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THE IMPACT OF NEW TECHNOLOGIES IN THE PROFILES DEMANDED IN THE SPANISH LABOR MARKET: AMAZON

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Resumen

En la actualidad, el rápido avance de la tecnología está transformando la forma en que nos comunicamos, nos relacionamos y trabajamos. Factores claves como la automatización, el machine learning y la inteligencia artificial contribuyen drásticamente a la mejora de la eficiencia y productividad desempeñadas en el mundo de la empresa. Esto está teniendo un impacto significativo en el mercado laboral, creando cierta inquietud tanto en términos de la evolución de los empleos disponibles como de los perfiles profesionales que son demandados por las empresas. En este trabajo, examinaremos detalladamente cómo estas nuevas tecnologías están afectando la evolución del empleo y de los perfiles demandados en el mercado laboral español en Amazon.

Abstract

Currently, the rapid advancement of technology is transforming the way we communicate, relate, and work. Key factors such as automation, machine learning, and artificial intelligence are significantly contributing to improving the efficiency and productivity within the business world. This is having a significant impact on the labor market, causing some concern regarding the evolution of available jobs and the professional profiles that are being demanded by companies. In this paper, we will examine in detail how these new technologies are affecting the evolution of employment and the professional profiles that are in demand in the Spanish labor market at Amazon.

Palabras clave

Tecnología, inteligencia artificial, machine learning, automatización, empleo, habilidades

Keywords

Technology, artificial intelligence, machine learning, automation, employment, skills

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1. Introduction

Nowadays we live in a society overwhelmed by the increasing presence of technologies and their full integration into the most critical and ordinary aspects of our daily lives. Indeed, as part of the so famously known Generation Z, we are the first generation to have been born and surrounded with the presence of these technologies as to a point where we have become dependent on their use and functionality on our society. In other words, we could say that we have fully implemented these technologies into our society as to blend in with our habbits, our work or any kind of activity that we wish to fulfill as to make our lives simpler, easier and less painful. And so, what are exactly these new technologies, what do they represent in our society and what will we learn from them as to guarantee their success in the future?

Well, in a few words, technology can be defined as the set of tools and systems designed to facilitate and make our lives better, as well as to solve complex problems and challenges that we may face. Indeed, since the creation of the wheel thousands of years ago right up to modern technology, humans have used technology as to benefit from an easier and more pragmatic way of life. Furthermore, by allowing and bringing to life the creation of new machines, devices and successful systems technology has completely revolutionized the way in which we work, travel, communicate and relate. As a matter of fact, the constant evolution in technology has led to new ways of thinking, innovation and progress and has ultimately radically changed our way of interacting within ourselves and our community. Needless to say, its crystal clear that technologies have had and will still have a tremendous impact in two specific parts intrinsic to our daily lives, which are communication and information. Allow me to elaborate further in detail by getting to the gist of this topic.

As we stand on the precipice of the fourth industrial revolution, technological advancements such as the Internet of Things (IoT), big data, cloud computing, robotization, machine learning and artificial intelligence (AI) have taken center stage, revolutionizing the world around us. Labor markets are not an exception to this wave of transformation; they are being fundamentally altered and reshaped by these technologies. Countries worldwide, including Spain, grapple with this digital disruption, aiming to balance the benefits of efficiency and innovation with the challenges posed by changing job demands.

In this milieu, our thesis titled "The Impact of New Technologies on the Profiles Demanded in the Spanish Labor Market: Amazon" delves into this intricate terrain, exploring the interplay between emerging technologies and the labor market in Spain. We will look particularly at Amazon, an international titan in the world of e-commerce and technology, to see how the company is navigating this change and what implications this could have on the wider labor market. This examination will include a study of the changing job profiles, the skills now in demand, and the strategies employed to manage this transition. In the following lines, we will inquire and carry out a thoughtful investigation on Amazon and how the use and impact of new technologies has managed to position this company as one of the leading e-commerce giants ahead of its competitors.

We will start off by analyzing the evolution of these new technologies and carrying out a detailed overview of the existing research on the impact of these new technologies in the labor market as well as an overview on the existing research on the profiles demanded in the Spanish labor market and Amazon in general. From then on, we´ll go in depth into describing these key technologies (IoT, big data, cloud computing, IA…) and their impact on the labor market from a general standpoint towards a more specific outlook. That is, we´ll go into details regarding the more general impacts on the labor market whilst transitioning to more specific impacts such as job creation, job displacement, skill gaps… Moving on, we will study the Spanish labor market, its status and trends, the impact of new technologies, the emerging and declining job profiles and the skills demanded by new job profiles, as well as a case study of Spanish companies adapting to technological change. Moreover, we will go through a case study on Amazon, its business model and reliance on technology, the impact of new technologies on job profiles within Amazon, its strategies for workforce adaptation and skills development as well as a case study of specific job profiles within Amazon. Lastly, we´ll go over some of the main challenges and opportunities regarding this topic by analyzing the skill gap problem, the role of education and continuous skill learning in this matter as well as the main public policies and institutional support to keep in mind.

Consequently, this thesis aims to solve the following objective by addressing the following research questions.

Research objectives and questions:

Course objective: Analyze the impact of new technologies on the profiles demanded in the Spanish labor market and the company Amazon.

Research questions:

1. What are the new technologies implemented at Amazon and how have they transformed the structure and processes of the organization?

2. What job profiles have emerged at Amazon as a result of the implementation of these new technologies?

3. What skills and competencies are required for these job profiles?

4. How has the implementation of these new technologies affected labor demand at Amazon?

5. How is Amazon's employee training and education being addressed to adapt to these technological changes?

6. What are the implications of the impact of new technologies in Amazon for the labor market and the training of workers?

In crafting our narrative, we aim to create an immersive exploration filled with a blend of relevant information and detailed analysis in order to appropriately replicate the intricate, complex, multi-layered reality of the labor market's evolution.

2. Literature Review

- *Definition and evolution of new technologies*

Technologies have been omnipresent in the world we live in today for a long period of time. Nowadays, the term "new technologies" refer to methods, systems, and devices which are the result of scientific knowledge being used for practical purposes" (Collins). On a more updated setting, we could refer to these "new technologies" as recent and ongoing technological advancements that are disrupting traditional operations, business models, and societal norms. Key examples of these include artificial intelligence (AI), machine learning (ML), Internet of Things (IoT), big data, and cloud computing, to name just a few. The journey of technological evolution has been a remarkable saga, spanning from the early rudimentary innovations to the dazzling scientific advancements of today. However, in order to adequately study the evolution of new technologies first we must analyze in depth the inception of our knowledge of technology. Hence, the seeds of technology were sown millions of years ago with the discovery of fire, and since then, it has developed into an enormous tree of progress, bearing the fruits of modern marvels like Artificial Intelligence (AI). With this narrative as our canvas, let's delve into the perplexities and burstiness in the historical trajectory of technological evolution.

First, let´s talk about one of the first monumental landmarks in technological development during the Lower Paleolithic Period, approximately 1.3 million years ago. Homo erectus, our human ancestor, mastered the art of making fire. The discovery of fire wasn't just a moment of serendipity; it was the origin of a trajectory that placed humans at the epicenter of Earth's species. Fire allowed for warmth in their habitats, defended them against wild animals, cooked their food, and ultimately sparked a cultural revolution. The control of fire marked a pivotal point in our technological voyage. Indeed, it demonstrated human's innate knack for manipulating the environment to their advantage, a characteristic that would go on to shape all future technological advancements. For instance, the Neolithic period, beginning around 12,000 years ago, bore witness to the genesis and creation of agriculture. It was a period of immense burstiness, with the rapid invention of several key technologies. From this point on, humans transitioned from a nomadic lifestyle to a settled agricultural community, leading to

the rise of civilization. This marked a shift in their relationship with nature as they transitioned and moved from passive adaptation to active modification of the environment. The domestication of plants and animals, the invention of pottery, and the development of weaving are just a few examples of this explosive burst of innovation. Fast forward to the Copper and Bronze Age around 6000 BC, humans began extracting and manipulating metals. The development of innovate techniques regarding metals such as metallurgy was a leap forward from the stone-based tools of the past. Copper and bronze tools were more durable and versatile, allowing for a simpler, nuanced interaction with the environment. This was the era when humans began to exert dominance over their surroundings, shaping the world to their preferences and needs. After this, the Iron Age followed, from around 1200 BC to 200 BC. Iron, which was considerably more abundant and harder than bronze, propelled humanity into a new era. Indeed, the arrival of iron smelting technology enabled us to create even more efficient, stronger, and cheaper tools and weapons. This age marks an important transition towards more complex civilizations, largely driven by these advancements in technology. Arriving at the historical crossroads of Mesopotamia around 800-1800 BC, humanity unlocked another significant technological achievement - the wheel. A seemingly simple invention, the wheel led to advancements in transport, agriculture, and later, industry. This period also saw the invention of writing, which paved the way for record-keeping, laws, and literature, thereby revolutionizing human communication. In addition to this, the age of the Roman Empire, from 25 BC to 390 AD, signified a critical turning point in the advancements we benefit from in today´s society. Indeed, this era was marked by tremendous technological burstiness, as Roman engineers and scientists introduced concrete, glass blowing, advanced building technologies, and much more. These advancements allowed for the creation of cities, roads, aqueducts, and many enduring structures, demonstrating humanity's growing ability to shape its environment on a grand. large scale. Moreover, in the 18th and 19th centuries, we entered the era of modern technology with the advent of the Industrial Revolution. Driven by the invention of the steam engine, this period saw a dramatic shift in manufacturing processes and societal structures. New industries sprang up, and the world became more interconnected than ever before.

In the latter half of the 19th century and into the 20th, the information revolution, epitomized by the advent of computers and the internet, profoundly reshaped society. Computers, initially used for basic calculations, have grown exponentially in power and functionality. They provided a platform for the next wave of technological innovations in the form of the Internet. The Internet, in turn, led to the creation of a new digital economy and a tremendous increase in data generation and collection. On another note, Big data, a term coined in the early 2000s, refers to the enormous volume of data that is too complex to be processed using traditional data processing applications. The rise of big data was fueled by the increased use of the Internet and the spread of digital devices. The potential of big data to provide valuable insights for decision-making led to the development of more sophisticated tools and technologies for data storage, management, and analysis. Around the same time, the concept of cloud computing started to gain traction. Cloud computing is a model for delivering information technology services where resources are retrieved from the Internet through web-based tools and applications, rather than a direct connection to a server. This technology allows for a more efficient use of computing resources and greater scalability and flexibility. These technologies have enabled an unprecedented level of global communication and access to information, transforming virtually every aspect of our lives.

Finally, we arrive in the current epoch of technological evolution, the era of AI and other frontier technologies. Artificial intelligence exemplifies the ultimate manifestation of our species' ambition to create machines that can emulate human intelligence. Coupled with technologies like 5G networks, quantum computing, and autonomous vehicles, AI represents the frontier of what is technologically possible. As it turns out, advances in AI and machine learning have paved the way for computers and machines to mimic human intelligence and learn from experience. AI technologies have the potential to transform various sectors, from healthcare and finance to education and entertainment. They can process large amounts of data, recognize patterns, and make decisions, sometimes exceeding human capabilities in specific tasks. Machine learning, a subset of AI, involves the development of algorithms that allow computers to learn from and make decisions or predictions based on data. The Internet of Things (IoT), another revolutionary technology, is a system of interrelated digital devices, mechanical and digital machines, objects, animals, or people that have unique identifiers and

the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. IoT brings a new level of connectivity to devices and systems, leading to a multitude of applications in industries such as manufacturing, agriculture, healthcare, and transportation. The ongoing development and integration of these technologies are setting the stage for a new era of innovation and disruption. As they continue to evolve and mature, their impact on different aspects of society, including the labor market, is expected to grow, necessitating a thorough understanding and proactive management of the challenges and opportunities they bring. While these technologies promise significant benefits such as improved productivity, efficiency, and quality of life, they also present challenges, such as privacy and security issues, ethical considerations, and workforce displacement due to automation. In the labor market, these technologies are redefining job roles, skills requirements, and work arrangements, trends that are expected to accelerate in the future.

In conclusion, the evolution of technology is a story of human ingenuity and ambition, from the earliest fire makers to today's AI engineers. This historical evolution testifies to our ceaseless quest to extend our capabilities and reshape our world through technological advancement. Ultimately, it's a story of how we have harnessed our surroundings, materials, and knowledge to create tools, systems, and machines to enhance our lives. Hence, the evolution of these new technologies over the past few decades has been characterized by rapid innovation and disruption, leading to transformative changes across various sectors of society, including the labor market. Understanding these technologies, their trajectory, and their potential impacts is crucial for preparing for and navigating the future of work. The next sections of this thesis will delve deeper into providing an accurate, detailed description of these technologies and their significant impact on global labor markets. By doing so, we will first analyze their impact on labor markets from a general, holistic point of view whilst transitioning to the more specific impacts they cause in trending issues such as job creation, job displacement and skill gaps and wage gaps.

3. New Technologies and Their Impact on Labor Markets

- *Description of key technologies (e.g., IoT, big data, cloud computing, AI…)*

The 21st-century labor market landscape is intrinsically related to the progression of key technologies. These technologies, including the Internet of Things (IoT), big data, cloud computing and artificial intelligence (AI), amongst many others, have penetrated every sector and greatly altered how businesses operate and people work. To better understand their impacts, it's crucial first to understand what they are and how they function. Therein, the essence behind the advancements foreseen in these new technologies are directly linked with improving both our communication channels and the way information is gathered, analyzed and perceived. The term ICT, which stands for Information and Communication Technologies, represents the set of technologies, devices and resources used to process, store, retrieve, transmit and share information and knowledge through electronic means. Regarding the labor market, ICTs have completely revolutionized our work environment, making it possible to automate processes, telework, improve efficiency and productivity as well as creating new business models. Another key revolutionary invention that has had a significant impact on the way technologies are impacting our society and specifically our workplace is the creation of computers. In short, the creation of computers and available software has made possible the ability to efficiently and quickly process enormous amounts of data by storing this data while allowing its own transmission and reception of information, thereby offering a vast range of accessibility and better use of information, completely revolutionizing the way we work. Consequently, a strong improvement in the overall information power capacity, in terms of speed and storage capacity, gives rise to one of the greatest computer revelations: Big Data.

