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Artificial Intelligence: Opportunities and Challenges in the Future of Labor Market and Work

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MSc in International Management

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PhD, Renato Telo de Freitas Barbosa Pereira, Assistant Professor with Aggregation, ISCTE–IUL

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BUSINESS
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To my family, for all their motivation, unconditional support, and for always believing in me.

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Resumo

A rápida evolução da Inteligência Artificial (IA) está a transformar o panorama do mercado de trabalho, apresentando oportunidades e desafios significativos. Esta investigação tem como objetivo explorar o impacto da IA na dinâmica do emprego, as mudanças nas funções profissionais e a evolução dos requisitos de competências. O estudo visa também compreender como estes impactos variam de sector para sector e de empresa para empresa. Para o efeito, os tópicos foram desenvolvidos através de uma revisão da literatura e de entrevistas qualitativas realizadas em diferentes sectores. As entrevistas destacaram o impacto subjetivo e variável da IA nos três aspetos acima referidos. No entanto, permitiram uma maior compreensão da influência da IA em casos específicos. Ao analisar o impacto da IA na mão de obra e no trabalho em diferentes indústrias, podemos compreender melhor os avanços feitos até agora, ao mesmo tempo que identificamos áreas para um maior desenvolvimento em vários sectores. Este estudo oferece uma avaliação aprofundada do impacto da IA no futuro do trabalho, destacando a importância da adaptação e da aprendizagem contínua para que as empresas e os indivíduos se mantenham competitivos num ambiente em constante mudança. Além disso, estas conclusões têm implicações práticas para as empresas, os decisores políticos e os indivíduos, especialmente à medida que navegam no cenário de trabalho em evolução na era da IA. Os resultados do estudo podem moldar o desenvolvimento da força de trabalho, a educação e a elaboração de políticas para promover a resiliência e a inclusão em meio aos avanços tecnológicos.

Palavras-chave: Inteligência artificial, Mercado de trabalho, Emprego, Funções profissionais, Competências

Classificação JEL: J21 (Força de trabalho e Emprego, Dimensão e Estrutura)**,** 033 (Mudança Tecnológica: Escolhas e Consequências; Processos de Difusão)

Abstract

The rapid evolution of Artificial Intelligence (AI) is transforming the labor market landscape, presenting significant opportunities and challenges. This investigation aims to explore how AI impacts employment dynamics, changes in professional roles, and evolving skill requirements. The study also aims to understand how these impacts vary from sector to sector and company to company. To achieve this, the topics were developed through a literature review and qualitative interviews conducted in different industries. The interviews highlighted the subjective and variable impact of AI on the three aspects mentioned above. However, they provided a greater understanding of the influence of AI in specific cases. By analyzing the impact of AI on labor and work across different industries, we can better comprehend the advancements made thus far, while also identifying areas for further development in various sectors. This study offers an in-depth evaluation of AI's impact on the future of work, highlighting the importance of adaptation and continuous learning for businesses and individuals to remain competitive in an ever-changing environment also, these findings have practical implications for businesses, policy makers, and individuals alike, especially as they navigate the evolving work landscape in the age of AI. The study's outcomes can shape workforce development, education, and policymaking to promote resilience and inclusivity amid technological advancements.

Keywords: Artificial Intelligence, Labor market, Employment, Professional roles, Skills

JEL Classification: J21 (Labor Force and Employment, Size, and Structure), 033 (Technological Change: Choices and Consequences; Diffusion Processes)

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List of Abbreviations

AI – Artificial Intelligence

AGI – Artificial General Intelligence

ANI – Artificial Narrow Intelligence

ASI – Artificial Superintelligence

CV – Computer Vision

DL – Deep Learning

EU – European Union

GDP – Gross Domestic Product

GDPR – General Data Protection Regulation

HR – Human Resources

L&D – Learning and Development

ML – Machine Learning

NLP – Natural Language Processing

OCR – Optical Character Recognition

OECD – Organisation for Economic Co-operation and Development

PCs – Personal Computers

RPA – Robotic Process Automation

R&D – Research and Development

UK – United Kingdom

VR – Virtual Reality

WEF – World Economic Forum

XAI – Explainable Artificial Intelligence

Introduction

Over the last few decades, we have seen a rapid and constant evolution of Artificial Intelligence (AI), which has permeated all aspects of human life. Whether in the personal context, where virtual assistants and recommendation algorithms shape our interactions with technology or in the social context, where AI is used for data analysis in areas such as health and education, its impacts are wide-ranging and multifaceted. However, it is in the workplace context that the effects of AI are particularly significant and incentive debate with differing opinions and concerns. As AI systems become more advanced and capable of performing tasks previously reserved for humans, there are fears that jobs will be replaced by these same systems and that the nature of work will be drastically altered.

It is important to recognize the socio-economic impacts that the implementation of AI technologies brings so that humans can take advantage of them. On the one hand, AI-driven automation can lead to greater efficiency, cost savings, and even the emergence of new sectors and job opportunities. On the other hand, there is a real risk of occupational displacement, with certain professions becoming obsolete and many workers facing difficulties in adapting to a constantly evolving job market.

The purpose of this study is to investigate and understand how the integration of Artificial Intelligence in the labor market and workplace is impacting and will impact job opportunities, job roles, and working skills in different sectors. Ultimately, this dissertation will seek not only to analyze the problem but also to offer insights and recommendations that can help address the challenges and maximize the opportunities arising from the integration of AI into the labor market. The research proposes to contribute to a more holistic and informed understanding of the complex interactions between AI, work, and society, to promote a more inclusive, dynamic, and sustainable future of work.

In this sense, the theoretical objective of this study is to investigate the influence of AI integration on the three topics described above. More precisely, this research aims to understand what happens specifically in each company and the measures they take concerning employment, job displacement and job creation, the creation of new roles and the elimination of others, the influence of AI on skills requirements, how companies and employees are adapting to the changing skill requirements brought about by AI and in this context, this study focuses on three main research questions:

RQ1) How does the integration of Artificial Intelligence affect employment dynamics, including opportunities, creation, and displacement of jobs in different sectors?

RQ2) How will Artificial Intelligence integration impact traditional job roles, and what new roles will emerge as a result?

RQ3) How is the demand for skills and qualifications in the labor market influenced by AI?

This investigation will consist of five chapters, each with specific purposes.

Chapter 1 presents the literature review on Artificial Intelligence and the influence of AI on the labor market and work.

Chapter 2 discusses the theoretical approach and the research questions on which the investigation was based.

Chapter 3 concerns the methodology used to answer the research questions and the research method applied.

Chapter 4 presents the results derived from the methodology that was used.

Chapter 5, the last chapter, draws the study conclusions, its limitations, and suggestions for future research.

CHAPTER 1

Literature Review

1.1. General Overview of Artificial Intelligence (AI) and Its Applications Across Industries

This first chapter begins with a comprehensive introduction to Artificial Intelligence, focusing on its definition and concepts, its development, and classifications, followed by a discussion about the broad scope of AI applications in various industries and how they are changing work processes.

AI can be defined as a broad term for computer systems that can sense their environment, learn, reason, and act in response to what they perceive and to achieve specific goals. Machine learning (ML), deep learning (DL), computer vision (CV) and Natural Language Processing (NLP) are examples of AI applications today (PwC, 2023).

The historical development of AI can be divided into three major phases. The first period, from the 1950s to the 1970s, is notable for developing the foundation for most AI algorithms. AI successes include algebraic problem-solving, language translation, and geometric theorem proof. Symbolic AI dominated the 1970s and 1990s, with "expert systems" or "knowledge-based systems" attempting to encode human expertise as computer programs in personal computers (PCs). These systems comprised a knowledge base containing facts and rules and an inference engine for symbol manipulation. The final period is distinguished by the evolution of machine learning in the 1990s, which led to the growth of deep learning. AI has successfully handled complex difficulties, providing practical solutions applicable across various areas such as data mining, industrial robots, business intelligence, banking software, medical diagnostics, and so on (Delipetrev et al., 2020). AI techniques expanded into new sectors such as computer vision, robotics, and language processing in the 2000s, paving the way for today's AI revolution (Gungor, 2023).

AI technologies are classified as weak, strong, or super AI. Weak AI also denoted as Narrow AI or Artificial Narrow Intelligence (ANI) represents AI systems designed for specific tasks or applications (Jean-Claude, 2022). These systems excel in specific tasks such as face recognition, speech processing in virtual assistants, and automobile control. Siri's speech and language recognition on iPhones and Netflix's recommendation algorithms are two examples of ANI (Kanade, 2022). Machines that can think like humans are known as strong AI or Artificial General Intelligence (AGI). AGI strives to perform any cognitive function that a

person can (Delipetrev et al., 2020). Super AI, also known as Artificial Superintelligence (ASI), is a type of AI that outperforms human intelligence in every way and can execute any work better than a person. ASI understands human feelings and experiences and can stimulate human-like desires, beliefs, and emotions. Both AGI and ASI are hypothetical (Kanade, 2022).

