DIGITAL TRANSFORMATION STRATEGY & ARTIFICIAL INTELLIGENCE

IN HUMAN RESOURCES MANAGEMENT AND ORGANIZATION

by

Domenico Pio Ippolito, BBA, MEcon, MSc, MBA

DISSERTATION

Presented to the Swiss School of Business and Management Geneva

In Partial Fulfillment

Of the Requirements

For the Degree

DOCTOR OF BUSINESS ADMINISTRATION

SWISS SCHOOL OF BUSINESS AND MANAGEMENT GENEVA

MARCH, 2024

DIGITAL TRANSFORMATION STRATEGY & ARTIFICIAL INTELLIGENCE

IN HUMAN RESOURCES MANAGEMENT AND ORGANIZATION

by

Domenico Pio Ippolito

Supervised by

Jaka Vadnjal

APPROVED BY

Anna Provodnikova, PhD
_____
Dissertation Chair

RECEIVED/APPROVED BY:

_____
Admissions Director

Dedication

To my dad Piero, my mom Concetta, my partner Anna Maria, my brother Nicola and my best friend Antonio who have always supported me: to my family.

Acknowledgements

During these years as a doctoral student, I had the opportunity to tap into the knowledge and experience of a great number of individuals who all contributed to this dissertation and my professional development as a management scholar in one way or another. This dissertation was the biggest academic challenge I have faced in my studies. My sincere gratitude goes to my mentor, Dr Jaka Vadnjal, whose generous care, valuable advice, and continuous encouragement helped me carry out this project.

I thank him for the continuous strong support and guidance. He has always been available, providing very useful feedbacks and valuable suggestions, constantly challenging my ideas. His support, suggestions, experience, encouragement, and understanding made writing the dissertation an incredibly enriching learning experience. Thanks for his suggestions about content analysis.

I thank the company where I work, my colleagues and my clients who have made themselves available to bring their experience and, in general, all the people that contributed in one way or another to the completion of this dissertation.

I feel grateful to have received help from thirteen people who I interviewed.

Words cannot express the deep and profound feelings of gratitude I have for everyone who has supported me on this journey of self-discovery, learning and personal growth.

My deep love and thanks to my parents who have been profoundly supportive. I would also like to acknowledge my family members who have shared their love and support and helped to keep me laughing through the tough times.

Finally, I am grateful to the Swiss School of Business and Management, for the excellent organization in this doctoral research program.

Last but not least, my thanks go to the companies that granted me the data for realizing this dissertation.

ABSTRACT

DIGITAL TRANSFORMATION STRATEGY & ARTIFICIAL INTELLIGENCE

IN HUMAN RESOURCES MANAGEMENT AND ORGANIZATION

Domenico Pio Ippolito
2024

Dissertation Chair: Anna Provodnikova

Digital transformation in all its facets is a topic that has always intrigued and fascinated me, so that I want to study its evolution over time and its impact on some aspects of the company business, in particular the effect on HR corporate function, in my opinion the most important.

The set of changes that digital technology causes or influences in all aspects of human life must be considered as a real revolution. The backbone of digital transformation is made up of technology, which is increasingly irreplaceable in today's context. However, its unconditional and constant use in all organizational areas not only causes the introduction of increasingly cutting-edge tools in the management of daily activities, but generates irrepressible effects that involve the people present within a company and influence their way of approaching work.

v

The implementation by a company of a digital transformation strategy is an important decision, destined to be successful only when the company is able to understand the challenges and trends that the external environment proposes.

Considering dynamic capabilities is crucial for those involved in in the transformation process, as they explain the way and the reason why some companies are able to grasp and face more immediately the technological and innovative challenges proposed by market trends, defining themselves as leaders, while others are unable to deal with them suddenly.

Among the activities that have undergone changes following the introduction of Artificial Intelligence in the various operational processes are Talent Acquisition and Skills Training & Development.

The recruitment of candidates and the training of skills are becoming meaningful in this historical period due to the reassessment of the importance of motivation and satisfaction of candidates and employees following the selection process or the internal growth path. This dissertation aims to study the impact of digital transformation in organizations by providing a quantitative and qualitative analysis of the current relationship between the introduction and evolution of the digital tools, Artificial Intelligence and the KPIs used to evaluate the performance of the HR function and employee satisfaction. The objective is to understand how technology will change the human capital management, impact on the organization of work and skills that will be required to do the enhanced jobs in the digital age.

TABLE OF CONTENTS

CHAPTER I:

INTRODUCTION

1.1 Background of the study

"Clearly, the thing that's transforming is not the technology,

it's the technology that's transforming you"

Jeanne W. Ross

The quote by Jeanne W. Ross, principal researcher at MIT Sloan's Center for Information Systems Research, was great food for thought for the creation of the research activity of my dissertation.

Digital transformation in all its facets is a theme that has always intrigued and fascinated me, so as to give me the desire to study its evolution over time and its impact on some aspects of the company business, in particular the effect on one of the most important corporate functions of staff, the HR.

The aim of this dissertation is to provide a quantitative and qualitative analysis of the current relationship between the introduction of a technology that is at the present situation very popular, Artificial Intelligence, from here on out AI, and the KPIs used to evaluate the performance of the HR function and employee satisfaction that are part of it.

To achieve this goal and create a complete and exhaustive analysis of this topic, the document has been divided into three sections: the first is dedicated to literary review, the second to research methodology, while the third is dedicated to discussion of the results obtained in the research.

Within the literary review, a well-defined path was created whose fil rouge is constituted by the different aspects that characterize the Digital transformation. The first aspect to highlight is the definition of this phenomenon; although it may seem simple and intuitive in the eyes of those who study it only superficially, digital transformation is a real revolution, defined by Stolterman and Forst (2004) as the set of changes that digital technology causes or influences in all aspects of human life. The backbone of digital transformation is made up of technology, which is increasingly overflowing and irreplaceable in today's context. Nonetheless, its unconditional and constant use in all organizational areas not only causes the introduction of increasingly cutting-edge tools in the management of daily activities, but generates irrepressible effects that involve the people present within a company and their way of approaching work.

The implementation by a company of a digital transformation strategy is an important decision, destined to be successful only when the company is able to understand the challenges and trends that the external environment proposes. In this regard, two paragraphs have been inserted in the chapter relating to the literary review, one of which is dedicated to the technological trends of 2021 and their implementation in the various industries in order to determine the level of digital maturity, while the other, equally fundamental, dedicated to dynamic capabilities.

The topic of dynamic capabilities is crucial for those involved in digital transformation, as it explains the way and the reason why some companies are able to grasp and face more immediately the technological and innovative challenges proposed by market trends, defining themselves as leaders, while others are unable to deal with them suddenly.

Following this, the literature review focuses on the heart of the research which consists in the use of AI systems and more properly Machine Learning to support the activities of the HR function.

Machine Learning, a branch of AI, is a fascinating technology that flawlessly demonstrates that it is possible to replicate human decision-making through an algorithm. Despite this technology has expanded dramatically only in recent years, its origins date back to years in which being able to emulate human thought through a computer was a utopia.

The literarature review describes the origins, characteristics, benefits, risks and business applications of this technology that changes the work routine of many people day after day. Among the activities that have undergone changes following the introduction of AI in the various operational processes are Talent Acquisition and Skills Training & Development.

The recruitment of candidates and the training of skills are becoming very important in this historical period due to the reassessment of the importance of motivation and satisfaction of candidates and employees following the selection process or the internal growth path.

The theoretical treatment of these issues leads to the formulation of the research question, explained in the section relating to the research methodology.

In this part of the document, the practical objective of the research is explicitly clarified and the ways in which it was conducted are explained, i.e. a survey distributed to various HR executives of three companies belonging to apparently different sectors for target customers and market size, but at the same time very similar in terms of innovation.

The survey investigates, from general to particular, all perceptions, difficulties and quantitative assessments related to the use of AI systems for the development of HR activities, providing quantitative and comparable results regarding the KPIs monitored during the process of transformation.

The results obtained as outcome of this research are analyzed and discussed in the fifth chapter of the dissertation, within which useful indicators are calculated to compare what emerges from the results of the survey and to draw conclusions about the main advantages found by the three companies chosen as sample for the research.

1.2 Research questions

This study aims to describe the quantitative and qualitative impact of digital transformation strategy within the HR department. The general research question is:

Who will be the protagonist of the HR function at the end of the digital transformation implementation, the man or the machine?

Today, companies no longer look solely for "knowledge" to hire and processes to manage, but rather cultural and motivating skills that allow each person to do the job they want. In an era (post pandemic) in which it is necessary to find a new meaning to the profession, bringing the topic of talent back to its highest value and its most precious meaning is a priority shared by all and the paths to follow to achieve this objective can be different.

Further specifying the scope of the research, the following supporting research questions (SRQ) are formulated:

- SRQ 1: Is AI the enemy of HR?

- SRQ 2: Can software make up for a recruiter during the interview phase?

- SRQ 3: How can talent become a resource?

- SRQ 4: What concerns companies and HR managers the most?

CHAPTER II:

REVIEW OF LITERATURE

2.1 The digital transformation

2.1.1 Analysis of the phenomenon: definition and main concepts

The 21st century is characterized by the eruption of one of the most disruptive trends in history: digital transformation. Born during the fourth Industrial Revolution, also called Revolution 4.0, the digital transformation is penetrating not only in the daily life of each individual, but also in the whole economic system, in every component.

Before analyzing in detail the different facets and implications of this trend, it is important to define exactly the meaning of the term "digital" in the term digital transformation.

Notwithstanding different meanings are attributed to this term, the most relevant was developed by a study by Domer & Edelman (2015), which starts from the assumption that today everyone talks about "digital", but few are those who know its real meaning. For some executives it's just a technology issue, for others it's just a new way of interacting with customers, while for still others it's a new way of doing business. None of these three definitions are completely wrong, but such conflicting views can often lead to a lack of alignment on corporate orientation, which can result in fragmented activities and initiatives and unsatisfactory performance. Domer & Edelman's study therefore revises the concept of "digital" and divides it into three pillars:

1) Creation of value for the new frontiers of the business world;

2) Optimization of customer experience processes;

3) Establishment of the fundamental capabilities useful for supporting the entire business revolution.

6

More specifically, all organizations or all those who approach the digital world must be able to understand the challenges of the external environment and the new sources of value. This can mean developing the same business in other industries or starting a new business in the same sector; at the same time, being "digital" means having to be more attentive to the evolution of the customer decision journey process, or rather, to all the behaviors and expectations of consumers in the same business or in other businesses.

The final element, perhaps the most important, includes all those organizational and technological processes that allow companies to be agile and flexible, namely a new management mind-set and a new data processing and archiving structure.

The first studies talking about digital transformation date back to the early 2000s by Patel and McCarthy; however, these two scholars have not come to the true theory of the concept of digital transformation. To date, in fact, there is no real shared definition of digital transformation and digital disruption. Everyone theorizes these concepts based on the technologies used and the change implemented in the processes. Despite this, various organizations and scholars have tried to give order to the multitude of concepts concerning these issues and some fairly complete definitions have emerged.

One of these emerges from a study of 2011 conducted by the consulting firm Capgemini in collaboration with MIT Sloan Management, in which the digital transformation (DT) is defined as "the use of technology to radically improve the performance or the value of the companies" (Westerman et al., 2011). It clearly captures the meaning of DT, but the ingredients necessary to achieve it are not included. This is the perception that according to Schallmo and Williams (2018) emerges from any conceptualization of digital transformation: everyone focuses on technology, but few are attentive to what it takes to lead a true digital revolution.

As proof of this, we can analyze the definition provided by Knobel and Lankshear (2008), according to which digital transformation means the last level of digital literacy.

A further perspective was provided in 2006 by Stolterman and Croon Fors according to which "digital transformation is the set of changes that digital technology causes or influences in all aspects of human life".

Of course, these are not the only definitions of DT. Being a phenomenon in constant discovery and evolution, there is no lack of properly defined theories in the last decade unlike the previous ones; two interesting definitions, which describe this phenomenon not only as a set of technologies, but also as a set of modifications of certain processes aimed at achieving set objectives, belong to Lucas (2013) and Hess (2016).

According to Lucas (2013), digital transformation alters the traditional way of doing business by redefining business capabilities, processes and relationships. While, according to Hess (2016), it is connected to the changes that the implementation of new technologies can bring to the company business model, changing the offer of products or services, the organizational structure or the automation of processes. Each previous conceptualization has its own peculiarities and focuses on different themes; therefore, it is useful to identify the main characteristics of the digital transformation phenomenon in the corporate world:

- It is a set of changes that impact on the business processes, products and services offered by the company, taking into account organizational needs and external trends, both factors change over time;
- It aims to improve business performance especially over a long-term time horizon, through the implementation of projects aimed at increasing turnover, reducing costs, increasing customer satisfaction and improving the efficiency of some business processes;

- It concerns the company as a whole and not just some corporate functions. Furthermore, even if more properly the process is activated in a single function, the repercussions will be visible throughout the organization;

- The digital technologies used have an impact on people's work. They are placed at the center of the company system and technologies are only a tool to achieve the set objectives more effectively and flexibly (Hess, 2016).

At this point it is legitimate to ask what is the moment in which the introduction of a particular technology in business processes can be considered the starting point of a disruptive transformation, a typical characteristic of digital transformation that leads to sudden and radical changes; the alternative, on the other hand, would consist in a mere incremental improvement of the existing technology (Lucas, 2013).

The literature on digital transformation and the adoption of IT technologies offers several ideas to answer the previous question, including that of Dehning (2003). According to his theory, a disruptive technology must at the same time:

- Revolutionize the business model by redefining business capabilities, organizational relationships and business processes;

- Make strategic acquisitions to enter new markets or new businesses or to acquire new skills;

- Allow the use of IT technologies to change the way certain tasks are performed, in order to gain a competitive advantage.

The use of these criteria to classify the disruptiveness of a digital transformation requires an in-depth knowledge of the context and a high capacity for judgment, otherwise misalignments could arise between the evaluations of different raters.

Lucas, instead, proposes seven typical dimensions of a digital transformation and highlights the way in which they can influence individuals, companies and society.

9

Additionally, for a new technology to be classified as a transformation, it must impact at least three of the following dimensions.

Table 1. Transformation Criteria and Examples		
	Individual	**Firm**	**Economy/Society**
Process	A change in a personal process of more than half the steps (e.g., digital photography)	A change in a business process of more than half the steps (e.g., book publishing vs. e-books)	
New organizations		Creation of a new organization with a value of at least $100 million (as in Amazon, Facebook, and Google) or multiple organizations (as in Health Information Exchanges)	Creation of a new organization that changes at least two hours of individual behavior a day (mobile communications and web)
Relationships	A change in social relations affecting at least half of one's contacts or doubling the number of contacts (e.g., Facebook)	A change affecting at least half of relationships with other organizations or a doubling of the number of relationships (e.g., iTunes for Apple, e-books for Amazon)	A change affecting at least two hours of individual behavior a day related to social relations (e.g., Facebook, Twitter)
User Experience	A change in user experience involving at least 2 hours per day (e.g., Facebook)		
Markets	A change in at least half of one's vendors in a particular market (e.g., iTunes vs. CD purchases)	Entering or leaving at least one market served by the firm (a.k.a. idevices)	Creation of a new market with at least $100 million of transactions a year (such as music downloading, search advertising)
Customers	-	A change in which the firm serves at least 50% more customers (e.g., Amazon e-books, iTunes)	
Disruptive impact		A change that forces at least one competitor to move from a profit to a loss, exit a market, enter into a merger or declare bankruptcy (e.g., Neflix vs. Blockbuster, e-books vs. Borders, digital photography vs. Kodak)	Reduction of at least $100 million in transactions a year in a market (e.g., print newspaper circulation)

Table 1 Transformation Criteria & Examples

Source: Lucas Jr, Henry, et al., 2013

The discussion above suggests that the fulcrum around which digital transformation revolves is the adoption of digital technology, or rather the phenomenon of digitization, as opposed to the use of analogue technologies.

All these technologies such as the Cloud, Machine Learning, a subset of AI technologies, Big Data Analytics, E-Commerce, Social and new marketing systems, are therefore a fundamental driver of digital transformation. Their use, in fact, contributes to the achievement of a greater operational efficiency through a process managed consciously from management.

10

2.1.2 Main macro-trends

Digital transformation has undergone a strong acceleration in recent years and especially in recent months due to the Covid-19 pandemic. The latter has forced organizations to reinvent themselves, to change the way they do business, to accelerate the introduction of new strategies aligned with the new technologies used.

According to Newman (2020), the acceleration that digital transformation has had in 2020 has been greater than that of the last decade. The cause is clear: the pandemic has placed the entire economic system in front of an unprecedented challenge and needs to be urgently met, such as the need to have secure connectivity 24/7; furthermore, compared to the forecasts of the previous year, some predicted trends have undergone a significant acceleration, while others have not been able to face the context and have been overshadowed.

From Newman's research the macro-trends that guide the digital transformation emerge, namely:

• The introduction of the 5G: for several years there has been talk of the introduction of 5G technology to improve connectivity performance, but its operation had never really been implemented by telcos. Since smart-working, video conferencing and uninterrupted use of the cloud have become an integral part of the days of most of the population, the need has arisen for a reliable and constant connection with greater bandwidth. To date, no type of business can be disconnected and 5G in 2024 is becoming part of everyone's daily life. Even if the advent of the pandemic initially interrupted the studies and experiments on 5G, in recent months a great effort has been made to make up for lost time and in fact in some markets such as China, 5G has now entered full capacity and the major manufacturers of smartphones and other technological devices (Samsung,

Apple, Xiaomi and Motorola) released 5G phones in every price range, in order to spread this technology in a widespread way.

• Evolution of Customer Data Platforms: the Customer Data Platforms help to collect data from all available sources, organize, label and make them usable for any user. In recent months there has been a strong growth in the use of these systems as companies seeking to operate more and more efficiently would struggle to organize and manage data from different sources, especially in a period in which business processes have become way more complex and fragmented also due to remote work. Several companies such as Adobe, SAP, Oracle, Microsoft, but also start-ups are investing a lot of capital to provide the market with new powerful CDPs and 2021 was the best year for their diffusion.

• Hybrid Cloud: The technologies of hybrid cloud help companies find the right balance for their cloud infrastructure needs. Over the past year, many organizations have invested in this technology, called the winning business architecture; among them are AWS (large public cloud provider), Azure, Google, IBM and Oracle. Cisco is also investing heavily in creating tools that enable simple connectivity between the cloud and on-premises data centers. The goal of the hybrid cloud is the ability to know how to manage a huge amount of data, without losing the effectiveness in terms of privacy, security and compliance. The Hybrid Cloud is one of the key innovations of the 2020-2021 two-year period and its takeover in the economic system has been accelerated due to the pandemic, although it was a trend already underway in previous years.

• Cybersecurity: the topic of cybersecurity had lost its position in the list of macro-trends of 2020, but with the advent of the pandemic it has once again become a topic of great importance. Hackers, in fact, have exploited the situation of instability and fragility to increase the attacks launched on the IT systems of companies. Statistics

(Newman, 2020) show that in the first quarter of 2020 alone, cyber-attacks on banks increased by 238%, while those on cloud servers by 600%. With a large percentage of workers who are not in the office and working on cloud networks even from personal devices, data security becomes a key issue to invest in and pay attention to. The development of AI and Machine Learning will play a central role as increasingly powerful algorithms capable of updating themselves and knowing how to dodge cyber-attacks will have to be developed.

•   Confidential Computing: it consists in encrypting the entire process, not just the data, creating different levels of security suitable for protecting all types of sensitive information. The Confidential Computing Consortium together with Google, Microsoft, IBM, Alibaba and VMware is developing new protocols in this regard.

•   Smartworking - New Normal: smart-working is now defined as the new normal of the working context. Before the pandemic exploded, only a few companies, the most internationalized and advanced from an organizational point of view, allowed high levels of flexibility in terms of working hours and spaces. In today's context, however, in which all companies have been forced to have their employees work from home, there have been many requests from employees to be able to extend the period of agile work even after the pandemic. The heyday of programs like Microsoft Teams, Zoom, Meet, Webex is therefore not over yet. Companies are investing to provide their employees with all the tools they need to do their work from home, so this trend will continue at least for the next few years. This is not the only factor to consider: smart-working is literally emptying the big town, the fulcrum of the economy. In fact, workers are moving to places with lower cost of living such as suburban or rural areas. Consequently, it is the duty of telecommunications companies to equip these areas with connectivity capable of supporting even a higher number of accesses than what happened a few years ago.

• Democratization of the Artificial Intelligence on a large scale: until a couple of years ago, AI was a tool reserved for scientific studies or advanced companies specialized in the sector. The pandemic, on the other hand, has triggered an acceleration of the democratization of AI, which has become a tool used by governments, large and small businesses to seek an answer to the situation of uncertainty. Many scholars argue that AI will be a trend of the future; this is incorrect because it is already present in the daily life of each of us: just think of the meta-data used by Netflix to suggest content to its subscribers, or the products suggested on Amazon that appear based on previous searches (Newman, 2020).

AI will acquire more and more power in everyone's life; data will be collected on purchases, eating habits and on-demand entertainment, these will then be subjected to complex processing and algorithms will be created capable of improving any type of work process and daily routine.

These trends will constitute the near future of the world of digital transformation in society in general but above all in the company. At the same time, not all organizations are approaching digital transformation with the same speed and more properly to the trends mentioned above. In this regard it is important to introduce the approach that Altimeter consultants use to measure the level of digital maturity. When this approach was introduced in 2016, many organizations had recently begun to immerse themselves in the world of digital transformation: for example, AI was not present among the trends being measured five years ago, while today it is an indispensable driver for digital transformation.

According to Altimeter research, it is possible to measure and compare the digital maturity phase of organizations, resulting from the efforts in terms of digitization of business processes.

14

Stage 1:
Making the Case

In this stage, companies are dipping their toes into digital transformation. They engage in early customer-facing experiments to help make the case for greater investment in digital platforms.

Stage 2:
Developing Foundations

Companies lay the foundation for more comprehensive digital transformation by seeking to understand customer journeys and improving the digital skills of employees. Early experiments start to map digital processes and successes gain traction and funding.

Stage 3:
Building Operations

Companies start digitizing their operations at scale. The block and tackle of modernizing platforms and processes happens at a departmental stage.

Stage 4:
Integrating Platforms

Having digitized operations, the focus turns to integrating them so that data can be used more strategically across the organization.

Stage 5:
Optimizing for Growth

Having laid a strong digital foundation, the focus turns to leveraging data and AI to create great customer experiences.
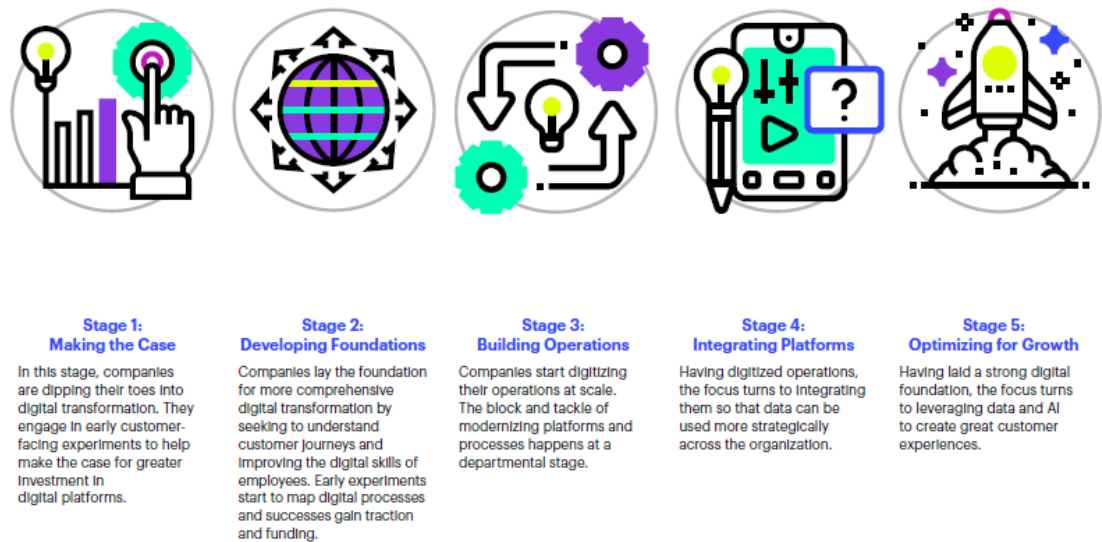
Figure 1: The Five Stages of Digital Transformation Maturity

Source: Li C., Akhtar O., Etlinger S., Terpening E., Moser T., Littleton A., 2020

Furthermore, the level of maturity was analyzed on the basis of geographic origin, organizational size, type of organization and sector. The curves that emerge from this analysis are very similar, since in every sector and in every geographical area there are leaders and followers, as happens with every trend, but above all this indicates that the ability to perform a real digital transformation is not hindered by any intrinsic element of the organization.
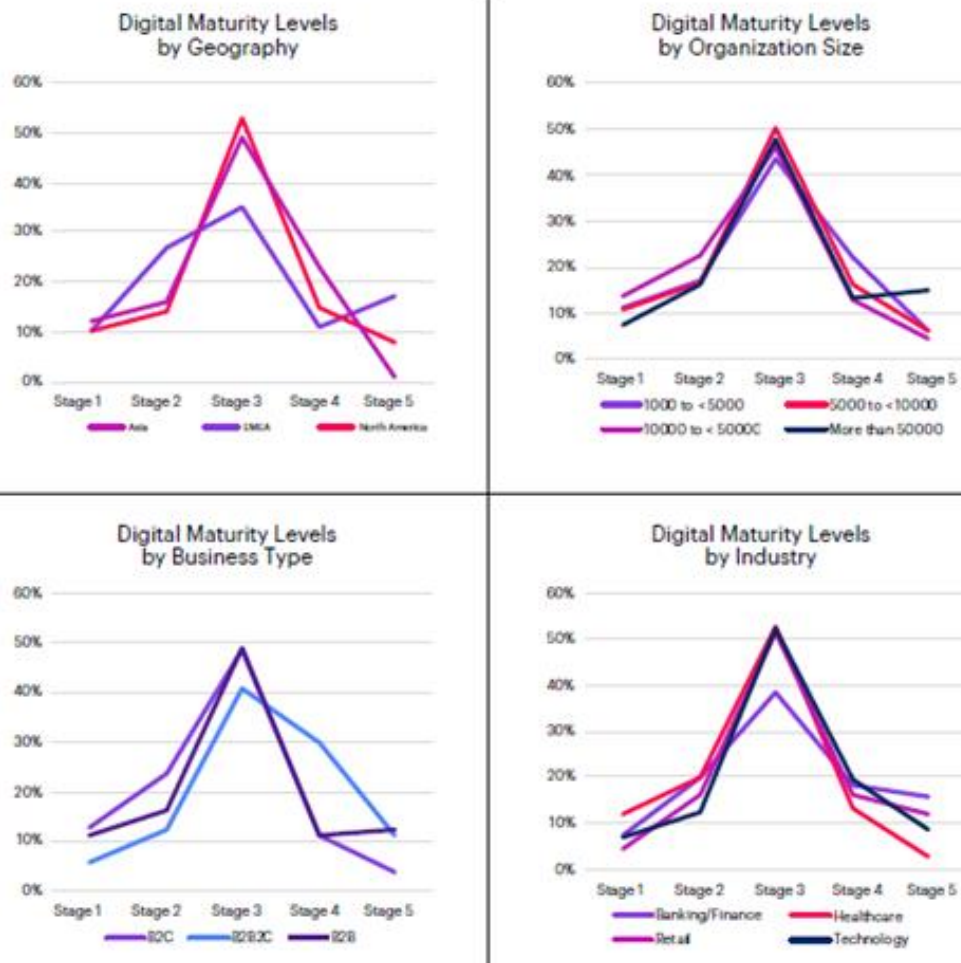
Graph 1: Digital Maturity Also Varies by Geography, Organizational Size, Type, and

Industry

Source: Li C., Akhtar O., Etlinger S., Terpening E., Moser T., Littleton A.,

The 2020 state of Digital, 2020

Particular evidence emerges from these graphs:

• Organizations in the EMEA region lag slightly behind those in North

America and Asia, though the percentage of European organizations found in stage 5 is

higher than that of American companies (17% for the EMEA area and 8% for the North American area).