In a few words, we could describe Big Data as the collection, processing and analysis of large amounts of data. As a result, we find ourselves in a society where having access to large amounts of data and the capability to analyze these data efficiently in order to find meaning becomes a clear competitive advantage in a business environment, as it allows for better decision-making while simultaneously cutting costs for the company. On a deeper note, in a competitive labor market scenario, Big Data has the ability to identify patterns and trends which can provide valuable information when dealing with decision-making scenarios, or for

instance can collect detailed information, thus offering tailored, personalized services adjusting to the client´s main needs and preferences or even using massive data analysis as a way to identify new opportunities for improvement and optimization of processes within the company. In a nutshell, data is power, and the ability to store and process bigger and bigger amounts of data is increasing at an exponential rate. Thanks to Big Data and process optimization, large and vast amounts of data are analyzed in order to figure out and determine which is the best possible solution as well as to optimize the decision-making process while cutting costs. Therein, when analyzing the impact technologies have on the profiles demanded in the labor market Big Data gives rise to new factors to analyze such as outsourcing, robotics and machine learning. For instance, according to a report written by OECD, "Machine learning (ML) models use big data to learn and improve predictability and performance automatically through experience and data, without being programmed to do so by humans" (OECD). Moreover, machine learning also contributes to improving the efficiency and productivity in companies by being able to perform tasks based on a large database, collecting said information and perfecting an automated model which in turn acts independently and autonomously in order to save a large amount of resources, time and expenses.

With the phenomenon of globalization and the rise of internet, these concepts of outsourcing, machine learning and robotics are increasingly becoming more popular and therefore automation is becoming more and more relevant. A ridiculous amount of outsourcing, transport and logistic processes are being automated as to save costs therefore decentralizing the market and pressuring companies to remain more competitive, which ultimately has a profound impact on the set of skills and profiles demanded in the labor market. Robotics is gaining popularity in companies as the easier, more practical and less cognitive tasks are being assigned to machines which operate more efficiently and at a lower overall cost than regular workers do. These sort of transitions, in the labor market and especially in countries who benefit from a strong technological domain and expertise are enhancing job displacement at a brutal rate and urges the need to question the set of skills and strengths that are required to remain competitive and avoid being replaced by a machine in the near future. On top of this, with today´s high-connectivity around the world mainly provided by the IoT, technologies are capable of transmitting information from one to another, autonomously,

without any human intervention whatsoever. By mentioning the term IoT, or Internet of Things, we refer to the collective network of connected devices and the technology that facilitates communication between devices and the cloud, as well as between the devices themselves (Amazon, 2021)". This phenomenon is allowing intelligent technologies to share massive data though sensors implanted in such objects and ultimately make appropriate, smart, independent decisions without the need of human intervention, therefore fostering automation and consequently job displacement.

To add to this issue, it remains evident that when analyzing today´s technological advancements and because of the strong implementation of automation, process outsourcing, machine learning, robotics and the IoT into our society, artificial intelligence certainly stands out as one of the most revolutionary and innovative tools to impact our modern world. AI, or artificial intelligence, is having, and will continue to do so in the future, a huge impact on important sectors such as healthcare, education, manufacturing, transportation and banking, just to name a few… By developing self-consciousness up to a certain degree, AI is capable of gathering millions and millions of data, identify patterns and draw up meaningful conclusions which can heavily benefit us and our society in the long term. For instance, from a healthcare point of view, AI can significantly improve the accuracy and effectiveness of a medical operation by using autonomous machinery, efficient algorithms and intelligent systems to better monitor the patient´s health whilst ensuring better outcomes in general and reduced costs for the company. Another critical example of AI´s impact on today´s society lies in self-driving cars such as Tesla. In the transportation industry, AI has made it possible to create autonomous, self-driving cars which ultimately provide an overall safer and more enjoyable experience whilst simultaneously increasing the supply chain efficiency of the company and reducing overall total costs. As impressive as AI turns out to be, its use should not be mismanaged, and in my opinion, it remains critical to understand both sides of its impact in our society, for the better or worse part. In other words, what I´m trying to say and reiterate throughout my thesis is that AI is an innovative tool that is constantly evolving, gathering data, learning from this data and ultimately bettering and upgrading its potential capabilities as we speak. We ought to take into account that as much of a positive impact that AI can make on our society, by creating new jobs and increasing efficiency, the exact same opposite can happen in terms of filling jobs that are deemed more manual and may only

require hard skills, thus threatening humans to adapt to a new set of soft skills which resonate with our unique values that make us humans such as emotional intelligence, empathy, creativity and social skills. According to the World Economic Forum´s "The Future of Jobs Report 2020", "AI will replace 85 million jobs globally and may create 97 million new roles by 2025" (World Economic Forum, 2020).

- *General impact of these new technologies on global labor markets*

New technologies, such as the Internet of Things (IoT), big data, cloud computing and artificial intelligence (AI) have fundamentally altered labor markets around the globe. As much as these technologies have driven economic growth and created new forms of employment, they have also prompted workforce displacement and led to a significant shift in the skills that employers are seeking. For instance, the IoT, a very disruptive technology, is dramatically changing labor markets. By connecting everyday objects to the internet, IoT has revolutionized industries such as logistics, manufacturing, and agriculture. While this technology allows for real-time tracking and efficiency, it has also led to the automation of certain job roles. Nevertheless, IoT has considerably increased the demand for new skills and roles such as data analysts and cybersecurity specialists who are needed to handle the massive amounts of data generated by IoT devices and to secure these devices from possible threats.

On another note, the advent of big data and cloud computing has led to a huge shift in how businesses operate nowadays. As a matter of fact, organizations now have the power to process and analyze large volumes of data for insights to drive decision-making. This transition has created a surge in demand for data scientists and data analysts who can interpret this data and make strategic recommendations. Furthermore, as more businesses shift their operations to the cloud for flexibility and scalability, there's an overall increased demand for cloud computing specialists, therefore creating new available jobs in the labor market. On a more important note, the influence of AI, in particular, has been substantial and pervasive, cutting across nearly all sectors. Its power to automate routine tasks has yielded several benefits, yet this very ability has also precipitated notable job displacement in sectors where tasks are deemed to be standardized and repetitive. Through machine learning and automation, AI has the potential to increase efficiency and accuracy in many job roles, effectively transforming industries ranging from manufacturing to healthcare. Let's take a

moment to explore the manufacturing sector, a realm where AI's effects are quite evident. On one hand, the automation of routine tasks has unfortunately led to job displacement in certain sectors such as transportation and manufacturing, as machines replace humans in performing routine, standardized tasks. Indeed, automation technologies, driven by AI, have transformed the assembly lines that once operated with human activity. Robots, programmed for precision and speed, now handle tasks that were traditionally performed by humans, from picking and placing components to welding and even quality control. Such profound changes have consequently led to job losses, especially for low-skilled workers performing routine tasks. This scenario is not unique to manufacturing; even service sectors such as transportation and customer service are seeing AI-driven automation replace human roles, leading to a reduction in available jobs.

On the other side of the coin, however, AI's contribution to job creation is significant and cannot be overstated. The rise of AI has spurred the need for a host of new roles that didn't exist a few decades ago. Look around, and you'll find job titles like "AI Ethicist," "Machine Learning Engineer," and "AI Solution Architect" being advertised, just to name a few. Indeed, AI has also given birth to entirely new job categories, like AI ethicists and machine learning engineers, thereby creating new job opportunities in the labor market. These roles cater to the design, implementation, and ethical use of AI in various industries. Furthermore, it's worth mentioning that AI is not just about job substitution; it's also about job augmentation. AI applications can be used to assist humans, thereby enhancing their capabilities, making them more productive, and enabling them to focus on tasks that require human strengths such as creative problem-solving, leadership, and emotional intelligence. For instance, AI-powered analytics can aid doctors in diagnosing diseases, or chatbots can handle routine customer queries, freeing up human customer service representatives for more complex customer interactions. As a matter of fact, AI can augment human capabilities in non-routine tasks, enhancing productivity and enabling more creative and high-level work. It frees workers from mundane tasks, allowing them to focus on complex problem-solving and strategic tasks that machines can't replicate. However, the introduction of these technologies has also highlighted a skills gap in the labor market. As technology outpaces the ability of the workforce to learn new skills, there is an increasing demand for workers with proficiency in these emerging technologies and less demand for workers with skills

suited to more traditional industries. Moreover, these technologies have enabled remote and flexible work arrangements, thereby reshaping the structure of workplaces and work relationships. The COVID-19 pandemic expedited this shift, further proving that many jobs can be performed from anywhere in the world. This flexibility has opened up opportunities for workers globally, but it also means increased competition.

In a nutshell, AI doesn't simply replace humans; it shifts the labor demand towards more complex, non-routine tasks and away from simple, repetitive work. This shift, while beneficial in many respects, does introduce several new challenges to take into account. As AI continues to evolve and spread through various sectors, the demand for highly skilled workers is increasing. Simultaneously, the demand for low-skilled workers is significantly decreasing, thus creating a disparity and widening the skills gap in the labor market. Likewise, the general impact of these technologies on global labor markets is complex and difficult to analyze from all perspectives. These new technologies bring with them both opportunities and challenges, creating new job roles while making others redundant. AI's capacity to change the way work is done, its ability to create and displace jobs, and its propensity to disrupt labor markets is considerable. These new technologies are not merely changing the nature of jobs but also where and how work is done. It's crucial for workers, companies, educators, and policymakers to understand these impacts to navigate the rapidly evolving labor market successfully. Hence, training and education systems must adapt to equip workers with the skills needed and required to succeed in this new technological era. This is not a distant future phenomenon, it's happening right now, constantly, and the pace is only set to increase. As we navigate through these changes, constant learning, upskilling, reskilling and policy adaptations are required to ensure that the labor force is prepared for an AI-dominated future. We stand on the precipice of a new era, one where AI, humans, and the labor market will interact and co-evolve in ways we are only beginning to understand.

- *Specific impacts: job creation, job displacement, skill gaps*
  - *Job creation*

The evolving technology landscape is rewriting the script of the labor market at an unprecedented pace. Emerging technologies like Artificial Intelligence (AI), machine learning, big data, and cloud computing are quickly expanding, creating a demand for new

skill sets and consequently, new job roles. Indeed, the advent of the digital era is indisputably driving the creation of novel roles and job opportunities that did not exist a decade or so ago, fundamentally redefining the job market landscape. As the World Economic Forum research highlights, roles in AI have taken pole position in the fastest-growing jobs over the next five years, underscoring the burgeoning significance of AI in the modern work landscape (Weforum). According to Euronews, "other roles trailing closely behind AI in this fast-paced job race are sustainability specialists, business intelligence analysts, and information security analysts" (Euronews). These job roles are testament to the shifting priorities in today's workplace where a company's sustainability efforts, data-driven decision-making capabilities, and cybersecurity defenses are of paramount importance.

Moreover, of notable significance is the explosive growth of positions such as data analysts, a testament to the rising tide of digitization and big data. Businesses, in their perpetual quest for efficiency and competitive edge, now swim in an ocean of data generated from myriad sources – from customer interactions and transactions to internal processes and external environments. Harnessing the power of all this data requires the expertise of data analysts. These professionals bring sophisticated skills to the table, transforming raw, often complex, data into insights that can inform decision-making, drive strategic initiatives, and optimize operations. Given the increasing reliance on data across industries, it's hardly surprising that data analysts are in such high demand. Their role is becoming as fundamental as the spine to the human body – supporting, aligning, and enabling the entire organizational structure to function seamlessly. Alongside data analysts, specialized sales representatives form another category of emerging roles that are gaining traction across industries. In an era characterized by rapidly evolving technologies and constant innovation, products and services are becoming increasingly complex. This complexity, combined with a growing and diversifying customer base, creates an imperative for specialized sales representatives. These individuals must master the art of articulating the benefits and features of these intricate products or services convincingly to a broad array of clients – be they businesses, government entities, or end consumers.

The evolving job market, however, isn't exclusively about emerging roles. It's also about changes within established industries – transformations that breed fresh opportunities while

discarding the obsolete. The figure below represents the net employment outlook by job family (employees are measured in thousands), in order to accurately portray a clear vision of how jobs in specific industries may tend to shift towards job creation or job displacement tendencies. We come up with the conclusion that office and administrative jobs are expected to suffer a huge decline in number of employees in the future (roughly 4.759 000 less employees) followed by manufacturing and production, construction and extraction, arts-design, entertainment, sports and media, legal as well as installation and maintenance. On the other hand, jobs in the fields of business and financial operations are expected to benefit from larger pool of employees (an additional 492.000 employees, to be precise), followed by management, computer and mathematical, architecture and engineering, sales and related as well as education and training).

Figure 6: Net employment outlook by job family, 2015–2020
Employees (thousands, all focus countries)

−4,759	Office and Administrative	+492	Business and Financial Operations
−1,609	Manufacturing and Production	+416	Management
−497	Construction and Extraction	+405	Computer and Mathematical
−151	Arts, Design, Entertainment, Sports and Media	+339	Architecture and Engineering
−109	Legal	+303	Sales and Related
−40	Installation and Maintenance	+66	Education and Training

(Weforum, 2020).