From a business perspective, AI technologies can be categorized based on the use case, in which machine learning and deep learning, neural networks, and computer vision are the main technologies that have revolutionized business processes and operations (Buntak et al., 2021). Machine learning is a subset of AI that can learn from data and make predictions and/or choices without the need for human intervention (Afiouni, 2019) and its goal is to teach a machine to learn from data and create inferences, predictions, and uncover connections that may be used to guide decisions (Enholm et al., 2021). Deep learning is a class of machine learning that excels at processing unstructured data. The deep learning algorithm continuously sends data through several levels; each layer can extract features and pass them to the next layer. The first layers extract low-level features, while the subsequent layers integrate them to generate a comprehensive representation (Mathew et al., 2020).

Neural networks are computing systems homologous to the human brain. It consists of numerous nodes, each with a function to perform to secure the outcome for which the network was formed. Because neural networks are analogous to the learning process of humans, they are frequently used when developing a system of considerable intelligence (Buntak et al., 2021).

Computer vision is an artificial intelligence field that teaches computers to interpret and comprehend the visual world. Its applications include video and image recognition, facial recognition, and object detection, as well as self-driving vehicles. As remarkable as this technology is, we must keep in mind that computers do not "see" in the same manner that humans do, thus the AI must be appropriately taught to achieve optimal accuracy (PwC, 2020).

Although the AI technologies mentioned above are considered the most relevant, others deserve to be highlighted due to their development and role in recent years, such as NLP, Robotic Process Automation (RPA), and Expert systems (Enholm et al., 2021). NLP is the process by which machines can interpret and analyze human language (Jarrahi, 2018). RPA refers to tools that work on the user interfaces of other computer systems, aiming to replace humans through automation from the outside in, reducing repetitive tasks and reducing strain on employees by automating repetitive tasks (Van der Aalst et al., 2018). As mentioned above, expert systems are knowledge-intensive software used to address specific domain challenges that can execute tasks that typically involve human experience. They are usually chosen as they give reasonable solutions for even the most ill-structured situations with no efficient

algorithmic solution (Tolun et al., 2016). It is predicted that future AI technologies will give improved openness, privacy, and efficiency. Explainable AI (XAI), for example, seeks to make AI models more accessible to humans by providing insights into their decision-making processes, hence enhancing confidence and adoption in fields such as medical care and self-driving cars (Linardatos et al., 2020). Furthermore, quantum AI is expected to address complex issues that are currently unsolvable for classical computers, increasing Research and Development (R&D) and optimization across all industries (McKinsey, 2021). While federated learning will allow firms to develop a shared global model without storing training data in a single location, it will improve privacy in fintech, insurance, and medical research (Khan et al., 2023).

Artificial Intelligence is a crucial technology that enhances innovation and efficiency in various industries, leading to the transformation of many sectors in the digital age. The impact of AI may vary based on the sector's openness to use and the level of development of AI within that sector. Despite the significant benefits that AI has offered to many businesses, it poses several fundamental challenges, including data privacy, the potential for bias, and a constant demand for trained labor.

Personalised financial planning, fraud detection and anti-money laundering, and process automation are the three areas with the most AI promise in the finance sector. While human financial advice is expensive and time-consuming, AI innovations such as robo-advice have enabled the development of customized investment solutions for mass-market customers in ways that were previously only available to high-net-worth individuals (PwC, 2023). Furthermore, AI has already changed trading by automating the trading process with the use of learning algorithms to predict stock prices, which ultimately leads to profit-generating.

AI systems are revolutionizing healthcare diagnostic processes by enabling high-accuracy disease diagnosis (Rahmaniar et al., 2023) and treatment by analyzing genomic data and identifying genetic variations. This allows for personalized treatment based on an individual's genetic profile (Quazi, 2022). AI also stimulates medication development by analyzing biological data to simulate molecular interactions, finding potential drug candidates, reducing costs, and making innovative therapies more accessible to all patients (Paul et al., 2021).

AI is boosting efficiency, confidence, sustainability, and customer service in the energy sector. It estimates energy demand correctly, optimizes power generation, and checks equipment conditions in real-time. AI-powered systems manage demand and supply, renewable energy integration, grid stability, and customer engagement, as well as forecast generation patterns and modify production accordingly. AI technology will become increasingly important

for efficient, dependable, and environmentally friendly energy services as these industries expand. Green hydrogen, a 100% carbon-free fuel, has the potential to become a serious contender in the energy market. Neural networks, ML, and fuzzy logic models assist in producing, storing, and transferring hydrogen energy (Sai Ramesh et al., 2023).

Complex AI systems assess sensor data, make navigational decisions, and safely operate vehicles without human intervention, revolutionizing the transportation business. The automotive industry has also used artificial intelligence to predict and prevent vehicle problems before they occur. This predictive strategy extends vehicle life, guarantees safer driving conditions, and can save money on unexpected maintenance costs (Rahmaniar et al., 2023).

Artificial Intelligence has had a major impact on the retail sector, helping both businesses and customers. Retailers are using AI to optimize inventory management, precisely estimate demand, improve supply chains, and adjust pricing strategies. This results in cost savings, shorter delivery times, competitive pricing, and tailored marketing strategies (Lokanan, 2023). AI technology enhances the customer experience by providing personalized recommendations, chatbots, and virtual assistants. It also promotes transparency, security, and payment efficiency through price comparison tools and AI-powered checkout systems. However, concerns about data privacy, security, and job displacement remain for both retailers and consumers (Guha et al., 2021). Enhanced monitoring and auto-correction of manufacturing processes, supply chain and production optimization, and on-demand production are the three sectors with the greatest AI potential in the manufacturing business. AI will allow more seamless integration of supply chain data, enabling anticipatory production and more efficient product delivery to clients (PwC, 2023).

Despite the industries mentioned above, there are others in which AI has an influence and which are worth mentioning, such as education, construction, the agricultural industry, the mining sector, the information and communication sector, and environmental protection. Table 1 summarizes the developments enabled by AI across different business sectors.

Table 1 - Summary of the impact of AI applications on business sectors

Finance	AI applications in the financial sector can enable personalized financial planning, fraud detection, anti-money laundering, and process automation. Innovations such as robo-advice allow for the creation of customized investment solutions for mass-market customers.
Healthcare	AI systems enable faster, more precise diagnosis and treatment. They also help develop medications by finding potential drug candidates, reducing costs, and making innovative therapies more accessible to patients.
Energy	AI improves energy efficiency, sustainability, and customer service by estimating demand, optimizing power generation, and managing renewable energy integration. AI tech is crucial for green hydrogen production, storage, and transfer.
Transportation	AI is revolutionizing transportation by processing sensor data, making navigational decisions, and operating vehicles without human intervention. Additionally, the transportation industry uses AI to predict and prevent issues, reducing maintenance costs and extending the longevity of vehicles.
Retail	Retailers use AI to optimize inventory, estimate demand, improve supply chains, adjust pricing, and improve customer experience through personalized recommendations, chatbots, and virtual assistants.
Manufacturing	AI has the greatest potential in three manufacturing sectors: enhanced monitoring, supply chain optimization, and on-demand production, enabling seamless integration of supply chain data, and efficient product delivery.

Source: Self-elaborated

1.2 AI's Impact on the Labor Market

Over the past few years, the impact of AI has been revolutionary and has significantly affected various industries. This has led to considerable changes in the global labor market as businesses and sectors adopt AI-powered technologies. In this section, we aim to examine the complex influence of AI on the labor market by reviewing worldwide trends and we will also explore the larger implications of AI, including its effects on job creation and displacement across various industries.

1.2.1. A Review of Global Trends

Artificial Intelligence has emerged as a transformational force, with significant implications for the global labor market. As AI technologies evolve, they provide both disruptions and possibilities to different industries and job roles.

AI technologies are introducing changes and uncertainties in the labor market. The impact of AI on workers is expected to be both positive and negative. On the positive side, AI will automate repetitive tasks, freeing up workers to focus on higher-level responsibilities. Individuals with the skills to use these emerging AI technologies will have the potential to earn more as efficiency and productivity improve. However, on the downside, the displacement of people whose jobs can be replaced by AI may lead to lower wages and fewer job opportunities for certain segments of the workforce. A report by the Organization for Economic Cooperation and Development (OECD) suggests that in the next few years, about 25% of current jobs will be at risk of being partially or completely replaced by AI technology. Other predictions indicate that by 2030, nearly half of the global workforce will need to upskill or reskill themselves to keep up with the changing job market (OECD, 2023).