•   Organizations with more than 50,000 employees are more likely to have a higher digital maturity status and in fact they make up more than half of the organizations that are in stage 5.

•   B2B2C type organizations, thanks to their need to interface both with normal customers and with other business customers, are at an advanced level of digital maturity than classic B2B and B2C.

•   Organizations belonging to the banking and financial sector are more concentrated, than others, in stage 5. The healthcare sector is firmly established in stage 3, while sectors such as technology and retail have a strong presence in stage 4. The study of digital maturity stages relating to organizations in different sectors, geographical areas or types of business can be closely linked to the development of the 2021 digital transformation trends.

In fact, technology priorities vary significantly based on the level of technology maturity. In the various stages, companies invest in technology in different ways, as can be seen from table 2. The percentages reported relate to the share of organizations that are in the stage and believe that its primary technology investment.

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
5G	17%	24%	23%	30%	53%
Hybrid Cloud	31%	42%	46%	45%	39%
Cybersecurity	34%	30%	48%	48%	61%

Teleconferencing (support to Smartworking)	30%	18%	14%	13%	6%
AI & ML	16%	20%	39%	47%	63%

Table 2: Technology investment priorities based on digital maturity stage

Source: Adaptation of data in Li C., Akhtar O., Etlinger S., Terpening E., Moser T., Littleton A., 2020

For example, organizations that are in stage 5 are more interested in technological solutions that allow cohesive, efficient and secure management of Big Data, such as Machine Learning, AI, 5G and Cybersecurity.

Organizations that are at an intermediate stage of digital maturity invest capital in technological challenges such as Hybrid Cloud and Cybersecurity.

The organizations in stage 1, on the other hand, focus on investments to support the new smart-working trend. In fact, not finding themselves at a high level of technological maturity, they still need to invest in these technologies which are already established for all those organizations that are at an advanced stage of maturity.

2.1.2.1 The impact on the business reality

As emerged from the analysis of macro-trends in the previous paragraph, the economic system is permeated by an incessant digital transformation that involves every type of business. Any company in facing this challenge is undergoing irreversible changes, fast but at the same time gradual. In order to organize the transformation process, every company must follow a strategic planning that highlights the medium / long-term objectives and at the same time changes and investments to be implemented in order to achieve those objectives. In fact, it is not just about economic investments, such as those necessary for the acquisition of new digital technologies, which are already very

expensive, but it is necessary to consider an organizational transformation created ad hoc in order to accommodate the implementation of new technologies.

Therefore, the revolution concerns different spheres such as the cultural, organizational and managerial one.

Many companies are moving in this direction, reinventing their five-year plans and adapting them to the needs of a market where the only solution to survive is digital transformation.

As emerges from a study by Blenko, Root & Elkhweet (2017), 80% of the CEOs interviewed say they have a digital transformation process in place through a remodeling of the Operating Model, while the percentage rises to 87% if we also consider those CEOs who plan this process for the next three years.

The organizations, therefore, are committed to the construction of the so-called Target Operating Model, which questions the old Operating Model by redefining the target modus operandi to be reached with precision and from an operational point of view.

In the Target Operating Model of organizations undergoing transformation there are several pillars to focus on, including:

- Remodeling of the organizational structure;
- Insertion of new professional figures;
- Change of internal and functional processes;
- Insertion of new IT systems for the management of data, information and shared projects;
- Business Model Change;
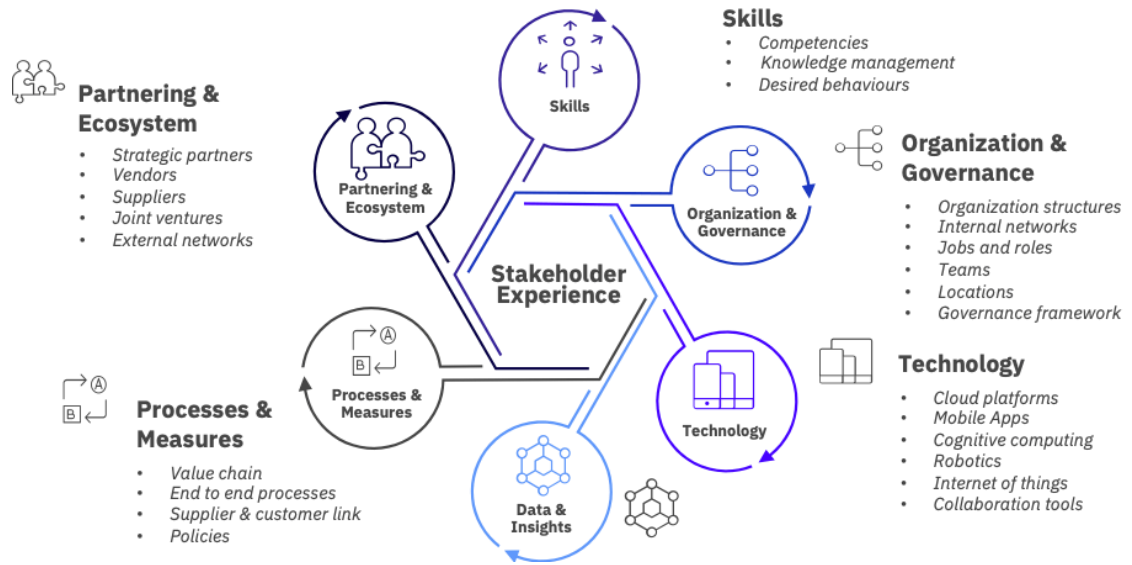- Renewal of the offer of products and services.

Figure 2: Establish a target operating model

Source: Establish an operating model, 2019

In the next paragraphs some of the pillars of the digital transformation Target Operating Model will be analyzed in order to have a clear vision of the operational changes implemented by most organizations.

2.1.2.2 New organizational models

The first component of the Target Operating Model in a digital transformation process consists in the reorganization of the company structure. This is a key factor as very often companies are focused on the new technology acquired and do not give much importance to changes in terms of skills, capabilities and more properly the organizational structure necessary to manage the change.

The biggest obstacle that involves the failure or slow progress of digital transformation consists precisely in organizational unpreparedness (Gupta, 2018). An additional factor of failure is represented by employee disengagement (Hughes, 2017); each employee of the organization should instead be involved in exploiting all the

20

opportunities that digital transformation can bring. Nonetheless, this condition turns out to be very difficult because, by nature, the human being is a creature who desires stability and tends not to perceive any change as positive, even if it improves one's position (Keyes, 2000). The concept of organizational barriers to digital transformation was born precisely because of this nature and the distrust that some have towards the constant and continuous use of advanced technologies in continuous evolution also in the environment and in work responsibilities, including (Gupta, 2018):

- Unclear vision of the objectives of the digital transformation;
- Lack of management experience in digital transformation;
- Lack of organizational agility;
- Inflexible organizational culture;
- Rewarding plan not aligned with digital transformation;
- Employee resistance to change.

These barriers, of course, are not present in the same way in all companies as each organization has its own structure and culture. In particular, organizations characterized by decentralized decision-making processes, greater coordination and collaboration, flexibility, agility, knowledge sharing among employees, a proactive approach and a flat organizational chart, are those for which greater efficiency has been found in the integration of digital transformation processes.

According to an in-depth analysis by Deloitte (2016) on the subject, the following four organizational models are the only ones suitable for the implementation of a digital transformation process.
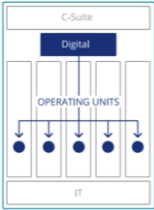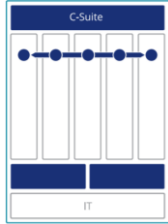
Model	Main feature	Description
Tactical 	Opportunism	In this model, DT is applied to the individual BUs to achieve already existing objectives. The investments are huge but made in silos and do not pervade the entire organization. This model is suitable for organizations that want to create a strong digital presence on the market, but without creating a real strategy.
Centralization 	Agenda setting	In this model, digital initiatives are concentrated in a central unit, which studies the corporate strategy and organizes the most suitable digital change for each single BU. Useful structure for exploring digital innovations on the market and for interfacing the different BUs for digital issues.
Champion 	Transformation	In this structure there is a real digital strategy communicated to all BUs. The emphasis of the process is based on knowledge sharing and training. This structure is suitable for organizations that have sufficient openness and trust and are more focused on performance rather than decision-making processes.
Business as usual 	Normality	In this model, the use of technology is not unusual, but it is part of the work routine. There is no need to create centralized teams because each single team is able to manage the digital transformation independently.

Table 3: The digitally-fit organization

Source: adapted from "The digitally-fit organization"

Each of these organizational models is suitable for implementing digital transformation, choosing one over another depends on the answer to the following questions:

- What is the objective of the digital transformation?
- What is the level of digital maturity of the organization?

For example, it is preferable for organizations that are not fully digitally mature to use the centralized model, while digitally mature ones use more integrated systems.

2.1.2.3 New enabling technologies

Digital transformation is based on technological pillars that in recent years have been modifying and innovating the formation of business processes. The adoption and implementation of these technologies, of course, have a close correlation with the macro-trends of digital transformation. Cloud computing, IoT, augmented reality, Big Data & Analytics and AI are the core of Industry 4.0.

The need for cloud computing arises when the servers traditionally used by companies are no longer able to manage and process a large amount of data. The National Institute of Standards and Technology (2011) defines cloud computing as a model that allows continuous access with minimal server effort to a network of different computing resources, such as networks, servers, stored data, applications and services.

Among the different cloud computing models (Software as a Service, Platform as a Service and Infrastructure as a Service) the one that is spreading the most in the corporate world is the last one, namely IaaS which provides the user, in this case the employee, the ability to access shared computing resources on their devices without using hardware.

There are three types of cloud on the market with different architectures. The first is for the public cloud, the second for the private cloud, and the third for the hybrid cloud.

23

While in the public cloud the external service provider manages the server used by the company for data storage, in the private cloud it is the company itself, often of medium or large size, to manage the software and data internally, to protect their discretion.

The hybrid cloud, on the other hand, indicated as one of the main technological trends for this year, combines the advantages of the private cloud with the structure of a public cloud, adapting to the companies that do not want to incur huge costs for a cloud but at the same time don't need to share their confidential information with third parties.

As can be deduced from the characteristics listed above, companies, in the use of cloud computing systems, are able to obtain both direct and indirect advantages based on the degree of exploitation of the potential that the cloud offers.

The advantages include:

- Increased calculation and data processing speed thanks to on-demand management;
- Reduction of data processing and storage costs;
- Reliability of performance and continuity of service;
- Ability for employees to work remotely on any device, a non-negligible feature in a historical period in which all companies are experimenting with remote work;
- Ability for HR to control internal cloud access by employees and monitor their activity;
- Positive impact on the offer of smart products; through the cloud, the products offered to the customer can provide data to the company that are useful for customizing the services and features offered.

The benefits that cloud computing would bring to companies are far greater than the risks deriving from a system of this type. In fact, the only risk is the possibility that the privacy of the system is violated through hacker attacks.

The second technology used by companies that are implementing a digital transformation process is the Internet of Things, also known as IoT. This expression was first used in 1999 by Kevin Ahston during a presentation on Procter & Gamble's new supply chain. The IoT is defined as an evolution of the Internet that allows each digital object to take on its own identity and interact with other digital objects through a form of machine-to-machine communication that operates without human intervention. Therefore, by communicating with each other, objects (tools or digital machines) acquire a form of intelligence based on previously collected data. The goal of the IoT is to make the life of those who use the devices easier by mapping the real world into the digital one.

In the company, the use of the IoT is aimed above all at the digitization of the entire value chain (McKinsey, 2015). In fact, each machine, equipped with special sensors, allows internal processes to be digitized, such as those dedicated to the supply chain, allowing flexible management remotely and with high levels of efficiency, not previously possible.

IoT systems also have advantages in terms of costs and revenues: the cost incurred for data collection and processing is reduced and at the same time an increase in revenues of about 2% or 3% each year is estimated (PwC, 2015); as for cloud computing, IoT systems are essential for advanced companies, but at the same time they scare them as the security of data transmitted via the IoT may not always be guaranteed, thus jeopardizing the privacy of users.

The third technology being analyzed is augmented realty. It includes all the systems that allow man to be able to have a vision of reality with more multimedia information, in practice it allows the user to see physical parts superimposed on digital parts. This technology is used more and more by the great e-commerce giants to improve the customer experience on their apps.

Notwithstanding, it should not be thought that the implementation of this technology only impacts on customers and their experience, but also impacts on all those industrial processes that require manual interventions. In companies that have a production process, production is revolutionized, as well as the tools available to workers that allow them to manage all activities even in a virtual way.

The fourth technology that needs a focus in this context is that relating to Big Data. In recent years we hear very often about Big Data and Analytics as now all companies need to manage, rework and analyze all the data available to them; both internal and external data have become a vital resource for the company: their use improves and makes the value chain efficient and at the same time allows to analyze the needs of the consumer and create targeted products for every need.

The Big Data & Analytics systems are connected to the Business Intelligence systems, which allow you to process the data collected previously and present them in an intuitive and flexible way, eliminating any repetition of information.

Big Data & Analytics systems have an impact on the business model that can be seen from various points of view. First of all, internal processes are speeded up and automated thanks to the timely filing and processing of a large amount of information. In addition, customer loyalty can be increased after customizing the offer of goods and services thanks to the data collected.

The latest technology, AI, is a fundamental part of the report and a larger chapter will be dedicated to it later in order to fully understand the implementation cases and the impact on the entire company system.

2.2 Artificial Intelligence in the company

2.2.1 History of Artificial Intelligence

AI is defined as the ability of a system to interpret data correctly, learn from these data and use the teachings to achieve specific goals and actions through forms of flexible adaptation (Haenlein & Kaplan, 2019).

The roots of AI back to the years '40, more particularly to 1942, when it was published the novel Runaround by Isaac Asimov. The protagonist of this story was a robot whose characteristics were based on the three laws of robotics:

- the robot cannot injure a human being or cannot cause him to suffer damage;
- the robot must obey the orders of the human being, except when they break the first rule;
- the robot must protect its existence, not opposing the first two rules.

Although this story to date may seem only a plot of a science fiction novel of the last century, the laws on which it is based are a clear example of how the scientists of the time were already at work for the creation of intelligent machines.

The first to propose a project in these terms were McCulloch and Pitt. In 1943, they proposed an electronic model based on the neural network, inspired by the functioning of the human brain. The system devised by these two scholars worked exactly like the human mind, applying Boolean logic, learning from experience and modifying behavior based on past mistakes and successes.
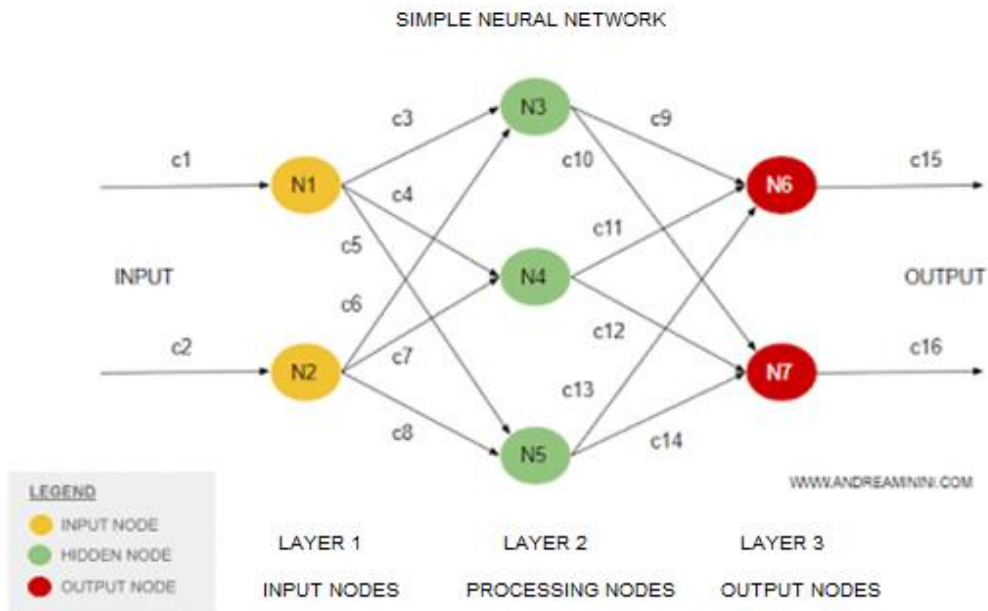
SIMPLE NEURAL NETWORK

LEGEND
- INPUT NODE
- HIDDEN NODE
- OUTPUT NODE

LAYER 1 — INPUT NODES
LAYER 2 — PROCESSING NODES
LAYER 3 — OUTPUT NODES

WWW.ANDREAMININI.COM

Figure 3: Simple Neural Network.

Source: https://www.intelligenzaartificiale.it

In 1950, Turing (1950) described how to create a machine with its own intelligence and how to test its capabilities through a simple benchmark: if a man who is interacting simultaneously with another man and with a machine is unable to distinguish which man is and which is the machine, then the machine can be called intelligent (Turing, 1950).

The term AI was coined only in 1956, when Marvin Minsky and John McCarthy held the first AI research seminar at Dartmouth College. Since that year, studies on this issue have continued constantly and to date, we have reached a situation in which AI is present almost everywhere in the daily life of each of us, from Facebook algorithms, to the logistics management of Amazon. AI in the coming years will have the same impact that Internet and social media have had in recent years, although many scholars are asking themselves important questions about the use of this technology in various fields.

One of these consists in knowing how to choose which decisions will be made by men, which by AI systems, and which by both and how they can coexist in a given environment.

2.2.2 Artificial Intelligence: main definitions and functioning

The concept of AI has different meanings based on the classification in which AI falls within. From a strictly technical point of view, AI is a branch of information technology in which all technologies allow the development of algorithms capable of providing computers with characteristics that are typically considered human, such as, for example, learning and reasoning. The second meaning of AI is more connected to the past and refers to Turing's theory. According to Ginsberg, any system that manages to pass the Turing Test can be defined as AI. However, the main objection to the functioning of this test (Ginsberg, 2012) consists in the fact that the machine, or the instrument presumably equipped with AI should be able to generate any possible response in a short time respecting all the characters it has available. This is very difficult and it is precisely at this point the difference between the human mind and intelligence that is attributed to machines.

According to a further point of view, the AI should not be compared with the human intelligence but rather with the ability of the machine or computer to react to external environmental stimuli and interfacing with it. If we consider this meaning, then even animals that interact with the external environment can be defined as intelligent. In this case we speak of "Weak artificial intelligence", which refers to the simple ability of machines to solve complex problems related to the external environment, without being able to reach full human intellectual capacities. The weak AI contrasts with the strong AI, which corresponds highest ambition of scientists who aim to create machines with their own conscience and their own emotions and act without human guidance (Coppin, 2004).

29

The operation of any system equipped with AI is based on four levels of activity:

- Recognition: consists of the ability to recognize sounds, voices, images and texts and to extract information from them;

- Reasoning: consists in the use of mathematical algorithms that work in an automated way to connect the information collected;

- Learning: this ability is specific to systems that analyze data (inputs) and then return outputs based on the machine learning technique. This technique is typical of Machine Learning systems;

- Human Machine Interaction: this type of technologically advanced activity allows humans to interact with the machine using natural language.

The third level of activity, the learning, is that conceptually creates a real distinction between the weak AI and strong AI.

Thanks to the learning models of intelligent systems, two other fields of study can be distinguished within the AI macro-area: Machine Learning and Deep Learning.

Machine learning uses complex techniques to solve functions that require data input. These techniques allow machines to collect data, learn from their application and make decisions based on previously collected data. In practice, Machine Learning is used for functions that each of us has on our smartphone such as voice or facial recognition.
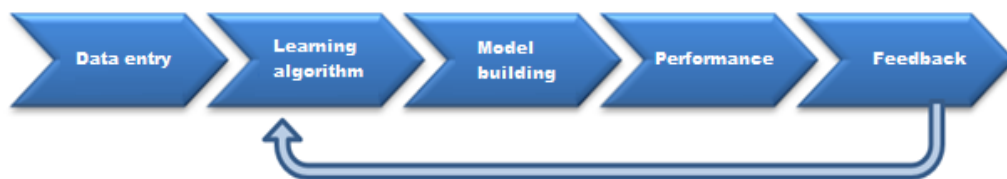

Figure 4: Machine Learning Process.

Source: Personal reworking of the theoretical process

Taking a step forward in AI technology leads to Deep Learning. To explain the Deep Learning process, computer scientists have taken as a reference the biological functioning of the human brain, with particular attention to neuronal interconnection. While Machine Learning is a subset of AI, Deep Learning can be defined as a subset of Machine Learning that exploits the infinite potential of artificial neuronal networks to create outputs after entering a very large amount of data. For this reason, the Deep Learning model proves to be very useful in analyzing Big Data, a trend that has become extremely widespread in recent years.

AI, Machine Learning and Deep Learning are three distinct non-overlapping concepts, each one is a branch of the other and the scheme that best represents these three areas is the following:
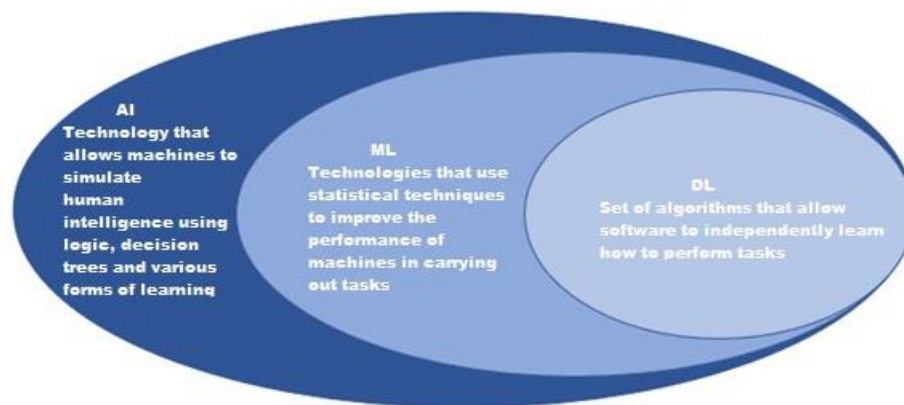

Figure 5: Overview of AI, ML and DL.

Source: Rielabo https://www.deeplearningitalia.com/

As emerges from the previous considerations, the fulcrum of AI is the learning process, which can be divided into different types:

- Supervised

- Unsupervised

- Reinforcement

1. Supervised Learning

The learning algorithm that has been mostly used in recent years for the development of AI systems is the Supervised Learning.

In Supervised Learning there is a "supervisor" who supplies a dataset of examples to the machine; this dataset contains both the input and the solution, in this way the computer can learn exactly the relationship between the data provided and the output to be generated (Chase, 2018). To verify that the computer is able to provide reliable solutions, the supervisor uses input tests that generate a solution which is then compared with the data set of examples provided previously. If the percentage of relevant responses is high, then the implemented learning system works.