Let´s analyze, for instance, the Computer and Mathematical field, traditionally viewed as a specialized domain within the Information and Communication Technology (ICT) sector. Today, its influence spreads across a variety of industries, thereby marking a significant shift. Financial Services & Investors, Media, Entertainment and Information, among others, are now actively seeking talent in this area, as the role of computing power and Big Data analytics has expanded from a niche to a universal driver of employment growth. Similarly, we're seeing solid job growth in the Architecture and Engineering roles, particularly within the Consumer, Information and Communication Technology, and Mobility industries. This shift seems to contrast with the stagnating demand for engineering talent in its traditional stronghold – the Basic and Infrastructure and Energy industries. Yet, this is reflective of the broader theme of job creation: roles are not disappearing but evolving, shifting in sync with the tides of technological innovation and industry dynamics.

However, the cherry on top of this transformational cake is the growth of high-skilled roles, a development that is both exciting and daunting. While it underscores the increasing sophistication and advancement of our economy, it also highlights a gap that needs bridging. High-skilled roles, as the name suggests, require a significant level of expertise, knowledge, and often, formal training. From the engineering specialties such as materials, bio-chemicals, nanotech, and robotics, to niche fields like geospatial information systems and commercial and industrial design, the job market is progressively moving towards specialization. According to a study made by LinkedIn regarding the most in-demand skills, "As business needs continue to evolve, the skills gap will only widen over time unless employers and their team members focus on upskilling and reskilling" (LinkedIn). In this study, we find that the most in-demand skills for the near future are management, communication, customer service, leadership, sales, project management, research, analytical skills, marketing and teamwork skills. These soft skills stand out as the most relevant skills to take into account for the future as they are deemed very common across a very popular number of industries. Yet, this trend towards high-skilled roles has implications that extend beyond the simple creation of jobs. It represents an evolution in the skill sets demanded by employers, with a clear bias towards complex, technical capabilities and away from routine, manual skills. It further suggests a future where the possession of specialized, high-level skills could be the defining line

between having a job and being unemployed. To summarize, the dynamics of job creation are undeniably shifting in response to digital transformation, industry evolution, and an increased emphasis on high-skilled roles. Emerging roles like sustainability specialists, business intelligence analysts, information security analysts, data analysts and specialized sales representatives are jobs that will significantly grow in demand due to their vast exposure across industry-specific growth in areas like Computer and Mathematical roles, just to name a few…

- o *Job displacement*

Job displacement, an unavoidable consequence of the relentless march of technology, paints a stark picture of the human cost of progress. It is not an entirely new phenomenon; from the Luddites rebelling against the mechanization of the textile industry in the 19th century to modern concerns over automation, job displacement is a constant companion of innovation. Yet, in our age of rapid technological advancement, this companion takes on a more significant and urgent role. The flux in the labor market is driven by the intersection of technology and economy, which, like an inexorable tide, sweeps away certain job families and functions. The office and administrative roles, which traditionally provided a secure livelihood for millions, are now in the firing line. Jobs in this family are predicted to be the hardest hit, with approximately two-thirds of job losses forecasted to occur in this sector. As a matter of fact, the automation and digitization of various sectors pose an existential threat to several traditional job roles. For instance, bank clerks and similar roles, according to the WEF report, are expected to be in the fastest decline, chiefly because of the rise of online banking and automation, which have made several banking services accessible at the click of a button. In addition, postal service workers, cashiers, and data entry clerks also face an uncertain future as automation, sensor technology, and online services render their roles less relevant. Indeed, "in terms of highest absolute job losses, data entry clerks fare the worst, with an expected 8 million job losses within five years, followed by administrative and executive secretaries, and accounting, bookkeeping and patrol clerks. These three occupations combined account for more than half of total expected job destruction, the Future of Jobs 2023 report notes" (Weforum).

Moreover, specific industries are expected to face significant upheavals. The figure below represents the overall skills stability for a vast number of industries, indicating whether these industries are predicted to become stable or unstable in the near future. Look at the Basic and Infrastructure, Energy, Financial Services & Investors, Information and Communication Technology, and Professional Services sectors. All these are poised for major redundancies, particularly in Office and Administrative functions. For instance, customer service roles, once seen as a bulwark against automation due to their reliance on human interaction, are increasingly threatened by mobile internet technologies.

Table 6: Skills Stability, 2015–2020, industries overall

Industry group	Unstable	Stable
Industries Overall	**35%**	**65%**
Media, Entertainment and Information	27%	73%
Consumer	30%	71%
Healthcare	29%	71%
Energy	30%	70%
Professional Services	33%	67%
Information and Communication Technology	35%	65%
Mobility	39%	61%
Basic and Infrastructure	42%	58%
Financial Services & Investors	43%	57%

Source: Future of Jobs Survey, World Economic Forum.

(Weforum, 2020).

Moreover, in the Mobility industry, advances in technologies such as robotics, autonomous transport, 3D printing, and new energy technologies pose significant threats to traditional manufacturing jobs. And, it's not just the manufacturing jobs at risk here. The Energy industry, for instance, is likely to see a decline in roles such as Chemical Processing Plant

Operators and Mining and Petroleum Extraction Workers due to industry-specific challenges and technological disruptions. Job displacement isn't a uniform wave washing over every industry equally. Its impact varies widely, with some sectors more exposed than others. In sectors like Basic and Infrastructure, Energy, Financial Services & Investors, Information and Communication Technology, and Professional Services, the threat to office and administrative functions looms large. Here, one can expect major redundancies as these roles become increasingly obsolete in the face of digital and technological advances. A poignant example of this is the impending displacement of customer service roles. While these roles have long served as an interface between businesses and their clients, technology, especially mobile internet, is rapidly encroaching on their territory. Now, businesses can monitor service quality online and maintain effective customer relationship management without the need for a traditional customer service function.
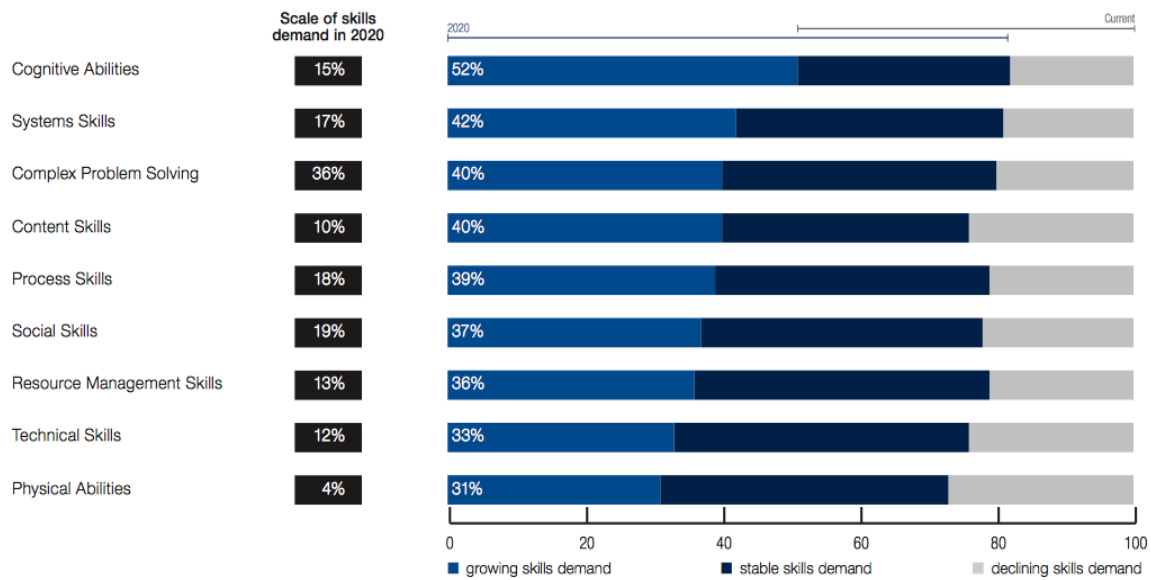
In essence, roles that have not adapted to the technological advances of the 21st century, while predicting a promising future for roles that are at the forefront of these technological breakthroughs. The "labour-market transformations" driven by these technological breakthroughs are expected to be a double-edged sword: causing job displacement on one hand, and job creation on the other. Indeed, "as traditional job roles see an unprecedented decline, a whole new wave of job roles is expected to be created, with 69 million new jobs projected to be created in the next five years, according to the WEF's Future of Jobs report (Weforum)". However, this labor market churn isn't devoid of economic challenges. According to the Weforum, high inflation, slower economic growth, and supply shortages are all predicted to contribute to a 2% decrease in current employment, which equates to about 14 million jobs (Weforum). One cannot escape the conclusion that job displacement is a significant and growing issue. The interplay of technology and economy is reshaping the job market, with some roles falling by the wayside while others flourish. Yet, it's critical to recognize that this isn't a purely destructive process. It's part of the broader evolutionary path of our economy and society, a path marked by both creative and destructive forces. While some jobs are displaced, others are created, and still, others are transformed. Thus, understanding job displacement is not just about recognizing the jobs we lose but also about understanding the shifts in skills and roles that are occurring across the labor market. In conclusion, job displacement is a complex issue with many facets. It's driven by the relentless

pace of technological advancement and its intersection with economic forces. Therefore, the technological revolution, while creating a myriad of new job roles, is also setting the stage for a considerable decline in traditional roles. It results in significant job losses in certain areas, notably office and administrative roles, and within specific industries. However, it's also part of a broader transformation of the labor market, involving shifts in skills and roles. As a result, understanding and addressing job displacement will be crucial. As we navigate through these changes we must prepare workers, businesses, governments, educators, and civil society for the looming disruptions and opportunities, and empower them to navigate the ensuing social, environmental, and technological transitions.

- *Skill gaps*

Let´s first talk about two intrinsic phenomena when analyzing skill gaps, which are skill stability and disruption. The notion of 'skill stability' is challenged by fast-paced technological, demographic, and socio-economic changes. Technological disruption, particularly robotics and machine learning, is significantly impacting existing job roles. However, it's important to note that these advancements are not completely rendering existing jobs obsolete; instead, they are changing the way these jobs are executed. The routine tasks within job roles are being automated, requiring workers to shift focus to other, often new, tasks and leading to a rapidly evolving set of required skills. This accelerating change in skills is not limited to industries at the forefront of technological innovation. Roles in fields like marketing and supply chain management, which might not seem directly influenced by technology, will still require different skill sets in just a few years due to changing market dynamics and business ecosystems. It's also pointed out that the pace of this change could render existing education and training systems insufficient. "With an estimated 50% of knowledge from the first year of a technical degree being outdated by graduation, traditional formal qualifications and hard skills may no longer be the mainstay of the workforce's skill sets" (Euronews). The figure below accurately represents the overall change in demand for core work-related skills, from 2015 to 2020, across all industries. Furthermore, this figure allows us to have a neat representation of the industries with higher growing demand for skills, those with stable skills demand and finally those which will be experiencing declining skills demand.

Figure 10: Change in demand for core work-related skills, 2015-2020, all industries
Share of jobs requiring skills family as part of their core skill set, %

	Scale of skills demand in 2020	2020	Current
Cognitive Abilities	15%	52%	
Systems Skills	17%	42%	
Complex Problem Solving	36%	40%	
Content Skills	10%	40%	
Process Skills	18%	39%	
Social Skills	19%	37%	
Resource Management Skills	13%	36%	
Technical Skills	12%	33%	
Physical Abilities	4%	31%	

■ growing skills demand   ■ stable skills demand   ▢ declining skills demand

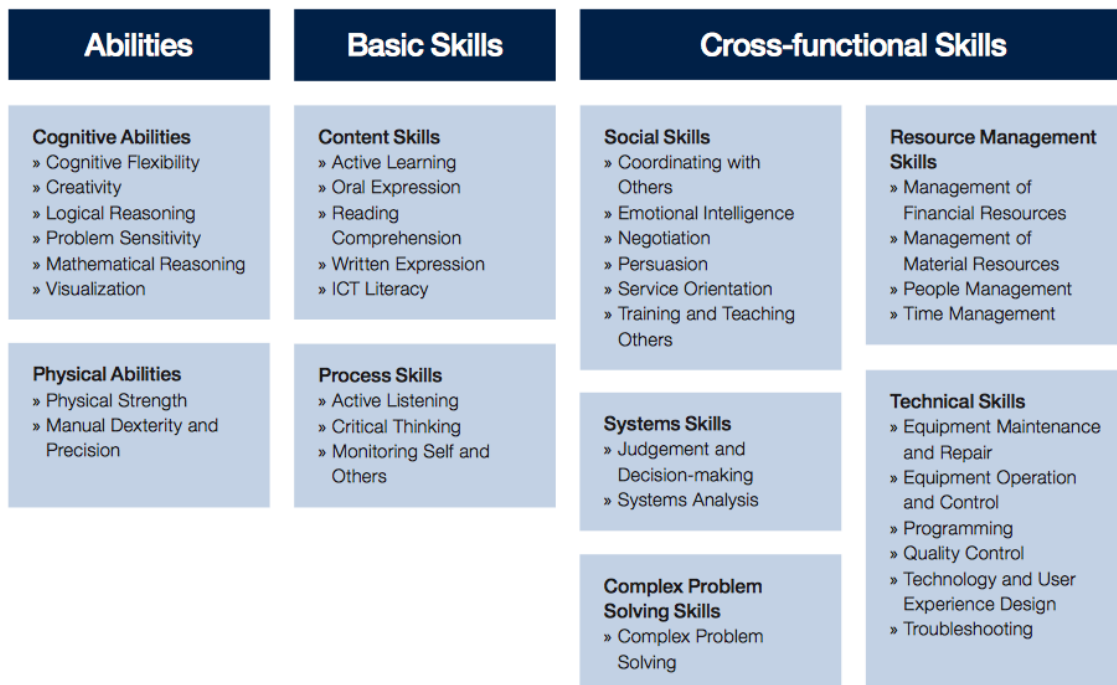Source: Future of Jobs Survey, World Economic Forum.