Over the last decade, the adoption of new digital technologies such as robotics and automation has been incremental, focusing on specific workforce segments or jobs. Goldman Sachs' March 2023 report emphasizes the situation's magnitude, mentioning that the automation of some tasks might disrupt an estimated 300 million jobs worldwide. However, Artificial Intelligence technologies are expected to have a far greater impact in the future. Not only will AI extend automation to tasks beyond regular non-cognitive duties, but as a general-purpose technology, it will influence all parts of our work and daily life (Minevich, 2023).

Furthermore, as digitization accelerates, the issue of knowledge and skill obsolescence across the workforce becomes more acute. The successful integration of new technologies inside organizations will be strongly reliant on individuals' absorptive capacity, which is linked

to their digital abilities. The risk of falling behind in global value chains owing to a failure to accept these new technologies is becoming more real (Charles et al., 2022).

AI's impact on the labor market also includes the creation of new job categories. While AI may replace some jobs, it also generates new job categories and opportunities. Roles as AI ethicists, data scientists, and machine learning engineers have arisen, indicating an increasing demand for skills that complement AI technology (OECD, 2023).

Artificial Intelligence tools can enhance productivity and innovation. As an automated technology, AI holds the potential for cost savings and increased productivity, allowing organizations to gain a competitive advantage. AI enables businesses to improve their value-added products, which increases the value of output from multiple factor inputs and hence boosts company productivity (Gao & Feng, 2023). According to a PwC analysis, AI development and adoption will boost global Gross domestic product (GDP) by up to 14% in 2030, amounting to an additional $15.7 trillion (PwC, 2017). Companies can also use AI to improve the quality of their products or services. Workers may gain from increased job quality, well-being, and satisfaction. Indeed, AI can replace dangerous or time-consuming tasks with more challenging and engaging alternatives. It can increase employee engagement, give them more autonomy, and even improve their mental health. Some workers may profit from greater wages.

AI technologies are having a significant impact on global competition and labor market dynamics. The influence of AI varies depending on the region and industry. Countries and industries that adopt AI technologies may have a competitive advantage, while others may struggle to adapt to the new technology paradigm. As a result, global labor market trends are changing, affecting migratory patterns, wage structures, and economic growth rates (OECD, 2023).

From a theoretical standpoint, the impact of AI on the demand for labor is ambiguous. Acemoglu and Restrepo (2019) present a theoretical framework for understanding the influence of new technologies on the labor market. AI will displace human labor (displacement effect), but it will also increase labor demand in jobs that are not affected by AI due to the increased productivity it delivers (productivity effect), as well as the development of totally new employment (reinstatement effect). It is unclear whether the impact of AI on the labor market will lead to an increase or decrease in aggregate labor demand. This is because there are both positive and negative effects associated with the use of AI in the workplace, and it is unknown which of these effects will be more significant. It is important to note that not all workers will be equally affected by AI, as certain groups may experience greater impacts on their

employment opportunities than others. For instance, workers who perform a large proportion of non-routine cognitive tasks, such as white-collar professionals, may be more exposed to the latest breakthroughs in AI. The most fundamental aspect for understanding AI's impact on labor demand is tasks (Charles et al., 2022).

Although AI has the potential to boost innovation and productivity growth, it also poses challenges that require proactive strategies and policies to promote inclusive and sustainable economic growth. The implementation of dynamic labor market policies, such as unemployment compensation, job transition assistance, and retraining programs, can help offset the short-term disruptions created by AI-driven automation. Furthermore, promoting diversity and inclusion in the AI workforce may enhance creativity and eliminate systemic biases in AI applications (OECD, 2023).

1.2.2. The Role of AI in Job Creation and Displacement Across Industries

According to research, digitization has impacted practically all major economic sectors and transformed the structure of labor markets. Although there are concerns about widespread job replacement due to technical developments, European and OECD nations have shown a neutral or even positive influence on net employment and labor productivity (Charles et al., 2022). According to the 2023 Future of Jobs Report by the World Economic Forum (WEF), AI is projected to generate 69 million job opportunities worldwide while eliminating 83 million jobs by 2027.

Throughout history, advances in technology have frequently resulted in changes in employment patterns, as certain work types become automated or obsolete, and new possibilities emerge. However, the high pace and depth of AI development raise fundamental questions regarding the extent to which job displacement may occur and people's ability to adapt to these changes. It is critical to analyze the possible effects of AI-driven job displacement for employees, organizations, and society (Karangutkar, 2023).

Although automation has clear benefits for the manufacturing industry, it also raises concerns about job loss. As technology replaces repetitive and low-skilled jobs, some jobs may become outdated. However, automation also creates new possibilities for upskilling and reskilling the workforce. Instead of replacing humans, technology often changes job responsibilities, requiring individuals to learn new skills and focus on activities that demand imagination, problem-solving, and critical thinking. The integration of AI technology in the finance sector has both positive and negative consequences for employment. Although some

routine tasks may be automated, there is an increasing need for people with expertise in data analysis, algorithm development, and risk management. To succeed in the rapidly evolving finance industry, it will be essential for individuals to acquire skills in machine learning, data science, and financial analytics (Rayhan, 2023).

Regarding the healthcare industry, AI technology can automate functions previously handled by healthcare experts such as radiologists and pathologists. For example, AI-powered systems may analyze medical pictures, assisting with diagnosis and perhaps decreasing the need for manual interpretation. While automation can improve efficiency and precision, it may influence demand for specialized healthcare positions (Larasati, 2023). Automating tasks that are structured, standardized, and repetitive is relatively simpler. In such cases, the rules can be easily translated into algorithms and scripts. In the retail industry, AI can be used to enhance or replace the jobs of cashiers, sales personnel, warehouse workers, customer care agents, and other back-office activities. However, automating tasks that require emotional intelligence and creativity is more difficult. This is because emotional intelligence requires a deep understanding of individual and social psychology, and these tasks will continue to be handled by humans for the foreseeable future (McKone & Madannavar, 2020).

As automation becomes more prevalent in certain tasks such as driving and sorting, new job opportunities are arising in fields like vehicle maintenance and monitoring. Additionally, the evolution of the transportation industry requires the development of skills such as managing and monitoring automated systems and analyzing data (Rayhan, 2023). The integration of AI technology in the energy industry has led to the creation of specialized roles in AI engineering, data science, and automation. This has resulted in improved efficiency in energy infrastructure operations. The use of AI in renewable energy programs has also generated employment opportunities in research, development, and maintenance. However, the shift towards cleaner energy sources and the automation of routine operations may lead to job displacement, particularly in conventional positions in power plants and fossil fuel-related industries (Diedrich et al., 2023).

Automation has improved efficiency, accuracy, and scalability. It has also created new, more skilled job opportunities, although it has displaced some jobs. The main challenge is to manage this transition effectively, ensuring that the workforce has the necessary skills for new jobs and that the positive impacts of technological growth are distributed equitably throughout society (Daniel, 2023).

1.3. AI and Skills: An Analysis of the Changing Workforce Competencies

As AI becomes more prevalent, the skills required for workers are changing rapidly. This section explores the unique skill sets necessary for managing an AI-powered world. We aim to understand the expectations placed on humans in this era of cooperation with intelligent technologies. We will examine corporate solutions like upskilling and reskilling, which organizations use to train employees and capitalize on AI's potential.

1.3.1. AI and Skills Demand

Organizations and workers will need to adapt to the adoption of AI, and this will primarily depend on ensuring workers are equipped with the necessary skills. There are two main reasons why AI will impact skill requirements. Firstly, AI has the potential to replicate an increasing number of capabilities, particularly cognitive and manual abilities, meaning some roles may become redundant, and new ones may emerge. The OECD's analysis of firms that have adopted AI indicates that manual skills are predominantly impacted by AI adoption with the manufacturing industry having the most examples of skill redundancies. Secondly, AI increases the demand for skilled professionals who can develop and operate it and for that reason, workers need to acquire skills that are relevant to the development, implementation, and management of AI (OECD, 2023).

Recent advancements in AI and automation technologies have made it possible to replicate some talents and abilities that were previously thought to be difficult to automate, such as fine arts, numerous psychomotor talents, as well as cognitive skills such as expression and understanding, scheduling, and advising (OECD, 2023). AI technology has been increasingly incorporated and developed in various fields, leading to a growing demand for both the skills required to develop AI systems and the skills needed to use AI applications. The development and supervision of AI systems require technical skills, and some of these skills are new and currently unavailable in today's jobs. These specialized AI skills include general knowledge of AI (machine learning), specific knowledge of AI models (deep learning, neural network, etc.), AI tools (PyTorch, TensorFlow, etc.), and AI software (galaxy cluster, java, etc.). Data science skills, such as programming languages, cloud computing, data visualization, and data analysis are also important. Other cognitive skills such as creative problem-solving and analytical thinking and transversal skills like management and social skills are also necessary. Regarding the skills needed to adopt and use AI applications, they can be classified into four categories: elementary AI knowledge such as the principles of machine learning, digital skills, transversal

skills such as communication, teamwork, and creativity, and other cognitive skills such as critical thinking, problem-solving, and analytical skills (Lane et al., 2023; Manca, 2023).