2. Unsupervised Learning

The second type of learning that is used in Machine learning processes is Unsupervised Learning. This learning method is mainly used in automation business processes to have more efficient performance.

The calculator using unsupervised learning learns to analyze data and provide solutions without the help of a supervisor and preset data sets. The structure of the data that the computer receives as input is heterogeneous, so there are two solutions to streamline the decision-making process: the first consists of a clustering data, the other, instead, consists in the reduction of the data used by the computer through the elimination of information not significant or repeated by the various datasets.

3. Reinforcement Learning

The third type of learning used in Machine learning is Reinforcement Learning. This model recalls the theory of reinforcement according to which a behavior that generates positive consequences tends to be repeated, while a behavior that generates negative consequences will no longer be implemented (Pilati, 2020).

Although this theory was created in the context of organizational behavior based on human behavior, the technologies that use Reinforcement Learning teach the computer to repeat an action or to provide a certain solution, if this has previously received positive feedback. For example, this technology is used by car parking sensors which from time to time indicate to the driver a parking space based on the solutions that have been previously accepted or rejected.

2.2.3 Artificial Intelligence in the company: advantages and risks

The trend to use AI and Machine Learning algorithms for an ever-increasing number of activities and tasks is radically changing the way of doing business. Automation is introducing new standards of speed and efficiency in all types of processes into business paradigms (Chase, 2018).

The support that AI systems can bring to every company, in any type of sector, starts from the possibility of using image and text recognition techniques of different nature both in the administration (contracts, invoices, CVs) and in business activity (forecasting of consumer behavior). Although these individual activities, taken individually, may seem of little relevance to any type of process aimed at improving performance, they have a significant impact on the level of general efficiency and more specifically on each individual team.

This is certainly a first advantage of AI. The efficiency and the possibility of improving any programming and control process of any type of activity allows a reduction in the time needed in the decision-making and production processes, factors of

vital importance for companies that want to grow in their market, conquer new business, attracting customers, but at the same time retaining and attracting talents.

According to research conducted by Directorate General of Communication of the European Parliament, the use of AI must be weighed in the different business circumstances. In fact, the excessive use of Machine Learning systems is not recommended for complex, not completely technical problems that necessarily require human intervention, such as the resolution of problems related to social issues (Guillot, 2020). At this point, it is difficult to define the threshold of activities that can be managed by a Machine Learning system and those that necessarily require human intervention.

Hull (2019) argues that managers often fail to distinguish the activities to be delegated entirely to machine learning systems and those to be supported personally. Certainly, the most advanced Machine Learning systems are capable of emulating emotional involvement, motivation and thinking, but they can never entirely replace the cognitive element that characterizes every human being (Hull, 2019).

Analyzing the risks of AI systems in the organizational context, the occurrence of algorithmic biases must not be overlooked. Just as humans can make mistakes in problem solving processes, AI algorithms can also run into decision biases due to a scarcity of information received as inputs or caused by defects in the programming of the algorithms that can lead to incorrect output data or often unethical (Muller, 2020). There are several examples that testify to the possibility that Machine Learning systems make mistakes even when used for technologically advanced companies such as Amazon, Google, Microsoft or Facebook.

These errors very often concern the ethical aspect of the decisions that systems have to make. It is not possible to teach a machine or a computer the discernment between what is ethical and what is not, nor is it possible for a system to refuse to

perform a certain task because it is unethical. It has been found that sometimes the output of machine learning systems involves the exclusion of the groups of individuals of a particular nationality, religion or economic class or gender. In this case, using machine learning systems for important decisions such as the approval of loans by a bank or the selection of a candidate for a job position, could be discriminatory for some categories of people. It should be pointed out that it is not necessarily true that these unethical choices necessarily derive from a system bias, but it is possible that systems are programmed specifically to generate certain outputs rather than others. In this regard, to prevent this from happening, European legislation, through the General Data Protection Regulation (GDPR) has sanctioned the "right of explanation", or the right of the subjects involved in processes that include the use of Machine Learning systems to receive an explanation on the outputs of the decision-making process and on the implications of sharing their data.

In conclusion, it is necessary to use the scheme of a SWOT analysis to fully and more clearly understand the strengths, weaknesses, threats and opportunities of the use of AI systems and more properly Machine Learning in a context of business.

STRENGTHS	WEAKNESSES
• Greater efficiency in technical and organizational decision-making processes • Problem solving impartially • Automation of complex processes	• Low transparency in the decision-making process • Decision biases
OPPORTUNITIES	THREATS
• Growing organizational flexibility • Efficient allocation of management's financial resources	• Discrimination in the output production process • Unethical outputs • Manipulation of programming to obtain certain outputs

Table 1: SWOT analysis - strengths, weaknesses, threats and opportunities of the use of AI systems in a context of business.

Source: Trost, 2020

2.3 Role of dynamic capabilities in response to Digital Disruption

Despite the fact that one of the greatest strategic imperatives of today's leaders is digital transformation, the literature on how organizations deal with change by approaching this new trend appears to be lacking. The use of the term transformation rather than change highlights that digital transformation is far beyond the sterile implementation of new technologies in business processes, but includes the set of actions to be taken to exploit the opportunities that new technologies offer and at the same time avoid the threats arising from them.

To do this, companies must face a further challenge which consists in knowing how to fully exploit the dynamic capabilities, essential in a process of strategic change.

The latter allow us to understand how and how quickly companies are able to respond to the needs of a constantly evolving market.

2.3.1 The theory of dynamic capabilities

The theory of dynamic capabilities, so current in recent years, originates from the well-known theory of the Resource Based View, according to which the resources within a company, or more generally an organization, when they respect the VRIN paradigm (valuable, rare, imperfectly imitable and imperfectly substitutable), are a source of competitive advantage. According to this theory, each company has at its disposal resources that, organized in a different way within the organization, allow it to obtain a competitive advantage on the market.

The static vision of the resources present in the company provided by the Resource Based View is overcome precisely by the theory of dynamic capabilities. Theorized by Teece in 1997, the prospect of dynamic capabilities is focused on the organization's ability to deal with an environment rapidly changing, by creating new resources, renewing existing resources or modifying the resources mix through a learning mechanism and collection of new skills over time. Furthermore, the dynamic capabilities within an organization allow the achievement of a competitive advantage and help companies to avoid internal rigidities that generate inertia, stifle innovation and inhibit development.

To better understand the meaning of dynamic capacities it is necessary to take a step back and consider the contribution of Winter (2003) and Winter and Zollo (1999, 2003). They first consider organizational learning processes as a source of dynamic skills and create a clear distinction between dynamic skills and operational skills (Boccardelli & Fontana, 2015). While operational skills are about being able to lead one's existence in the present, dynamic skills are about changing and approaching the future (Boccardelli &

Fontana, 2015). Even Collis classified capabilities by dividing them into simple capacities and dynamic capabilities.

The simple skills are as follows:

- Capabilities that allow the company to perform its basic functions;
- Capabilities that allow dynamic improvements of business activities.

Unlike the previous ones, the dynamic abilities instead can be classified into the following categories:

- Capabilities that allow for dynamic improvements after understanding the intrinsic value of other resources or after developing new strategies before competitors;
- High order capabilities, or meta-skills linked to the concept of learning to learn.

This last classification is the most important: dynamic capabilities are in fact meta-skills thanks to which the organization can reach and maintain competitive advantage conditions for a period of time through the ability to analyze and deal with threats and opportunities of the external environment in order to manage a reconfiguration of internal assets (Teece, 2007). Furthermore, the same author points out that dynamic skills do not always have a direct effect on company performance; rather, there is an indirect influence on the company's resources.

Dynamic capabilities can be divided into three processes: sensing, seizing, transforming.

- Sensing is defined as "the activity of scanning, creating, learning and interpreting the external environment to capture all the trends that could change the organization" (Teece, 2007). According to various empirical researches, emerging changes are more likely to be perceived by

perceptive top managers who are attentive to what is happening outside. This activity is essential to seize various opportunities which may consist, for example, of new resources to be introduced into the organization.

- Seizing refers properly to the set of activities aimed at addressing all those opportunities and threats that have been detected in the sensing phase. Among the activities of this phase are the forecast of substantial investments to face the new opportunities, the expansion of the offer of products and services to customers and the creation of new business models. Obviously, the quantity of resources distributed to face threats and opportunities deriving from the external environment makes us understand the propensity of companies to deal with dynamic environments, or their degree of organizational agility. Agility is defined as the ability of an organization to efficiently and effectively redistribute, redirect its resources to create value and protect high-yielding assets as required by internal and external circumstances (Teece, 2016). In general, in companies that show themselves to be agile from this point of view, dynamic skills play a central role in investment decisions and in the design of business models.

- Transforming: at the heart of this process is the ability to configure organizational resources with the aim of not becoming static and passive in the face of future changes. The change that occurs in this phase aims to sustain the competitive advantage over time through continuous reconfiguration. This is the most complex phase because it very often involves a substantial modification of organizational routines in a gradual and not sudden way. As in any transformation phase, corporate values and

39

culture need to be open to change and employees need to accept a strategic

reconfiguration, otherwise individuals' resistance to change would become

a significant barrier to the transformation taking place.

Figure 6: Simplified diagram of

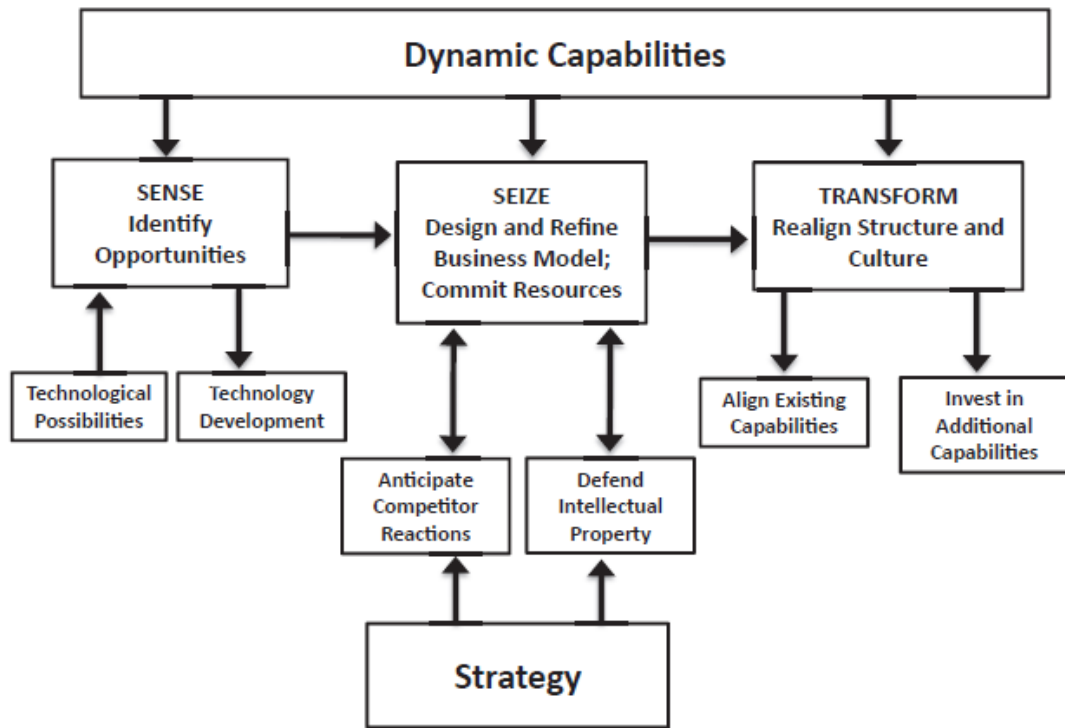Teece's Dynamic capabilities, David J., 2018

Dynamic capabilities have many facets and it is not necessarily true that

companies should excel in all of them. While a company may have potential in the

sensing phase, that is, interpretation and understanding of the external environment

trends, another might excel in redefining the business model after having caught the

external opportunities.

Nevertheless, there are companies that have "strong dynamic capabilities", i.e., compared to their competitors they have strong dynamic capabilities in the sensing, seizing, transforming phases.

2.3.2 Dynamic capabilities in the digital age

One of the main challenges that organizations have been facing in recent years is balancing between leveraging existing capabilities and building capabilities best suited to the digital transformation environment.

Despite this clear need for capacity evolution within a company, building capabilities suitable for digital transformation has received little attention from scholars, while the evolutionary picture of dynamic skills has become one of the key issues in the strategic management literature.

To study the influence of dynamic capabilities in a context impacted by digital transformation, it is necessary to rely on their previously analyzed subdivision.

The sensing phase, in this context, involves the identification, co-development and evaluation of technological opportunities in relation to the customer's needs. Organizations must be able to identify external inputs useful for aligning with digital strategy. The actions useful for achieving this goal are:

• Exploration of opportunities and markets;

• Collection of information from internal or external sources (customers and suppliers);

• R&D activities.

Generally, companies find it very difficult to build sensing dynamic capabilities that can predict future trends in digitization.

Both dynamic managerial capabilities and business units dedicated to scenario planning play a key role in detecting emerging trends, but both have limits in analytical

terms. This limitation is evident in a context where the use of IoT platforms for the collection and analysis of Big Data is disruptive. Considering the technological advances in this direction that allow for greater accuracy in analyzing large-scale data in real time, greater speed in terms of computation, storage and data retrieval, the cost of market forecasts based on machine learning has been reduced and more and more companies are turning to AI to anticipate new trends and circumvent cognitive limits.

In this context, therefore, the main challenges for business executives also change, and they must:

• Shift the focus of employee training from forecasting to judgment skills;

• Evaluate the pace and direction of the adoption of AI technologies to properly plan the training of the workforce;

• Develop processes in which teams of experts are involved in the judgment of the data emerging from AI analyzes.

The second phase, seizing, requires acquisition skills that ensure leaders avoid deception, prejudice, arrogance and disappointment, such as to prevent the use of new digital models, new digital platforms and new business models. Knowing how to seize the opportunities that come from the external environment is a very complex ability that implies constant action and commitment to be able to understand the risks and benefits of the aforementioned opportunities.

Thanks to digital transformation, companies have learned to experiment with different techniques to seize opportunities, including:

• Decoupling: regulation of power relations;

• Disintermediation: reduction of the power conferred on intermediaries;

• Generalization of the existing value chain.

Oftentimes, not all businesses who perceive an opportunity then eventually invest to implement it because they are so rooted to existing processes, which tend to avoid the disruptive innovation that destroys existing skills. To prevent this from happening, companies should increase their degree of agility by using information technology (IT) to build related capabilities. These techniques allow you to:

• increase customer agility through, for example, the co-creation of user experience platforms;

• increase the agility of partnership, or create a good system of external partners who can support in this phase of innovation;

• increase operational agility to improve financial performance.

According to various empirical studies, the exploitation of IT capabilities allows the implementation of various agile responses such as the launch of new business initiatives for the development of new products, or more simply the adaptation of existing production processes and the use of new resources (Overby et al., 2006).

Certainly, the sensing and seizing phases help to create and discover opportunities, but the implementation of a real digital strategy requires transforming capabilities (Bharadwaj et al., 2013). The main characteristic of an organization with transforming capabilities lies in an agile and entrepreneurial approach and at the same time expansive in external relations (Day & Shoemaker, 2016).

According to some empirical studies (Svanh, 2017), the implementation of a digital transformation is much more challenging than other types of strategic renewal as it is necessary to try to balance four variables:

- New innovation capabilities and product innovation practices already existing within the organization;

- Product and process innovations;

- Collaborative tensions between employees and external partners;

- Governance structures capable of ensuring flexibility and control.

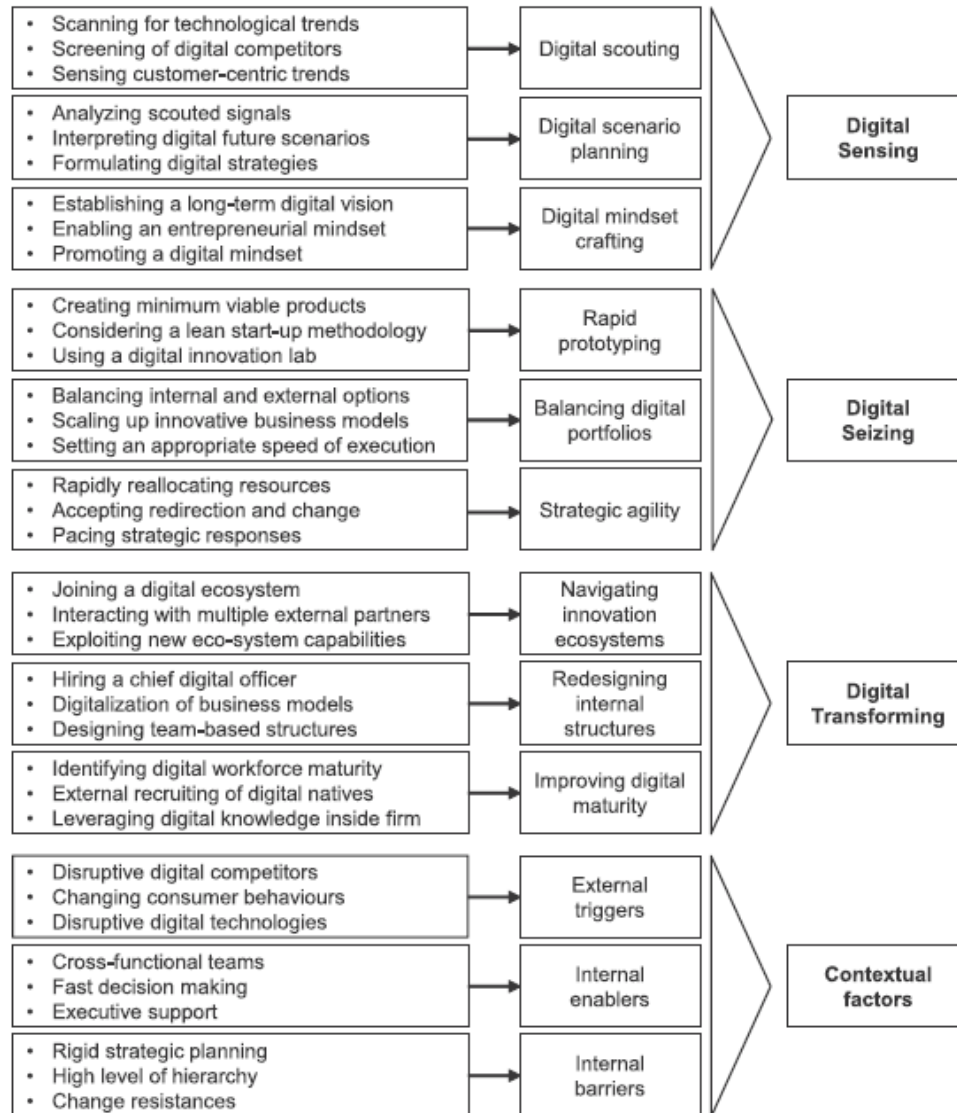| Scanning for technological trends / Screening of digital competitors / Sensing customer-centric trends | → | Digital scouting | | |
Analyzing scouted signals / Interpreting digital future scenarios / Formulating digital strategies	→	Digital scenario planning		Digital Sensing
Establishing a long-term digital vision / Enabling an entrepreneurial mindset / Promoting a digital mindset	→	Digital mindset crafting		
Creating minimum viable products / Considering a lean start-up methodology / Using a digital innovation lab	→	Rapid prototyping		
Balancing internal and external options / Scaling up innovative business models / Setting an appropriate speed of execution	→	Balancing digital portfolios		Digital Seizing
Rapidly reallocating resources / Accepting redirection and change / Pacing strategic responses	→	Strategic agility		
Joining a digital ecosystem / Interacting with multiple external partners / Exploiting new eco-system capabilities	→	Navigating innovation ecosystems		
Hiring a chief digital officer / Digitalization of business models / Designing team-based structures	→	Redesigning internal structures		Digital Transforming
Identifying digital workforce maturity / External recruiting of digital natives / Leveraging digital knowledge inside firm	→	Improving digital maturity		
Disruptive digital competitors / Changing consumer behaviours / Disruptive digital technologies	→	External triggers		
Cross-functional teams / Fast decision making / Executive support	→	Internal enablers		Contextual factors
Rigid strategic planning / High level of hierarchy / Change resistances	→	Internal barriers		

Figure 7: Digital capabilities for digital transformation structure.

Source: Warner, Karl SR; Wäger, Maximilian, 2019.

Figure 7 shows the process of building dynamic capabilities in a context of digital transformation. Although the scheme of the three key phases is constant, each of them (sensing, seizing and transforming) is in turn subdivided into more elaborate processes

that derive directly from the complexity of introducing digital transformation in any organization. At the same time, the same figure indicates the external factors that allow the effective implementation of the digital transformation. These include the introduction on the market of disruptive technologies and more technologically advanced competitors and the change in consumer behavior and needs. To these factors are added the internal ones that hinder or facilitate the realization of digital transformation. The latter, in particular, allow the development of dynamic capabilities within teams.

2.3.3 Dynamic managerial capabilities to support digital transformation

One of the key steps to consider in analyzing dynamic capabilities in the context of digital transformation is the importance of the role of managers in updating, developing and creating the company's resource base (Adner & Helfat, 2003). The set of these activities attributed to managers falls within the notion of dynamic managerial capabilities (Helfat and Martin, 2015). The reason they are so important is the key role of managers in improving organizational performance, especially in times of strategic change due to the discovery and creation of new opportunities.

Teece also focused on the role of managers. According to the author, managers, in addition to having an operational role in the development of current activities related to staff management or budgeting, also cover two fundamental roles: the entrepreneur and the leader.

As an entrepreneur, the manager must have the ability to sensing and seizing, that is, he must know how to seize opportunities from the external environment and must know how to create a field of application of these opportunities within the corporate business model.

As a leader, the manager must be able to spread the culture of change, motivate employees and try to align their values and vision with the company's strategic plan.

45

It is crucial to distinguish the roles and activities inherent to the dynamic capabilities pertaining to managers of different seniority. According to several theoretical studies, top management (CEO, senior manager, general managers) have a very important role in the implementation of dynamic capabilities. Teece (2012), in fact, explained that while some elements are inherent in organizations, the ability to transform corporate resources it is up to those at the top of the company.

More specifically, the role of top management consists not only in engaging in entrepreneurial activities, but also in recognizing innovative ideas that come from all levels of the organization (Teece, 2016). This role also consists in knowing how to orchestrate the dynamic managerial capabilities of the other members of the senior manager team, creating and promoting an environment in which the team can discuss and share ideas, perspectives and beliefs. This promotes synergy and continuous learning between team members, with a consequent improvement of the dynamic managerial capabilities of each senior manager.

In conclusion, as for any change of a strategic or organizational type, also for digital transformation it is necessary that organizations are led by managers who know how to welcome change with all that it entails. Managers must be able to take risks and break old patterns by not anchoring themselves to old habits and business models that are now obsolete.

2.4 Digital transformation in the HR function

The analysis of the impact of digital transformation in a specific function of the company organization, that is the one that deals with the management of HR, constitutes the heart of this dissertation.

Digital transformation has heavily impacted on HR Management processes, from the transformation of organizations into smart organizations to the use of AI in various

areas, such as recruiting & selection, employee development, the creation of succession plans, HR performance measurement and turnover. It is not trivial that cutting-edge technologies are used in this context, since frequently it is thought that Machine Learning or Big data Analytics techniques are applied only in company areas dedicated to production, logistics, customer relations. As already mentioned in the previous paragraphs, it is impossible to introduce a digital transformation process in the company by involving only part of it, but a widespread diffusion of the new organizational modus operandi is necessary.

Before analyzing in detail how digital transformation is changing HR processes and what are the advantages and disadvantages that the organization can derive from it, it is necessary to focus on the strategic value of this function in an organizational context.

2.4.1 The HR function: the strategic value

Penrose's theory on the resource-based view highlights how a company's profit, competitive advantage and profitable growth are based on a correct valorization of internal resources (Grant, 1991). According to this theory, the effectiveness of organizational strategies depends on the ability of those who manage the organization to know how to correctly coordinate internal resources in order to achieve a lasting competitive advantage over time (Gabrielli, 2020).

Among the types of resources listed by Grant (2005), in addition to the tangible and intangible ones, there are human ones. The quality of the staff, the skills possessed, the ability to relate to employees, their engagement and their level of motivation are the beating heart of the company. The need to establish, maintain and adapt working relationships with one's collaborators over time makes the activity of the HR function indispensable for organizational activity (Solari, 2004).

Although companies began to focus on the key role of the HR function only 15 years ago, the history of HR Management dates back to the 17th century in England, during the industrial revolution. Factories began to grow and so did the demand for labor. The companies hired thousands of people who worked up to 16 hours a day. The world of work was completely changing and even the experts noticed this: the working efficiency of employees increased in correlation with their satisfaction. As a result, factory managers as well as the government have begun introducing programs aimed at increasing comfort, employee satisfaction and workplace safety.

The second turning point of HR Management has happened in the twentieth century, when most companies started introducing a real department dedicated to personnel management. Subsequently, what increased the value of this function in the company was the introduction of trade unions, or third parties to the company dedicated to the development and defense of personnel.

The third turning point has occurred in the 70s of XX century, when large multinational organizations have transformed "personnel management" into "HR functions". From this moment, the HR functions began to manage complex processes and procedures concerning the globalized workforce. In recent years, the demand of organizations has drastically changed as the economies of the more developed countries have moved towards the service business. The context in question made it so that issues such as leadership development, building a strong corporate culture or building succession plans were crucial to securing the future of the business.