(Weforum, 2020).

We can point out that skills such as cognitive abilities, system skills and complex problem solving are experiencing the largest growth in demand and therefore must be taken into account when performing up-skilling and re-skilling programs. In particular, "with regard to the overall scale of demand for various skills in 2020, more than one third (36%) of all jobs across all industries are expected by our respondents to require complex problem-solving as one of their core skills, compared to less than 1 in 20 jobs (4%) that will have a core requirement for physical abilities such as physical strength or dexterity (Weforum)".

In my opinion, it also remains very important to keep in mind the role of work-related practical skills and competences. While hard skills and formal qualifications remain important, employers are also placing value on practical, work-related competencies that help employees perform their roles successfully. It's predicted that by 2020, over a third of the core skills desired in most jobs will be ones not yet considered crucial today. This shift is being driven by the growing importance of data literacy and data-based decision making, as well as the need to respond swiftly to changing consumer values in sectors like Mobility, Energy, Financial Services & Investors, and Information and Communication Technology.

It´s also very important to take into account that each industry is constantly adapting to market trends and new disruptions, so changing skill requirements is imperative in order to keep a competitive advantage. As a matter of act, different industry sectors require varied combinations of skills, and the report suggests that these combinations are being impacted by disruptive changes. In the figure below are represented some of the most valuable, core work-related skills to keep in mind. These skills are organized in three different sections: abilities, comprised of cognitive abilities and physical abilities, basic skills, involving content skills and process skills, and finally cross-functional skills, encompassing social skills, system skills, complex problem-solving skills, resource management skills and finally technical skills.

Figure 9: Core work-related skills

Abilities	**Basic Skills**	**Cross-functional Skills**	
Cognitive Abilities » Cognitive Flexibility » Creativity » Logical Reasoning » Problem Sensitivity » Mathematical Reasoning » Visualization	**Content Skills** » Active Learning » Oral Expression » Reading Comprehension » Written Expression » ICT Literacy	**Social Skills** » Coordinating with Others » Emotional Intelligence » Negotiation » Persuasion » Service Orientation » Training and Teaching Others	**Resource Management Skills** » Management of Financial Resources » Management of Material Resources » People Management » Time Management
Physical Abilities » Physical Strength » Manual Dexterity and Precision	**Process Skills** » Active Listening » Critical Thinking » Monitoring Self and Others	**Systems Skills** » Judgement and Decision-making » Systems Analysis	**Technical Skills** » Equipment Maintenance and Repair » Equipment Operation and Control » Programming » Quality Control » Technology and User Experience Design » Troubleshooting
		Complex Problem Solving Skills » Complex Problem Solving	

Source: World Economic Forum, based on O*NET Content Model.
Note: See Appendix A for further details.

(Weforum, 2020).

Overall, complex problem-solving is expected to be a core requirement for over a third of all jobs, but the need for this skill may diminish in technical industries due to automation. On the other hand, social skills, such as persuasion and emotional intelligence, will be more in demand compared to technical skills. A rise in the need for cognitive abilities, content skills, and process skills is also anticipated. The data suggests that even within individual job families and occupations, the evolution of skill requirements is pronounced. Increased technology literacy will be required in frontline roles, while creative and interpersonal skills will become more necessary in technical occupations. For instance, the increased integration of the mobile internet and Internet of Things (IoT) will transform many job roles, requiring a higher level of technological literacy and understanding of workplace processes. Furthermore, roles that were traditionally technical will require more creative and interpersonal skills. This is why it´s necessary to redefine roles and the specific types of skills needed. Furthermore, the respondents anticipate a wider range of occupations will need cognitive abilities like creativity, logical reasoning, and problem sensitivity as part of their core skills set. Conversely, the demand for physical abilities is not expected to increase significantly, while the need for technical skills will remain relatively stable. Overall, the skill gap landscape is complex and rapidly changing, influenced heavily by technological advancements and shifting socio-economic factors. To adapt and thrive, both individuals and organizations will need to embrace lifelong learning and invest in continuous skills development.

4. Spanish Labor Market: Status and Trends

- *Overview of the Spanish labor market*

Spain, an illustrious country in the Southern region of Europe, is often hailed for its vivacious culture, historical heritage, and its culinary delights. But today, we choose to pivot our attention to the beating heart of its socio-economic makeup: the labor market. It's important to tread into this terrain with an understanding that it is a constantly shifting landscape, colored by the interplay of numerous internal and external factors (OECD, 2021). Spain's labor market, with its diverse fabric, comprises various sectors ranging from the robust service industry, a substantial manufacturing sector, and a gradually declining yet significant agricultural sector (OECD, 2021). It is highly characterized by a seasonal pattern with the tourism industry employing a large segment of the population. Additionally, "the Spanish economy is the fourth largest in the European Union and the 14th largest in the world in terms of nominal gross domestic product or GDP (Europa.eu,2022)". However, the country has grappled with relatively high unemployment rates, especially among the youth, an issue that the government continually aims to address (Eurostat, 2022).
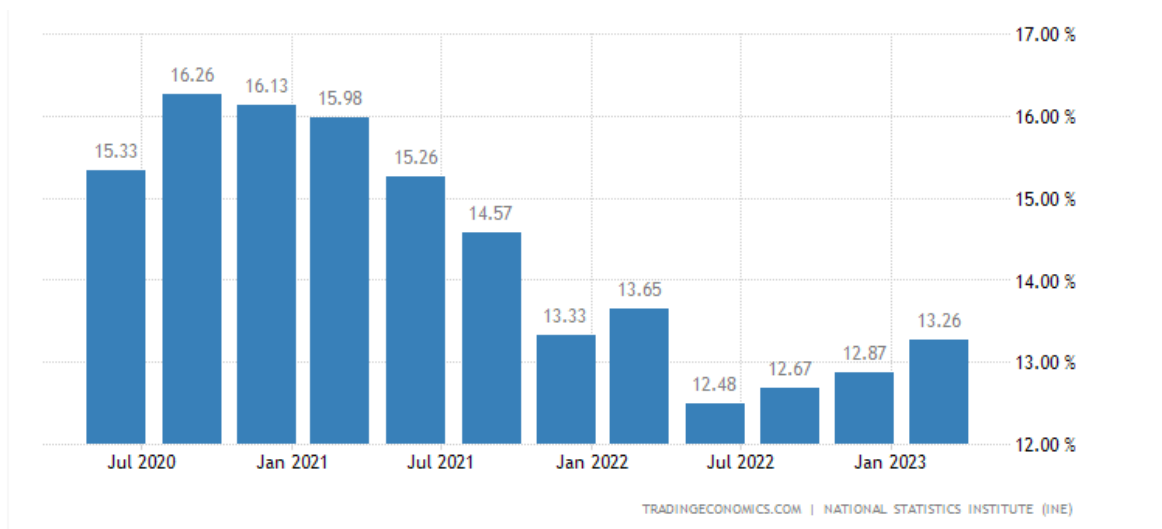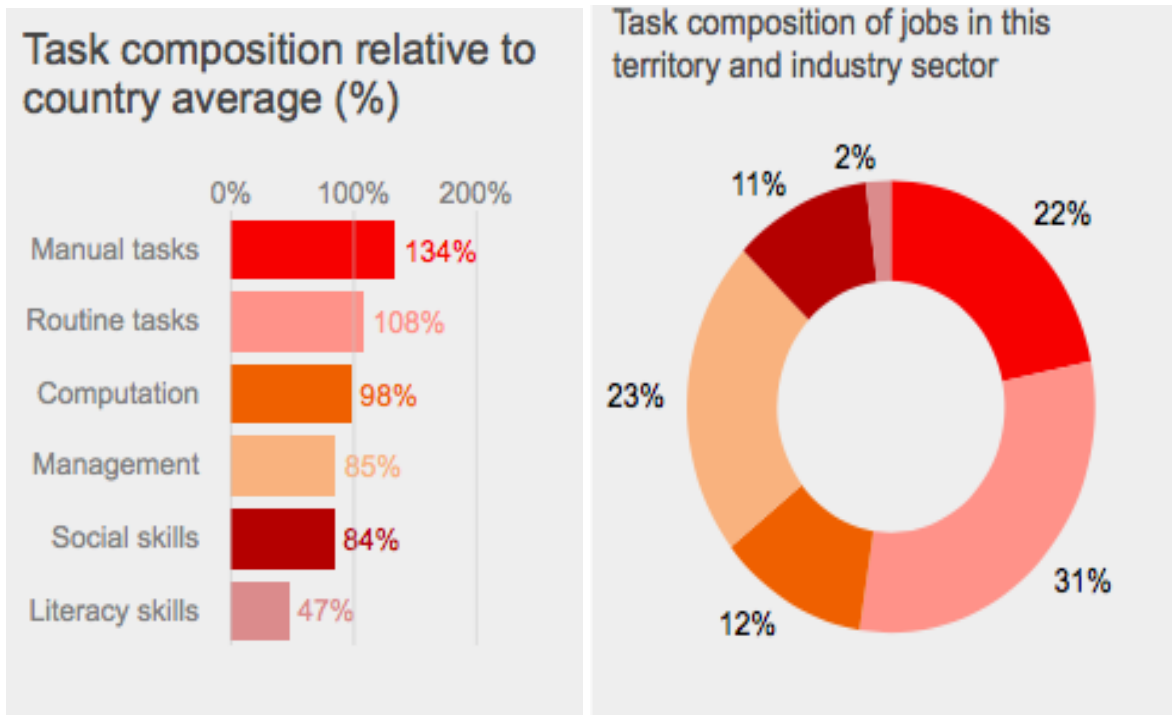

(National Statistics Institute, 2023).

Indeed, according to trading economics a study made by the National Statistics Institute found out that "Spain's jobless rate rose to 13.26 percent in the first quarter of 2023 from 12.87 percent in the previous three-month period and above market expectations of 12.9 percent. The rate was 13.65 percent in the first quarter of 2022. The number of unemployed people increased by 103.8 thousand to 3.128 million, while the number of employed declined by 11.1 thousand to 20.453 million (National Statistics Institute, 2023). Recent years have witnessed a rapid shift in the Spanish labor market, a turn of the tide brought about primarily by new technologies such as artificial intelligence (AI), big data, and cloud computing (Eurofound, 2020). As these technologies continue to mature, they shape and reshape the contours of job profiles demanded in the labor market. They bring a vast number of new opportunities while rendering some existing skills and roles obsolete, thus creating a strong tension between progress and displacement. A fascinating aspect to observe is that even amid this technological flux, Spain has been the birthplace of several tech giants and has fostered a thriving startup ecosystem (Startup Genome, 2021). Indeed, "the value of the Spanish ecosystem — measured as the total valuation of its startups — has grown nearly 40% on average each year over the last five years (Sifted, 2022). This rise in tech-oriented enterprises has stoked a surge in demand for tech-savvy roles, such as data scientists, AI specialists, and cybersecurity experts.

Nonetheless, the arrival of these tech roles hasn't been without its ripple effects. Certain sectors, particularly those traditionally less reliant on technology, such as retail, hospitality, and certain clerical roles, are experiencing a dip in demand (McKinsey Global Institute, 2021). The rise in automation, for instance, can be a double-edged sword, leading to increased efficiency but also leading to job displacement in certain sectors. In conclusion, the Spanish labor market stands at the cusp of a profound transformation, fueled by an accelerating technological revolution. As these waves of change continue to wash over the landscape of the Spanish labor market, there is an undeniable need for adaptive measures, strategies, and policies to navigate this shifting terrain. Moving forward, a closer look into the impact of these technologies on specific sectors and companies within Spain would certainly paint a more detailed picture. A case in point is Amazon, a global behemoth whose

business model is rooted in technology, and whose practices, as a result, can shed light on the broader trends and impacts on the labor market.

- *Impact of new technologies on the Spanish labor market*

As we dive deeper into the discussion on the impact of new technologies on the Spanish labor market, it's crucial to acknowledge the transformative power that new technologies have. They're not just tools to augment human capabilities; they are, in fact, catalysts that are driving sweeping changes across all sectors, ushering in what many term as the Fourth Industrial Revolution (Schwab, 2016). Indeed, the Spanish labor market is no exception to this global phenomenon. As we've already touched upon in the previous section, these technologies are creating new roles while making others obsolete, leading to a dynamic interplay of job creation and displacement. A report by PwC (2018) reveals that "around 30% of existing jobs in Spain could potentially be at high risk of automation by the early 2030s" (PwC, 2018), a statistic that underscores the significant impact of technologies like AI and robotics on the labor market. This echoes the sentiments expressed by the OECD (2019), which estimates that about 22% of jobs in Spain are highly automatable, slightly above the OECD average of 14%. On the brighter side, technologies such as AI, IoT, and Big Data are also generating new roles and opportunities. The demand for highly skilled tech professionals, such as data scientists, cybersecurity experts, and AI specialists, has witnessed a tremendous surge (Eurofound, 2020). The burgeoning startup scene in Spain, which raised €1.2 billion in 2020, is also contributing to this growing demand for tech talent (Startup Genome, 2021). This bifocal view of job creation and job displacement led by technological disruption paints a vivid picture of what many term as 'labor market churn,' a phenomenon where the overall employment levels may remain stable, but the type of jobs available undergoes a significant shift (Chui et al., 2020).