The 2023 Future of Jobs Report by the WEF highlights that the demand for skills varies across industries. Physical skills (which include manual precision and dexterity and sensory processing abilities) are in demand in industries like Care, Personal Service, Wellbeing, Agriculture, Forestry, Fishing, Mining, Metals, and Advanced Manufacturing. Management skills (comprising talent and resource management and operations and quality control) are needed in the Care and Agriculture sectors. Engagement skills (that includes marketing, media, customer service, and service orientation) are becoming important in sectors like Care, Personal Services, Well-being, Accommodation, Food, Leisure, Media, Entertainment, and Sports. Technology skills are important in the Financial Services sector. Cognitive abilities (that include problem-solving and critical and analytical thinking) are in high demand in industries like electronics, chemicals, advanced materials, and nongovernmental and membership organizations. Socio-emotional attitudes (related to self-efficacy, collaborating with others, and ethics) are growing rapidly in the Oil and Gas, Care, Personal Services, Wellbeing, and Electronics sectors.

The adoption of AI is expected to have a considerable impact on labor markets, not just in terms of employment and job quality, but also on how work is structured, what kinds of tasks, and ultimately the skills necessary.

1.3.2. AI and Upskilling/Reskilling Initiatives

In the revolutionary era of Artificial Intelligence, to stay relevant in the job market, it is necessary a proactive approach to learning new skills. AI not only changes sectors, but it also impacts the whole structure related to job positions. As AI technologies transform employment needs, the notions of upskilling and reskilling have become critical to preparing individuals for success in an AI-driven world. Upskilling refers to the process of improving existing skills or acquiring new ones to advance in a career or be more effective in a current position (Moore et al., 2020). On the other hand, reskilling involves learning a completely new skill set that is different from an employee's current position. This strategy aims to prepare them for moving to a different profession or industry (Sawant et al., 2022). Both strategies have been gaining importance not only for the improvement of an organization’s performance but also on employee satisfaction and retention (Ekuma, 2023).

The current era of AI and automation has necessitated the need for upskilling and reskilling initiatives to ensure organizational success and competitiveness. According to the Future of

Jobs Report 2020 by the WEF, it is projected that by 2025, half of all employees globally will require reskilling. This projection does not include those who are currently unemployed (Li, 2022).

Businesses can identify the skills gap in their workforce and determine the necessary skills for AI use. This can be achieved by considering industry trends, market needs, and the unique capabilities of AI tools and systems. A skills audit or skill gap analysis can also be conducted to determine the skills needed in a specific profession or industry and compare those needs to the existing abilities of workers in that sector. This investigation can identify skill gaps between job requirements and current employee skills, enabling organizations and individuals to make informed training and development decisions. Organizations can tailor training programs to specific needs, while individuals can focus on personal development for improved work performance and career progression (Morandini, 2023).

One way to improve the skills of workers in the context of AI is to foster a culture of continuous learning within the company. Employees should be encouraged to take charge of their own learning and development (Ekuma, 2023). Companies can use AI to create comprehensive training programs covering AI and ML basics. AI-powered feedback and evaluations help employees identify strengths and areas for growth, guiding their learning and development. Personalized learning experiences and real-time feedback through AI help employees learn and acquire new skills efficiently (WEF, 2023). They can also partner with educational institutions that offer AI courses. Additionally, companies can provide their employees with the opportunity to work on real-world AI projects, as well as workshops and hackathons to help them put AI principles into practice (Morandini, 2023). Artificial Intelligence can create challenges for adult learning systems, but it also provides an opportunity to enhance the design, targeting, and delivery of training programs. AI technology has the potential to identify skill gaps, improve training planning and delivery, and increase training participation and inclusion (OECD, 2023).

Upskilling and reskilling are crucial for businesses to adapt to changes in technology and labor market demands. However, executing these efforts can present various challenges.

Employees' unwillingness and engagement to invest time and money in upskilling or reskilling themselves for the future is a challenge. Companies should provide possibilities for their employees to learn, provide free Internet access and information, and provide financial assistance, such as tuition support (Li, 2023). Lack of resources is a barrier to implementing upskilling and reskilling programs. Companies may struggle to allocate time, budget, and staff, while HR teams face competing priorities and financial constraints. Another challenge is the

cost and issues associated with developing programs. Identifying partners, evaluating existing and emerging skills needs, and developing the actual details of a program, such as content and format takes a great deal of time. Another obstacle is the expense and issues that come with program development. Identifying partners, analyzing existing and growing skill shortages, and establishing program elements like content and structure take a significant amount of work and time (Bosler, 2021).

1.4. Government Policies and Regulations for AI in Employment/Workplace

Governments across the globe have been implementing laws and regulations to ensure the ethical and responsible use of AI in workplaces. With the rising adoption of AI, concerns about fairness, transparency, and privacy have led to the introduction of standards aimed at safeguarding workers' rights and promoting equal opportunities. This section highlights the primary features of these regulations and measures taken to create a more inclusive workforce, along with the challenges involved in their implementation.

Artificial Intelligence systems can be advantageous in the workplace, as they can increase safety and productivity. However, if not developed or applied appropriately, they can also pose significant risks to employee's well-being and fundamental rights. The rapid growth and extensive use of AI technology emphasize the urgent need for policymakers to act swiftly and implement regulations to guarantee that AI in the workplace is reliable and trustworthy. So far, OECD country's AI-specific initiatives to promote trustworthy AI in the workplace have primarily focused on soft law, which refers to non-binding techniques that rely on an organization's ability to self-regulate, which include for example, the establishment of ethical frameworks and principles, technological standards, and codes of behavior for trustworthy AI. (OECD, 2023). Soft law is a more flexible approach to managing AI, as it is easier to apply and adapt than hard law. It fills gaps in AI regulation and provides incentives and standards for trustworthy AI in the workplace. As AI is a rapidly growing technology, soft law offers essential flexibility, as legislation may not always address the hazards caused by the latest breakthroughs. Most AI-specific legislation is being developed and may take several years to implement (Gutierrez & Marchant, 2021).

While several OECD member countries are developing AI-specific legislation, as the case of the United Kingdom's (UK) AI regulation White Paper of March 2023, which frameworks its latest efforts for regulating AI, however, The UK Government presently sees no need for further or AI-specific laws due to the safeguards offered under the existing rule of law across

domains and industries. Furthermore, the White Paper emphasizes that the soft law approach will mean the UK's rules can adapt as this fast-moving technology develops, protecting the public. some countries are managing AI predominantly through soft law, in addition to applying existing legislation to workplace AI, which is the example of Japan. The Japanese Government focuses on guidance to support companies' voluntary efforts for AI governance based on multistakeholder dialogue.

Although there is no explicit legislation or regulation governing artificial intelligence in employment, the European Union (EU) and its Member States are currently implementing several AI-related policies and practices. The European Commission's 2020 Data Strategy and White Paper on Artificial Intelligence both propose significant ideas with implications for the use of AI in the workforce, emphasizing people above technology. The EU Directive 2002/14EC requires that employees be informed about changes and impacts in the workplace by technological innovation and the introduction of AI technologies (Deshpande, 2021). The European Union's General Data Protection Regulation (GDPR) gives individuals a right to meaningful human involvement in significant decisions that impact them, allowing them to opt-out of entirely automated decision-making in the workplace. Article 22 of the GDPR guarantees that individuals have the right not to be subject to decisions based primarily on automated processing and Article 88 is primarily aimed at data protection in the workplace, allowing member states to establish more precise measures to protect employees' personal data (OECD, 2023). AI is subject to various regulations, including intellectual property, data protection, antitrust, financial regulation, product responsibility, and consumer protection laws. However, due to increasing concerns, governments are now creating new regulations specifically for AI. The EU is currently developing the world's first AI-specific legislation called the AI Act, which is expected to come into effect in 2026. The legislation will set standards for openness and fairness, accountability, and guidelines for training, validation, and testing data (Cissé & Casey, 2023).