From this it follows that the quality of the services offered by the HR function has a strong impact on the establishment and maintenance of the competitive advantage of an organization. Nowadays, in fact, the HR function is not only important because the entire

structure of the personnel organizational processes derives from it, but also because it is closely linked to the corporate strategy.

The point of contact between corporate strategy and HR Management gives rise to a line of research called Strategic HR Management, according to which the application of certain HR management policies and practices could be decisive for the success of the business strategy.

The literature identifies three main objectives of Strategic HR Management:

- Ensure that HR practices are conceived consistently with the business strategy (vertical alignment);
- Contribute to the formulation of the business strategy so that the management realizes the value of the human resources within the company;
- Provide a clear direction to respond jointly to the needs of the business and those of the company's employees, by implementing correct HR practices.

As already anticipated in the paragraph dedicated to dynamic capabilities, the resource-based view approach is static and, in this context, can be expanded with the so-called integrative approach proposed by Golden and Ramnujan (1985). According to this model, between corporate strategy and HR there is an extremely dynamic relationship, based on a continuous well-structured interaction in which HR management is part of the organizational strategic top.

Figure 8: Integrative approach

Source: Adaptation of representation of the Integrative Approach, Gabrielli, 2016.

In the globalized economic context in which companies operate in this decade, the relationship between HR Management and corporate strategy is even more accentuated and a good connection between them creates a clear distinction between companies capable of achieving a global competitive advantage and companies with a competitive disadvantage.

The fundamental role of HR management in achieving corporate strategic objectives is now well established. In fact, today's context characterized by high competitiveness and changeability requires companies to have capable and highly professional human resources, which after being organized and managed efficiently, can allow the organization to achieve profitable results.

2.4.2 The applications of AI in the HR function

The HR function is addressing the digital transformation and the disruptive impact of AI in all its functions. The automation of most of the activities is now established evidence and its greatest advantage consists in reading the materials concerning employees and candidates in a shorter period of time, without human prejudices and bias.

As companies begin to grow larger, more sophisticated needs emerge to achieve the main business goal: saving resources and time.

Until a few years ago, the benefits of AI in HR Management consisted mainly in improving the efficiency of functional activities and reducing costs through the automation of different processes; today, thanks to technological evolution, the HR teams are able to solve critical problems of the organization by providing people centered solutions, promoting areas of performance improvement and contributing to the improvement of profitability and business results. The introduction of AI has allowed the switch of the role of the HR function, that has moved from an administrative role to a mission critical role (PwC, 2017).

To better understand this concept, it is necessary to define in detail the reasons why AI is used in the HR function (Suruchi, 2019):

- Intelligent Automation: the possibility of automatic learning of Machine Learning systems reduces manual and redundant work, promoting innovation and attention to the company mission;

- Data driven decision making process: the HR team is helped by AI software to derive a correct discernment of data, eliminating the possibility of decisions being made taking into account any mistakes made by people. In fact, AI is useful in impartial and data-driven decision making on a larger scale;

- Employee engagement: as known from the theories of business organization and organizational behavior, the experience and engagement of employees in company activities have an impact on company profits (Pilati & Tosi, 2020). AI can help enable many employee engagement tools that are useful from their placement to the company until their departure, with one goal: retaining talent.

In addition to the reasons and possible benefits resulting from the use of AI in the HR function, it is necessary to analyze the complexities and challenges with which some companies are interfacing or still others could interface in the future. These complexities can be divided into four categories:

- Difficulty in evaluating employee performance: there is a risk that the data entered into the AI systems are untrue and unreliable, creating negative repercussions on employee performance monitoring. Another limitation is represented by the difficulty in evaluating the members of each individual team.

- Difficulty in creating databases for Big Data Analytics: companies do not have such a large amount of staff data that they can only make decisions based on databases. Data Analytics tools used for other purposes and in other departments may not be as useful in the HR function.

- Difficulty in guaranteeing correct procedural and distributive justice among employees (Pilati & Tosi, 2020): there are several examples that confirm the occurrence of episodes of "injustice", one of these is the Amazon case which had to abandon the use of the AI software used for recruiting as it showed prejudices on the basis of the sex of the candidates, that is, it preferred male candidates rather than female ones.

- Risk of bluffing by the employee to avoid the negative consequences deriving from the algorithm observation and decision-making processes: trying to mask own real abilities when being monitored by a system managed by the employer is a completely natural phenomenon. Consequently, at times, AI systems fail to obtain the desired results, i.e., real outputs, without biases dictated by human behavior.

According to several empirical studies concerning future trends in the HR world, AI will occupy a position of great importance in the context of transformation of the HR function. A study conducted by CENTERIS and ProjMAN (2019) confirms the application of AI tools in HR in support of different activities such as recruiting and selection, training & development, HR Performance Measurement, management and team estimate. It is interesting to note that not only companies are implementing these systems in a practical way, but also at a literary level in recent years, the attention towards these issues has grown a lot. CENTERIS argues that out of 32 publications analyzed in this regard, in the years 2000 to 2018, Management, Team Estimate and Recruiting & Selection are the three macro-areas of application most analyzed and developed.

Application in HR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
Management								1		1	3			1		1		1	
Team Estimate							1			1	1			1		1			
Recruitment & Selection		1																	3
Employability/R&S					1					1									1
Recruitment																			2
Turnover										1									1
HR Performance Measurement								1					1						
Corporate Education /training									1			1							
Development (HRD)									1										
Management by Competencies				1															
Quality of life at work															1				
Employability																		1	

Table 4: Distribution of topics regarding the use of AI in HR from 2000 to 2018

Jatobà, Mariana, et al., 2019

The analysis of the table 4 shows that from 2000 to 2010, the increase in attention to this issue was considerable. In the early years, scholars focused more on the theme of recruiting & selection, or rather on the administrative and strategic role that this department has within the company. On the other hand, two interesting phenomena are noted in the two-year period 2009 - 2010. In these two years, the topic of the publications has been more oriented towards issues concerning Management and Team Estimate, or rather activities to support decision making processes.

After a slight decline in research on the AI in the HR function, in 2018 it began a period of growth, during which it faced a great attention to this issue with increments of publications on changing recruitment and selection processes through the use of AI.

The impact of digital transformation in the HR department was analyzed from a practical point of view by Talent Garden in 2019. Its report was created as a result of the dissemination of a survey concerning the degree of digital evolution aimed at over 500 HR managers throughout Europe. In the following paragraphs, the transformation process of these activities will be analyzed in detail, with the consequent benefits brought to company performance.

2.4.3 Recruitment & Selection Process

One of the possible fields of application of AI in HR management is the recruitment and selection process.

Recruitment consists of "all those activities that the company puts into practice to express its demand for work and activates the potential job offer in its regard, while monitoring the evolutionary dynamics of the labor market" (Costa & Gianecchini, 2009). In this phase of the process, the main objective is to bring the most suitable candidates to the company in order to fill a specific role (Dello Russo, 2008).

The selection phase has as its main objective the choice of candidates among those who have been reached in the recruiting phase with characteristics corresponding in terms of potential and performance to the expectations of the company and who are willing to enter into a relationship with it (Solari, 2004).

The responsibility of those involved in recruiting and selection is very delicate as according to Finnegan (1983), recruiting means "choosing the right person for the right job".

The change in the selection process (recruiting and selection) involves the use of advanced Machine Learning systems that have to implement complex automated learning activities based on reading and understanding words, phrases and strings of information present in complete documents.

The selection phase of a candidate is in itself very delicate and entrusting it to an algorithm that autonomously determines whether the person being examined is the right one to fill a specific role, is a very courageous choice. In fact, it is very difficult for an algorithm to know how to evaluate the psychological attitude of an individual by evaluating emotionality and motivation. Many companies, in addition to using Machine Learning processes for the evaluation of candidates, build Assessment Gamification platforms to test and understand how the candidate behaves in certain situations, especially the stressful ones. In this regard, it is important to point out that Machine Learning and Gamification systems are used not independently, but jointly with human action.

More specifically, the recruitment and selection activities that can be carried out with the support of AI systems can be divided into the following categories (Geetha, 2018):

- Screening Curriculum Vitae: the AI tool supports the candidate before, during and after the application for a job vacancy. In this way, companies are able to interact with candidates using chat boxes that provide automatic answers and feedback for candidates;

- Candidate engagement: the AI tool allows candidates to send their application through external sites which, by extrapolating contact details or other information, allow them to autonomously fill in the entry fields provided by the company website. In this way, the candidate is able to send his application more easily and the company can also use external sites to contact him again;

- Re-engagement: the re-engagement process supported by AI allows, once a specific job position has been closed, to automatically redirect some candidates to other company job vacancies, based on the skills and experiences described in the CV;

- On-boarding process: the AI tool can be used to support the on-boarding process of new hires in the company. In this context, AI provides the new employee with the contents useful for his on-boarding directly and without the need for the help of HR.

The use of these tools to support candidates and those who work in HR Management is part of the more complex strategy of corporate digital transformation, with consequent real advantages. It is possible to draw up a list of the main benefits deriving from the use of AI (Geetha, 2018):

- Time saving: the AI tools keep the data records, avoiding their repetition and the possibility that they have to be analyzed again. For example, the CV screening activity is repetitive and these new systems, through

Machine Learning, avoid wasting time in mechanical and monotonous tasks;

- Better mapping of talents: AI allows to identify the best talents by deep automatic screening and comparisons between different profiles; in this way, the allocation of resources to the various positions is optimal both for the employee who carries out a job suited to his skills, and for the company that improves the work experience within it;

- Cost reduction: AI tools avoid the need to go to external agencies that deal with head hunting. In this case, the cost of the Machine Learning tools is incurred on a one-off basis and outsourcing becomes a second choice compared to the internalization of the process;

- Better quality of the candidates hired: the AI tool, if programmed in such a way as to guarantee the equity of the output produced, makes an initial impartial screening of the candidates, without the occurrence of any bias or human prejudices;

- Reduction in employee turnover: The turnover rate measures the percentage of workers in a company who have decided to leave the company in a given period of time. If the turnover rate is very high, it means that those involved in Talent Acquisition have a large amount of work to do in order to satisfy all the requests of job vacancies. With an AI system that is able to evaluate the best fit between the candidate and the company, both voluntary and involuntary turnover will be lower. This leads to an improvement in the efficiency of the selection team, but at the same time a greater involvement on the part of employees, who, by

spending more time in the company, are able to feel an integral part of the organizational reality.

2.4.4 Training & Development activity

According to the Talent Garden report (2019), the second business that will undergo substantial changes consequently to the digital transformation is the training of employees.

Those involved in the People management and people development strategy must be able to guarantee employees personalized training programs to broaden their cultural background in terms of theoretical knowledge and technological and analytical skills.

Today it is impossible to put into practice the same training activities organized a few years ago; the scenario has undergone enormous changes and people are increasingly used to using digital technologies for any activity, not excluding training.

The years during the Covid-19 pandemic have put a strain on those involved in the development of employee skills and leadership due to the almost complete suspension of all activities in presence, including training ones. Consequently, an acceleration of the use of e-learning and gamification was recorded.

It is possible to use e-learning in two ways:

•   Uniquely provide all employees with the same training package regardless of their background;

•   Use systems that, with the support of AI, create intelligent platforms that automatically understand employee gaps, by observing their digital behaviors providing them with content appropriate to their level of competence. This type of technology adapted to corporate training falls under the macro-category of adaptive learning (Tseng, 2008).

Gamification, on the other hand, consists in the use of practices and mechanisms typical of the game to help learners in learning the concepts or tasks provided. The reason why gamification is used for employee training within the company is mainly to improve engagement, problem solving skills and active involvement. The benefits deriving from the use of adaptive learning and gamification are evident both in terms of employee satisfaction and in terms of greater organizational efficiency of the team that manages the training activities. The employee, who is offered a personalized training package that changes over time, manages to feel more appreciated and listened by his employer, fills his weaknesses in terms of skills and knowledge and is encouraged to participate again in personalized training.

From an organizational point of view, the advantages can be found in the greater efficiency of the teams that deal with employee training and development. Thanks to the contribution of AI systems, the assignment of training activities to employees is simpler and more immediate.

CHAPTER III:

METHODOLOGY

3.1 Introduction and objectives of the research

This second part of the dissertation is based on carrying out an empirical analysis that sees companies belonging to different sectors with a single feature in common: the use of AI technologies in the processes of the HR business function.

The advantages deriving from the use of these systems in Talent Acquisition and Training & Development activities have been extensively described in the managerial literature and can be briefly summarized as: time savings, better mapping of incoming talents or those already present in the company, reduction of costs, better quality of the candidates hired and affinity between the skills possessed and those required, reduction in employee turnover, better level of engagement by employees in training activities and better teaching quality.

Nonetheless, no studies emerged from the reviewed literature that could empirically measure the effect of digital transformation on the performance of the HR department.

The objective of this research consists precisely in seeking the direct relationship between the level of digitization of business processes and the reaction to digital change with the improvement of performance, measured through specific company indicators. The KPIs (Key Performance Indicators) chosen for the comparison of the performances between the identified companies and consequently between the sectors, consist of time performance, cost per hire, improvement of the quality of candidates, satisfaction of candidates consequent to a specific selection process and satisfaction of employees in new training and development activities.

3.2 Methodology

Among the three study approaches available to support this research, the one chosen is quantitative.

First of all, to justify the choice adequately, it is necessary to make an overview of the available approaches:

- Qualitative approach: methodology that explores the meaning attributed to a social problem by different individuals or groups of them. The research process that starts from the composition of the questions to the collection of data is inductive and gives importance to the explanation of the complexity of a given situation. This model is usually used in research where the variables are not known, or for research on little studied topics for which there is no solid basis of empirical research.

- Quantitative approach: approach used to verify objective theories by examining the relationships between three variables (dependent and independent) through the use of statistical processes. This methodology is used for research where there is a clear identification of the factors that influence the result and consequently of all the variables involved in the process

- Mixed approach: the mixed research approach involves both quantitative and qualitative research and data analysis methods. The information emerging from these two types of analysis is then incorporated into a single research and used for the creation of complete hypotheses and theories. This method is used when both approaches described above are not exhaustive for the search, but compensate each other and consequently both of them must be used (Porter, 2015).

The research model chosen in this study is quantitative and involves the use of a survey.

The survey is a tool that provides a quantitative / numerical description of trends, attitudes and opinions of a given sample of the population (Fowler, 2008).

Through the results obtained from the survey to which various companies will be subjected, it will be possible to effectively verify the existing link between the digitization of some processes and the improvement of performance.

3.3 Overview of the selected companies

The choice of the sample of companies for the research was carried out following two well-defined criteria:

1) Belonging to different sectors

2) Implementation of AI systems in the HR function

The selected companies are Unilever, PriceWaterhouseCoopers (PwC) and L'Oreal. These companies, in addition to being market leaders internationally, are at the forefront of digital transformation and cultural revolution focused on adapting to new digital systems. The selected companies, their respective sectors and their level of introduction of the digital transformation are described in detail below.

3.3.1 The Unilever case

Unilever is a public company based in Rotterdam (Netherlands) born in 1930 from the merger of two pre-existing companies (brothers Lever and Nederlandsche margarine Unie). To date, it is one of the largest manufacturers of consumer goods, owner of over 400 brands spread internationally in more than 190 countries and with excellent positions in individual market rankings. The products marketed by Unilever belong to different categories: Home Care, Food & Refreshment and Beauty & personal Care.

Unilever, being by now a company with worldwide diffusion and at the forefront in the management of the value chain of its products, for some years has been investing

heavily in the IoT, robotics, AI and augmented reality, both in support of the business, through the " introduction of these technologies not only to connect the supply chain to partners and customers but also to support and make the staff functions of its structure more efficient. The goal of Unilever's digital transformation plan is to automate as many internal processes as possible; to date about 700 have already been automated with a consequent reduction in costs and improved efficiency.

Unilever, like many other companies, is also addressing a very important issue: the transformation of the HR function. As stated by Gianfranco Chimirri, HR Director of Unilever Italy, the HR function, in addition to introducing new technologies into daily activities, must reconstruct the path of the candidate or employee by creating an "Employee Experience" linked to a total reorganization of the team and activities carried out by its members.

The introduction of Artificial Intelligence systems in Unilever HR has essentially three objectives:

- Expansion into new emerging markets: Unilever hired around 30,000 people and received nearly 2 million applications in one year, of which 58% came from countries with emerging economies;
- Reduction of hiring costs: according to 60% of employees, a bad hiring can cost the company about $ 30,000, so if, hypothetically, Unilever hires only invalid candidates in a year, there would be a cost of 75 million dollars. The use of AI must support the hiring team by reducing the hiring percentage of people who are not professionally valid or not in line with the company;

- Elimination of discrimination in recruiting: the selection of candidates is often subject to discrimination against minorities and diversity due to bias and personal prejudices (Unilever, 2023).

AI is mainly used to improve the selection process, through the creation of an innovative approach that is based on the creation of a candidate experience that offers an intuitive process and an "out of the box" interface. The result of this approach is a process.

Unilever's new Talent Acquisition approach is based on the creation of a process consisting of 4 phases of gamification and video interview.

The first step is to create a Digital Application Form that can be filled in both by the candidate and in an automated way through the LinkedIn profile.

The second step, following the submission of the application, involves an assessment of 12 phases consisting of gamification. These games allow you to analyze the cognitive, problem-solving, risk-taking skills and work attitude of candidates. Machine Learning algorithms are used in this context to benchmark candidate results and to align the level of games. For these particular types of assessments there are no right or wrong answers provided by the candidates but the ability to reflection of the candidate in situations never seen before is assessed.

The third step consists of a 30-minute Video Interview in which the recruiter is not a person, but a Machine Learning algorithm. This system looks at the expressions and body language of the candidate to evaluate the perfect fit with the company. In addition, the AI bot managed by Microsoft is able to answer a very high number of broad-spectrum questions asked by the candidate. This system is based on the three pillars of AI:

- Descriptive: create a shortlist of profiles by analyzing the answers of a questionnaire to which all candidates are submitted;

64

- Predictive: use the data of employees already present in the company to create benchmarks with external candidates;

- Prescriptive: create a continuous updating and comparison of the data and feedback added to the system.

The last step of this process is the one that precedes and partially includes the candidate's on-boarding by providing an invitation to a Discovery Center through which candidates can meet and digitally experience a typical day at Unilever.

This interesting and innovative process stimulates candidates and helps the recruiting team in streamlining daily tasks. These new processes substantially modify the work carried out by the HR function which has consequently been reorganized. According to the new approach proposed by Chimirri, the HR function is made up of a few HR Business Partners responsible for the evolution of the organizational design and the development of the "next generation talent" (Chimirri, 2019); the role of recruiter, on the other hand, is modified and transformed into a "Talent Advisor", that is a person who manages employer branding activities, analyzes KPIs and tries to align HR data with business data, manages the career path of employees from start to finish, thus contributing to the creation of a "people centered" culture.

3.3.2 The PwC case

PricewaterhouseCoopers is an international network of companies that provides auditing, management consulting, legal and tax services to companies with the aim of providing its customers with innovative answers in response to complex problems of various kinds.

This company, which is currently one of the Big Four in consulting and auditing, was born in 1998 from the merger of Pricewaterhouse and Coopers & Lybrand. PwC provides its services in 151 countries through a network of 364,000 employees.

PwC, as well as the previous selected company, is trying to redefine the role of the HR function following the use of cutting-edge technologies, such as Machine Learning.

One of the activities that is progressing technologically thanks to digital transformation is recruiting. Over the last few years, the PwC selection process has seen the introduction of job assessments based on gamification aimed at assessing the candidates' soft skills, such as the candidate's reasoning skills, aptitude and reflections during stressful situations.

3.3.3 The L'Oréal case

The third company taken into consideration for the research is L'Oreal, the first company in the world by turnover in the beauty and cosmetics sector. Founded in 1907, today L'Oréal is a large group that has a great variety of brands categorized according to their distribution criteria on the market: products for the general public (Garnier, Maybelline, L'Oréal Paris), professional products (RedKen, Matrix, Kérestase), luxury products (YSL, Lancome, Shu Uemura), dermo-cosmetic products (Vichy, La Roche-Posay, CeraVe) and The Body Shop.

This company, or rather, this large international group, is present in 150 countries and has 86,000 employees worldwide.

The strong international structure of L'Oréal creates a great corporate attention towards human relations, employee engagement and building a sense of trust, mutual respect, cooperation and personal development. Furthermore, the transformation of the group into a Beauty Tech is increasingly creating the need for new corporate roles, new profiles with increasingly diversified hybrid skills with a focus on digital.

Digital transformation, in all its facets, is involving L'Oréal and its fields of application range from creating a more personalized experience for the customer to

implementation in internal company processes. Although it may seem that interfacing with the customer in the world of beauty can only be a real experience, today L'Oréal has introduced the concept of Beauty Tech, that is a completely different and innovative way of doing business. The three pillars of L'Oréal's digital business transformation are:

- Create a virtual and personalized experience for the customer
- Use the potential of data to propose satisfying consumer experience
- Reinvent product storytelling to engage more customers

As already mentioned previously, L'Oréal is implementing digital transformation not only to approach its customers differently but also to improve internal processes, including those concerning the activities of the HR team.

Over the past few years, L'Oréal has introduced a conversation platform with Mya Systems, a company that provides AI solutions for the recruiting sector, in the UK, USA and France. More specifically, Mya Systems allows a more efficient management of the applications received in order to make recruiters concentrate on less mechanical and standardized aspects of the selection process, that is, those concerning human and qualitative development.

Mya Systems supported L'Oréal in defining the specific criteria that candidates must meet for each different job vacancies. This system composed of real Machine Learning algorithms is able to ask questions to its interlocutor to understand if their characteristics correspond to the requirements of the position.

It should be noted that the difference in the quantity of content of the 3 cases in question depends on the amount of information that it was possible to access and search and the level of advancement of digitalization within each company.

3.4 Creation of the survey

As already mentioned in the paragraph dedicated to the methodology, in order to continue the research and directly understand the impact of AI systems on HR processes and activities, a single survey was created for all three companies studied.

The structure of the questionnaire was designed so that both quantitative and objective data (company performance, process transformation) and personal information on how each HR has dealt with the change could be extracted from the answers jointly.

The survey was divided into two sections:

- Digital transformation
- Artificial Intelligence & HR
- Concluding section

In the section dedicated to digital transformation, questions have been included regarding the perceived level of digital maturity of the company, the widespread diffusion in the various functions of the digital transformation and the possible presence of cultural barriers to the new digital approach.

The second section, on the other hand, goes right into the heart of the topic examined and presents more specific questions regarding the activities that are now accompanied by Machine Learning systems, the advantages, the organizational and operational criticalities deriving from the change in these processes.

The concluding section, on the other hand, is composed of questions that aim to collect the personal opinions of the interviewees on the topic under consideration. There are questions about the critical issues and the change in skills necessary to be able to face changes of this type.

The methods of answering all the survey questions were chosen in order to create a homogeneous database of information as final output, consisting of tables, key numbers

and standardized assessments. Only for a few questions, especially those that are part of the concluding section, the interviewees were given the opportunity to write a paragraph to explain certain dynamics that are difficult to include in multiple answers or evaluation scales.

The answer modalities chosen for the remaining questions were: multiple choice and Likert scale. The Likert scale is among the most used in different types of surveys such as marketing or behavioral ones. This type of analysis aims to detect the attitudes and opinions of the respondents. Likert-scale questions offer participants answers that go from one extreme to the other and, compared to binary questions that offer only two answer options, are more effective in obtaining accurate feedback and all the nuances of the collected opinions.

The tool used to create and distribute the survey is Google Forms, which is an app offered by the Google Suite for creating and studying surveys of all kinds.

This tool was very useful as it allowed not only to customize the type of answer to be assigned to each single question but also to analyze the results obtained both through an Excel database and through explanatory graphs for each question.

The survey to which the companies in the sample were subjected is presented below, with the previously explained subdivision and the chosen response methods.

Section 1: Digital transformation

1) Is your company implementing a digital transformation strategy?

• Yes

• No

2) If so, how would you define its level of digital maturity?

• 1 (poor) to 5 (cutting edge)

3) The use of advanced technologies for carrying out business processes is:

• Reserved for some corporate departments

• Widespread throughout the company

4) How would you evaluate the role of corporate culture in this transformation?

• It contributed to the creation of barriers to digital transformation

• It supported the digital transformation

5) How do you think digital transformation has affected business performance?

• Positively

• There are no differences from the previous situation

• Negatively

Section 2: Artificial Intelligence & HR

6) Has your company implemented AI systems (e.g., automatic CV screening, gamification for assessment, etc.) to support the HR function?

• Yes

• No

7) If so, how many years have these systems been active?

• Less than 2 years

• 3 or more years

8) What activities are supported by these technologies?

• Talent Acquisition

• Skills Training & Development

• Performance Measurement

- Workforce Planning
- Management of the relationship with employees

TALENT ACQUISITION ACTIVITIES

9) Compared to the use of traditional processes, the Time Performance of the recruiting activities supported by AI is:

- Improved
- Remained constant
- Worsened

10) If there have been improvements, can you indicate in what terms? (e.g., Reduction of the time needed to complete the selection process from 50 days to 40 days)

11) Compared to the use of traditional processes, the Cost per Hire relating to the recruiting activities supported by AI is:

- Improved
- Remained constant
- Worsened

12) If there have been improvements, can you indicate in what terms?

13) Compared to the use of traditional processes, the quality of the candidates selected during the pre-screening activities supported by AI is:

- Improved
- Remained constant
- Worsened

14) Do you think that the use of AI algorithms for recruiting is useful for eliminating the cognitive biases (prejudices, first impression) typical of a first personal evaluation?