Task composition relative to country average (%)

Task	Relative to country average
Manual tasks	134%
Routine tasks	108%
Computation	98%
Management	85%
Social skills	84%
Literacy skills	47%

Task composition of jobs in this territory and industry sector

2%, 11%, 22%, 31%, 12%, 23%

(PwC, 2018).

For instance, let's consider the manufacturing sector, traditionally a significant contributor to the Spanish economy. In the graphs represented above, we can clearly see the composition of tasks for the manufacturing sector in the Spanish market labor. As it is, we can infer that the manual tasks represent the most composition in the manufacturing industry compared to the country average (an overwhelming 134%), whilst also representing a total of 22% of composition in this industry. Therefore, we can reaffirm that manufacturing industry is expected to experience a strong impact with the rise of new technologies as their main composition of jobs are the ones to be most impacted in future years to come. Additionally, with the rise in automation and robotics, many routine manual jobs within this sector are being replaced. A study by McKinsey Global Institute (2017) indicates that about 48% of activities in manufacturing can be automated using current technology. However, the same technology opens up avenues for new roles, such as robotics maintenance technicians or data analysts, that support these automated processes. Thus, the overall impact on employment within this sector is a complex interplay of various factors.

Figure 1 – Potential job automation rates by industry across waves

% of existing jobs at potential risk of automation
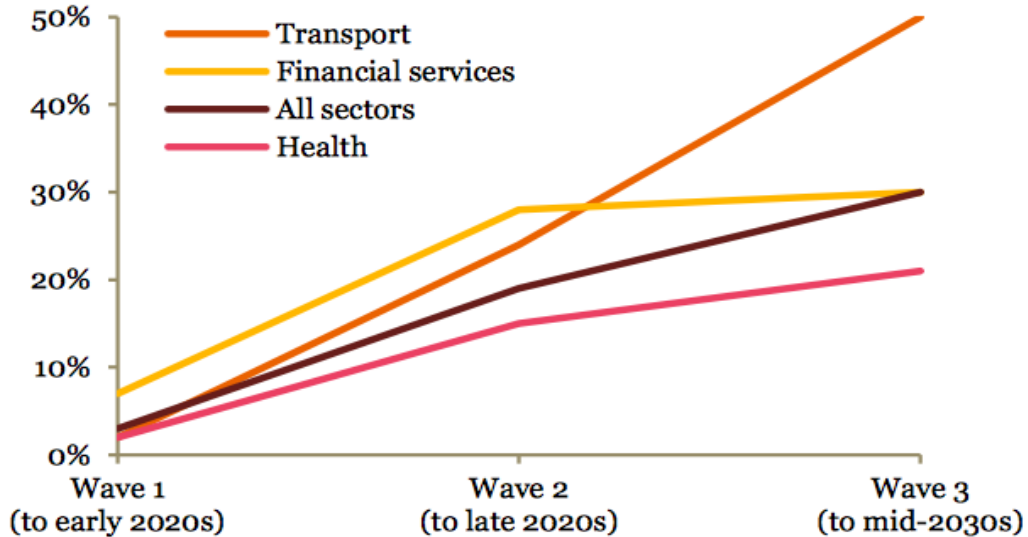
Source: PwC estimates based on OECD PIAAC data (median values for 29 countries)

(PwC, 2018).

The figure above, depicting a graph which represents the potential job automation rates by industry across waves, is an accurate indicator of which industries will be affected the most in the short, current and long-term. We observe that the transport industry will have the highest impact regarding automation as the graph depicts a straight, upward line, indicating an increased automation in this industry for the long-term. On another note, the service sector, particularly in fields like online retail and fintech, offers another interesting perspective. While there is a reduction in traditional roles such as bank tellers and retail sales clerks due to digitization and AI-powered automation, there's an uptick in demand for professionals skilled in digital marketing, data analysis, and user experience design (LinkedIn, 2020). Hence the upward, increasing line in the graph which decreases with time. Lastly, we observe that the health sector is somewhat less dependent on automation in comparison to the remaining sectors, as it reaches an approximate estimate of 20% automation in the industry, compared to approximately 30% in all remaining sectors, respectively. Moreover, it's

essential to take into account the 'softening' impact of technology, where technology changes the way tasks are performed within a job rather than eliminating the job itself. A classic example would be a customer service representative, who now relies on CRM software and AI-powered insights to better serve customers. In conclusion, new technologies are causing a profound transformation in the Spanish labor market, influencing both job creation and displacement. It's an evolving narrative, a complex mosaic created by the interaction of various factors. The following sections will further delve into the emerging and declining job profiles in Spain and the skillsets they require, thereby adding more depth to our understanding.

- *Emerging and declining job profiles in Spain*

With the profound impact of technology on the Spanish labor market, as previously discussed, we now turn our attention to the specific job profiles that are emerging and those that are experiencing a decline in demand. Emerging roles largely reflect the growing sectors and trends we've mentioned earlier. At the helm are positions that are intimately tied to the technological revolution itself. AI and machine learning specialists are in high demand, as Spain, like the rest of the world, is eager to harness the power of these transformative technologies. Cybersecurity professionals are another area of significant growth, as the digitization of businesses raises concerns over data protection and security. Hence, this industry is expected to grow enormously as a survey from Mckinsey reveals "$2 trillion market opportunity for cybersecurity technology and service providers (Mckinsey, 2023). As a matter of fact, according to digital Spain, a program supported by the European Commission enhancing digital growth in countries by setting digital policies, investments, measures and alternatives, towards reaching sustainable goals in the fields of science, technology and ecology, one of the main targets is "Strengthening Spain's cybersecurity capacity, consolidating its position as one of Europe's centres of business capacity *(2025 goal: 20,000 new specialists in cybersecurity, AI and data)*" (España Digital Gob, 2022).

Moreover, the thriving start-up culture in cities like Barcelona and Madrid is fostering a demand for roles such as digital marketers, UX designers, and data analysts. Indeed,

regarding digital marketers, with the rise of internet usage and e-commerce in Spain, companies have had to pivot their marketing strategies towards the digital sphere to reach their target audience. According to Datareportal (2022), Spain has an internet penetration rate of 93%, meaning that a significant proportion of the population is online. Therefore, the role of digital marketers who can effectively use SEO, social media, email marketing, and other digital tools to drive customer engagement and conversion is highly sought after.

Concerning UX Designers, or User Experience (UX) designers, these profiles play a crucial role in creating engaging and user-friendly digital platforms. The continued digital transformation of businesses in Spain, and the ever-increasing consumer expectation for seamless online experiences, has led to a surge in demand for these professionals. In the pioneer tech scene in cities like Barcelona and Madrid, UX designers are especially valued for their ability to help companies differentiate themselves in a crowded digital marketplace (Grant, 2015). Lastly, regarding data analysts, it´s important to realize the amount of data generated by online activities is staggering. This data, when properly analyzed, can provide crucial insights for businesses, helping them to understand their customers, optimize operations, and make informed strategic decisions. Data analysts who can extract, interpret, and communicate these insights are therefore in high demand. As reported by the Spanish Ministry of industry, trade and tourism, the use of big data analysis in Spanish enterprises has seen a substantial rise in recent years, reflecting the increasing importance of data-driven decision making (Ministerio de Industria, Comercio y Turismo, 2023).

On another similar note, the rise of fintech has also seen a surge in demand for blockchain experts and financial technology engineers, a trend reflected in the rapid expansion of companies like BBVA and Banco Santander into the digital space (Business insider, 2021). Indeed, the rise of fintech, the combination of finance and technology, has transformed traditional banking practices and fostered a growing demand for blockchain experts and financial technology engineers. Blockchain's inherent security and transparency have made it the backbone of fintech innovations such as cryptocurrencies, smart contracts, and decentralized finance (DeFi). Thus, blockchain experts who can develop and manage these systems are sought after. Moreover, financial technology engineers who can design and implement innovative fintech solutions, including mobile banking apps, payment gateways,

and robo-advisory platforms, are also in demand. These professionals can help companies like BBVA and Banco Santander streamline their operations, enhance customer experience, and stay competitive in a rapidly evolving digital finance landscape. Moreover, in the sustainability domain, roles like renewable energy consultants and sustainability specialists are gaining traction, in line with Spain's commitment to achieving its renewable energy targets and Europe's Green Deal. Indeed, "the Spanish government's Integrated Energy and Climate Plan 2021-2030 sets out a target of installing an additional 60GW of renewable power capacity, so that it reaches a 74% share of electricity generation by the end of the decade (Rated Power, 2023).

On the flip side, several traditional job profiles are witnessing a decline, particularly those susceptible to automation. Bank clerks, for instance, are experiencing a steady decrease in demand as online banking services gain popularity and AI starts handling more routine tasks (Funcas, 2021). Similarly, data entry clerks, postal service workers, and cashiers are seeing their roles diminish due to automation and digital transformation. Also, door-to-door sales jobs are decreasing due to the rise of e-commerce and digital marketing (Bloomberg, 2023). As it turns out, consumers are increasingly shifting towards online shopping, which offers convenience, variety, and often, lower prices. Moreover, digital marketing tactics such as targeted ads, SEO, and email marketing allow companies to reach potential customers directly and more efficiently, reducing the need for traditional door-to-door sales methods (Shopify, 2022). For these reasons explained above, the Spanish labor market is undergoing a dynamic shift driven by the forces of technological change and digitalization. This transformation is manifesting as a reshaping of job profiles, as there are many emerging jobs on the line as well as declining jobs in the market.

- *Skills demanded by new job profiles*

A comprehensive examination of the Spanish labor market reveals a significant shift in the type of skills desired by employers. Rapid technological advancements and a transforming economic landscape have influenced the set of capabilities that are increasingly sought after in the Spanish labor market. Herein, we'll delve into the specifics of these high-demand skills,

and why they are so valuable in the future term. According to a study made by Forbes, the Top 10 most in demand skills for the next 10 years are the following: Digital literacy, Data literacy, Critical thinking, Emotional intelligence, Creativity, Collaboration, Flexibility, Leadership skills, Time management and Curiosity and Continuous learning (Forbes,2022). For instance, digital literacy is a skill that has soared in demand across a multitude of industries. Indeed, as mentioned before, the ability to navigate digital platforms, understand data, and utilize technology is not only coveted, but considered essential. Many employers now view this as a baseline requirement, irrespective of the role or industry. Moreover, data analysis is a skill growing in importance. From healthcare to finance and e-commerce, sectors are becoming increasingly data-driven. Thus, professionals skilled in data analysis, capable of drawing insights from raw data to inform decision-making, are sought after (OECD, 2023). Similarly, the rise of AI and machine learning has created a demand for specialists in this field. The ability to design, build, and manage AI systems is a rapidly growing niche, particularly in tech-driven sectors like fintech and healthcare (Syndell, 2023). Next, cybersecurity expertise is another critical skill in the digital age. As organizations rely more on digital platforms, they are more vulnerable to cyber threats. Consequently, cybersecurity experts who can develop and implement robust security measures are highly demanded (Incibe, 2023). On a somewhat related note, UX design has become a vital skill as businesses prioritize user-friendly interfaces for their digital platforms. Companies need experts who can intuitively design platforms that deliver optimal user experiences (IE Business School, 2023). Furthermore, sustainability expertise is becoming increasingly valuable, particularly given the European Union's focus on green policies and initiatives. Professionals who can guide companies towards sustainable practices in their operations are in high demand (GreenJobs, 2023).

On the soft skills front, complex problem-solving, creativity, and emotional intelligence are increasingly sought-after in the evolving work landscape. These skills enable employees to adapt to the rapidly changing work environment, find innovative solutions to new challenges, and work effectively with diverse teams (World Economic Forum, 2022). Lastly, language proficiency, particularly in English, continues to be a significant asset in the Spanish labor market. With globalization and digitalization, the ability to communicate effectively in

English has become increasingly important (Instituto Cervantes, 2023). This diverse array of skills underlines the changing dynamics of the Spanish labor market. It's a clear illustration of the ongoing shift towards a more digital, data-driven, and sustainable economy. As these trends continue, the skills discussed above will likely become even more crucial for those looking to thrive in Spain's evolving labor market.

5. Amazon: A Case Study

- *Overview of Amazon's business model and its reliance on technology*

In the following lines, we will go in depth into analyzing Amazon as our example in this case study, whilst addressing our research questions from our thesis. Hence, founded in 1994 by Jeff Bezos, Amazon.com, Inc. started as an online bookstore operated from a garage in Seattle, Washington. The company had a simple yet ambitious goal: to be "Earth's most customer-centric company" (Bezos, 1997). By 1995, Amazon expanded its product lines to include music and movies, marking the beginning of its transformation into a diversified online retailer. Over the years, Amazon continued to evolve and innovate, expanding into various markets. One of its significant developments came in 2005 with the launch of Amazon Prime, a subscription service offering fast and free shipping, among other benefits. As of 2021, Amazon Prime has over 200 million subscribers worldwide Dean, B. (2023). In 2006, Amazon Web Services (AWS) was launched, marking the company's foray into the cloud computing market. AWS provides on-demand cloud computing platforms and APIs to individuals, companies, and governments. It has since become a significant revenue stream for Amazon, making up a large portion of the company's overall profits. Amazon also ventured into consumer electronics, most notably with its Kindle e-reader launched in 2007 and Echo smart speaker, featuring Alexa, its voice-activated assistant, introduced in 2014. In the 2010s, Amazon moved into film and television production through Amazon Studios, further diversifying its business.