1.5. AI in Human Resource Management and Development

In the ever-evolving environment of modern business, the incorporation of AI has proven to be a revolutionary force that is changing traditional methods in various industries. Human resource management and development is one of the areas experiencing a significant paradigm shift. Integrating AI technology into Human Resources (HR) has helped in a new era of efficiency, creativity, and strategic workforce optimization. This collaboration not only streamlines

traditional HR operations but also provides new insights that drive a proactive approach to talent acquisition, employee engagement, and career development.

Artificial Intelligence is transforming the recruiting environment, with AI-powered technologies assisting businesses in finding and hiring the most talented individuals more quickly, effectively, and precisely (Henkin, 2023). AI is a technology that can use data throughout the candidate journey to deliver intelligent workflows that help nurture the appropriate applicants more efficiently (Laurano, 2022). There are some areas in talent acquisition where AI is being used or will be used soon. Firstly, NLP AI technology is being used in the sourcing stage (Coombs et al., 2021) to help write more engaging and truthful job descriptions and job campaigns to target audiences (Henkin, 2023). AI algorithmic prescreening technology (Yin et al., 2018) can assist in qualifying and ranking candidates, understanding their resumes and skills, and experience. In this recruitment phase, AI technologies can intelligently interact with candidates, answering all their queries and worries without having been expressly programmed with the solutions (Henkin, 2023). AI can help assess skills and abilities by not only reproducing memorized job descriptions but also recognizing requirements based on job need analysis and historical successes of job holders. AI-powered technologies assess and extract skills to determine which skills are most relevant for a particular position. These algorithms go beyond simple keyword matching. They can use context to infer talents that are not clearly stated in resumes. Semantic extraction of skills reduces the opportunities lost through keyword searches and leads to a more complete and fairer selection process for recruiters and applicants (David, 2023). In the selection/interview phase, AI-based automated assessments, AI-based interviews, and NLP can help HR managers to conduct tests and interviews in multiple languages (Hewage, 2023). In the candidate communication phase, automated candidate communication tools such as status updates and chatbots can improve the candidate experience, deliver interview feedback, generate post-interview assessment reports (Hewage, 2023), and provide onboarding inputs before their arrival. AI in the talent acquisition process can help analyze the success of the recruitment process and forecast demand based on historical data and economic performance as well. (Henkin, 2023).

Employees are a company's most valuable resource, as they form the basis for a successful and sustainable business. Their performance has an impact on the overall development of the company. For this reason, companies have started to invest more in the training and development of their employees. This is an important process, both for the people, as it prepares them for future positions of greater responsibility, and for the companies, as it is one of the

most important tactics for their success. Studies show that companies that invest in training experience higher sales and gross profits per employee (Ihsan, 2023).

AI can significantly increase the effectiveness of employee training. AI technology can be used to create personalized learning experiences for its workers (Shao & Shi, 2020). AI makes it easier to design clear training material and procedures for employees. It can extract information from vast amounts of employee data and analyze individual learning patterns, complemented by in-depth research that enables the development of individualized learning initiatives based on their needs and preferences. Adaptive learning systems use artificial intelligence to dynamically adjust the difficulty of content based on learner performance. Learning insights can contribute to a more comprehensive understanding of learner behavior, which improves quantitative capability. Organizations will use the insights to create smarter and wisely placed material that is adaptable, intelligent, and responsive to a learner's unique journey. Consequently, AI would change the way learning materials are distributed and managed, leading to better alignment with business goals (Porwal & Mehta, 2021). With the help of AI technologies, learning and development (L&D) experts can provide other learning methods, such as online learning, which reduces time and space constraints and makes it easier for trainers to access all kinds of resources outside the office, improving the training output and saving companies funds (Shao & Shi, 2020). For more complex training material, such as certification, it can also collaborate with human colleagues, with the AI automating certain parts of the training and humans providing unique feedback where needed. Virtual reality (VR) technology is also used to teach staff in a simulation format. It enables an intensive experience and at the same time increases the effectiveness and practicality of the training. The simulations can be customized according to individual performance, enabling targeted improvement of skills (Porwal & Mehta, 2021). AI can provide real-time feedback on performance and assessment so that learners can better understand their strengths and areas for improvement. Automated assessments using AI algorithms can evaluate a learner's progress and adjust the training course accordingly.

1.6. AI and Decision-making in the Workplace

As organizations navigate the challenges of a changing business environment, the strategic use of AI algorithms is proving to be a revolutionary tool that provides exceptional insight and efficiency in management decision-making. This section looks at the unique role of AI in management decision-making and shows how algorithms are being used to inform, enhance, and in some cases automate key decisions that steer an organization.

In general, AI systems may be used to help or replace human decision-makers (Duan et al., 2019). AI can improve decision-making through data analysis, enabling companies to use data and make better decisions. AI can apply machine learning algorithms to recognize patterns, relationships, and anomalies in large data sets that traditional analytical approaches may miss. This analytical capability allows managers to make decisions based on a detailed understanding of the problem, rather than relying on intuition alone. Automated decision support systems not only speed up decision-making but also reduce the potential for error that occurs with manual processes (Prasanth et al., 2023). Another area in which artificial intelligence is used is risk assessment. Risk assessment is often based on research and historical data. AI helps with this process by reviewing vast amounts of previously collected data to identify hidden threats that may have gone unnoticed. AI models in finance, for example, can detect early warning signs of an economic downturn by analyzing minute differences in a range of economic factors. Strategic planning involving AI improves the accuracy of decisions and enables companies to take advantage of new opportunities. As mentioned earlier, retailers can use artificial intelligence to forecast demand for consumer goods and use this information to make decisions about inventory levels and supply chains. By evaluating business trends, customer behavior, and competitive strategies, the predictive potential of intelligence can provide insights that inform strategic decisions (Charitha & Hemaraju, 2023).

Although AI capabilities help humans manage complexity through machine's better analytical approach, the role of human decision-makers and their intuition in managing uncertainty, especially the ambiguity of decisions, remains undeniable. Machines rely on humans when unconscious decision heuristics are required to analyze and facilitate the consequences of decisions (Jarrahi, 2018).

CHAPTER 2

Theoretical Approach

Considering the literature review carried out through the previous chapter, and the several insights from different authors on artificial intelligence and its impact on the labor market and work, it was possible to derive three research questions. Following the purpose of this work, I consider to be relevant to focus on the effect of AI in employment dynamics, including opportunities, creation, and displacement of jobs, in job roles, such as the ones that have emerged with AI integration and the ones that have been eliminated by it, as well as the influence on the skills requirement and what can be done to prepare and train employees.

Following the insights provided by the authors and through the starting question, it is possible to divide it into three different questions, each focusing on one of the topics on which this study is based.

It is a fact that automation is gradually affecting the dynamics of work and employment, as well as professions at different levels on a global scale, which led me to the first research question:

RQ1) How does the integration of Artificial Intelligence affect employment dynamics, including opportunities, creation, and displacement of jobs in different sectors?

As technological advances are integrated into the various existing sectors of activity, new opportunities will arise and new jobs will be created, but at the same time as new jobs are created, others will be negatively affected and may even lead to their disappearance. On the other hand, people who are less prepared and less qualified will be the most affected and will also benefit the least from the positive effects of AI (Strack et al., 2021). The integration of AI into work processes will inevitably have negative impacts in terms of layoffs and the extinction of jobs that can in fact be fully automated and where the human role is not necessary. According to the McKinsey Global Institute (2018), an estimated 375 million workers (14% of the global workforce) may need to switch to new occupational categories by 2030 as AI and machine learning automate many existing jobs. Additionally, they project that AI and machine learning could potentially create 2.3 million new jobs by 2025.

However, we are seeing and will continue to see more and more collaboration between AI and humans in the workplace and in the tasks they have to carry out (Finquelievich, 2019). This leads to the second research question:

RQ2) How will Artificial Intelligence integration impact traditional job roles, and what new roles will emerge as a result?

The introduction of AI is intended to replace routine and mechanical tasks and jobs with AI and its technologies, freeing humans for tasks that require creativity and critical thinking, i.e., tasks that require so-called "soft skills," skills that only humans possess (Rodrik & Stantcheva, 2021). On the other hand, the integration of AI into work and the labor market will lead to the emergence of other new jobs (OECD, 2023). The fact that new jobs and functions will be created as a result of the integration of artificial intelligence technologies into the labor market means that other types of skills and qualifications will be indispensable (Strack et al., 2021), and it is from this line of thinking that my third and final research question arises:

RQ3) How is the labor market's demand for skills and qualifications influenced by AI?

CHAPTER 3

Methodology

3.1. Research Method

The primary goal of this research is to gain insight into how the integration of Artificial Intelligence into the labor market and work affects and will affect job opportunities, job roles, and working skills. This research has an exploratory dimension that arises from the dynamic nature of AI technologies, the uncertain impact on labor markets, the complex interactions involved, the need for strategies to respond to these changes, and the ethical and social implications that arise from technological advances in the labor market and work. Exploring these dimensions is crucial to understanding the transformative potential of AI in shaping the future of work.