- From 1 (no) to 5 (yes)

15) Candidates who face a candidate experience that includes the use of AI are:

- More satisfied than those who go through a classic selection process

- As satisfied as those who go through a classic selection process

- Less satisfied than those who go through a classic selection process

16) Can you indicate the percentage of candidates who are fully satisfied with having undergone a selection process including steps managed by an algorithm?

SKILLS TRAINING & DEVELOPMENT ACTIVITIES

17) Are employees more satisfied with training activities since gamification systems are used to personalize training activities?

- Yes

- Quite

- No

18) If so, can you indicate in what terms there has been this improvement? (eg. Satisfaction rate from 40% to 60%)

19) Since these innovative forms of training have been introduced, the number of participants in these activities is:

- Increased

- Remained constant

- Decreased

Section 3: Concluding section

20) How do you think that the hard and soft skills that an HR must possess in order to interface with the new working reality characterized by digital transformation have changed?

21) How do you rate your experience in using AI systems in your daily activities?

•   1 to 5

22) What are the main difficulties you faced during the transformation process?

3.5 Presentation of the results

The survey administered to the companies in the sample has a mixed structure, contains both quantitative questions aimed at measuring and comparing the performance of companies, and qualitative questions aimed at accurately understanding the attitude of company employees to change, how they got used to a new reality and the difficulties encountered.

After this brief introduction, it is necessary to present the results obtained from the questionnaire, distinguishing them from time to time based on the relevant company.

The first data to be identified concerns the number of responses received, that is 31, divided as follows between the different companies:
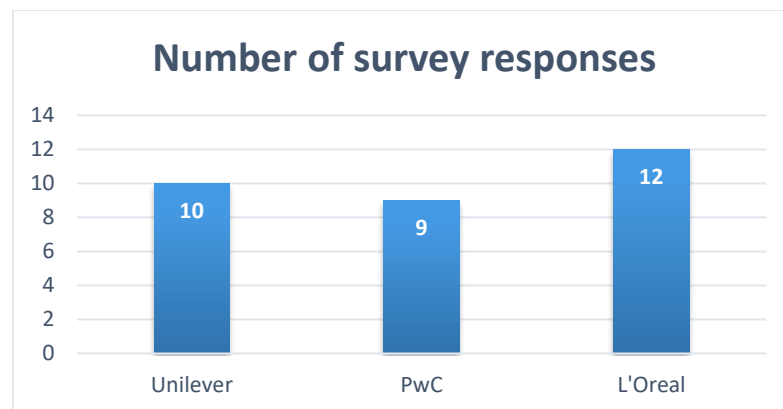
Graph 2: Number of survey responses

The number of responses obtained by each company for the survey is almost similar. Since the questionnaire, as previously mentioned, was not disseminated to all employees but only to some members of the HR Community, belonging to different teams, the number of responses obtained is satisfactory.

At this point, before proceeding with the comparison of the evidence that has emerged between the different companies and extend the discussion to a macro context, namely that of the entire industry, it is necessary to focus on the answers obtained for each company.

Unilever results

For Unilever, the giant of consumer goods, 10 members of the HR Community participated in the research. As explained above, the first section of the survey, aimed at understanding the employee's perception of the corporate digital transformation strategy, obtained fairly homogeneous answers.

100% of respondents are aware that the company is carrying out a digital transformation strategy (question 1) and this is widespread implemented in all company departments (question 3).

Each employee has a different perception of the company's digital maturity level, measured in the survey using a Likert scale. The scores obtained for this question (question 2) are as follows:
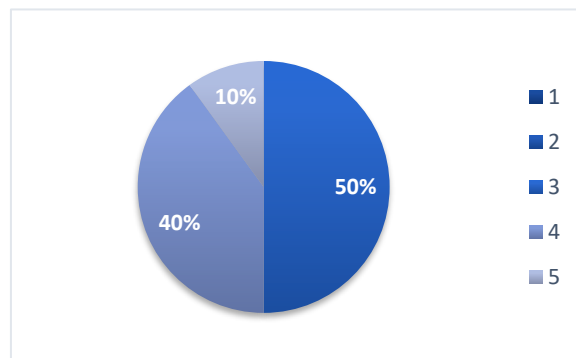
Levels of the Likert scale	Results
1 (Poor)	0%
2	0%
3	50%
4	40%
5 (Vanguard)	10%

Table 5: Question 2

Unilever employees consider their employer's level of digital maturity to be good on average. Most of the respondents gave an average rating, an indication that in the company there is an internal desire for growth and digital development further than the results already achieved. The other 50% of respondents, on the other hand, believe that their company has advanced levels of digital maturity.

The other two key themes addressed by the survey are: the role of corporate culture in the context of digital transformation (question 4) and the correlation between the implementation of such a strategy and the improvement of both company and team performance, in terms of efficiency, cost, customer satisfaction or employee satisfaction (question 5).

In this regard, the sample gave a unanimous response stating that the corporate culture has fully supported DT's strategy and that this is having positive repercussions on some company performance indicators. The results presented from this point onwards are those relating to the second section of the survey, concerning the application of AI technologies in the HR function.

100% of survey respondents have been using AI systems and Machine Learning algorithms in their daily activities (question 6) for more than 3 years (question 7) mainly

for two types of activities, found by the entire community interviewed: Talent Acquisition and Skills Training & Development (question 8).

The unanimity of the responses to these questions indicates that the AI systems adopted by the company are used by many employees, in the sample under examination all of them, whereby the digitization of some processes appears to be properly diffused among employees.

By analyzing the impact of these systems on some specific company performance indicators in the HR field, there are discrepancies between the answers. The first analyzed indicator is the one that measures the Time Performance of recruiting and selection activities (question 9). More precisely, the KPI in question is the Time to fill, which measures the time needed from the opening date of the job vacancy on the various company channels and the closing date of the position with the consequent hiring of the chosen candidate.

Responses were obtained in and the survey showed the results presented in the Time Performance Chart 3.
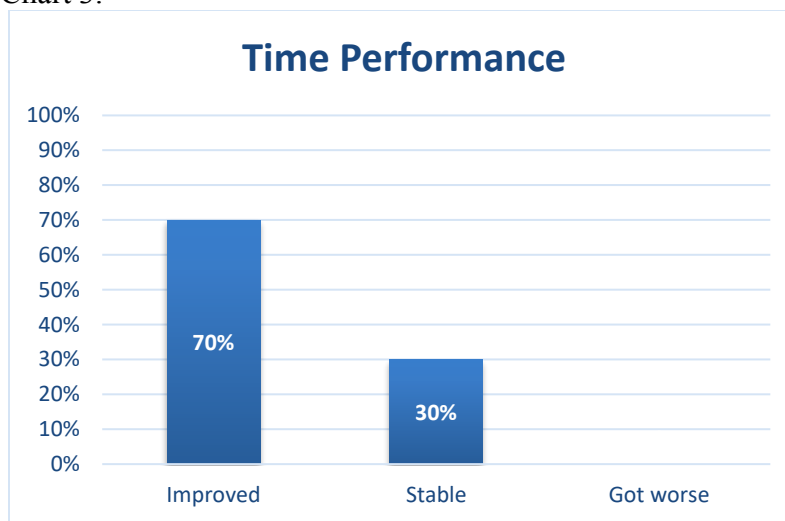
Chart 3: Question 9

70% of employees who use AI tools for recruiting activities (initial CV screening, use of chatbot and video interviews) believe that Time Performance for the entire selection process has improved, while 30% believe it has remained constant. To quantify the improvement of this performance indicator, it is necessary to analyze the answers to question 10.

Those who have argued that the Time Performance for recruiting activities remained constant, justified their claim by stating that the use of these systems has resulted in substantial changes in terms of Time Performance, or that some observed improvements are not entirely attributable to the use of AI systems. Those who have recognized a real improvement in the performance of this indicator, that is 70% of the sample, quantified it as follows:

Reduction from 45 to 20 days of Time to fill	14%
Time for hiring halved	86%

Table 6: Question 10

The second indicator considered is the Cost per Hire, or the average cost incurred by the company to recruit a new employee (question 11). According to estimates of the employees, the Cost per Hire consequently the use of AI systems turns out to be improved to 60% of employees, while remained constant for the other 40%, as can be seen from the following chart:

Chart 4: Question 11

The other indicator, analyzed by question 13, is the quality of the selected candidates, which should be modified thanks to the AI systems that help to better understand the skills of the candidates and to conduct a more impartial screening. Obviously, the perception of the quality of a candidate's skills and attitudes is very personal, consequently the answers are quite heterogeneous.
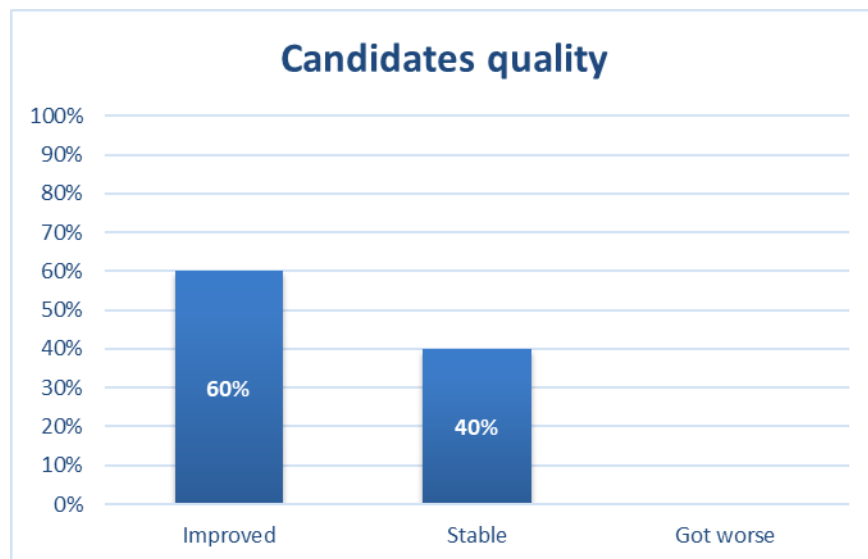

Chart 5: Question 13

78

In Unilever, most HR claim that since AI systems are used to carry out a first pre-screening of CVs and gamification assessment activities are used to test the skills of candidates, the quality of the profiles that enter a shortlist of candidates for a job vacancy is better than that obtained by working exclusively with classic systems. Nonetheless, it is important to point out that no respondents have noticed a deterioration in the quality of candidates since these technological systems have joined the work of recruiters.

The next question (question 14) concerns a very important issue, i.e., the elimination of cognitive biases that may arise at the moment of the first meeting with the candidate. The Unilever community was asked to indicate the level of support of the AI systems in these terms on a scale of 1 to 5 and the answers obtained are as follows:
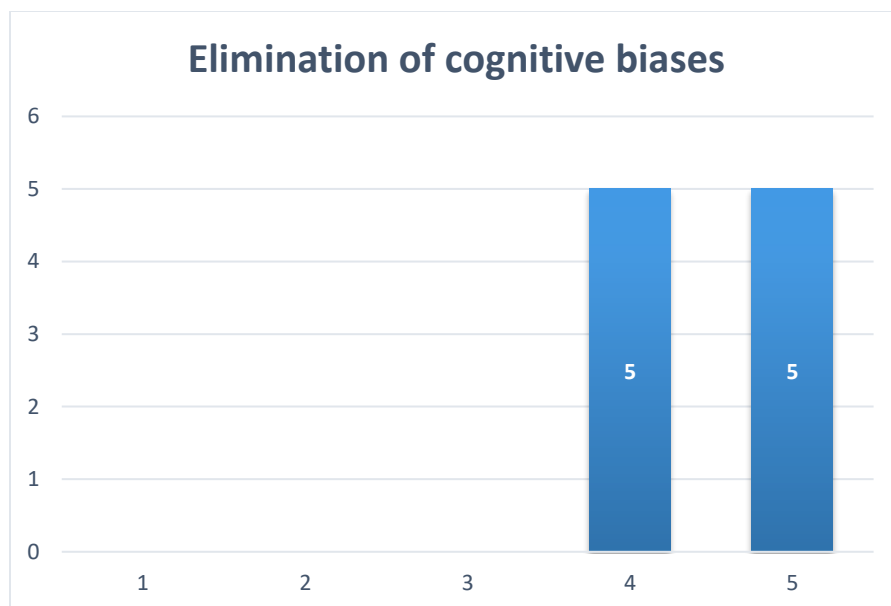
Graph 6: Question 1 4

The evidence that emerges from this question is significant as the employees themselves recognize that very often in the first interview or screening of profiles, we are influenced by photographs, attitudes, physical appearance or ethnicity. Instead, if the first

phases of the selection process are carried out by an impartial algorithm, there is no longer the danger of these biases appearing.

Especially in an international company like Unilever, where candidates and employees come from different countries and have a heterogeneous background, the theme of the fight against prejudice and discrimination is very important, consequently the use of impartial systems such as Machine Learning may be the key to solving this problem.

A further indicator to be analyzed is the percentage of candidates satisfied with undertaking or having undertaken a selection process that involves a mix between algorithm and human touch (question 16). In Unilever this percentage amounts to 80%.

Since among the activities supported by the AI systems in Unilever there is not only Talent Acquisition but also Skills Training & Development, all the survey respondents also filled out the section concerning the impact of the technology in question in this second line of activity. According to 100% of the HR Community (question 17), employees are more satisfied with training activities since they are supported by gamification systems and systems that automatically understand the skills to be developed for each employee. All HRs found an increase in employee participation in these activities (question 19) as well as other positive aspects, indicated in the following graph (question 18):

Results of new training activities

- 40% Increased engagement
- 20% Increased effectiveness
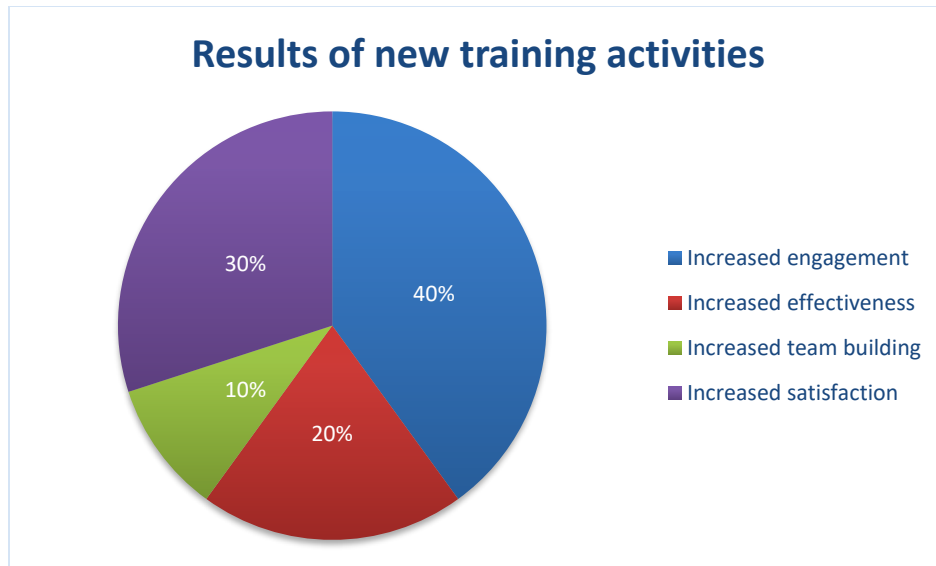- 10% Increased team building
- 30% Increased satisfaction

Chart 7: Question 19

From this graph it emerges that the engagement and participation corresponding to the main objectives of the activities organized for employees, are achieved more if systems that use AI are introduced to support traditional methods and classic activities, to better understand the employee and to offer a package of activities suited to the career path.

To conclude the survey, the HR Community was asked what were the changes in terms of hard and soft skills that the employees of the HR function had to face in a context of digital transformation (question 20) and the answers obtained were the following:
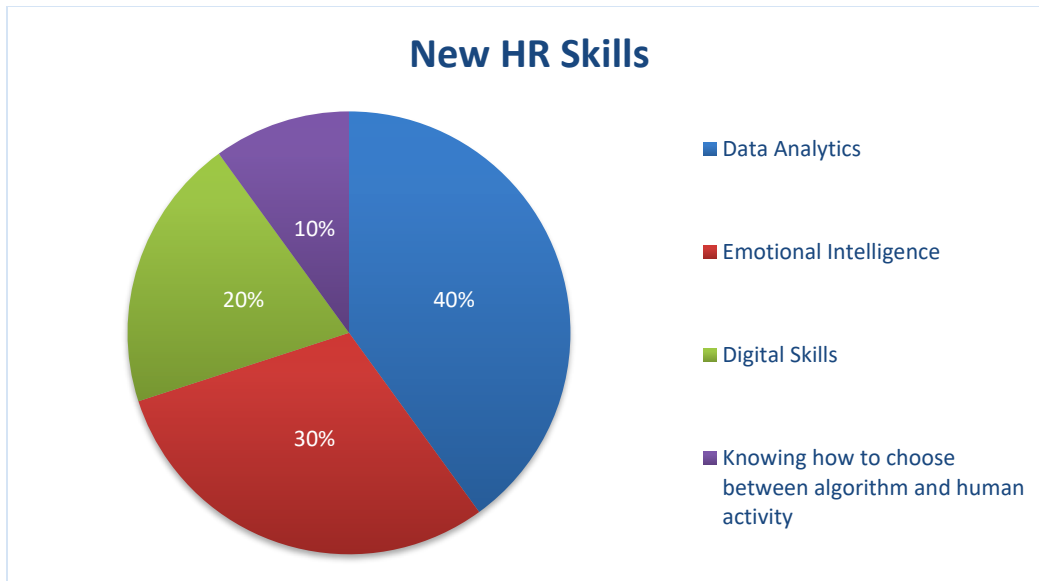
Chart 8: Question 20

According to the Unilever HR Community, the new HR employee is no longer a simple recruiter but becomes a Talent Advisor and must be equipped with emotional intelligence to carry out his activities correctly, to be able to establish good relationships with both colleagues and candidates. Furthermore, the most important hard skill that HR must be equipped with since the digital transformation process was implemented is the ability to analyze data.

The difficulties that HR Community has encountered in the daily use of these systems can be summarized in the following table (question 22):

No difficulty	40%
Convert the whole community to digital	20%
Get used to overturning the new recruiting routine	20%
Maintain a balance between the data, the analysis of data and the human touch	20%

Table 7: Question 22

82

In conclusion, 40% of Unilever HR Community interviewed gave a rating of 4 to their company's new digital transformation experience, while 60% gave a rating of 5 (question 21).

PwC results

The members of the HR Community of PricewaterhouseCoopers (PwC) who participated in the survey are 9. Out of these, 100% are aware that their company is implementing a digital transformation strategy (question 1) and this has been widespread in all company departments, both the various lines of business such as consultancy or auditing, and internal company services (question 3). The following table analyzes the level of corporate digital maturity perceived by employees (question 2):

Level of the Likert scale	% of answers
1	0%
2	0%
3	22%
4	67%
5	11%

Table 8: Question 2

Excluding the first two levels of digital maturity that are not suitable for a company of this size and with such a high level of international development in all its business lines, and therefore taking into account only the scores ranging from an average

level at the maximum score of 5 (cutting-edge), it is clear that most of the respondents place their company at a medium-high level, almost at the forefront, indicating that employees are aware of all the initiatives and all the tools made available by the employer to complete digital transformation.

100% of the respondents claimed that the role of corporate culture was in support of digital transformation (question 4) and that the changes resulting from this strategy improved company performance (question 5).

The analysis presented below highlights the integration of AI and machine learning tools in the activities of the HR function.

Respondents stated that PwC has been using these systems for less than two years to support Talent Acquisition activities (question 6, 7, 8). The answers given to these three questions were unanimous, indicating that in all company departments that deal with Talent Acquisition for any line of business it is possible to use these systems. In question 9, the PwC HR Community was asked how the Time Performance of recruiting activities had changed as a result of the introduction of AI systems. The answers given to this question are distributed as shown in the below graph on time performance:
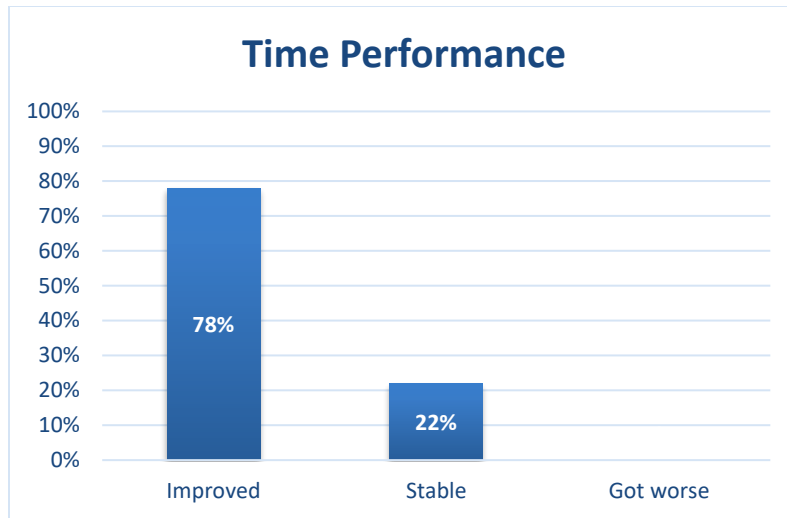
Chart 9: Question 9

Most employees who slowly change their work routine every day by introducing artificial intelligence systems is experiencing improvements in Time Performance, which in the field of recruiting indicates reduced time needed to close an open job vacancy.

According to a PwC study, the ideal average time for selecting a candidate should not last more than a month, as this issue is not connected to the efficiency of the team but also indirectly to the satisfaction of the candidate experience. The HR Community believes that the improvements found in terms of Time Performance for recruiting activities are as follows:

Recruiting process < 1 month	29%
Less time expenditure in interviews with subsequent negative results	43%
Possibility to dedicate yourself to strategic impact projects during the time saved using the tools	14%
Reduction / cancellation of time needed to pre-screen for positions with over 300 candidates	14%

Table 9: Question 10

85

From the table 9 it is clear that the benefits in terms of Time Performance are multiple. The reduction of the time expenditure for interviews with negative results and the time to screen multiple CVs are certainly among the main advantages in terms of importance and efficiency of the team, as the staff who were usually engaged in these activities, can devote themselves to other more challenging and strategic impact activities. The first advantage is very significant, namely the decrease in the time to fill a role (the time between the opening date of a position and the closing date of the same). According to a study conducted by PwC, a recruiting process that lasts more than a month turns out to be unsatisfactory for the candidate and improving this indicator through the use of AI systems is a great achievement from several points of view.

The indicator analyzed by the next question is the Cost per Hire. For PwC, the respondents gave a unanimous result and 100% of them indicated that the Cost for Hire has not undergone significant changes as a result of the introduction of AI systems in the HR function (questions 11 - 12). The perception that HRs have about the quality of candidates who are selected in the early stages by Machine Learning tools is different (question 13). The answers are heterogeneous and more precisely:
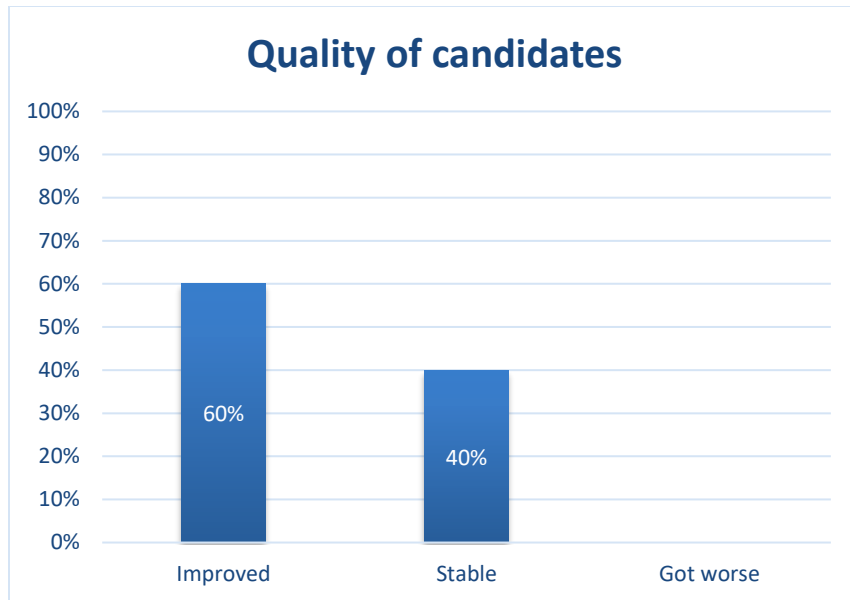
Quality of candidates

Chart 10: Question 13

As emerges from the previous graph, the quality of the candidates selected by the AI
tools is never worse than the quality of the candidates analyzed
through traditional systems, indeed according to 56% it has improved and according to
44% of the recruiters it has not undergone variations. As already specified for the
previous use case, question 13 is linked to the next question, in which the HR
Community is asked if the AI tools help to eliminate the cognitive biases that often arise
in recruiting activities. The following is the evidence that emerged from the sample's
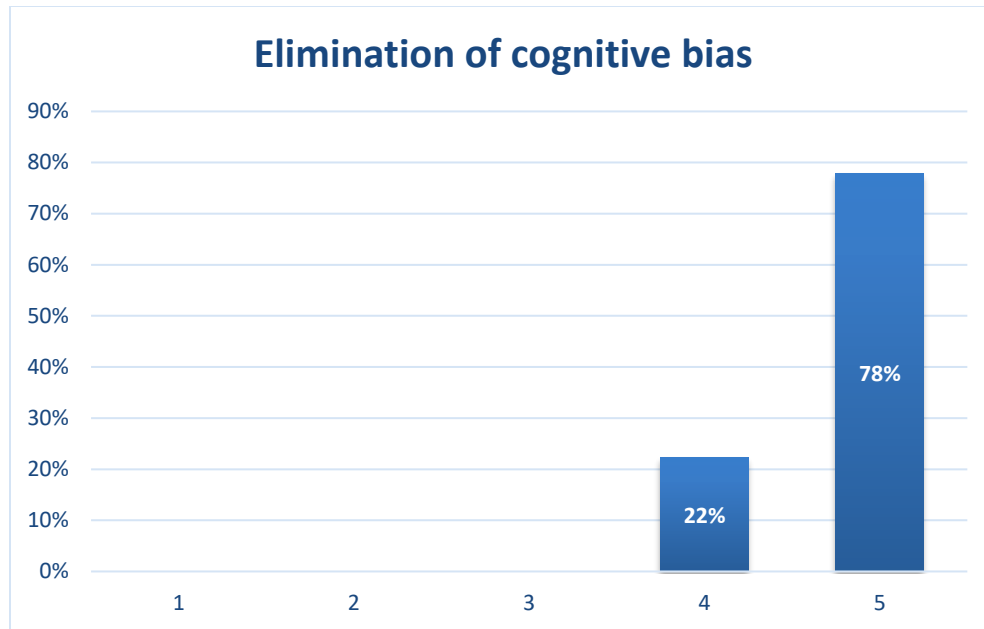responses:

Figure 11: Question 14

It is clear that in an international organization, such as a Big4 consulting firm, the profiles that are presented for each position are very heterogeneous and prejudices of different types could arise, so it is very interesting to note how these tools constitute an important help for all those who know candidates for the first time.

