of RPA benefits is the reduction in errors. It is the nature of humans to make mistakes, humans get tired and sometimes forget, machines on the other hand eliminate mistakes completely in their tasks, the ones that can be automated. In E&Y case manual mortgage processes were prone to errors such as document ordering, data entry, and data verification, with the RPA the process got streamlined and errors are no more.

The second part of the findings are learned from conducting a questionnaire which aims to complement the findings from the case study. The first question further adds to the concept that automating repetitive work increases productivity and saves time and costs. These benefits start to show over an average period of 1 year. Within this period Andreas Kaplan and Michael Haenlein argued that A.I. will have implications for any kind of organization by helping conduct a multitude of tasks faster and at a lower cost. In addition, the work environment in term of employees' creative thinking and moral does not seem to be hindered by automation. In fact, the free time saved is better spent on other important tasks that create value and further foster the innovative spirit of the working team.

The part of human job security against automation is a lengthy one. However, the results obtained during this study suggest that the impact is not as large as its thought. Ronald Rust and Ming-Hui fundamental idea of their theory is that A.I. job replacement occurs at the task level, rather than the job level, which will still leave human element at the top of the pyramid to control the flow of work. The researchers also built a framework that consists of four intelligences that explain the skill requirements for different intelligence tasks: empathetic intelligence, intuitive intelligence, analytical intelligence, and mechanical intelligence. The A.I. automates the mechanical intelligence part and some portions of the analytical intelligence. So, to counter the loss of job resulting from it, the employees are reassigned to handle the intelligences that cannot be automated effectively by A.I. Basically, making the impact of A.I. a shift of needed jobs rather than pure loss of jobs.

5.2 Limitations

It goes without saying that no research is without its flaws, and this thesis is no exception. In this study we tackle a wide subject with many layers and applications in a general way in the field of business. This gives the reader a general understanding on how these mechanisms we observed and analyzed work and interact with the business environment in a broad manner which is useful, but can be short or inadequate to explain and understand it when it comes to specialization as there are many fields of businesses and within the same field each company functions under different circumstances and have their own strategy and long-term goals. Even though during the study we tried to keep the topic on artificial intelligence in financial sector, that alone has many subdivisions. For example, fintech involves different applications of the technology such as Insurtech, Regtech, and blockchain.

Exploring each one of these divisions would require significant more research and complicate things which will harm the fundamental goal of this study.

Another limit of this study involves the topic itself. Academically, artificial intelligence is a field that develops at a high pace, and it is a high probability that current standards and ground rules may change over the years due to the nature of this field. Some technologies get abandoned in favor of new and improved innovations, while others survive and transform over the years and get adopted to become new standards such as the internet itself. Even if artificial intelligence itself does not succeed in renovating the workplace, there is a good chance that innovations brought forward by it will get absorbed by firms and evolve into whole different technology.

A third limitation in this study is in the cultural and country level. The information used for this thesis may not be relevant or accurate when used from another country's perspective. This is because each country has its own cultural environment that may affect how people react or approach work in their country. For example, Japan is known for its hard work culture where people tend to overwork more than the usual 60 hours/week like in western countries (Ronsse, 2015). In addition, loyalty is important there, so when someone joins a company, they are expected to stay with it (Marvin, 2018). This may change how the Japanese firms react to artificial intelligence systems and some of the flaws we discussed in this study may not be observant in the Japanese firm, such as job loss due to artificial intelligence automation may can be less frequent than that of American firms, for example.

5.3 Recommendations and Further Research

Artificial intelligence concept is seeing more development and studying by researchers than ever before because of its potential to become the next big thing in businesses and other fields. The automation and neural networks artificial intelligence provides can be the key to transform business processes and how certain processes are done, eliminate errors and improve work efficiency, reduce costs, and improve quality of services to retain more customers. All these benefits have the possibility to be a game changer for how business is conducted, very much like how the introduction of the Internet allowed changed business procedures and opened the way

for new opportunities and advantages such as remote work and communication via video conferences.