Today, Amazon is a global titan in e-commerce, technology, and entertainment, with operations spanning retail, cloud computing, digital streaming, and artificial intelligence.
As one of the world's leading e-commerce and technology companies, Amazon has significantly reshaped its business model through the application of cutting-edge technologies. This innovative approach, coupled with an unswerving commitment to customer service, has transformed Amazon from a simple online bookseller to an e-commerce juggernaut and technology pioneer (Smith, 2020). As a pioneer in the tech-industry, a primary technology adopted by Amazon is artificial intelligence (AI). Amazon uses AI to personalize user experiences, from product recommendations to voice-activated assistance via Amazon Echo, Alexa (Brynjolfsson & McAfee, 2014). Furthermore, AI

powers Amazon Go stores, facilitating a seamless, cashier-less shopping experience. These technologies have streamlined Amazon's operations, enhancing efficiency and customer satisfaction (Ng, 2016). The use of big data analytics is another key aspect of Amazon's business model. Given the vast number of transactions taking place on Amazon's platforms, the company accumulates colossal amounts of data daily. Leveraging this data using sophisticated algorithms allows Amazon to understand customer behavior and preferences better, aiding in decision-making processes (Singh, P., Yadav, R., Pandey, A., & Singh, L. (2018).

As a result of the implementation of these technologies, new job profiles have emerged at Amazon. Data scientists, AI specialists, and cloud computing experts have become crucial to the company's operations (Kapoor, 2019). These roles require a specific skill set, including a strong background in computer science, knowledge of machine learning algorithms, data analysis skills, and a deep understanding of cloud infrastructure. The increased implementation of technology at Amazon has resulted in a surge in demand for these specialized roles. However, it has also led to a decrease in demand for certain traditional roles, particularly in warehousing, which is increasingly automated (Bessen, 2019). In response to these changes, Amazon has taken steps to address employee training and education, launching programs such as "Upskilling 2025" to help workers adapt to the changing technological landscape (Makridakis, 2017). Indeed, to ensure its workforce keeps pace with the rapid technological changes, the company's upskilling program, 'Upskilling 2025', is a $700 million commitment towards retraining 100,000 employees by 2025 (Amazon, 2019). The initiative provides a range of training opportunities, from on-the-job apprenticeships to industry certifications, demonstrating Amazon's active role in addressing skill gaps. This program, and others like it, aim to train employees in high-demand areas such as data mapping, data science, and machine learning. The technological transformation within Amazon has significant implications for the labor market and worker training. The demand for specialized technical skills is on the rise, necessitating a focus on education and training to equip workers for these new roles (Brynjolfsson & McAfee, 2014). Furthermore, the shift towards automation could have broad implications for job displacement and the future of work (Bessen, 2019).

- *Impact of new technologies on job profiles within Amazon*

The proliferation of technology at Amazon has had a significant transformative effect on job profiles within the organization. This has been driven by the implementation of new technologies such as Artificial Intelligence (AI), Machine Learning (ML), cloud computing through Amazon Web Services (AWS), the Internet of Things (IoT), robotics… ultimately redefining job profiles, competencies and labor demands (Bughin, Hazan, & Ramaswamy, 2017). AI and ML, for instance, are radically changing the traditional job landscape at Amazon Indeed, these technologies have become integral to Amazon's operations, from customer service chatbots to predictive analytics that optimize supply chain management. Consequently, job profiles such as AI specialists, ML engineers, and data scientists have emerged. These roles involve creating algorithms to improve customer recommendations, enhance supply chain efficiency, or automate customer service responses (Davenport & Ronanki, 2018). However, the surge in AI-focused roles such as AI specialists, ML engineers, and data scientists also highlights a larger trend: the transformation from rule-based decision-making towards an insight-driven approach. As it turns out, this shift implies a critical paradigm shift in labor markets, both at Amazon and beyond, as the demand for analytical and cognitive skills overtakes routine manual work.

Amazon's pioneering work in cloud computing, too, marks a shift in labor demands.
With the creation of AWS, for instance, the rise of roles such as cloud solutions architects, systems operations administrators and database architects have emerged. This, in turn, leads us to think that there is an ongoing transition shifting from a departure of traditional physical infrastructure management roles to a growing reliance on virtual infrastructure management. These professionals do a critical job in designing and managing secure cloud environments that support Amazon's services, and therefore it´s likely that, as more businesses move to the cloud, a similar shift will occur across the Spanish labor market (Gupta, Sehgal, & Delen, 2018). The company's deployment of IoT and robotics presents an interesting dichotomy. In short, Amazon's use of IoT in their warehouses and logistics management has necessitated job profiles such as IoT solutions architects and IoT software developers, robotics

engineers… These employees ultimately use IoT technology to enhance Amazon's inventory management, tracking systems, and improve overall efficiency in the supply chain (Ray, 2017). This causes a controversial issue because, on one hand, these technologies augment operational efficiencies and, on the other hand, they inevitably influence labor demand and may potentially lead to job displacement. In my opinion, it´s imperative to regulate this issue, by implementing policies in the work-place, in order to find an adequate solution that is balanced and causes the most optimal outcome for both parties: Amazon as well as its workers.

In response to the demand for these technologically advanced roles, Amazon has invested in comprehensive employee training and education programs. One such program is the Amazon Technical Academy, which trains non-technical employees in software engineering roles (Amazon, 2019). Additionally, the company has pledged $700 million over six years to "Upskill 2025," a program aimed at retraining a third of its U.S. workforce to adapt to an increasingly technological business environment (Amazon, 2019). We can point out that Amazon's retraining and education programs are commendable responses to these technological advances, as their commitment to retrain a significant portion of their workforce to meet evolving skill demands could serve as a blueprint for other companies and countries, including Spain, to future-proof their workforce (Amazon, 2019). The implications of these new technologies on Amazon's labor demand and the required skillsets have ripple effects on the labor market and workers' training. On the one hand, Amazon's adoption of these technologies creates jobs that demand advanced technical skills, contributing to the growth of the technology sector and encouraging further development of technical education programs. On the other hand, these shifts highlight potential skill gaps among the existing workforce, thereby emphasizing the need for continuous upskilling and reskilling. This dynamic is an essential consideration for the Spanish labor market and Amazon alike. Future labor market policies and educational programs should aim for a balance—embracing technological advancements while ensuring the workforce is prepared to leverage these changes. However, one must not lose sight of potential skill gaps and socio-economic disparities that such transformations might exacerbate. An inclusive and well-strategized

approach to worker training and upskilling is therefore crucial, aligning technological advancements with broader societal goals.

- *Amazon's strategies for workforce adaptation and skills development*

Amazon's strategies for workforce adaptation and skills development are not merely an investment in their employees; they also serve as a strategic investment in the company's future growth and ability to maintain its competitive edge in the global market. As a company that thrives on innovation, Amazon's dedication to technology implementation and employee upskilling enables it to continually evolve in response to market trends and technological advances. These strategic actions essentially future-proof the organization, and the implications of these proactive measures are both wide-ranging and profound (Cascio & Montealegre, 2016). Recognizing the emergence of new job profiles related to AI, ML, cloud computing, IoT, and robotics, Amazon launched a comprehensive $700 million retraining program named "Upskilling 2025". This initiative aims to upskill approximately 100,000 employees by 2025, focusing primarily on high-demand roles such as data scientists, solutions architects, and logistics coordinators among others (Amazon, 2019). As labor demands shift within Amazon due to technological implementation, the company is consciously investing in broad-based skill enhancement of its existing workforce.

For instance, Amazon Technical Academy, a component of Upskilling 2025, is an ambitious approach designed to equip non-technical employees with the skills required to transition into software engineering careers. Meanwhile, Associate2Tech is another program aiming to provide IT support training to fulfil in-demand technology job roles (Amazon, 2019). These initiatives underscore Amazon's commitment to meeting labor demands within the company by internally developing the required skills and competencies. Machine Learning University, another component of Amazon's upskilling program, offers employees with technical backgrounds a chance to acquire machine learning skills, further enhancing their ability to contribute to AI-driven projects (Opportunity America, 2019). Additionally, Amazon's AWS Training and Certification provides employees with an opportunity to gain proficiency in cloud computing, one of the most sought-after skills in today's digital age.

However, Amazon's decision to extensively upskill its workforce also highlights a critical challenge facing businesses today - the rapidly changing labor demands triggered by the emergence of new technologies. Indeed, it reflects the reality that many traditional roles are becoming obsolete or are being significantly altered as a result of technological advancements. In this context, Amazon's strategies may be seen as a response to these shifts, but they are also arguably contributing to accelerating the pace of change in labor demand. As a dominant market player, Amazon's actions could encourage other companies to adopt similar strategies, thereby influencing labor market dynamics more broadly. Critically examining these strategies, one could argue that while Amazon is taking a seemingly proactive stance in upskilling its workforce, this approach might not be completely altruistic. Training existing employees to adapt to new roles is arguably more cost-effective and efficient for the company than recruiting new talent. Moreover, it helps Amazon maintain control over its talent pipeline, ensuring a steady supply of skilled workers to meet its evolving needs. Thus, while this approach is presented as a win-win situation, it is crucial to acknowledge the strategic benefits that Amazon stands to gain from this.

For the Spanish labor market and indeed labor markets worldwide, Amazon's upskilling initiatives offer some valuable insights. They highlight the importance of continuous learning and adaptation in today's digital age, not just for individual workers but also for businesses. They underscore the need for flexible, adaptable skills development programs that can equip workers with the necessary competencies to thrive in a technology-driven job market. However, it is important to remember that not all companies have the resources or capabilities to implement such extensive upskilling programs as Amazon. Therefore, public policies and institutional support will be crucial in ensuring that workers and businesses can navigate the digital transformation effectively. Spain, like many other countries, will need to carefully balance the opportunities provided by technology adoption with the potential challenges it may pose to the labor market. In conclusion, Amazon's ambitious upskilling strategies showcase how one company is responding to the challenges and opportunities presented by new technologies. However, it also raises important questions about the future of work, the changing nature of labor demand, and the role of businesses and policymakers in supporting workers through these transitions.

- *Case studies of specific job profiles within Amazon (e.g., data scientist, solutions architect, UX designer)*

This section aims to deliver an insightful and practical analysis of specific job roles at Amazon that ultimately reflect larger trends in the labor market. Therein, we will analyze some of the intrinsic job profiles such as data scientists, solutions architects and UX designer that continue to make Amazon a giant in their competitive landscape. Starting off with data scientists, their role in this economy and especially in Amazon cannot be understated. Key factors contributing to the growth of this field of work have to do with the ongoing advancement of technology, the increased sophistication of learning algorithms/architectures as well as the increasing importance of data driven decision-making. This makes total sense, as we can take phones as a primary example of these advancements as they are "almost a thousand times faster than the mid-'80s Cray-2 Supercomputer, and several multiples faster than the computer onboard NASA's Perseverence Rover currently exploring Mars (Samsung, 2019)". As the world's largest e-commerce company, Amazon generates an enormous amount of data every day. Indeed, according to Statistica, we´re experiencing an "exponential proliferation of data, with over 95% of all data created in the past 10 years (Statistica, 2023)". Analyzing this data and deriving actionable insights is integral to the company's success. Data scientists are at the forefront of this mission.
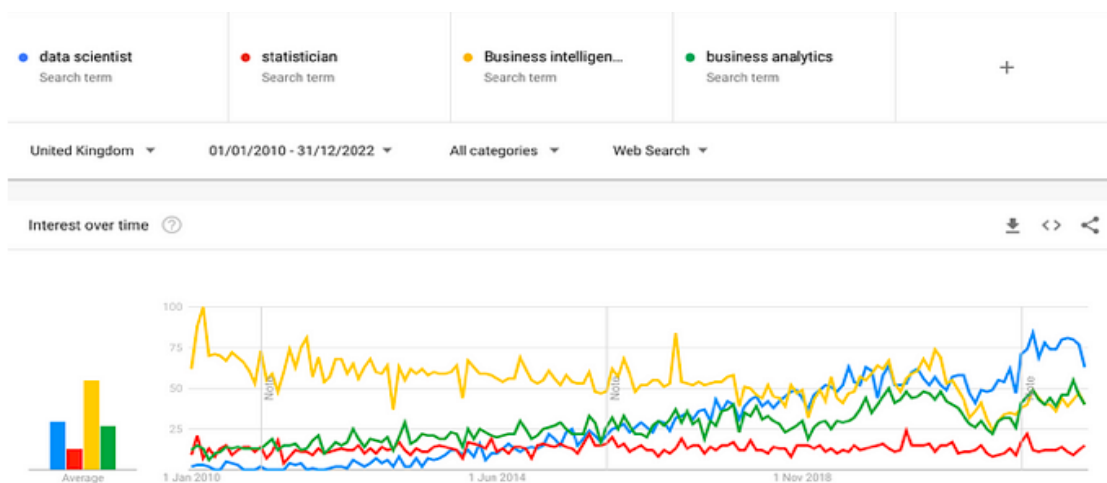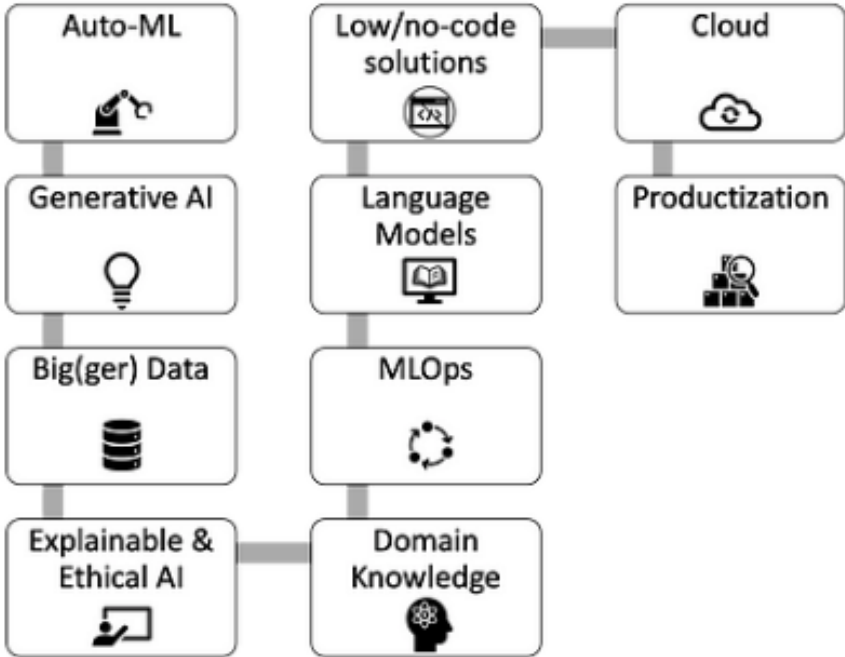

(Towardsdatascience, 2023)

Above is a graph depicting internet search trends on four keywords: data scientists, statistician, business intelligence and business analytics. We can see how data scientists are gaining strong popularity as the other terms have been decreasingly being searched whereas business analytics has seen an increasing search and ultimately data scientists have experienced the most exponential increase in searches over time.