At this point of the research, for the company in question it will be necessary to directly analyze the answers of the final section of the survey as the sample stated that the employer does not use AI tools to support the Training & Development activities of the candidates.

Coming to question 20, it is possible to identify what are the new skills that an HR must possess in a context of digital transformation. The following results emerged from the sample's responses:
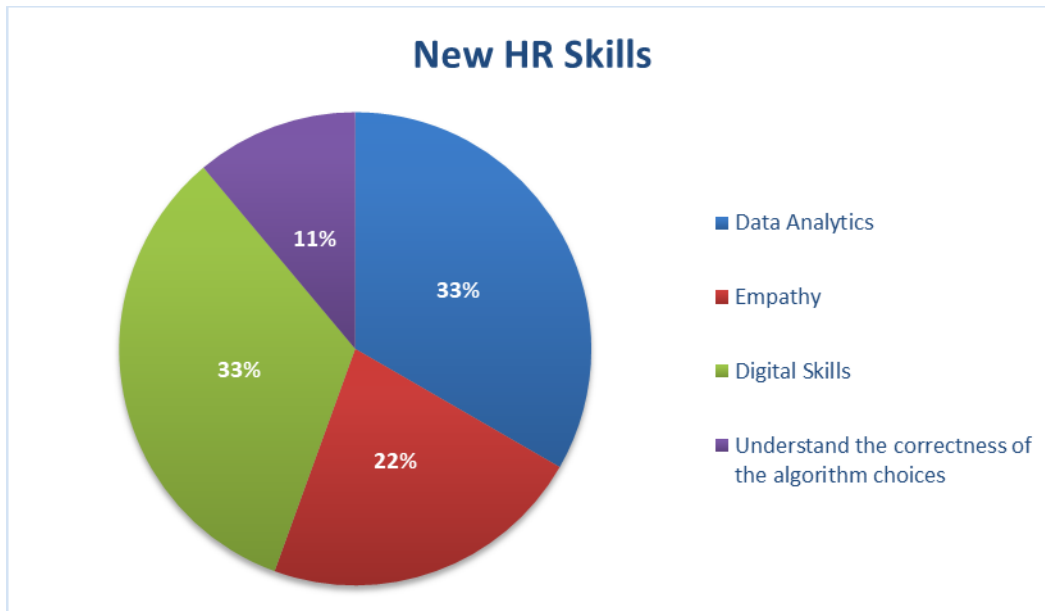
Chart 12: Question 20

The interviewed members of the PwC HR Community stated that the new skills that an HR must have consist in particular in digital skills and data analysis skills, which in total reach 66% of the answers.

Combined with the new skills to be developed, there are the difficulties that the HR Community has had to face during this new digital transformation process. The difficulties that PwC HR members encountered during this particular transition period (question 22) can be summarized and clustered in the following table:

No difficulty	44%
Understand how far to make choices based on algorithm analysis	22%
Create a Human centered selection process also through the use of tools	22%
Switch of habits	11%

Table 10: question 22

The analysis of the following table shows that the majority of those who answered to the survey did not encounter difficulties in facing a digital transformation process, which indicates a strong ability to adapt and understand the new digital tools by the HR Community.

If in fact, from the previous question it emerged that digital skills and data analysis skills are the most useful skills for an HR that faces a digital transition, the answers to question 22 allow to indirectly understand that the PwC HR Community is extremely competent both in data analysis and in the use of digital tools. Finally, it is interesting to highlight the evaluation that each respondent provided to the experience of using AI Tools (question 21).
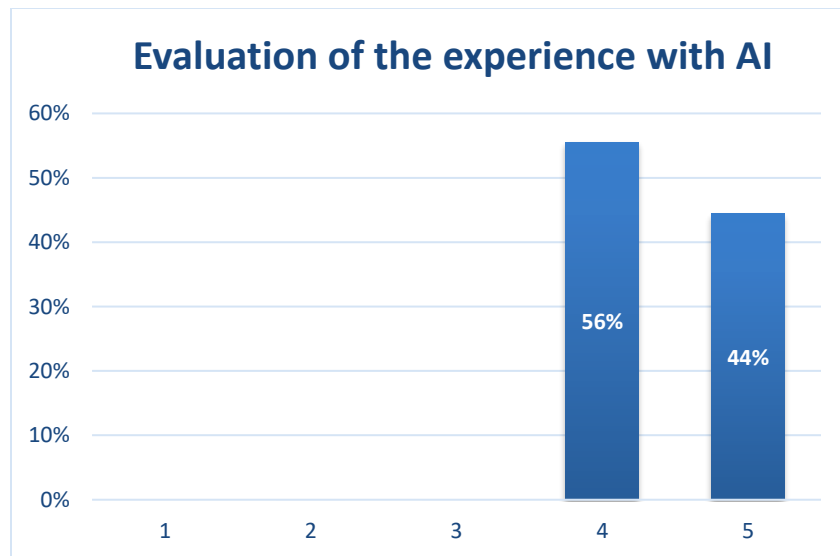

Figure 13: Question 21

Likewise, the level of satisfaction is very high. All interviewees rank above average, giving good/excellent ratings to their experience.

L'Oréal results

The members of the L'Oréal HR Community involved in the survey are 12, the highest number of respondents compared to the other companies in the sample. 100% of these are aware of the implementation of the digital transformation strategy (question 1), widespread in all company departments (question 3) and fully supported by the corporate culture (question 4), at the same time positively influencing corporate performance (question 5).

From the data resulting from question 2, concerning the perceived level of digital maturity of L'Orèal, the answers provided by the HR Community are the following:

Level of the Likert scale	Percentage of responses
1	0%
2	0%
3	17%
4	58%
5	25%

Table 11: Question 2

The level of digital maturity perceived by employees who are part of L'Oréal's HR Community can be considered quite high, even though there is a small percentage (17%) that provide an intermediate evaluation. As regards the implementation of the introduction of AI Tools to support the activities of the HR function, it is possible to analyze the second section of the survey.

L'Oréal has been implementing these systems for less than two years (question 6-7) and supported activities are: Talent Acquisition, Skills Training & Development, Employee Relationship Management (question 8). At this point we come to the evaluation of some useful indicators to assess the impact of the AI Tools on the performance of the HR team; the first indicator to consider is Time Performance (question 9).
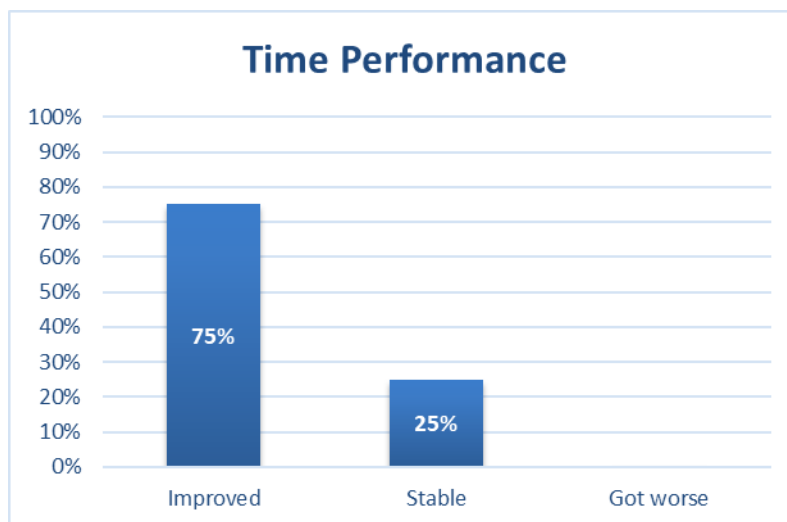

Chart 14: Question 9

The graph above shows that 75% of respondents show an improvement in Time Performance of the HR team in the selection of candidates. Only 25%, however, show that it has not undergone particular changes. At this point it is useful to analyze what are the improvements in terms of Time performance that have been identified by the interviewees. They have been enclosed in the following table:

Reduction of the mechanical repetitiveness of pre-screening and less time for the first selection	30%
About 10 days less for the selection of candidates	20%
More time to better analyze each candidate because the system eliminates those that are not compatible with the position	20%
Less time to get skills assessments (through assessments)	20%
Reduction of recruiting days from 50 to 35	10%

Table 12: Question 10

From this table some very interesting considerations emerge, one of them is listed in the third row, found in 20% of the answers. By assigning certain activities to an AI tool, each HR can devote himself more to those candidates who are selected, organizing a greater number of meetings with them or organizing different types of assessment/onboarding activities.

In addition to this interesting consideration, there is the reduction of the days required to carry out the pre-screening of candidates, an activity totally or partially delegated to the Machine Learning tool and, consequently, the reduction of days to close a job vacancy from 50 to 35.

Moving on to the next indicator, that is the Cost per Hire, from the results of the survey it emerges that it has not worsened since the introduction of AI Tools, but on the contrary, with a unanimous response, all respondents claim that this indicator has improved over time (question 11). A further condition to be analyzed is the quality of the candidates who are selected by the AI tools. L'Oréal recruiters have highlighted that the quality of CVs that pass the pre-screening performed by the tools is:
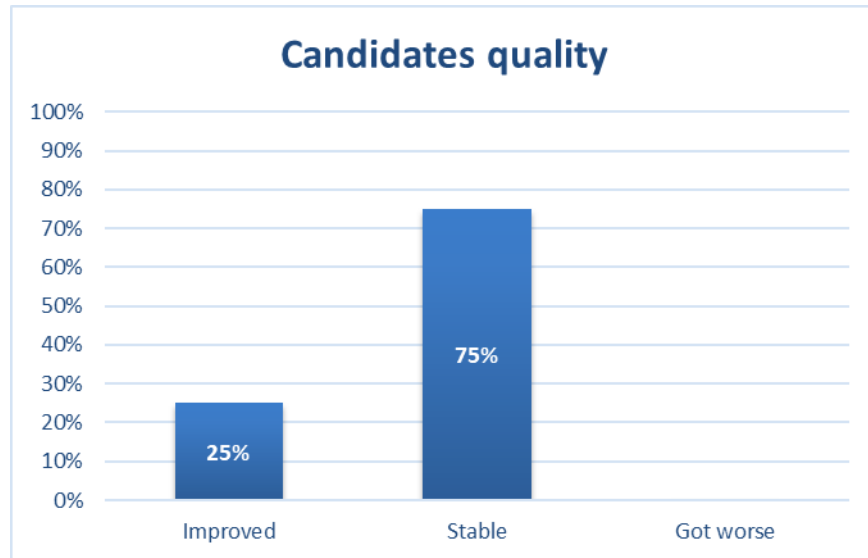
Chart 15: Question 13

The majority of the interviewees reveal that the quality of candidates who pass the initial selection stages supported by AI tools has not undergone particular variations compared to previously selected candidates. Only a small percentage show an improvement in the selected profiles. The impact of Machine Learning algorithms on the elimination of cognitive biases during the recruitment process is analyzed with the answers to question 14. The scores on the Likert scale assigned by the respondents to this question are as follows:
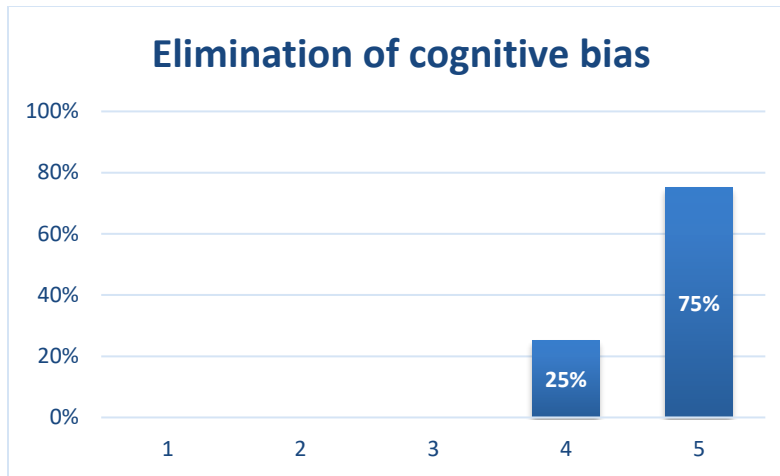
Chart 16: Question 14

The answers given to this question are quite positive. In a large multinational like L'Oréal where issues such as diversity & inclusion are deeply felt and developed by the business community, it is important to see that 75% of respondents say that Machine Learning tools have greatly supported in eliminating the formation of cognitive bias during the recruiting of candidates. The other 25% interviewed still gave a positive answer, with a score of 4.

Furthermore, evaluating the candidates' experience with a mixed selection process, i.e., including both a phase completed through the Machine Learning Tool and a phase with the support of HR, the answers of the HR Community show that 100 % of respondents believe that a mixed process is more satisfactory and more accurate than a process that includes only phases carried out according to traditional methods (question 15).

It is thus necessary to focus on the second part of the section dedicated to HR, in which the impact of AI tools in the world of Training & Development is analyzed.

According to the members of the HR community who participated in the survey, the employees who interface with gamification or personalized training activities are on average more satisfied than the classic previous training experiences. More specifically, 50% of respondents argue that employees are more satisfied than in the previous experience, while the other 50% argue that employees are fairly more satisfied than in the previous experience (question 17).

All those who claim that employees are more satisfied have found improvements in terms of engagement in training activities, participation, in fact 100% claim that there are more participants in these activities, increased team building, greater effectiveness of training activities (question 18/19).

Increased participation in training activities	100%
Higher effectiveness of training activities	50%
Higher engagement	33%
Increased team building	17%

Table 13: Questions 18-19

Finally, there is the section dedicated to an overall evaluation of the digital transformation experience that took place within the company. First of all, question 20 asks what are the new skills that an HR must possess in order to face an AI strategy, which can be summarized in the following graph:

New HR Skills

Legend:
- Data Analytics
- Emotional Intelligence
- Digital Skills
- Being able to become a career consultant
- Being able to understand how much to trust in AI systems

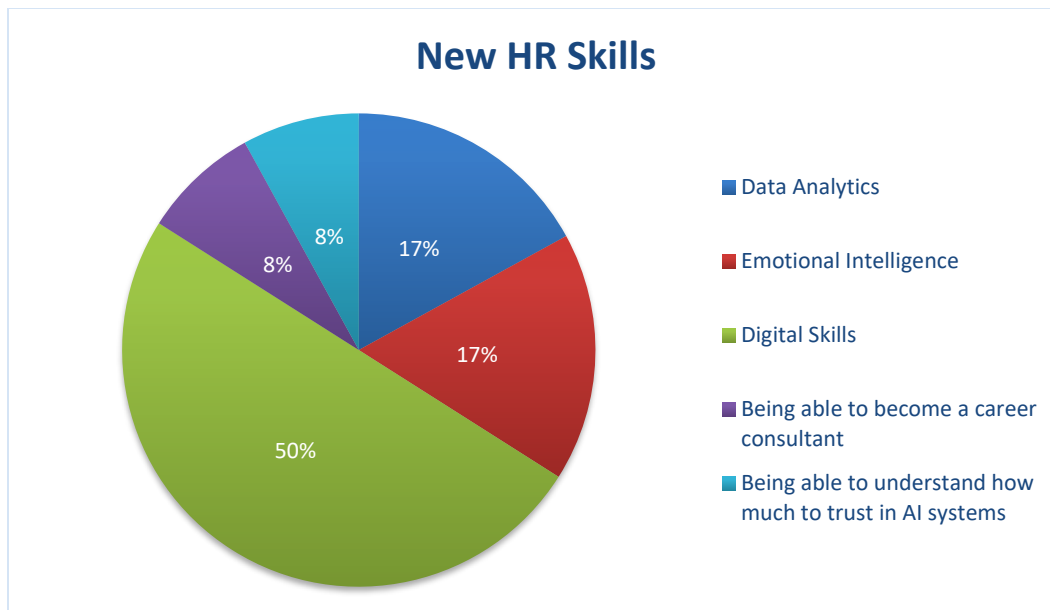Pie chart values: 17%, 17%, 50%, 8%, 8%

Chart 17: Question 20

In L'Oréal, the best skills that HR thinks should be developed by an HR community that is interfacing with a digital transformation process are precisely the digital ones, followed by those relating to data analytics. Nevertheless, digital skills that also include management and understanding of the tools used turn out to be once again the keystone for a company that wants to evolve. The penultimate question posed to the sample consists in highlighting the major difficulties encountered during the digital transformation process (question 22).

In L'Oréal, the majority of respondents (83%) indicated that they had not encountered particular difficulties in this phase of change, while the remaining 17% includes both those who have encountered problems getting used to a new way of dealing with daily activities, and those who have found it difficult to balance the data emerging from the tools and the human touch.

To conclude the analysis, the sample was asked to give a rating from 1 to 5 to evaluate the overall experience with the use of AI tools for carrying out the daily activities of the HR function. The following graph shows the results of their responses:
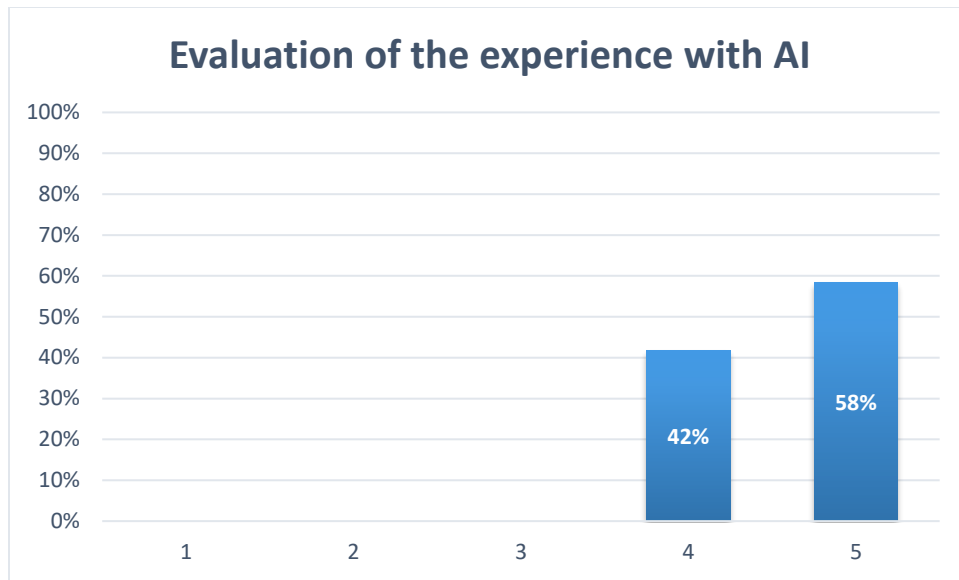

Figure 18: Question 21

The previous graph shows that in L'Oréal, most of the employees interviewed are quite satisfied with their experience with the use of AI tools. Those who in the previous question had highlighted that they had encountered critical issues and difficulties in using these systems gave a rating of 4, while all the others, more generally, are fully satisfied with the digital transformation HR strategy implemented in their company.

CHAPTER IV:

DISCUSSION

The third section of the paper consists of the discussion and comparison of the results obtained from the survey submitted to the companies chosen for the research. Following the detailed analysis carried out in the previous chapter, in which the main response trends were analyzed for each individual company and for each question of the survey through summary tables and graphs, in this section a comparison of the results previously obtained will be made and useful indicators will be calculated to understand the actual relationship between the implementation of typical technologies in a digital transformation strategy and company performance or employee satisfaction in the activities carried out daily.

As already explained in the section dedicated to the methodology and the research question, the target of this analysis is to discover and quantify the impact of the introduction of AI and Machine Learning Tools in the activities of the HR function.

4.1 Comparison of the case studies

The comparison between the results of the survey submitted by HR Community employees of the three companies in the sample is based on the intrinsic assessment of the differences that characterize each company, properly related to the sector to which they belong.

Production and distribution of consumer goods, consultancy and beauty and cosmetics are three apparently very different industries, with very different target customers and an equally different international approach. Despite all these great differences, there is one aspect that unites these three companies, namely the desire to become increasingly important, increasingly efficient and keeping up with modern

99

technologies, not forgetting the impact that the changes aimed at achieving these objectives have a wide range of stakeholders involved.

The first consideration to make when comparing the case studies is that each company is implementing a digital transformation strategy that involves most of the company departments. As already extensively discussed in the chapter relating to literature, a digital transformation strategy does not consist only in introducing cutting-edge technologies such as AI or the Cloud in all its forms into business processes, but it also includes a profound cultural transformation that leads employees to get used to a new, more dynamic approach to work, focused on different and innovative objectives.

In this regard, the first data to be compared concerns the level of digital maturity perceived by the employees interviewed within each company. By calculating an arithmetic average of the scores obtained and their standard deviation and considering that the values provided by them for the answer vary on a scale from 1 to 5, the following results are obtained:

	Unilever	PwC	L'Oréal
Average scores question 2	3.6	3.9	4.0
Standard deviation (σ)	0.66	0.57	0.64

Table 14: Average results for question 2

As can be seen from table 14, all three companies have a perceived level of digital maturity above the average value of the scores provided by the response options (2.5). With an average score of 4.0, L'Oréal is the company with the highest level of digital

maturity perceived by employees, followed by PwC and finally Unilever. Instead, the company that has a lower standard deviation of the answers to this survey question (question 2) is PwC, i.e., most of the respondents from this company have concentrated their response around a value of 4.

Next, it is necessary to take into consideration a very important aspect regarding the issue under consideration, namely the role of corporate culture in supporting a transformation process, in this case the digital one. All three companies have a very strong corporate culture felt by employees, so much so as to obtain 100% positive answers to the question that investigates the presence of a supportive role on the part of the corporate culture. It has already been established that in companies with solid values and culture well anchored in employees there is a greater openness to change and strategic transformation, with a consequent removal of all the barriers that often hinder all those strategic initiatives that aim to revolutionize the business or some business processes (Gupta, 2018).

At this point in the discussion, it is important to examine the focus of the research, that is, the implementation of AI systems and tools to support the HR function. There is no doubt that the choice of the companies in the sample was made upstream, already knowing that all three companies were applying a digital transformation strategy including effects on the processes of the various company functions. What distinguishes the three companies consists both in the timing of implementation of these systems, and in the type of activities that are supported by the Tools in question.

The activity to which the support of AI Tools is increasingly entrusted is Talent Acquisition, mentioned by all three companies, followed by the activity of Skills Training & Development; the management of relations with internal employees has been recorded only for one company. What emerged from the surveys is a confirmation of what had

already been previously ascertained by the Talent Garden study (2019), according to which in 69% of the cases analyzed, the digital transformation will bring substantial changes to the sourcing and recruiting activities of candidates, and 54% will make changes to the performance of personnel training and skills development activities.