In light of the above, the research method chosen was a qualitative study. Qualitative research is a type of research that allows us to explore and provide more concrete views and opinions on real issues and is extremely useful for investigating complex issues that are difficult to assess in quantitative research, such as experiences and beliefs. Qualitative research essentially asks open-ended questions whose answers cannot be easily translated into numbers, such as "how" and "why" (Tenny et al., 2022). It is important and indispensable to stress that the conclusions of this research should be read carefully, and it is essential to bear in mind that it is based on a relatively small sample, which means that it is not possible to generalize. This is presented as one of the main limitations of this research, along with the gap in the literature review, although both limitations were already foreseen at the beginning of this study. We know that different companies and employees react differently to phenomena that influence their actions, and the phenomenon of integrating Artificial Intelligence into work and the labor market is no exception. We must look at the conclusions of this study in a particular way, considering the influence on different sectors and different companies, and we can not draw a conclusion that is transversal and general to all industries and companies because, as mentioned above, this is a subject that is under study and development, so it is premature to draw general final conclusions about it.

In Table 2, one can discern the correlation between the research objectives, the theoretical research questions derived from the preceding literature review chapter, and their respective connection to the literature review and the employed data analysis method.

Table 2 – Relationship between the objectives, research questions and literature review

Objectives	Research questions	Literature review
(O1) Understand how the integration of AI will impact job dynamics, including job opportunities, job creation and job displacement across different sector	(RQ1) How does the integration of Artificial Intelligence affect employment dynamics, including opportunities, creation, and displacement of jobs in different sectors?	OECD, (2023); Charles et al., (2022); Minevich, (2023); Gao & Feng, (2023); PwC, (2017); Acemoglu and Restrepo (2019); WEF, (2023); Karangutkar (2023); Rayhan, (2023); Larasati, (2023); Diedrich et al., (2023), Daniel, (2023).
(O2) Understand how AI technologies will change job roles	(RQ2) How will artificial intelligence integration impact traditional job roles, and what new roles will emerge as a result?	OECD, (2023); Acemoglu and Restrepo (2019); Charles et al., (2022), Daniel, (2023).
(O3) Understand how AI influences the skills requirement in the labor market	(RQ3) How is the demand for skills and qualifications in the labor market influenced by AI?	OECD, (2023); Lane et al., (2023); Manca, (2023); WEF, (2023); Moore et al., (2020); Sawant et al., (2022); Ekuma, (2023); Li, (2023); Morandini, (2023), Bosler, (2021)

Source: Self-elaborated

The present investigation consisted of four phases. The first phase involved conducting a thorough review of relevant literature and processing existing information on the topics. The second phase focused on applying the theoretical framework to real-life observations to ensure the highest confidence level in the results. The third phase involved fieldwork and data

collection through interviews, and finally, the fourth phase involved the qualitative analysis of the interview data.

3.1.1 Data collection method

Considering the primary research goal, it was decided the semi-structured interview technique to conduct qualitative research. This method involved using open-ended questions based on a pre-established interview script. The questions were organized in a specific order, with some being closed and direct, ensuring that all participants could answer the same questions, and others being open-ended, allowing interviewees to express their thoughts more freely.

One of the advantages of qualitative methods in exploratory research is that open-ended questions allow participants to respond in their own words, rather than being limited by predetermined choices often found in quantitative methods. (Mack et al., 2005). The option to carry out semi-structured interviews was based on the intention of not restricting the participants to a script that could direct their responses, thus seeking to obtain more elaborate answers that provide access to different types of information that would not be acquired otherwise. The research adopted a pragmatic or inductive approach, which implies that the focus is not on obtaining absolute conclusions, but rather on analyzing a set of phenomena and facts that allow comparisons to be made and possible correlations between them to be explored.

According to Bekele & Ago (2022), the appropriate number of interviews needed to conduct a study can vary based on several factors, including the research focus, the specific research questions, available resources and time, institutional committee requirements, the input of the epistemic community in which the researcher is situated, the characteristics of the chosen participant group, the field of inquiry, the researcher's experience with qualitative research, and other relevant considerations.

The financial sector was chosen for interviews and analysis due to its economic significance and the increasing impact of technology, particularly artificial intelligence. This sector is dynamic, with automation and data analysis revolutionizing traditional processes such as credit approval and risk management. Additionally, shifting consumer expectations and the need for efficiency make this field an intriguing area to explore the evolving skills of professionals. As mentioned in the Literature review chapter, the integration of AI not only transforms operations but also redefines the required roles and skills, underscoring the importance of understanding these changes to anticipate the future of work in finance.

The original aim of this study was to conduct interviews with six companies from the Finance sector. However, unforeseen challenges, particularly the lack of cooperation from some

companies, made it impossible to achieve the intended number of interviews. Several companies either declined to participate or were unresponsive, leading to a necessary revision of the study's scope. Consequently, the analysis was focused on the views of three different finance companies: one from Portugal, one from Spain, and the last one from Italy, with each one of them being successfully conducted. While these interviews provided valuable insights, the reduction in the number of sectors represents a significant limitation of the study. This limitation may have affected the breadth of the findings, as the exclusion of some companies potentially limits the generalizability of the results. The insights gained from the excluded companies might have provided a more nuanced understanding of the broader implications of AI integration across the financial sector. Nonetheless, the chosen companies are highly relevant and offer a meaningful exploration of the research questions within the context of their specific challenges and opportunities.

Based on the stated objectives and the three research questions, the purpose of conducting interviews is to investigate how the integration of AI has impacted employment, job creation, and job displacement across the financial sector. The interviews aim to determine which new job roles have emerged and which ones have become redundant due to the integration of AI. Additionally, the interviews seek to comprehend how AI has affected the skills of workers, which new skills have become necessary, and which skills have become outdated and the interviews aim to explore how workers adapt and evolve their skills in response to the changes brought about by AI.

3.1.2 Interview's procedure

In the research, a crucial phase involved meticulously planning and developing the interview framework. The interview script was organized into four distinct sections. The first section, comprising three questions, aimed to delve into the impact of AI on job dynamics, particularly focusing on AI integration and its effects on employment. The second section, consisting of two questions, was centered on understanding the changes in job roles brought about by AI. The third section, also comprising two questions, sought to examine the influence of AI on skill requirements, specifically addressing how workers are adapting to changing skill demands and the issue of skill obsolescence. The last section aimed to explore the overall reflections and opinions on how companies foresee AI technologies changing the overall skills landscape in the labor market.

The participants were contacted either through corporate email or LinkedIn, and the interviews were carried out using platforms such as Zoom or Microsoft Teams. All online

interviews were audio-recorded, with a commitment to maintaining strict confidentiality of personal data. None of the interviews lasted longer than 20 minutes, and they were conducted in both Portuguese and English to accommodate the diverse nationalities of the interviewees and the companies involved. At the start of each interview, the research objectives were clearly outlined, emphasizing the importance of including companies at various stages of AI adoption, including those with minimal progress.

3.2 Sample characterization

This study utilized a probability sample, carefully selecting participants from a targeted population to ensure a comprehensive representation of the sector most likely to be affected by the integration of AI. As indicated in several studies, including those by Espina-Romero et al. (2023), this population includes organizations within industries expected to undergo significant transformation due to technological advancements. Initially, the goal was to interview six different companies to gather a diverse range of insights. However, the final sample comprised only three companies that were willing to share their experiences regarding the impact of AI integration on both their sector and their specific business operations. Among these, one company is based in Portugal, another in Spain, and the third in Italy, offering valuable perspectives on the challenges and opportunities presented by AI. This limited yet insightful sample provided valuable insights into the topic.

CHAPTER 4

Data Analysis and Discussion

This section presents a comprehensive analysis of the data collected from the interviews, connecting it to the key concepts and research discussed in Chapter 1. The main focus of this analysis is to examine the influence of integrating Artificial Intelligence on the labor market, employment dynamics, and job skills. It will specifically investigate the effects of AI on the finance sector of various organizations. The goal of this analysis is to thoroughly explore how AI has affected employment within these organizations, including the creation of new job opportunities and the elimination or displacement of existing roles. Additionally, the analysis will explore how AI has impacted the skills required by workers, identifying which new skills are now essential to adapt to emerging technologies and which skills have become obsolete due to automation and technological innovation. Furthermore, the study will evaluate the ability of

workers to adapt to these changes, including how they have developed and updated their skills in response to AI-driven transformations. The objective is not only to understand the immediate effects of AI but also to forecast future trends and assess how this sector may evolve as technology continues to shape the labor market and professional requirements.