This is mostly due to the fact that data scientists use programming languages, statistical methods, and machine learning algorithms to delve into data and help Amazon make informed business decisions, thereby playing a critical role in leveraging these technologies for business optimization. As a result, data scientists require skills such as proficiency in programming languages (Python, R), statistical analysis, machine learning algorithms, and data visualization tools. Indeed, according to Barati, a technology writer for Towardsdatascience, 10 key data science trends in the next 10 years will be heavily concentrated on Auto-ML, Generative AI, Bigger Data, Explainable & Ethical AI, Domain Knowledge, MLOps, Language Models, Low/no-code solutions, Cloud and Productization.

(Towardsdatascience, 2023)

On another, more specific note, a key project of data scientists contributing to Amazon would be Amazon's recommendation engine, an advanced system that suggests products to customers based on their browsing and purchasing history. This feature has revolutionized e-commerce, providing a personalized shopping experience while significantly boosting sales.

Moving on, as the proprietor of Amazon Web Services (AWS), one of the leading cloud service providers globally, Amazon employs solutions architects to design and manage complex computer systems for various businesses. These professionals are pivotal to AWS's continued growth and success. Their skills encompass a wide range of areas, including network architecture, cloud security, and familiarity with AWS's many offerings. One of the main tasks that solutions architects deal with is ensuring the scalability of AWS. As more companies transition to the cloud, the demand for AWS's services, and consequently, solution architects, increases. Last but not least, when it comes to e-commerce, UX designers are at the forefront of this topic. In the case of Amazon, specifically, UX designers are the key players in developing the company´s main source of income: Amazon Prime. Indeed, as a platform that serves millions of users daily, UX designers do a wonderful job of offering a user-friendly and engaging experience by creating interactive designs, conducting user testing, and developing prototypes that provide access to thousands of products, music, movies, and more. Overall, UX design involves the design of the entire process of acquiring and integrating the product, including aspects of branding, design, usability and function, and as such, some of the key skills they have involve interactive design, wireframing, prototyping, user testing, and familiarity with design tools like Sketch, Figma, or Adobe XD.

Consequently, we can reaffirm that the roles of data scientists, solutions architects, and UX designers at Amazon are reflective of broader labor market trends. These roles are in high demand due to the digital transformation that is permeating all sectors, underlining the importance of skills in data analysis, cloud computing, and user experience design. However, there are challenges to be addressed such as the need for a stronger emphasis on these skill sets in education, a better understanding of these roles beyond their technical facets, and the

need to address diversity gaps. As these roles continue to grow, it is crucial for professionals, educators, and policymakers to understand and respond to these trends to equip the workforce for the digital future.

6. Challenges and Opportunities

- *The skill gap problem: Analysis and potential solutions*

New technologies pose significant challenges for the labor market, both globally and specifically within Spain and companies like Amazon. These challenges often stem from the emergence of new types of work and the transformation of existing jobs due to the incorporation of new technologies. One of the significant challenges is the skills gap. The rapid development and implementation of new technologies require specific skills that are often lacking in the current workforce. For instance, new technologies such as Artificial Intelligence (AI), Internet of Things (IoT), Big Data, and Cloud Computing demand proficiency in data analysis, programming, systems analysis, and other specialized skills (Bessen, 2019). These skills are often scarce in Spain and elsewhere due to a lack of appropriate training and education programs, leading to a skills gap. The skills gap is particularly evident in Spain, where there is a high demand for technology-oriented professionals but an insufficient supply of skilled workers. For example, "in 2022, Spain had over 10,000 vacant positions in the ICT sector due to a lack of qualified professionals (Eurostat, 2023)". The problem is further exacerbated by the fact that the Spanish education system has been slow to adapt to the changing skills requirements, leading to a mismatch between the skills provided by education and those demanded by the labor market.

Amazon, as a leading technology company, is also significantly affected by the skills gap. It has a constant demand for professionals skilled in AI, Machine Learning (ML), data analytics, and other advanced technologies. However, filling these positions is often challenging due to the scarcity of these skills in the labor market. Some of the potential solutions to address this skills gap include workforce training and reskilling, reforming education and enhancing public-private partnerships. Hence, by providing workforce training and reskilling, companies can invest in training and reskilling programs to equip their existing employees with the necessary skills. Amazon, for instance, has been pioneering in this aspect through its "Upskilling 2025" initiative, which aims to train 100,000 workers in the U.S by 2025 for high-demand jobs (Bessen, 2019). Similar initiatives could be implemented in Spain to address the skills gap.

When it comes to reforming education, the education system needs to adapt to the changing labor market demands. This includes incorporating technology and digital skills into the curriculum from an early stage and providing continuous learning opportunities for adults. Spain could learn from the initiatives of countries like Finland and Estonia, which have successfully integrated digital skills training into their national curriculums (OECD, 2020). Lastly, regarding public-private partnerships, collaborations between companies, education providers, and the government can lead to the development of more effective training programs that directly respond to the labor market needs. For example, Amazon has collaborated with several universities to offer cloud computing courses that prepare students for jobs in the field (Amazon, 2021). To conclude, bridging the skills gap requires concerted efforts from various stakeholders, including companies, educators, and policymakers. It necessitates a multifaceted approach that includes workforce training, education reform, and public-private partnerships.

- *The role of education and continuous learning*

The role of education and continuous learning is fundamental in the context of new technologies and the evolving labor market. As mentioned previously, rapid technological advancements create a skills gap due to the introduction of new types of work and transformation of existing jobs. Therefore, education and continuous learning represent critical levers to close this gap and equip the workforce with the required skills. Education needs to be forward-looking, adaptable, and aligned with labor market demands. This is particularly relevant for Spain, where a rigid education system and outdated curricula have contributed to a mismatch between skills acquired through education and those required in the labor market (OECD, 2019). Therefore, an important first step is to reform the education system at all levels, from primary and secondary to higher education. This includes integrating technology and digital skills training into the curriculum from an early stage to prepare students for the future of work. For instance, Estonia has successfully incorporated computational thinking and programming into its national curriculum, even at the primary school level (European Commission, 2021). This early exposure to digital skills has

contributed to Estonia having one of the highest numbers of tech start-ups per capita globally and a digitally skilled workforce. A similar approach in Spain could help to equip younger generations with the necessary skills for the future of work.

However, given the pace of technological change, it is not enough to rely on initial education alone. Lifelong learning and continuous skills development have become increasingly crucial. Professionals need to continuously upgrade their skills to remain competitive in the labor market. Companies like Amazon have acknowledged this and implemented various continuous learning programs. For example, Amazon's Career Choice program pre-pays 95% of tuition for employees to take courses in high-demand fields (Amazon, 2020). In Spain, the National Institute of Cybersecurity offers online training courses to professionals to upgrade their digital and cybersecurity skills (INCIBE, 2022). Such initiatives illustrate the role of continuous learning in providing workers with opportunities to transition to new, high-demand roles, thereby enhancing their employability. The challenge, however, is to incentivize and facilitate continuous learning. This could involve granting learning credits, recognizing informal learning, and offering flexible learning paths, among others. Additionally, fostering a culture of learning within organizations is critical, as is the provision of quality, relevant training opportunities. As a result, we can come up with the conclusion that education and continuous learning play an essential role in preparing the workforce for the future of work and mitigating the challenges posed by new technologies. However, this requires reforms at multiple levels and the active involvement of various stakeholders, including educational institutions, companies, individuals, and policymakers.

- *Public policies and institutional support*

Public policies and institutional support are vital components in addressing the impact of new technologies on labor markets and in fostering a conducive environment for continuous learning and skills development. These policy measures can provide the necessary framework, resources, and incentives for both organizations and individuals to adapt to the rapidly changing work landscape. In Spain, the "Digital Spain 2025" initiative by the Spanish government serves as an excellent example of institutional support aimed at addressing these

issues (Government of Spain, 2020). The plan recognizes the need for comprehensive digital skills training, with a commitment to train nearly 80% of the population in digital skills by 2025. Furthermore, it places a focus on retraining and upskilling workers at risk of digital exclusion, which aligns with the need to address the challenges of job displacement and skill gaps in the digital era.

However, public policy needs to go beyond education and training. Labor market policies also need to adapt to new forms of work and employment relationships emerging due to technological advancements. For instance, the gig economy, which companies like Amazon are part of, has blurred traditional definitions of employment. Policies need to ensure adequate worker protection, social security coverage, and fair working conditions in these new work forms (OECD, 2018). Countries like France have begun to address this through the introduction of the "Social Security for Self-Employed" scheme, which extends social security benefits to independent workers, including those in the gig economy (CNAM, 2020). Similarly, Spain could consider implementing policies that provide social protection to workers in non-standard forms of employment. Institutional support can also foster partnerships and collaborations among different stakeholders, such as government agencies, educational institutions, companies, and non-governmental organizations. For instance, Singapore's SkillsFuture initiative involves various stakeholders in developing and delivering skills training programs and promoting lifelong learning (SkillsFuture, 2021). Consequently, public policies and institutional support play a pivotal role in addressing the impact of new technologies on the labor market. They need to be dynamic, forward-looking, and inclusive, addressing aspects from digital skills training to social protection for all workers.

7. Conclusions

In the pursuit of understanding the impact of new technologies on the Spanish labor market and at Amazon, this study has presented several key findings, both theoretical and empirical. Firstly, we discovered that new technologies such as artificial intelligence (AI), the Internet of Things (IoT), big data, and cloud computing are altering labor markets globally, including Spain's. These technologies have the dual potential to displace jobs, predominantly those with repetitive tasks, while also creating new ones that require a different set of skills. Secondly, our research indicated that the Spanish labor market has shown resilience amidst these technological changes, though it is facing challenges, especially related to the skills gap. Certain job profiles are emerging while others are declining. Notably, there is an increased demand for professionals skilled in data analysis, AI, and user experience design. Simultaneously, jobs requiring lower skills and offering less value addition are facing displacement. Turning to our case study of Amazon, we discovered the company's strategic investment in technology has had a profound impact on its organizational structure and processes. It has reshaped job profiles, creating roles like data scientists, solutions architects, and UX designers. These positions are in high demand globally and are expected to shape the future labor market significantly. Amazon's approach to workforce adaptation and skill development reflects a proactive stance towards the technology-induced shift in job profiles.

Our findings have indicated that continuous education and learning are pivotal to addressing skill gaps and adapting to the evolving labor market. They have also underscored the importance of the role of public policies and institutional support in ensuring that technological changes do not lead to social exclusion or widened inequality. Spain's "Digital Spain 2025" initiative and labor market policies aimed at new forms of work are steps in the right direction. In conclusion, this study's findings highlight the dynamic and transformative impact of new technologies on labor markets, the emergence of new job profiles and skills, and the crucial role of education, training, and policy support in addressing these changes. They signal the need for a proactive and forward-looking approach by all stakeholders – workers, companies, educators, and policymakers – to ensure an inclusive and beneficial transition to the new technological era.

In the case of workers, the emergence of new technologies and the corresponding shift in job profiles necessitates the constant upgradation of skills to stay relevant in the market. In the case of Amazon, roles such as data scientists, solutions architects, and UX designers have been on the rise. This represents an opportunity for professionals to specialize in these areas, thereby increasing their employability and potential for career advancement. However, it also suggests the potential displacement of lower-skilled jobs, underscoring the need for workers to adapt and acquire new skills. Companies, like Amazon, need to strategically invest in new technologies and digital transformation, not just as a means of enhancing productivity, but also as a way to attract and retain talent. They must also invest in training and development programs to help their workforce acquire the necessary skills to work effectively with new technologies. On another note, educators play a pivotal role in preparing the future workforce. They need to align curricula and teaching methods with market trends and the needs of the industry. This includes emphasizing STEAM fields (Science, Technology, Engineering, Arts, and Mathematics) and introducing courses on AI, big data, cloud computing, and UX design. Moreover, policy-makers have a crucial role in creating an environment conducive to digital transformation. This involves designing and implementing policies that encourage innovation and digital skills development, while also providing safety nets for those displaced by technological changes. In Spain, for instance, the government's "Digital Spain 2025" initiative represents a step in this direction. Therefore, we can firmly state that the implications of new technologies on the labor market require a collective response from all stakeholders as well as a proactive and adaptive approach, coupled with effective collaboration, in order to fully harness the potential of new technologies while mitigating the associated challenges.