Starting from the analysis of the effects of the implementation of AI Tools in Talent Acquisition activities and therefore the search and selection of candidates, Unilever, PwC and L'Oréal will be evaluated and compared with each other based on the following indicators:
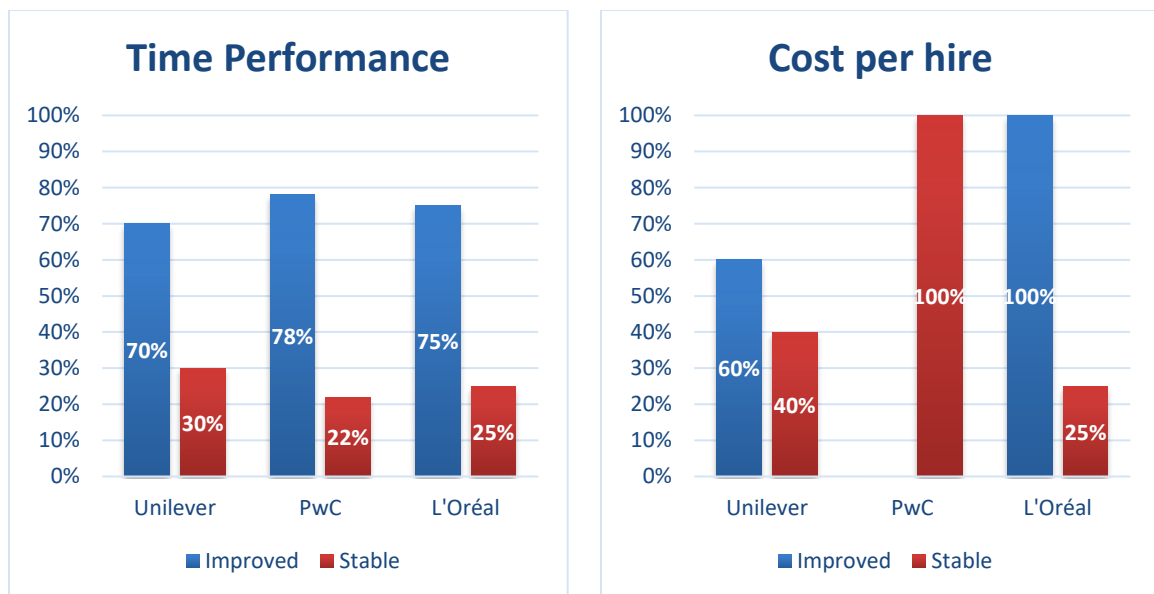

Chart 19 (a) and (b): Questions 9 & 11 – Comparison between Unilever, PwC e L'Oréal
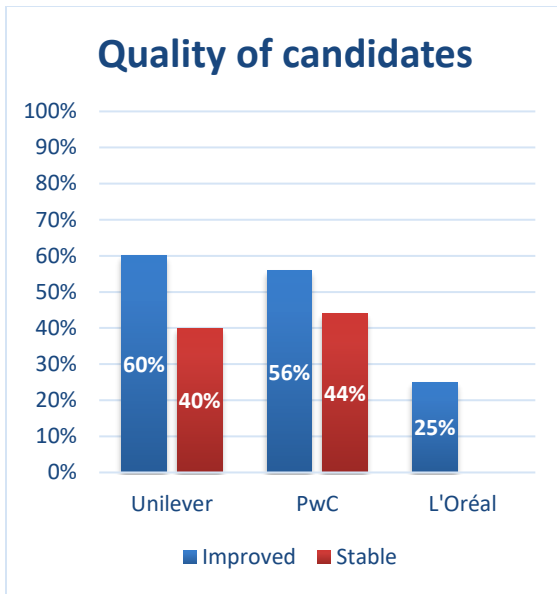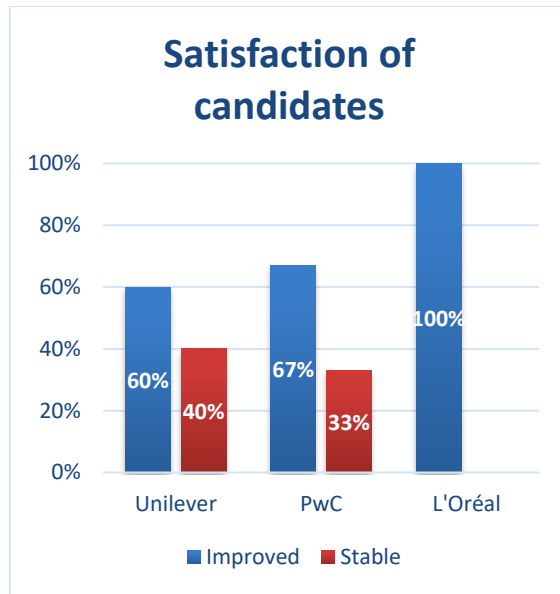
Chart 20: Question 13 – Comparison

Chart 21: Question 15 - Comparison

	Average scores
Unilever	4.5
PwC	4.78
L'Oréal	4.75

Graph 19a shows that most of the respondents from all three companies positively assessed the impact of the introduction of AI Tools on Time Performance related to Talent Acquisition activities. Frequently the time elapsed between the publication of a job offer and the hiring of the candidate chosen during the selection phase is prolonged, even for several months. Obviously, in the event that an employee is being replaced or if there is an urgent need for a resource to be inserted, extending the waiting time is not positive, as in many cases the company performance could be affected.

Consequently, a tool that manages to improve Time Performance to hire a resource is an optimal solution for the company and for those who deal with Talent Acquisition. On average, 74.3% of total respondents stated that they found improvements in the Time Performance of the recruiting and selection of candidates, while 26% said that there were no substantial changes in the result of this indicator.

Each member of the HR Community has indicated the terms of improvement of this KPI focusing on different aspects. Some have focused only on reducing the time needed to close a job vacancy, while others have deepened the analysis, focusing on other crucial and stimulating aspects, thanks to which the importance of the role of HR in corporate strategy shines through. The theory concerning Strategic Human Resources Management (Gabrielli, 2020) is taken up precisely in this context as, from some answers it emerges that the time that was previously taken to screen many CVs for each single position, is now partially recovered and used for various types of activities including those with a greater strategic impact within the company.

Furthermore, in addition to this important evidence, it emerges that, starting from a smaller base of candidates following the first selection made by the AI Tool, those involved in the selection are able to devote themselves more to interesting candidates, creating with them greater opportunities for meeting and testing. Another fundamental point is precisely the assessment of the skills, which is speeded up and made more immediate and efficient thanks to the gamification activities used during the skills assessment phase.

However, the answers of this type provided by the survey participants were not relevant in percentage compared to those that focus exclusively on reducing the time that elapses between opening the job position and closing it.

In conclusion, it is clear that the AI Tools are definitely useful for improving the Time Performance of the team that deals with recruiting and personnel selection; this phenomenon does not occur in isolation in some sectors, but its occurrence is generally widespread in all sectors, without substantial differences in perception.

The second indicator to consider in this analysis is the Cost per Hire, which is the amount of both internal and external costs incurred by the company to hire a candidate. The evidence emerging from the results of questions designed to analyze this indicator are very different: PwC respondents, representatives of the consulting sector, argue that the cost incurred for hiring employees has not changed following the introduction of AI Tool, unlike L'Oréal, a company for which everyone has confirmed an improvement in this indicator and consequently a reduction in the average cost necessary for the acquisition of a candidate.

In this regard, it is clear that, contrary to the other indicator for which the improvement of its performance is ascertained in each selected company, in this case the trend of the Cost per Hire after a digital transformation strategy is not a certainty about companies can count on.

At this point, it is important to analyze one of the key indicators on which the research is based, that is the quality of the candidates selected by the AI Tools. This KPI is very important as the quality of candidates for a specific position and, consequently, the quality of hires is closely linked to the candidate journey and the employee's experience after hiring. The hiring phase and the onboarding phase of the person chosen for a particular position are significantly important both for the company and for the resource. Selecting a candidate who recognizes himself/herself in the company's values and culture fosters retention of talents and reduces the company's turnover rate. As already extensively discussed above, the Machine Learning algorithms applied to ATS

(Applicant Tracking Systems) allow to select some profiles and discard others directly based on a percentage of fit with the description of the shared position or through an automatic screening of personal branding video. Nonetheless, not all users of these systems benefit from it, as can be seen from graph 21.

The company that has found a net improvement in this indicator is Unilever, followed by PwC. Instead, as for L'Oréal, it emerges that the systems used have not created a substantial improvement in the quality of candidates who manage to pass the first selection step for a position. By creating a single database containing the responses obtained from the three companies, it turns out that according to 45% of respondents, the quality of the candidates selected by the AI Tools is improved, while for the remaining 55% there have been no changes compared to the past.

The quality of the candidates, as previously mentioned, is a data that can be read in conjunction with that dedicated to their satisfaction with respect to a partially automated candidate experience managed by AI algorithms. In fact, if graphs 20 and 21 are compared, we essentially see a relationship between the data provided by the first two companies: at Unilever, according to those who have highlighted a higher quality of candidates, there is also greater satisfaction with respect to the candidate experience. At PwC the percentages do not fully correspond but the number of satisfied candidates is higher than the one recorded for their quality in terms of skills related to the position. For L'Oréal, instead, the results are totally discordant: while the quality of the selected profiles has not improved compared to when traditional methods were used, the candidates are all more satisfied with their candidate journey which involves the use of Mya Systems, which uses a chatbot to get in touch with the candidate and evaluate some characteristics necessary for the position.

This analysis shows that, since each company uses an AI system which in turn uses an algorithm based on different input data and tests, the effectiveness of the results emerged from the algorithm depends on the way it is programmed. The differences in programming affect the effectiveness of the systems and consequently the experience that each company gains with their use is different.

From the analysis of the previously compared data, an average of the scores of the Likert scale provided by the interviewees emerges when asked about the possibility of Machine learning systems being able to eliminate, albeit partially, that set of cognitive biases that very often characterize the activity of research and selection. These systems are only useful in the first screening phase and the data shows that the results obtained in all three companies are excellent. The employees who found the greatest improvements in these terms were those of PwC, followed by those of L'Oréal and finally those of Unilever. Note that this ranking is based on centesimal differences and there is no real prevalence of the performance of one business system over another.

Despite this, it is important to highlight that the scores provided by the three companies are positioned on a high range; no score falls below 4.5/5. This indicates that the problem of cognitive bias at the time of selection was felt quite previously by recruiters and the development of an automatic system aimed at eliminating them constitutes an effective means both to improve the selection of candidates and to increase the awareness of the HR Community about this issue.

This topic is fundamental in this historical period as companies are developing various processes and initiatives to give light to the theme of diversity and inclusion and to ensure that there is no prejudice or discrimination among employees. The first step to achieve this goal consists precisely in creating a base of employees as heterogeneous as possible, without clustering previously created at the time of the CV screening.

It is therefore important to focus on the second cluster of activities supported by the use of AI systems that was analyzed by the survey, namely those concerning the development and training of employees.

Unlike the activity of Talent Acquisition, in most companies supported by AI systems, the development and training of employees is often supported by traditional systems and processes, sometimes not stimulating and unable to understand the actual learning needs of the employee.

According to the interviewees of the Talent Garden study (2019), the activity that undergoes major changes as a result of the digital transformation is Talent Acquisition (according to 69% of respondents), while the activity that is in second place, with a percentage equal to 54% is the Training & Development of employees.

In the research carried out, only 2 out of 3 companies use tools equipped with AI for employee development and training activities, namely Unilever and L'Oréal, whose employees said they use gamification and personalization of training courses. The results obtained in terms of employee satisfaction as a result of the introduction of these new systems, in general, can be considered satisfactory. According to the members of the HR Community, all employees are more satisfied with the training activities carried out in mixed mode, i.e., using both traditional methodologies such as lessons, classic online training courses, gamification and assessment paths to test skills and provide the right support to fill the gaps.

The improvements that have been found in this area must take into account not only employee satisfaction but also other indicators such as engagement and participation constantly monitored by those involved in the organization of these activities.

In this regard, what emerged from the results of the two companies is not very dissimilar and more generally, if the results obtained by the two companies (L'Oréal & Unilever) are combined, the following data is obtained:

	L'Oréal	Unilever
Higher participation in training activities	100%	100%
Higher effectiveness of training activities	50%	20%
Higher engagement	33%	30%
Higher team building	17%	10%
Higher satisfaction of the participants	-	30%

Table 15: AI Effects on Training & Development

The percentages in table 15 refer to the number of respondents who provided the corresponding positive effect of the introduction of AI systems in Training & Development. The data that catches the eye more than the others concerns participation: in both companies, thanks to these systems, participation in training and development activities has increased.

The other two main positive effects that have been highlighted are both higher effectiveness of training activities and higher engagement of the participants. These two aspects are precisely two of the main objectives underlying the structuring of the gamification systems used for employee training. Indeed, the use of a strategy, trivially taken from video games, based on scores, levels and badges encourages the participant, in this case the employee as a learner, to get involved and accept new challenges. In this

way, the involvement of people increases, as well as the achievement of learning objectives.

Concluding the analysis about the use of AI in Training and Development activities, it is necessary to highlight how employee development is not only for personal growth but also for business growth. Among the main advantages for the business are the increase in the productivity of the employee, who becomes more and more prepared in the field, acquires more and more familiarity with the useful tools to manage their duties and consequently becomes increasingly satisfied with the job.

Furthermore, improving the skills of its employees contributes to the optimization of its offer and to a repositioning on the market, dictated by better competitiveness. Finally, the enhancement of employee motivation should not be underestimated (Pilati, 2020). In this case, the Training activities work on the extrinsic motivation of the employee, who, thanks to the learning sessions completed and shared with colleagues, will be able to feel more valued and realized within the organizational context.

At this point of the discussion, it is useful to focus on the comparison of the answers provided by the employees of the three companies to the last section of the survey concerning the general evaluation of the HR digital transformation approach adopted by the company, including the difficulties encountered and new skills learned.

The first issue to be analyzed includes the new skills useful for those involved in the management and organization of HR. The answers provided by the employees of the three companies do not differ much from each other, so in this case, rather than highlighting the differences between the three case studies, it is more effective to analyze the phenomenon as a whole and summarize in the following table all the answers provided by the participants, with the attached percentage calculated on the cumulative total for all the answers.

New HR skills	Percentage
Digital skills	34%
Data Analytics	31%
Emotional Intelligence	16%
Empathy	6%
Understanding if the algorithm choices are right	6%
Knowing how to choose what to let the algorithm manage and what to let the person manage	3%
Become career advisors	3%

Table 16: Summary of new HR skills

The table above shows that Digital and Data Analytics skills are on the podium of the new skills needed by HR employees. First of all, the intrinsic meaning of digital competence must be defined in detail. Digital skills have now become a priority for all companies that are implementing a digital transformation strategy, as digital innovation does not only consist in the introduction of new technologies but also in the need to have within the company professional figures ready to manage the transformation itself. (Mauri, 2019) Starting from this consideration, it is clear that companies will no longer have only the need to acquire a few new resources capable of strategically managing the change of processes in the transition period due to digital transformation, but there will be the need to train internal resources on learning and upskilling.

The advent of digital transformation has totally changed the meaning of the term "digital skills". When it comes to digital skills, by now, it is no longer necessary to focus

only on their more reductive and literal meaning, but you have to consider a broader and more complex meaning according to which digital skills constitute "a set of technological skills that make it possible to obtain information from data, make predictions, create content and speed up processes through information technology and the Internet" (Mauri, 2019).

This complete meaning of Digital Skills is in turn inclusive of the Data Analytics skills highlighted by 31% of survey respondents, as new skills that HR must possess. For 64% of HR Community employees, having highlighted that the new skills necessary to carry out the management and organization of HR are those relating to the Digital and data analysis fields, means that the within companies there could be a digital skill gap especially within certain functions or for some roles.

The issue of the Digital Skills Gap is rather broad and deeply felt, especially after the pandemic, as a result of which various studies have shown that in Europe 42% of citizens do not have a basic level of digital skills, despite these are required by most job positions. In addition, around 37% of the workforce has a lack of digital skills although the roles covered require at least basic skills.

Starting from this observation, it cannot be excluded that the Digital Skills Gap also involves the company departments that deal with the organization and management of HR; the use of AI Tools and the analysis of the data emerging from them were not basic skills required a few years ago when hiring the same people who have to carry out these activities today.

In addition to the importance of HR Community training on digital issues, the role of the Analytics Translator is pivotal for every company, indeed fundamental in this historical period (Henke et al., 2018).

The Analytics Translator plays a fundamental role in linking the technical experience of engineers and Data Scientists with the operational experience of those who work in the various functions (Supply Chain, Marketing, Production, etc.). Their role is to ensure that the insights generated through very complex analyses translate into a full-scale impact within the organization. The Translator needs to know the industry and the company in order to correctly identify the value of AI in the business context. According to the McKinsey Global Institute, by 2026, the demand for Analytics Translator in the US alone will amount to between two and four million.

Introducing an Analytics Translator even in those HR teams in which the use of AI systems is pervasive, albeit for short periods of time, can be useful to improve the efficiency of the teams and to ensure that all new processes are absorbed in daily activities correctly and without difficulty.

In order not to neglect the issue of difficulties, it is important to focus on the answers provided by the participants in the research to the question relating to the main difficulties encountered during the transition from a traditional working mode to one including Machine Learning tools. The table below lists the main answers provided regardless of the company they belong to:

Difficulties encountered	Percentage
No difficulty	55%
Maintain the right balance between the human touch and the use of algorithms	32%
Create a Human Centered process also through the use of AI Tools	6%
Understand how far to make choices based on algorithm analysis	6%

Table 17: Difficulties encountered - cumulative percentages

As emerges from the analysis of the previous data, most of the respondents did not encounter any difficulties in transforming the work processes and tasks carried out with a view to digitization. However, the second data, perhaps the most interesting one, indicates that almost 1/3 of the respondents have insecurities about the correct balance between human touch and the use of algorithms. The ultimate goal of those involved in the organization and management of HR is to create a relationship with the employee or candidate. This relationship, also based on the concept of empathy and understanding, would disappear when people no longer have a relevant role in either the selection process or in listening to the needs of employees in organizing skills development activities. HR people are afraid of just that: a risk of excessive detachment from everyday activities caused by delegation of the same to AI. Therefore, it would be necessary to try to achieve the right balance between human touch and AI, in order to be able to build Human Centered relationships, only supported by intelligent systems and not replaced by them.

In conclusion of the comparative analysis of the survey, the last interesting data must be considered, namely the degree of satisfaction of the members of the HR Community with regard to the introduction of Machine Learning systems into the work routine.

As already mentioned in the chapter relating to the research methodology, to carry out this evaluation, the scores from 1 to 5 provided by the respondents are analyzed, in which 1 represents the minimum level of satisfaction, while 5 represents the maximum level. First of all, it is interesting to evaluate the difference in score provided based on the company they belong to. In the following table it is possible to analyze the values found:

Company	Average score	Standard deviation
Unilever	4.40	0.49
PwC	4.44	0.50
L'Oréal	4.58	0.49

Table 18: HR Community satisfaction comparison

As can be seen from the previous table, the average score provided by the employees of the three selected companies is almost similar and is between 4 and 5. Considering that the maximum score is 5, in general the evaluation of the HR Community regarding the involvement of its department in the digital transformation strategy is surely positive.

This result is certainly related to the data in table 17, which showed that most of the respondents had not encountered particular difficulties following the introduction of a digital transformation strategy. Consequently, such a high overall rating is also dictated by the lack of difficulties encountered. This indicates that indeed, for the three selected companies, the so-called Digital Skills Gap is not so pronounced and that within the HR function, the employees were ready and able to face the digital transformation.

To conclude the comparison between the three sample companies, it is possible to relate through the Pearson correlation index the evaluation of the level of corporate digital maturity perceived by employees and the overall evaluation of the experience with AI tools following the corporate digital transformation. The questions that can be used to obtain this data are question 2 and question 21.
The result of this analysis can be seen in the following table.

Company	ρ_{XY}
Unilever	0.49
PwC	0.57
L'Oréal	0.63

Table 19: Correlation index, questions 2-21

According to statistical theory, the correlation index has a value between -1 and 1, more specifically, if the value is > 0, the variables are said to be directly correlated and the closer the value is to 1, the more the correlation is strong.

In all three cases analyzed, the perception of corporate digital maturity and the overall evaluation of real and practical experience with a digital transformation strategy are two directly correlated variables, i.e., those who gave a higher score to question 2 (level of corporate digital maturity) also gave a higher score to question 21 (overall evaluation of the experience with AI). Furthermore, given the values of the index calculated in the previous table, the correlation of the two variables in all three companies is moderate and is higher for the L'Oréal company.

At the conclusion of the comparison between the case studies, the analysis carried out showed that all three companies proved to be three pioneers in their sector (consumer goods, consultancy and beauty & make-up) in the field of innovation and digital transformation. The employees who participated in the survey, admitting that the corporate culture has helped and supported the whole community in the digital transformation process, implicitly underlined that a solid cultural and values approach, inclined to grasp all the innovations and challenges that the market offers, turns out to be winning and satisfying for employees.

By analyzing the specific case of the implementation of AI in the processes and daily activities of the HR function, it can be seen that for international companies with a global impact, such as those analyzed, the support of digital tools for Talent Acquisition activities and organization of skills training sessions for employees is fundamental. It allows you to face an increasingly heterogeneous, large and fast labor market, from the business side, that needs not only the careful eye of those who have acquired the skills to be able to organize and manage company HR, but also upperparts digital support that help to avoid waste of time and resources that can be used to contribute more efficiently to the achievement of the corporate strategy. The three companies have shown that they have been able to improve all or most of the performance indicators analyzed in the research, thus confirming the effectiveness of the introduction and application of AI tools to support their activities.

- SRQ 1: Is AI the enemy of HR?

Absolutely not. Applying technology to people means believing in the value of a new alliance, starting from the concept of freeing up the HR team's time and focusing on the relationship component. We must dispel the cliché according to which the machine only does repetitive work and the human being only intellectual work and instead make our own the paradigm that work is done together, combining the two factors with the aim of uniting sustainability of time and artificial intelligence, simplification of complexity, invisibility of processes and effectiveness of the result. Because it is only in this way that we can raise the level of efficiency and aim for the dimension of an agile organization. Let's take a practical example. Technology helps the recruiter overcome the risk of being stuck in front of a blank sheet of paper and not knowing what answer to give to the candidate. Furthermore, human beings cannot objectively process and categorize

117

thousands of texts relating to as many profiles and associate them with the most correct context.

- SRQ 2: Can software make up for a recruiter during the interview phase?

The software, as widely demonstrated, is an ally of HR and therefore does not replace the role of the recruiter but supports him in the various phases of the process. In several companies, among the solutions adopted have been introduced templates that help, simplify and speed up the crucial moments of selection, while as regards the interview, templates have been created that can suggest questions in line with the role, to be asked to the talent to interview. Thanks to algorithms, recruiters can view the "fit index" of candidates, a synthetic index that emerges from the answers provided by the candidate and which allows them to view at a glance the talents most similar to the role sought.

- SRQ 3: How can talent become a resource?

The topic of talent is very broad: the problem is not finding it and attracting it, but keeping it. The heart of the issue is the people experience: it is no longer enough to put the person at the center, but rather we need to make them the protagonist, because it is by doing so that individuals become the protagonists who act profitably and with satisfaction in a given time, role and space.

- SRQ 4: What concerns companies and HR managers the most?

The change in the process, not artificial intelligence as such, because the technology is an "embedded" component. Therefore, we must be aware that change is in the nature of people and we must think from the perspective that each individual must become their own HR manager. It is a factor of cultural seeding and contamination. The relationship must be nurtured continuously and people must breathe "oxygen" and then put it back into circulation: digital transformation becomes fundamental as a tool capable

of enabling this model, providing feedback and freeing part of human energy. Algorithms must be trained to strengthen the pact between human beings and technology, giving talent what it really needs.

- RQ: Who will be the protagonist of the HR function at the end of the digital transformation implementation, the HR or the machine?

In this study it has been demonstrated quantitatively and qualitatively, in an analytical manner, that a change of approach is required.

We move from a process-based model to a relational model, from customer experience to people experience. We must tend towards a "relationship driven" approach and focus on technology's ability to interpret content and on the human being's ability to contextualize. The key words behind this new model are skills, motivation and relationship, because work is a pact between human beings: we need to think of the term TEAM as the acronym for Together, Everyone Achieves More.

HR will be able to avoid passively undergoing the implementation of digital transformation and will be able to govern it, continuing to be protagonists of the HR function, if they develop dynamic capabilities, i.e., new advanced digital skills.

CHAPTER V:

CONCLUSIONS

5.1 Discussion of results

In this paper, I wanted to shed light on an increasingly widespread issue in the business context, namely the implementation of the digital transformation strategy. More specifically, the impact of the introduction of advanced technologies such as AI and Machine Learning on the operation of a company function, the one that deals with the management and organization of HR, was analyzed. Assuming that the ultimate goal of the HR function is to attract, motivate and retain talents within the company, through the survey to which three companies belonging to different sectors were subjected, I wanted to analyze how the AI systems are used to pursue this goal.

At the same time, the survey investigates how the digital transformation process within an organization has affected departmental performance and employee perceptions of the company's digital maturity, the difficulties encountered during the change process and the development of new capabilities.

All the companies selected for the research, Unilever, PwC and L'Oréal, in addition to representing three market leaders in their respective sectors, namely the production and distribution of consumer goods, management consulting and beauty & cosmetics, constitute three pioneering companies in the innovation, technological development and digital transformation. In confirmation of this evidence, the results of the survey show that the perception of HR Community employees regarding corporate digital maturity is very satisfactory and reflects the objectives of the digital transformation macro-strategy implemented by companies.

As regards the implementation of tools and technologies typical of digital transformation in the HR function, it is concluded that the two most supported activities

120

by these systems are the recruiting and selection of new candidates and the organization of Training & Development activities of employees.

Only two out of three companies analyzed use these systems to support both purposes, namely Unilever and L'Oréal, while PwC uses AI only to support the screening and assessment of candidates during the selection phase.

As highlighted in the discussion of the results, the main advantages that employees claim to have obtained thanks to the use of these systems can be found through the measurement of certain KPIs, such as Time Performance for recruiting and selection activities, the quality of candidates who pass the first screening carried out automatically by the ATS and their satisfaction in terms of candidate experience. With regards to the activities of organizing personalized training courses for employees, the improvement in the results achieved is surprising: all of them show a greater participation of employees in these new activities and the improvement of their engagement in team working activities.

Consequently, it can be concluded that the three companies selected for the research were able to address and incorporate within their strategy all those inputs from the external environment capable of stimulating and positively distorting the strategy and modus operandi of employees.