4.1 Finance Sector

A. Impact on Job Dynamics

(QA1) How has the integration of AI impacted employment dynamics in your sector?
(C1) “Before AI, banks were already working with complex mathematical models and searching for patterns in customer data, mainly for credit processes. They have been keeping up with developments with new tools and creating data lakes from which to apply risk, security, behavioral, marketing and compliance models. The big impact has been in identifying patterns more quickly, but personally, I think we're still at the beginning of being able to work with AI.”.
(C2) “In many areas and functions that can be automated, or algorithms can identify patterns and decision support processes more quickly and effectively, deciding or supporting better decisions. For example, in credit decision and allocation processes.”.
(C3) “Manual work has been replaced by automation and higher efficiency in data analysis, customer support and marketing.”.

The responses from all three companies underscore the significant impact of AI on the employment landscape within the sector, particularly in terms of automation and efficiency. Company 1 highlights that even prior to the advent of AI, it had been utilizing complex models to analyze customer data, particularly in credit processes. The company has found that with the introduction of AI, tools and data lakes have facilitated the application of these models in areas such as risk and marketing. Nonetheless, the company believes that the sector is still in the early stages of fully integrating AI. Company 2 emphasizes that AI has expedited the automation of various functions and enhanced decision-making support, particularly in the credit granting process. Algorithms have enabled quicker and more effective decision-making, optimizing the allocation of resources. Lastly, Company 3 focuses on the direct impact of AI in replacing manual labor with automation, resulting in greater efficiency in data analysis, customer service, and marketing. In summary, all the companies acknowledge that AI is driving increased automation and efficiency, with a positive impact on replacing manual tasks and expediting decision-making processes. However, the level of maturity in AI integration varies among companies.

(QA2) Can you share any specific examples of how AI has influenced job opportunities?

(C1) “Data Scientists have become decision validators. Chatbots are now able to respond to messages or voice messages on a first level, but they still don't have the capacity to respond to more complex issues. Fraud detection models for accounts and cards are constantly being introduced, with people dedicated to validating self-learning models on the one hand, and a greater flow of communication with customers on the other (calling to confirm non-standard movements, for example). There has been a growth in IT teams for AI-related functions.
These changes are beginning to have an impact on hiring patterns, more than ever in IT AI is something real and important, data is critical for good bank management and self-service has been on the rise in digital channels and human support has been reduced, but this already started with the internet before AI, I personally believe that there will be reductions in human resources in administrative functions.”.

(C2) “Allowing us to increase our efficiency in the credit granting business, growing the business and thereby increasing hiring needs in the areas of customer service, product development, analytics and technology.”.

(C3) “Use of AI tools for: Data Analysis – predictive analysis; Customer support – chatbots. Marketing – copywriting.”.

The companies' replies reveal how the integration of AI has influenced job opportunities, especially with the creation of new roles and the automation of traditional functions. Company 1 highlights the growing demand for data scientists, who now act as decision validators, as well as an increase in IT teams focused on AI. Automation with chatbots and fraud detection models has reduced the need for human support in simple tasks, but there is an increase in validation functions and customer interaction. The company believes that there will be a reduction in human resources in administrative functions as automation progresses. Company 2 points out that AI has enabled greater efficiency in the credit granting sector, which has resulted in business growth and, consequently, the expansion of hiring in areas such as customer service, product development, analysis and technology. Company 3 mentions the use of AI in functions such as predictive data analysis, customer support with chatbots and marketing automation, but does not directly detail the impact on job opportunities. In short, AI has generated new opportunities, especially in areas of IT and data science, while automating simpler functions. Some companies foresee job cuts in administrative tasks, while others see growth in sectors such as customer service and technology.

(QA3) Have there been instances where job roles have become obsolete due to AI integration?
(C1) “In the financial sector there has been a reduction in the workforce due to the evolution of technology, the AI implemented does not yet support Generative AI and this will be significant, as it allows real-time conversations with clients and the execution of functions.”.
(C2) “I wouldn't say obsolete, but substantially improved, requiring them to evolve or find other resource profiles. In the areas of repetitive activities that can be accelerated in order to improve service processes, it is clear that in the medium term (5-10 years) there will be functions that will tend to see the number of resources greatly reduced. Examples: human telephone answering, service desks (banks, retailers, etc.).”.
(C3) “Copywriters, I’d say. Most AI tools help marketers write copy/content.”.

The responses from the companies address the issue of job obsolescence resulting from the integration of AI, presenting varied perspectives on how technology is reshaping the labor market. Company 1 acknowledges that the financial sector has already witnessed a decrease in the workforce due to technological advancements. Although current AI does not utilize Generative AI for real-time customer interactions, the company acknowledges the significant impact this evolution will have on the sector's efficiency. On the other hand, Company 2 takes a more optimistic stance, arguing that functions have not become obsolete, but rather significantly improved. The company highlights that repetitive tasks, which can be expedited by AI, will lead to a reduction in resources for functions like telephone answering and support services, especially over a 5-10 year timeframe. Company 3 mentions the obsolescence of roles such as editors, as AI tools are streamlining content creation for marketing, partially replacing these professionals. In conclusion, the companies concur that AI is reshaping the nature of job functions. While some roles are becoming obsolete or decreasing in number, others are evolving and demanding new skills, underscoring the necessity for adaptation in the job market.

B. Change in Job Roles

(QB1) Can you provide examples of job positions created by implementing AI?
(C1) “For the time being AI has been implemented with external specialists while we are creating internal knowledge, there are people who are being reclassified with training in the area, and with RPA processes when there are retirements no new resources are admitted.”.
(C2) “Integration of elements for the areas of risk analysis models, credit decisions and customer retention. In IT areas for the implementation and management of data platforms.”.

(C3) “Customer Support Manager – they leverage AI (for example, chatbots) to improve user acquisition and retention.”.

The answers from the companies illustrate how the integration of AI is leading to the emergence of new job opportunities and the transformation of existing roles. Company 1 highlights that external experts initially introduced AI, but the organization is now focused on fostering internal expertise. Employees are undergoing reclassification and training in AI, particularly in automation processes (RPA), with no new hires being made upon retirements. Company 2 mentions the establishment of roles centered on risk analysis, credit decisions, customer retention, and IT positions for implementing and managing data platforms, indicating a growing demand for specialized skills in technology and data analysis. Company 3 highlights the creation of positions like Customer Support Manager, which utilizes AI tools such as chatbots to enhance user acquisition and retention, showcasing a practical application of AI in improving customer service. In essence, companies acknowledge that AI implementation is generating new roles and necessitating the retraining of employees, especially in data analysis and customer support. While there is a focus on cultivating internal expertise, the requirement for technology specialists to oversee the new demands is also apparent.

(QB2) What factors contribute to certain roles becoming obsolete with AI integration?
(C1) “Administrative functions will be the most affected; paper-based order entry functions (for example, a form signed in person at a branch) will be replaced by OCR, RPA and AI for validating business rules. Legal support functions, such as lawyers who draw up contracts for specific operations, may also become redundant and for the more common functions of queries and operations, AI via voice will increasingly become a reality.”.
(C2) “The fact that they are easily replicable and do not add intrinsic value to the client.”.
(C3) “Automation of repetitive tasks and the ability of AI to analyze large data sets more efficiently than humans.”.

The responses from the companies highlight key factors contributing to the obsolescence of certain roles with the integration of AI. They emphasize automation and efficiency as the primary drivers of this shift. Company 1 specifically mentions that administrative functions, such as paper-based order entry, are among the most affected by these changes. Technologies like OCR (Optical Character Recognition), RPA, and AI are taking over these tasks, along with legal functions like contract drafting. The automation of queries and operations through voice

assistants is also expected to become increasingly prevalent. Company 2 adds that functions that are easily replicable and do not significantly contribute to the customer experience are most likely to become obsolete. This underscores the importance of functions that add substantial value to the customer. Company 3 further supports this analysis by highlighting the automation of repetitive tasks and AI's superior ability to analyze large datasets efficiently, rendering certain functions unnecessary. In summary, the obsolescence of certain functions is driven by the automation of administrative and repetitive tasks, the lack of added value for the customer, and AI's superior efficiency in data analysis. These trends translate a significant transformation in traditional roles, necessitating professionals to adapt to a rapidly changing environment.

C. Influence on Skills Requirement

(QC1) How do you foresee AI technologies changing the overall skills landscape in the labor market?

(C1) “They will become increasingly relevant and critical in the recruitment of some jobs. I believe that in the future AI will be integrated to provide a personalized service, but the path is complex and difficult as the European Union is introducing the AI directive which, for example, aims to block the use of AI for facial patterns to be used for identification, but for a bank this would be the most obvious solution to validate a customer from a distance. On the other hand, AI is highly developed in China, which may not be as spectacular as OpenIA's ChatGPT and Google's Gemini, but is much more complex and integrated into the daily lives of its citizens, for example in the integrated marketplace that is WeChat (the Chinese WhatsApp).”.