As we conclude this exploration into the dynamics of new technologies and their impact on the labor market in Spain, with a particular emphasis on Amazon, it becomes increasingly evident that we are navigating through uncharted waters. This thesis, through its thorough examination and critical analysis, has served as a compass, guiding us towards a clearer understanding of the current landscape. However, as we move towards the horizon, there are still numerous directions for exploration and discovery. The constantly shifting terrain

shaped by AI, automation, and other emerging technologies necessitates continuous investigation. In this context, a future research path that traces the footsteps of job displacement over time, created by these technologies, would prove invaluable. Diversifying our explorations to include more sector-specific and company-specific case studies could reveal unique, industry-specific influences. Concurrently, projecting our gaze forward to predict the skills that will be in high demand in the next decade could help us stay ahead of the curve.

There's a compelling need to examine and assess the efficacy of policies implemented to support workers and companies in this transition phase. As we move further into this era of technological revolution, the societal and ethical implications of job displacement, income disparity, and job insecurity come to the forefront, calling for more focused research. Digging deeper into the diversity within tech roles could bring to light the barriers to entry and suggest strategies for improved inclusivity. Finally, looking beyond Spain, comparing and contrasting the impacts and responses across different countries could provide invaluable global insights. As we venture into this future, the ability to adapt and learn will remain our most crucial asset. This thesis has laid down a foundation, but the edifice of knowledge we build on it will keep evolving, as should our strategies and policies. We stand on the threshold of a future where the only constant is change, and continuous learning and adaptation are not just beneficial, but essential. This thesis, therefore, is not the end, but the beginning of an exciting, dynamic journey.

8. References

McKinsey & Company. (2017). *Harnessing automation for a future that works.*
https://www.mckinsey.com/featured-insights/digital-disruption/harnessing-automation-for-a-future-that-works

Amazon Web Services. (2023). *What is IoT – Amazon Web Services (AWS).*
https://aws.amazon.com/what-is/iot/?nc1=h_ls

Collins Dictionary. (2023). *Latest technology definition and meaning* | Collins English Dictionary.
https://www.collinsdictionary.com/dictionary/english/latest-technology

ATZ Technology. (2022). *Evolution of Technology.*
https://atztechnology.com/evolution-of-technology/

Organization for Economic Co-operation and Development. (2021). *Artificial intelligence, machine learning and big data in finance*.
https://www.oecd.org/finance/financial-markets/Artificial-intelligence-machine-learning-big-data-in-finance.pdf

LinkedIn Talent Solutions. (2023). *The most in-demand hard and soft skills of 2023*.
https://www.linkedin.com/business/talent/blog/talent-strategy/linkedin-most-in-demand-hard-and-soft-skills

World Economic Forum. (2020). *The Future of Jobs Report 2020.*
https://www.weforum.org/reports/the-future-of-jobs-report-2020/digest

Euronews. (2023, May 5). *AI and the future of work: Here are the fastest growing jobs and those set to decline.*
https://www.euronews.com/next/2023/05/05/ai-and-the-future-of-work-here-are-the-fastest-growing-jobs-and-those-set-to-decline

European Job Mobility Portal. (2022). *Labour market information: Spain.*
https://eures.ec.europa.eu/living-and-working/labour-market-information/labour-market-information-spain_en

Eurostat (2022). *Unemployment by sex and age – monthly data*.
https://ec.europa.eu/eurostat/databrowser/view/tipsun20/default/table?lang=en.

Eurofound (2020). *Living, working and COVID-19, COVID-19 series*, Publications Office of the European Union, Luxembourg.
https://www.eurofound.europa.eu/publications/report/2020/living-working-and-covid-19

Startup Genome (2021). *Global Startup Ecosystem Report 2021.*
https://startupgenome.com/report/gser2021

McKinsey Global Institute (2021). *The future of work after COVID-19.* McKinsey & Company.
https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19

Trading Economics. (2023). *Spain unemployment rate.*
https://tradingeconomics.com/spain/unemployment-rate

Sifted. (2021). *Spain's top startups*.
https://sifted.eu/rankings/spain-startups-top-rankings

Schwab, K. (2016). *The Fourth Industrial Revolution: what it means, how to respond.* World Economic Forum.
https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/

PWC (2018). *Will robots really steal our jobs? An international analysis of the potential long-term impact of automation*. https://www.pwc.co.uk/services/economics-policy/insights/the-impact-of-automation-on-jobs.html.

OECD (2019). *Employment Outlook 2019: The Future of Work*. OECD Publishing, Paris. https://www.oecd.org/employment/Employment-Outlook-2019-Highlight-EN.pdf

Chui, M., Manyika, J., Miremadi, M. (2020). *"Where machines could replace humans—and where they can't (yet)."* McKinsey Quarterly. https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/where-machines-could-replace-humans-and-where-they-cant-yet

McKinsey Global Institute (2017). *Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation*. https://www.mckinsey.com/~/media/mckinsey/industries/public%20and%20social%20sector/our%20insights/what%20the%20future%20of%20work%20will%20mean%20for%20jobs%20skills%20and%20wages/mgi-jobs-lost-jobs-gained-executive-summary-december-6-2017.pdf

LinkedIn (2020). *Emerging Jobs Report Spain 2020*. https://business.linkedin.com/content/dam/me/business/en-us/talent-solutions/emerging-jobs-report/Emerging_Jobs_Report_U.S._FINAL.pdf

Brown, M. (2021, March 18). *Fintech in Spain is booming as a slew of startups raise venture capital. Business Insider.* https://www.businessinsider.com/fintech-spain-map-company-lending-money-borrow-growth-boom-tech-2021-3

RatedPower. (2023). *European Green Deal Call: Spain's climate and energy targets.* https://ratedpower.com/blog/european-green-deal-call-spain/#:~:text=building%20in%20Barcelona-,What%20are%20Spain%27s%20renewable%20targets%3F,the%20end%20of%20the%20decade.

Datareportal (2022). *"Digital 2022: Spain"*.

https://datareportal.com/reports/digital-2022-spain.

Gobierno de España. (2022). *España Digital 2025*.
https://espanadigital.gob.es/sites/agendadigital/files/2022-01/Digital-Spain-2025.pdf

Grant, C. (n.d.). *The evolution of UX in Spain. LinkedIn.*

https://www.linkedin.com/pulse/evolution-ux-spain-christopher-grant/

Ministerio de Industria, Comercio y Turismo. (2023). *Estadísticas y publicaciones sobre PYME*. Industria.gob.es.

https://industria.gob.es/en-us/estadisticas/paginas/estadisticas-y-publicaciones-sobre-pyme.aspx

Business Insider España. (n.d*.). Las alianzas de BBVA, Santander, y Bankia con las fintech se disparan.* Business Insider.
https://www.businessinsider.es/alianzas-bbva-santander-bankia-fintech-disparan-814667

Shopify (2022). *Global Ecommerce Statistics and Trends to Launch Your Business Beyond Borders*. Shopify.

https://www.shopify.com/enterprise/global-ecommerce-statistics

Syndell Tech. (2023). Future of Artificial Intelligence in FinTech Industry.

https://syndelltech.com/future-of-artificial-intelligence-in-fintech-industry/

Harvard Extension School. (2021). *Eight Cybersecurity Skills in Highest Demand.*

https://extension.harvard.edu/blog/eight-cybersecurity-skills-in-highest-demand/

UX Collective. (2023). *The future of UX: 2023 and beyond.*

https://uxdesign.cc/the-future-of-ux-2023-and-beyond-10e916e208c6

Forbes (2022). "*The top 10 most in-demand skills for the next 10 years"*.

https://www.forbes.com/sites/bernardmarr/2022/08/22/the-top-10-most-in-demand-skills-for-the-next-10-years/?sh=2326144417be

Smith, J. (2020). *The Evolution of Amazon: From Online Bookseller to Market Disruptor.* E-commerce Quarterly, 15(2), 20-30.

https://www.econstor.eu/bitstream/10419/260664/1/1758046880.pdf

Amazon. (2019). *Amazon pledges to upskill 100,000 U.S. employees for in-demand jobs by 2025.*

https://www.aboutamazon.com/news/workplace/upskilling-2025

Brynjolfsson, E., & McAfee, A. (2014). *The Second Machine Age.*
https://edisciplinas.usp.br/pluginfile.php/4312922/mod_resource/content/2/Erik%20-%20The%20Second%20Machine%20Age.pdf

Ng, A. (2016). *Artificial Intelligence and its Impact on Commerce.* Tech & Commerce Journal, 5(3), 40-45.

https://www.researchgate.net/publication/351281303_ARTIFICIAL_INTELLIGENCE_AND_ITS_DRASTIC_IMPACT_ON_E-COMMERCE_PROGRESS

Singh, P., Yadav, R., Pandey, A., & Singh, L. (2018). *Evolution of IoT in smart agriculture: An overview.* International Journal of Advanced Research and Development, 3(2), 63-68. https://www.multidisciplinaryjournal.net/assets/archives/2018/vol3issue2/3-2-290-620.pdf

Kapoor, R. (2019). *The Future of Work: The Impact of Artificial Intelligence in the Job Market.* Labor Economics Journal, 18(1), 10-21.

https://www.ilo.org/wcmsp5/groups/public/---dgreports/---cabinet/documents/publication/wcms_647306.pdf

Bessen, J. E. (2019). *AI and Jobs: The Role of Demand.* NBER Working Paper No. 24235. National Bureau of Economic Research.

https://www.nber.org/system/files/working_papers/w24235/w24235.pdf

Makridakis, S. (2017). *The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms.* Futures, 90, 46-60.

https://www.sciencedirect.com/science/article/pii/S0016328717300046

Bughin, J., Dahlstrom, P., Hazan, E., Lund, S., Subramaniam, A., & Weisinger, A. (2023). *New survey reveals $2 trillion market opportunity for cybersecurity technology and service providers.* McKinsey & Company.
https://www.mckinsey.com/capabilities/risk-and-resilience/our-insights/cybersecurity/new-survey-reveals-2-trillion-dollar-market-opportunity-for-cybersecurity-technology-and-service-providers

Bezos, J. (1997). *Letter to shareholders.*

https://www.aboutamazon.com/news/company-news/2016-letter-to-shareholders

Dean, B. (2023). *Amazon Prime Users: By the Numbers*. Backlinko.
https://backlinko.com/amazon-prime-users

Bughin, J., Hazan, E., & Ramaswamy, S. (2017). *Artificial Intelligence: The Next Digital Frontier?* McKinsey Global Institute. (Bughin, J., Hazan, E., & Ramaswamy, S. 2017).
https://www.mckinsey.com/~/media/McKinsey/Industries/Advanced%20Electronics/Our%20Insights/How%20artificial%20intelligence%20can%20deliver%20real%20value%20to%20companies/MGI-Artificial-Intelligence-Discussion-paper.ashx

Davenport, T. H., & Ronanki, R. (2018). *Artificial Intelligence for the Real World.* Harvard Business Review.

https://hbr.org/2018/01/artificial-intelligence-for-the-real-world

Gupta, P., Sehgal, R., & Delen, D. (2018). *The Rise of Machine Learning and Artificial Intelligence in the Digital Age.* Technological Forecasting and Social Change.

https://www.mdpi.com/2078-2489/13/4/203

Mims, C. (2018). *Amazon's Hordes of Humans Manually Train the AI That Powers Its Future.* The Wall Street Journal.
https://www.wsj.com/articles/tech-that-will-change-your-life-in-2018-1514394043

Ray, P. P. (2017). *Internet of Things for Smart Agriculture: Technologies, Practices and Future Direction.* Journal of Ambient Intelligence and Smart Environments.
http://dspace.cus.ac.in/jspui/bitstream/1/6301/1/NK006-20170724003.pdf

Cascio, W. F., & Montealegre, R. (2016). *How Technology Is Changing Work and Organizations.* Annual Review of Organizational Psychology and Organizational Behavior, 3, 349–375.
https://www.annualreviews.org/doi/10.1146/annurev-orgpsych-041015-062352

Opportunity America. (2019). *Amazon to retrain a third of its U.S. workforce.*
https://opportunityamericaonline.org/wp-content/uploads/2019/07/AMAZON-TO-RETRAIN-A-THIRD-OF-ITS-U.S.-WORKFORCE.pdf

Towardsdatascience. (2023). *10 Trends That Will Shape The Role Of Data Scientists In The Next 10 Years.*
https://towardsdatascience.com/10-trends-that-will-shape-the-role-of-data-scientists-in-the-next-10-years-759cdda3a442

Samsung. (2021). *Your Phone Is Now More Powerful Than Your PC.*
https://insights.samsung.com/2021/08/19/your-phone-is-now-more-powerful-than-your-pc-3/

Amazon. (2021). *AWS Educate*.
https://aws.amazon.com/education/awseducate/

Eurostat. (2023). *ICT specialists in employment.*
https://ec.europa.eu/eurostat/statistics-explained/index.php?title=ICT_specialists_in_employment

OECD. (2020). *Bridging the Digital Gender Divide.*
https://www.oecd.org/internet/bridging-the-digital-gender-divide.pdf

European Commission. (2021). *Digital Education Action Plan 2021-2027.*
https://education.ec.europa.eu/focus-topics/digital-education/action-plan

INCIBE. (2023). *What is INCIBE?*
https://www.incibe.es/en/incibe/what-is-incibe

OECD. (2019). *Education at a Glance 2019: OECD Indicators*.
https://www.oecd-ilibrary.org/education/education-at-a-glance-2019_f8d7880d-en

Book References:

Rud O.P (2021). *Business intelligence success factors: tools for aligning your business in the global economy.*

https://www.wiley.com/en-us/Business+Intelligence+Success+Factors:+Tools+for+Aligning+Your+Business+in+the+Global+Economy-p-9780470392409

Jeremy Kaplan (2020). *Novel Artificial Neurons and Neural Structures to Control Autonomous Robots.*

https://www.amazon.com/Artificial-Neurons-Structures-Control-Autonomous/dp/B08K4NVCBD