Furthermore, it is important to highlight the speed with which these companies have been able to approach and face a complete and comprehensive digital transformation strategy; it is due to the presence within the organization of managers and staff with dynamic capabilities, that is the ability to be able to adequately grasp and exploit all the challenges and inputs from the external environment.

In conclusion, the careful and accurate analysis of the performance of each individual KPI following the introduction of AI Tools in the HR function shows how the

advantages deriving from the combination of technological innovation and digital skills can bring great improvements in terms of efficiency of business processes. Nevertheless, all companies and not only those in the sample must focus on a key point which consists in the development and acquisition of resources that are able to use and take advantage of the data, information and outputs deriving from AI systems. For this to happen, a real organizational cultural reconversion is required that places the importance of digital transformation at the center of the mindset of all employees.

References

Accenture. (2016). The promise of artificial intelligence. Redefining management in the workforce of the future. Retrieved from https://www.accenture.com/

Adecco, BCG. (2020). Artificial Intelligence in the Workplace. Creating effective Machine-Workforce collaboration.

Adner, R., & Helfat, C. E. (2003). Corporate effects and dynamic managerial capabilities. Strategic management journal, 24(10), 1011-1025.

Agrawal, A., Gans, J. S., & Goldfarb, A. (2019). Artificial intelligence: the ambiguous labor market impact of automating prediction. Journal of Economic Perspectives, 33(2), 31-50.

Ahmed, O. (2018). Artificial intelligence in HR. International Journal of Research and Analytical Reviews, 5(4), 971-978

Al-Debei, M. M., & Avison, D. (2010). Developing a unified framework of the business model concept. European journal of information systems, 19(3), 359-376.

Ambrosini, V., & Bowman, C. (2009). What are dynamic capabilities and are they a useful construct in strategic management? International journal of management reviews, 11(1), 29-49.

Anita, R. "Effective Strategic Talent Acquisition Process-A Conceptual Study." Gavesana Journal of Management 11.1 (2019): 42-51.

Annan D. (2021). Half the sky understanding the basis for entrepreneurial management. Swiss School of Business and Management Geneva.

Arabie, P., Hubert, L., & De Soete, G. (Eds.). (1996). Clustering and classification. World Scientific.

Ashton, K. (2017). That Internet of Things Thing. RFID Journal (2009). URL: http://www. rfidjournal. com/articles/view, 4986.

Asimov, I. (1941). Three laws of robotics. Asimov, I. Runaround.

Bagnoli, C., Bravin, A., Massaro, M., & Vignotto, A. (2018). Business Model 4.0. Edizioni Ca'Foscari, Venezia.

Barboza, C. (2019). Artificial Intelligence and Hr: The New Wave of Technology. Journal of Advances in Social Science and humanities, 5(4), 715-720.

Battisti, M., & Deakins, D. (2017). The relationship between dynamic capabilities, the firm's resource base and performance in a post-disaster environment. International Small Business Journal, 35(1), 78-98.

BCG. (2017). Embracing HR disruption. A leadership discussion.

Bersin, J. (2019). HR Technology Market 2019. Disruption Ahead.

Bersin, J., & Chamorro-Premuzic, T. (2019). New ways to gauge talent and potential. MIT Sloan Management Review, 60(2), 1.

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. V. (2013). Digital business strategy: toward a next generation of insights. MIS quarterly, 471-482.

Bibi, M. (2019). Execution of Artificial Intelligence Approach in Human Resource Management Functions: Benefits and Challenges in Pakistan. Sarhad Journal of Management Sciences, 5(1), 113-124.

Blenko M., Root J., & Elkhweet N. (2017). When weak operating models happen to good strategy, Bain Insights.

Buzko, I., Dyachenko, Y., Petrova, M., Nenkov, N., Tuleninova, D., & Koeva, K. (2016). Artificial Intelligence technologies in human resource development. Computer modelling and new technologies, 20(2), 26-29.

Cappelli, P. (2020). The consequences of AI-based technologies for jobs. R&I Paper Series, (4), 42.

Charlier, R., & Kloppenburg, S. (2017). Artificial Intelligence in HR: a No-brainer. Pwc. at.

Cappelli, P., & Tavis, A. (2018). HR goes agile. Harvard Business Review, 96(2), 46-52.

Cappelli, P., Tambe, P., & Yakubovich, V. (2020). Can Data Science Change Human Resources? In The future of management in an AI world (pp. 93-115). Palgrave Macmillan, Cham.

Chase Jr, C. W. (2018). Machine Learning Is Disrupting Demand Planning. The Journal of Business Forecasting, 37(3), 26-30.

Collis, D. J. (1994). Research note: how valuable are organizational capabilities? Strategic management journal, 15(S1), 143-152.

Comiter, M. (2019). Attacking artificial intelligence. Belfer Center Paper, 2019-08.

Coppin, B. (2004). Artificial intelligence illuminated. Jones & Bartlett Learning.

Costa G., Gianecchini M. (2009). Risorse umane. Persone, relazioni e valore. McGraw Hill, Milano.

Creswell, J. W. (2003). Research design. Thousand Oaks, CA: Sage publications.

Daugherty, P. R., Wilson, H. J., & Michelman, P. (2019). Revisiting the jobs artificial intelligence will create. MIT Sloan Management Review, 60(4), 0_1-0_8.

Day, G. S., & Schoemaker, P. J. (2016). Adapting to fast-changing markets and technologies. California Management Review, 58(4), 59-77.

Dehning, B., Richardson, V. J., & Zmud, R. W. (2003). The value relevance of announcements of transformational information technology investments. Mis Quarterly, 637-656.

Deshpande, A. (2018). Talent Acquisition through Technology. IOSR Journal of Business and Management (IOSR-JBM), 2, 72-79.

Domer K., Edelman D. (2015). What digital really means. Retrieved from https://www.mckinsey.com/industries/high-tech/our-insights/what-digital-really-means

Drucker, P. (1994). The theory of the business.

Ellehave, C., Burns, E. W., & Ulrich, D. (2021). Embracing and Harnessing Uncertainty:

Leadership Skills for Uncertain Times. In Role of Leadership in Facilitating Healing and Renewal in Times of Organizational Trauma and Change (pp. 21-40). IGI Global.

Falletta, S. V., & Combs, W. L. (2020). The HR analytics cycle: a seven-step process for building evidence-based and ethical HR analytics capabilities. Journal of Work-Applied Management.

Ellehave, C., & Ulrich, D. (2021). Above and Beyond the Yearly Wheel: Anticipating and Realizing the Ever-Evolving Contribution of HR. Journal of Human Resource Management, 9(3), 88.

Flippo, E. B. (1966). Principles of personnel management. McGraw-Hill Book Co.

Fontana, F., & Boccardelli, P. (2015). Corporate Strategy: una prospettiva organizzativa e finanziaria per la crescita. Hoepli.

Forbes (2016). How Digital Transformation elevates Human Capital Management.

Gabrielli, G., & Profili, S. (2012). Organizzazione e gestione delle risorse umane. Isedi.

Gartner. (2020). Preparing for the Workplace of the Future.

Geetha, R., & Bhanu, S. R. D. (2018). Recruitment through artificial intelligence: a conceptual study. International Journal of Mechanical Engineering and Technology, 9(7), 63-70.

George, G., & Thomas, M. R. (2019). Integration of artificial intelligence in human resource. Int. J. Innov. Technol. Explor. Eng, 9(2), 5069-5073.

Ginsberg, M. (2012). Essentials of artificial intelligence. Newnes.

Glassdoor. (2020). Glassdoor's Job & Hiring Trends for 2020.

Golden, K. A., & Ramanujam, V. (1985). Between a dream and a nightmare: On the integration of the human resource management and strategic business planning processes. Human Resource Management, 24(4), 429-452.

Grant, R. M. (1991). Contemporary Strategy Analysis, Blockweel, Oxford.

Grant, R. M. (2006). L'analisi strategica per le decisioni aziendali, Il Mulino, Bologna.

Guillot, J. D. (2020). Quali sono i rischi e i vantaggi dell'intelligenza artificiale? Parlamento europeo. Retrieved from https://www.europarl.europa.eu/news/it/headlines/society/20200918STO87404/quali-sono-i-rischi-e-i-vantaggi-dell-intelligenza-artificiale

Gupta, P., Fernandes, S. F., & Jain, M. (2018). Automation in recruitment: a new frontier. Journal of Information Technology Teaching Cases, 8(2), 118-125.

Gupta, S. (2018). Organizational barriers to digital transformation. KTH Royal Institute of Technology, School of Industrial Engineering and Management, Stockholm, Sweden.

Haenlein, M., & Kaplan, A. (2019). A brief history of artificial intelligence: On the past, present, and future of artificial intelligence. California management review, 61(4), 5-14.

Helfat, C. E., & Martin, J. A. (2015). Dynamic managerial capabilities: Review and assessment of managerial impact on strategic change. Journal of management, 41(5), 1281-1312.

Hemalatha, A., & Kumari, D. P. B. (2020). A CONCEPTUAL FRAMEWORK ON ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN HUMAN RESOURCE MANAGEMENT. The International Journal of Analytical and Experimental Modal Analysis.

Henke, N., Levine, J., & McInerney, P. (2018). Analytics translator: The new must-have role. Harvard Business Review.

Hess, T., Matt, C., Benlian, A., & Wiesböck, F. (2016). Options for formulating a digital transformation strategy. MIS Quarterly Executive, 15(2).

Hmoud, B., & Laszlo, V. (2019). Will artificial intelligence take over humanresources recruitment and selection?. Network Intelligence Studies, 7(13), 21-30.

Hull, J. (2019). Machine Learning in Business: An Introduction to the World of Data

Science. Independently Published.

Halid, H., Yusoff, Y. M., & Somu, H. (2020, May). The Relationship Between Digital Human Resource Management and Organizational Performance. In First ASEAN Business, Environment, and Technology Symposium (ABEATS 2019) (pp. 96-99). Atlantis Press.

Han, D. (2020). The Rose: Artificial Intelligence in the Current Hiring Process. Marriott Student Review, 3(3), 5.

Hancock, B., & Schaninger, B. (2020). HR says talent is crucial for performance-and the pandemic proves it. Retrieved September.

Heric, M. (2018). HR new digital mandate. Digital technologies have become essential for HR to engage top talent and add value to the business. Retrieved August, 20, 2019.

IBA Global Employment Institute. (2017). Artificial Intelligence and Robotics and Their Impact on the Workplace.

IBM Institute for Business Value. (2016). Redefining Talent. Insights from the Global C-suite Study – The CHRO perspective.

International Telecommunication Union. (2020). Digital Skills Insights 2020, Geneva, Switzerland.

Jatobá, M., Santos, J., Gutierriz, I., Moscon, D., Fernandes, P. O., & Teixeira, J. P. (2019). Evolution of artificial intelligence research in human resources. Procedia Computer Science, 164, 137-142.

Keyes, C. L. M. (2000). Subjective change and its consequences for emotional well-being. Motivation and Emotion, 24(2), 67-84.

Lankshear, C., & Knobel, M. (Eds.). (2008). Digital literacies: Concepts, policies and practices (Vol. 30). Peter Lang.

Lanvin, B., & Monteiro, F. (2019). The global talent competitiveness index 2019: Entrepreneurial talent and global competitiveness. INSEAD, the Adecco Group,

and Tata Communications.

Leonard-Barton, D. (1992). Core capabilities and core rigidities: A paradox in managing new product development. Strategic management journal, 13(S1), 111-125.

Li C., Akhtar O., Etlinger S., Terpening E., Moser T., & Littleton A., (2020) The 2020 state of Digital Transformation: benchmarking Digital Maturity in the COVID-19 Era.

LinkedIn. (2020). Global Talent Trends.

Ljubotina, P., Bojnec, Š., & Vadnjal, J. (2019). Macroeconomic factors forming family business heir's career choice intention. Acta Oeconomica, 69(3), 425-444.

Lucas Jr, H., Agarwal, R., Clemons, E. K., El Sawy, O. A., & Weber, B. (2013). Impactful research on transformational information technology: An opportunity to inform new audiences. Mis Quarterly, 371-382.

Machinery, C. (1950). Computing machinery and intelligence-AM Turing. Mind, 59(236), 433.

Maduravoyal, C. (2018). Artificial intelligence in human resource management. International Journal of Pure and Applied Mathematics, 119(17), 1891-1895.

Manyika, J., Chui, M., Bisson, P., Woetzel, J., Dobbs, R., Bughin, J., & Aharon, D. (2015). The Internet of Things: Mapping the value beyond the hype. McKinsey Global Institute.

Matsa, P., & Gullamajji, K. (2019). To Study Impact of Artificial Intelligence on Human Resource Management. International Research Journal of Engineering and Technology, 8, 1229-1238.

Matt, C., et al. (2016). Options for formulating a digital transformation strategy. MIS Quarterly Executive, 2016, 15.2: 6.

Mauri, M. (2019). Cosa sono le competenze digitali e come svilupparle in azienda, Retrieved from https://blog.osservatori.net/

McCarthy, J., Minsky, M. L., Rochester, N., & Shannon, C. E. (2006). A proposal for the dartmouth summer research project on artificial intelligence, august 31, 1955. AI magazine, 27(4), 12-12.

McCulloch, W. S., Pitts, W. (1943). A logical calculus of the ideas immanent in nervous activity. The bulletin of mathematical biophysics.

McKinsey & Company. (2014). Guiding the people transformation: The role of HR in lean management.

McKinsey & Company. (2017). The CEO's guide to competing through HR.

Mell, P., & Grance, T. (2011). The NIST definition of cloud computing.

Mirković, V., Lukić, J., Lazarević, S., & Vojinović, Ž. (2019). Key characteristics of organizational structure that supports digital transformation. In International Scientific Conference Strategic Management and Decision Support Systems in Strategic Management.

Mooney, D. J. (2020). A Meta-Analysis of E-Recruitment Applicant Experience, Perception, and Behavior (Doctoral dissertation, Walden University).

Müller, V. C. (2016). Risks of artificial intelligence. Boca Raton, FL: CRC Press.

Nair, L. (2018). Talent management as a business discipline: A conversation with Unilever CHRO. URL: https://www.mckinsey.com/business–functions/organization/our–insights/talent–management–as–a–business–discipline–a–conversation–with–unilever–chro–leena–nair.

Nawaz, N. (2019). How far have we come with the study of artificial intelligence for recruitment process. Int. J. Sci. Technol. Res, 8(07), 488-493.

Newman D. (2020). Top 10 Digital Transformation Trends For 2021. Retrieved from https://www.forbes.com/sites/danielnewman/2020/09/21/top-10-digital-transformation-trends-for-2021/?sh=6b2917d1c6f4

Oracle. (2017). Embracing Digital HR. Become a True Talent Leader in the Cloud.

Osterwalder, A., & Pigneur, Y. (2012). Designing business models and similar strategic objects: the contribution of IS. Journal of the Association for information systems, 14(5), 3.

Overby, E., Bharadwaj, A., & Sambamurthy, V. (2006). Enterprise agility and the enabling role of information technology. European Journal of Information Systems, 15(2), 120-131.

Pandey, S., & Khaskel, P. (2019). Application of AI in human resource management and gen Y' s reaction. International Journal of Recent Technology and Engineering, Volume 8, Issue 4.

Park, W. (2018). Artificial intelligence and human resource management: new perspectives and challenges. Japan Institute for Labour Policy and Training, Tokyo, available at https://www.jil.go.jp/profile/documents/w. park. pdf.

Pasini, P., & Perego, A. (2014), Research Report: Digital Transformation e Impresa Digitale, Divisione Ricerche.

Patel, K., & McCarthy, M. P. (2000). Digital transformation: the essentials of e-business leadership. McGraw-Hill Professional.

Penrose, E., & Penrose, E. T. (2009). The Theory of the Growth of the Firm. Oxford university press.

Pilati, M., & Tosi, H. (2020) Comportamento organizzativo. EGEA spa, 2020.

Porter, M. E., & Heppelmann, J. E. (2015). How smart, connected products are transforming companies. Harvard business review, 93(10), 96-114.

Provodnikova A., Rajagopal L. R. (2023). Building a thrive mindset and heartset in the age of AI. Swiss School of Business and Management Geneva.

PwC. (2017). The way we work – in 2025 and beyond.

PwC. (2018). What's now and what's next in human resources technology. PwC's Human Resources Technology Survey.

PwC. (2019). Shared Services – Digitalise Your Services.

Rajesh, S., Kandaswamy, U., & Rakesh, A. (2018). The impact of Artificial Intelligence in Talent Acquisition Lifecycle of organizations. International Journal of Engineering Development and Research, 6(2), 709-717.

Raich, M., Dolan, S. L., Ulrich, D., & Cisullo, C. (2021). HUMAN UNIQUENESS AT THE DAWN OF INTELLIGENT MACHINES. EUROPEAN BUSINESS REVIEW.

Randstad. (2020). Talent Trends Report.

Raviprolu, A. (2017). Role of Artificial Intelligence in Recruitment. International Journal of Engineering Technology, Management and Applied Sciences, 5(4).

Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016, Article 22.

Reilly, P. (2018). The impact of artificial intelligence on the HR function.

Saengchai, S., Duangkaew, S., & Jermsittiparsert, K. (2019). Consequences of the Recruitment and Selection Process on Employee Turnover & Absenteeism: Profitability in the Textile Sector of Indonesia. International Journal of Innovation, Creativity and Change, 10(1), 40-57.

Sahoo, M. B. (2019). People Analytics and Disruptive Technologies are Transforming Human Resources Roles. Southwestern Business Administration Journal, 18(1), 4.

Samarasinghe, K. R., & Medis, A. (2020). Artificial Intelligence based Strategic Human Resource Management (AISHRM) for Industry 4.0. Global Journal of Management and Business Research.

Schallmo, A., & Daniel, R. (2018). Digital Transformation Now! Guiding the Successful Digitalization of YourBusiness Model. Springer Science+ Business Media, LLC.

Scholz, T. M. (2019). Big data and human resource management. In Big Data. Edward Elgar Publishing.

Silic, M., Marzi, G., Caputo, A., & Bal, P. M. (2020). The effects of a gamified human resource management system on job satisfaction and engagement. Human Resource Management Journal, 30(2), 260-277.

Silic, M., Njavro, M., Silic, D., & Oblakovic, G. (2018). Health Belief Model and Organizational Employee Computer Abuse. In International Conference on HCI in Business, Government, and Organizations (pp. 187-205). Springer, Cham.

Silic, M., Silic, D., Kolak, D., & Leontic, M. (2021). Proposing a novel approach to learn to code through a gamified online system by creating meaningful interactions. Global journal of Business and Integral Security, 1(1), 16-31.

Singh, A., & Hess, T. (2017). How chief digital officers promote the digital transformation of their companies. MIS Quarterly Executive, 16(1).

Society for Human Resource Management. (2019). Emerging roles in HR. The rise of the digital and productivity. Retrieved from https://www.shrm.org/

Society for Human Resource Management. (2019). HR People + Strategy and Willis Towers Watson Announce New Research Initiative to Study the Rapidly Changing Role of HR Executives. Retrieved from https://www.shrm.org/

Society for Human Resource Management. (2020). Can CHROs and Chief Digital Officers Get Along? Retrieved from https://www.shrm.org/

Solari, L. (2004). La Gestione delle risorse umane. Carocci.

Sommerfeld, B., & Moise-Cheung, R. (2016). The digitally-fit organization. Inside magazine (12 - Part 01 - From a digital perspective).

Stolterman, E., & Fors, A. C. (2004). Information technology and the good life. In Information systems research (pp. 687-692). Springer, Boston, MA.

Svahn, F., Mathiassen, L., & Lindgren, R. (2017). Embracing Digital Innovation in Incumbent Firms: How Volvo Cars Managed Competing Concerns. MIS Q., 41(1), 239-253.

Talent Garden (2018). L'HR del futuro, un leader per la Digital Transformation. Retrieved from https://digitaltransformation-risorseumane.talentgarden.org/

Tambe, P., Cappelli, P., & Yakubovich, V. (2019). Artificial intelligence in human resources management: Challenges and a path forward. California Management Review, 61(4), 15-42.

Teece, D. J. (2016). Dynamic capabilities and entrepreneurial management in large organizations: Toward a theory of the (entrepreneurial) firm. European Economic Review, 86, 202-216.

Teece, D. J. (2018). Business models and dynamic capabilities. Long range planning, 51(1), 40-49.

Teece, D., Peteraf, M., & Leih, S. (2016). Dynamic capabilities and organizational agility: Risk, uncertainty, and strategy in the innovation economy. California management review, 58(4), 13-35.

Teece, D., Pisano, G.; Shuen, A. (1997) Dynamic capabilities and strategic management. Strategic management journal, 18.7: 509-533.

Trost, A. (2020). HR in the Context of Digitization. In Human Resources Strategies (pp. 1-5). Springer, Cham.

Trost, A. (2020). Managing change and transformation. In Human Resources Strategies (pp. 329-347). Springer, Cham.

Trost, A. (2020). Transformation into an Agile Future. In Human Resources Strategies (pp. 349-362). Springer, Cham.

Tseng, J. C., Chu, H. C., Hwang, G. J., & Tsai, C. C. (2008). Development of an adaptive learning system with two sources of personalization information. Computers & Education, 51(2), 776-786.

Ulrich, D. (2020). HR's ever-emerging contribution. Strategic HR Review.

Ulrich, D. (2021). What is Organization? The Evolving Answer. The Evolving Answer.

Ulrich, D., & Yeung, A. (2019). Agility: The new response to dynamic change. Strategic HR Review.

Vadnjal, J., & Mishe, R. (2018). Entrepreneurial intentions among students: differences in business and non-business studies. International Journal of Advances in Agriculture Sciences.

Vadnjal, J., Vadnjal, M., Vadnjal B. (2023). Social capital and woman entrepreneurs: the characteristics of social capital among woman entrepreneurs across different life stages.

Vanderbist, D. (2020). Will AI Technology Replace Humans In Talent Acquisition? Literature Research.

Warner, K. S., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. Long Range Planning, 52(3), 326-349.

Westerman, G., Bonnet, D., & McAfee, A. (2014). The nine elements of digital transformation. MIT Sloan Management Review, 55(3), 1-6.

Winter, S. G. (2003). Understanding dynamic capabilities. Strategic management journal, 24(10), 991-995.

Wright, J., & Atkinson, D. (2019). The impact of artificial intelligence within the recruitment industry: Defining a new way of recruiting. Carmichael Fisher, 1-39.

Yawalkar, M. V. V. (2019). a Study of Artificial Intelligence and its role in Human Resource Management. International Journal of Research and Analytical Reviews (IJRAR), 6, 20-24.

Yeung, A., & Ulrich, D. (2019). Reinventing the organization: How companies can deliver radically greater value in fast-changing markets. Harvard Business Press.

Yoo, Y., Boland Jr, R. J., Lyytinen, K., & Majchrzak, A. (2012). Organizing for innovation in the digitized world. Organization science, 23(5), 1398-1408.

Zhang, L., & Zhang, B. (1999). A geometrical representation of McCulloch-Pitts neural model and its applications. IEEE Transactions on Neural Networks, 10(4), 925-929.

Sitography

• Bechervaise C. (2020, January 24). *AI adoption in HR – Lessons from Unilever.* https://takeitpersonelly.com/2020/01/24/ai-adoption-in-hr-lessons-from-unilever/

• Booth R. (2019, October, 25). *Unilever saves on recruiters by using AI to assess job interviews.* https://www.theguardian.com/technology/2019/oct/25/unilever-saves-on-recruiters-by-using-ai-to-assess-job-interviews

• Deep Learning Italia. (2022). *Deep Learning Italia.* https://www.deeplearningitalia.com/

• Dörner k. and Edelman D. (2015, July, 1). *What 'digital' really means.* https://www.mckinsey.com/industries/high-tech/our-insights/what-digital-really-means

• European Commission. (2023, October 10). *Digital skills and jobs.* https://digital-strategy.ec.europa.eu/en/policies/digital-skills-and-jobs

• European Parliament. (2020, September 29). *What are the risks and benefits of artificial intelligence?* https://www.europarl.europa.eu/topics/it/article/20200918STO87404/quali-sono-i-rischi-e-i-vantaggi-dell-intelligenza-artificiale

• HRM Handbook. (2021-2022). *Human Resources Management Guide and Handbook.* https://hrmhandbook.com/

- Intelligenza Artificiale. (2022). *Il portale dedicato all'Intelligenza Artificiale.* https://www.intelligenzaartificiale.it

- IS-LM S.r.l. (2024) *Learning Solution.* https://www.learningsolution.it/

- L'Oréal (2022). *Using artificial intelligence in order to help candidate experience.* https://www.loreal.com/en/news/science-and-technology/research-innovation/using-artificial-intelligence-in-order-to-help-candidates-experience/

- Newman D. (2020, September 21). *Top 10 Digital Transformation Trends For 2021. Forbes.* https://www.forbes.com/sites/danielnewman/2020/09/21/top-10-digital-transformation-trends-for-2021/?sh=6b2917d1c6f4

- Qualtrics. (2024). *Likert scales: definition, benefits & how to use them.* https://www.qualtrics.com/it/experience-management/ricerca/scala-likert/

- Talent Garden (2023, August 9). *Dalla Digital HR alla "Purpose Transformation": Intervista a Gianfranco Chimirri, HR Director di Unilever Italia.* https://talentgarden.org/it/human-resources/intervista-chimirri/

- Unilever. (2023, November 17). *New AI lab to boost innovation, technology and collaboration.* https://www.unilever.com/news/news-search/2023/new-ai-lab-to-boost-innovation-technology-and-collaboration/