(C2) “In a very short space of time, they will be a fundamental aspect of recruitment processes, almost as basic a skill as mastering personal productivity tools (powerpoint, excel...) or knowing SQL, or speaking English.”.

(C3) “More demand for data analysts/scientists, machine learning to better manage AI tools, whilst there’s a need for more creativity and strategic planning.”.

The replies from the companies indicate a shared perspective on the impact of AI technologies on the evolving job market landscape. Company 1 underscores the increasing importance of AI-related skills in the hiring process. While acknowledging the promising integration of AI for personalized services, the company also highlights potential regulatory challenges, such as the new European Union directive, which may complicate implementation. Additionally, it draws attention to the advanced development of AI in China, emphasizing its deep integration

into daily life. Company 2 foresees AI skills becoming indispensable in recruitment processes, comparing their significance to proficiency in productivity tools like Excel and PowerPoint, as well as language skills such as English. This projection signals a substantial shift in the evaluation of skills within the market. Finally, Company 3 stresses the rising demand for data analysts, data scientists, and machine learning skills. Furthermore, it underscores the necessity of creativity and strategic planning, indicating the ongoing value placed on interpersonal and critical thinking skills. In essence, the consensus among the companies is that AI is reshaping the essential skill set required in the job market. Proficiency in AI, data analysis, and creativity is emerging as foundational, reflecting a transformation in recruitment expectations and the desired professional profile.

(QC2) How do employees in your industry adapt to changing skill requirements brought about by AI?
(C1) “Lots of training and trial and error in using it. In a bank with thousands of people, I'm still not clear what the impact will be at all levels of the function. On the other hand, although its potential is clear, there are still no cases of significant cost savings that make it clear what can be transferred to AI, so the scope for training is still very limited.”.
(C2) “A lot of training and involving specialists in the subject, creating mixed teams to retain know-how and explore new AI opportunities.”.
(C3) “Through trainings or workshops focused on AI.”.

The responses from the companies illustrate how employees are adjusting to the new skill demands driven by AI. Company 1 acknowledges that adaptation involves extensive training and trial and error, but there is still uncertainty regarding AI's impact at various levels. The absence of clear cost-saving cases limits training opportunities. Company 2 underscores the significance of engaging specialists and establishing diverse teams to retain expertise and explore new AI-related prospects. Company 3 highlights that adaptation occurs through AI-focused training and workshops. In conclusion, companies acknowledge that adapting necessitates investing in training and collaboration, with some proactively preparing their teams.

D. Overall Reflection

(QD1) How do you foresee the trajectory of AI integration influencing job dynamics in the future?

(C1) “Potentially it could be transformative, but it's still in its infancy, as we're still improving the models that predict the best words in creating a response. On the other hand, the capacity for self-learning and mathematical modeling is impressive, but I still see a lot of false positives. In other words, it's going to be socially transformative and could become a new revolution, not in industry, but in services. It could free up capacity for manual labor that is currently in short supply, and that would transform work patterns and the economy.”.

(C2) “I often say that it will be as disruptive as the introduction of the internet, only much faster.”.

(C3) “The demand for AI-savvy professionals will grow, and companies will need to focus on continuous skill development to keep pace with technological advancements.”.

The feedback from companies regarding the integration of AI indicates an anticipation of substantial transformation in future work dynamics. Company 1 believes that AI has the potential to be transformative, particularly in the service sector, despite still being in its early stages of development. The company acknowledges that while AI's self-learning capabilities and mathematical modeling are impressive, challenges such as false positives still need to be addressed. This advancement has the potential to reduce manual labor and reshape work patterns and the economy. Company 2 draws a parallel between the integration of AI and the transformative impact of the internet, forecasting a similarly disruptive influence, but at a faster pace. This implies that changes may occur rapidly and affect multiple industries. Company 3 emphasizes the increasing demand for professionals with AI skills, prompting companies to prioritize ongoing skill development to keep pace with technological advancements. In summary, companies view the integration of AI as a transformative force capable of fundamentally altering work dynamics. Despite the challenges, there is an expectation of swift and significant change, with a growing emphasis on training skilled professionals.

CHAPTER 5

Conclusion

This research delved into the opportunities and challenges posed by Artificial Intelligence for the future of the job market, with a specific emphasis on the financial sector. The literature review unveiled a growing consensus regarding the transformative influence of AI on work processes, encompassing the automation of routine tasks and the emergence of new roles reliant on analytical and technological skills. However, it also raised queries about the impact of this transformation on employment, particularly concerning job replacement, changes in required qualifications, and the necessity to retrain the workforce. The interviews validated many of the insights discussed in the literature while offering a practical and specific perspective on the financial sector. The interviewed companies noted that while AI has the potential to streamline operations and enhance efficiency, it also presents challenges in terms of integration with human processes, organizational adaptation, and ongoing skills development.

One key point that emerged from both the literature and the interviews is the idea that AI, while disruptive, presents an opportunity to revamp work processes by creating new roles and functions, particularly in fields like data analysis, AI governance, and cybersecurity. The companies interviewed emphasized that in the financial sector, AI has proven most effective in streamlining repetitive and transactional tasks such as credit analysis and fraud detection, freeing up employees to focus on more strategic and value-added activities. However, both sources highlighted the significant shift in skill requirements that this transition necessitates. Companies emphasized the urgent need to support employee retraining, particularly in technology and data analysis, to fully harness the potential of AI adoption. This issue is extensively discussed in the literature, which underscores the importance of ongoing education and lifelong learning as essential measures to mitigate the impact of automation on employment.

One of the challenges highlighted in both the literature and the interviews is the potential impact of AI on employment. Although companies acknowledge that AI may result in the displacement of certain jobs, there is a general agreement that new roles will arise, particularly in the fields of AI system development and maintenance. Nonetheless, the pace of this transition and companies' capacity to accommodate these new needs are still uncertain and a cause for concern in the foreseeable future.

AI is a powerful tool in the financial sector, capable of revolutionizing work processes and creating new opportunities for growth and innovation. However, its adoption comes with challenges, particularly in talent management and the cultural transformation of companies. The future of work in the era of AI will be shaped by companies' capacity to navigate these changes effectively and responsibly, fostering innovation while prioritizing the well-being of their employees and aligning with new market demands.

This research contributes to the existing literature by offering a comprehensive analysis of how companies within the financial sector are addressing the challenges and opportunities presented by AI. By comparing theoretical expectations with the practical realities identified in interviews, this study provides valuable insights into the best practices and obstacles encountered by organizations in their digital transformation journey. Drawing from the findings, several recommendations can be proposed for companies seeking to effectively integrate AI: continuous upskilling of the workforce is essential, necessitating the development of AI training programs to prepare employees for the evolving requirements; change management is crucial, requiring organizations to implement robust strategies to ensure employee acceptance and adaptation to new technologies while fostering innovation; and ethical considerations must not be overlooked, with companies needing to strike a balance between AI-driven innovation and ethical and regulatory concerns, ensuring the responsible and transparent use of these technologies.

5.1. Limitations

The investigation relied on existing literature and primary data gathered from interviews. A key limitation of this research pertains to the small sample size of the interviewees. While this study aligned with prior research, caution should be exercised when extending the findings from the interview data. It is important to emphasize that this is an exploratory study, and due to the limited sample size, the findings should not be broadly generalized or considered representative.

5.2. Suggestions for Future Research

The primary recommendation is to address the main limitation of the study by expanding the sample size significantly. Additionally, it would be valuable to explore this topic in other industry sectors to investigate potential variations. Lastly, it is important to consider the concerns raised by some interviewees who argued that artificial intelligence is not yet at a stage

of complete independence and integration, and its major impacts in work and labour market will be more apparent in the future.

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Anexes

Annex A - Interview Script

A. Impact on Job Dynamics

(QA1) How has the integration of AI impacted employment dynamics in your sector?
(QA2) Can you share any specific examples of how AI has influenced job opportunities?
(QA3) Have there been instances where job roles have become obsolete due to AI integration?

B. Change in Job Roles

(QB1) Can you provide examples of job positions created by implementing AI?
(QB2) What factors contribute to certain roles becoming obsolete with AI integration?

C. Influence on Skills Requirement

(QC1) How do you foresee AI technologies changing the overall skills landscape in the labor market?
(QC2) How do employees in your industry adapt to changing skill requirements brought about by AI?

D. Overall Reflection

(QD1) How do you foresee the trajectory of AI integration influencing job dynamics in the future?