It is important to note that simply implementing artificial intelligence systems into businesses without doing the proper prerequisite research and analysis will not guarantee realizing all the benefits A.I offers. This is because there are many factors to consider in order to ensure a successful transition into A.I. driven automation. For instance, there is a certain technical uncertainty that surround RPA, it poses for the company several questions that need to be answered such as what is the architecture of the target environment and how are infrastructure assets safeguarded (Scott Furlong, n.d.). A skilled management should be well aware of these pitfalls and how to avoid them by properly understanding what involves implementing A.I. in the company and educate all the associated employees about it and answer all their questions to make everything clear as possible and avoid any unclear expectations or confusion of responsibilities.

Advancements in the field of artificial intelligence and its applications for businesses pose to be the fuel for developing disruptive technology that will change the way businesses are done and open the way for new opportunities. One example is chatbots economy which businesses are foreseeing enormous potential for it and are already investing heavily in it to be on the cutting edge. These chatbots programs will be able to handle various tasks automatically ranging from scheduling meetings, reporting, and help users with many general tasks. These programs are lightweight and are faster to build compared to traditional applications, which make them appeal to businesses. This makes them well suited to mobile devices which many people use, giving it an advantage compared to other traditional methods of communications. In addition, being built on artificial intelligence technology, these chatbots are able to “learn” and improve over time to automate a wider range of processes in an increasingly human-like way. For example, it is able to mimic human speech patterns to stimulate more intimate interactions, and it can use predictive statistics and information to generate information proactively rather than reactively in response to a prompt (Business Insider Intelligence, 2018).

The previous example is but a fraction of the capabilities of artificial intelligence, the applications are numerous, and the technology evolves and develops constantly. This research covers only a handful of the applications using artificial intelligence that may benefit companies and increase the

efficiency of their processes by automating them. This leaves room for more research and studies on artificial intelligence applications and effects on other aspects of businesses and management not covered in this research, such as recruiting, marketing, and forecasting. It is important to note that not every artificial intelligence application or development is guaranteed to be a successful implantation for businesses, that is why it is necessary to commit necessary time and resources to research and study this technology to properly understand its implications and benefits to ultimately decide if it will be beneficial in the long term, the short term, or not beneficial at all. After all, a good and skilled management should do research and careful understand the technology before investing significant amount of time and money to ensure a successful integration.

5.4 Self Reflection

Working on this research has been one of the most exciting and unique tasks I have undertaken in my years of academic learning. This project is different from other assignments I have done in different extinguishable ways. First of all, the scale of this study is very significant in relative to other projects I did, requiring much research and reading on different topics, such as finance, management and technology, from various sources, such as reports and books. Secondly, reading, and extracting information is not enough alone, complementary analysis and interpretations are necessary to properly explain the point of the study to the readers. Lastly, because of the nature of writing theses and the way they are structured, the study needs to be organized in a specific way and adhere to certain writing rules, such as the APA citation style.

All the aforementioned challenges were the major obstacles I faced while working on this research, and in order to finish the work correctly, these challenges needed to be tackled down. However, it is important to note that simply breaking down these obstacles and moving on is not enough, improving myself and learning new lessons that will aid me in the long run and help me become a better learner is the true success here. Firstly, because of the relatively long duration of this study, and having such an open schedule leaves room for slacking and leaving work to the last minute. So it is important to be disciplined and keep consistent in the work and not leave it all to the last minute and avoid the mentality of “work expands so as to fill the time available for its completion” (Parkinson, 1955). Secondly, in a world full of diversions and distractions, planning and thinking long-term is

critical for being organized and using my time efficiently, especially when it comes to projects. This skill will be essential and carried on to any career I pursue. Last but not least, learning is not constrained by being in school or college, instead it is a lifelong process that continues on. Realizing this can help foster this mentality and makes me a better person in general.

In the end, I'd like to emphasis on the lessons I learned along the way as I worked on this research, and how they helped me in a variety of ways that will aid me as I work toward any career. After all, the journey itself is part of reaching the destination, the work involved in this research taught me a lot of valuable things. It is really a unique experience that involves different challenges, and each challenge teaches you a crucial lesson that you will benefit from in every aspect of your career. For that, I am thankful I had the opportunity to work on this project and experience all the stages and steps involved. It has been a wonderful journey.

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