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The Impact Of Society 5.0 On Human Resource Management

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Abstract

As the world advances into the era of Society 5.0, characterized by the integration of cutting-edge technologies, artificial intelligence (AI), and the seamless convergence and merging of physical and digital domains, this thesis explores the transformative effects of these changes on the field of Human Resource Management (HRM). Society 5.0 represents a paradigm shift in societal organization, emphasizing the human-centric fusion of technology and society to address complex global challenges.

This research investigates the multifaceted implications of Society 5.0 on HRM practices, considering the evolving role of HR professionals in a digitized and interconnected environment. Through a comprehensive literature review and case studies, the study aims to describe the key challenges and opportunities arising from the integration of advanced technologies, including digitalization and artificial intelligence (AI), in the domain of HRM.

The thesis also explores the potential impact of Society 5.0 on workforce dynamics, employee engagement, and talent management strategies. It delves into the ethical considerations associated with the use of emerging technologies in HRM, emphasizing the need for a balanced approach that prioritizes both technological efficiency and human well-being.

Furthermore, the research examines the role of HRM in facilitating organizational adaptation to the changes brought about by Society 5.0. The study highlights the importance of fostering a culture of continuous learning and skill development to meet the demands of a rapidly evolving digital landscape. By understanding and utilizing the transformative potential of Society 5.0, organizations can proactively shape their HRM practices to foster innovation, resilience, and sustainable human development in the digital age.

CHAPTER I: INTRODUCTION AND BACKGROUND OF STUDY

1.1 Introduction

The path of human society has been markedly influenced by successive waves of technological advancement, each contributing to the evolution of societal structures and processes. The transformative changes inherent in the four industrial revolutions have observed an increasing digitization of the worldwide environment. Notably, the emergence of Industry 4.0, characterized by technology-driven transformations, has initiated rapid changes and swift transformations in the domains of technology, industries, and societal patterns over recent decades.

The improvement of production, efficiency and quality lies at the core of Industry 4.0, achieved by the widespread adoption of advanced technologies like big data analytics, artificial intelligence (AI), and digital twin systems. Nevertheless, the influence of these technological innovations goes beyond industry boundaries, reaching into the core of human and social realms. The impulsive evolution of information and communications technology (ICT) is causing profound changes in both societal and industrial domains, positioning digital transformation as a fundamental aspect of contemporary industrial policy across various nations.

Although Industry 4.0's digital transformation brings about advantages such as increased efficiency and flexibility, it is not without its limitations, hence requiring a careful examination. Acknowledging the transformative potential of digitalization, it is crucial to recognize the attendant challenges, including the substantial impact on conventional industries, the increase in social complexity, and the emergence of security risks and privacy

concerns. Consequently, the imperative to address these challenges has given rise to the conceptualization of Society 5.0.

Society 5.0 represents a visionary response to the multifaceted challenges posed by the digital age, envisioning a super-smart society where the fusion of cyberspace and physical space, facilitated by the comprehensive utilization of ICT, enhances the quality and comfort of life for all. Originating in the 5th Science and Technology Basic Plan, adopted by the Japanese Cabinet in January 2016, the parallel concepts of "Society 5.0" and "Industry 5.0" represent integral components of a forward-looking strategy. While Industry 5.0 focuses on the evolution of industrial practices, Society 5.0 embodies a holistic and broader vision for societal advancement, integrating both digital and physical dimensions.

This thesis seeks to interpret the implications of Society 5.0 on the domain of HRM, recognizing the imperative to navigate the transformative dynamics introduced by technological evolution. In doing so, the study aims to contribute to the scholarly discourse by critically examining the intersection of Society 5.0 and HRM, identifying the challenges and opportunities that lie at the intersection of these transformative forces.

Key words

Society 5.0, Industry 5.0, Industry 4.0, human resource management, Digitalization, Digital transformation, Artificial Intelligence

1.2 Articulation of the Study

The present study endeavors to investigate the intricate phenomenon of Society 5.0. The research begins with a comprehensive review of relevant literature to explain the essence and also impact of Society 5.0 in the HRM and its subsequent outcomes.

Furthermore, Chapter 2 delineates the research hypotheses, questions, and methodologies underpinning this investigation.

In the subsequent chapter, Chapter 3, we discuss the definitive concept of Industry 5.0 and Society 5.0, explaining their objectives, opportunities and challenges. To enhance the analysis, concrete case examples are provided, providing support for the arguments presented. Moreover, this section delves into how the HRM employs a range of digitalization tools with the aim of improving operational effectiveness and efficiency within their organizations. These tools encompass a variety of technologies and software applications designed to streamline HR processes, such as recruitment, training, performance management, and employee engagement.

Chapter 4 is dedicated to a thorough investigation of relevant case studies, aiming to provide a comprehensive understanding of different companies implementing digitization on their HR practices. Through accurate analysis of these case studies, the intricate dynamics between Society 5.0 and its impact on HRM practices are explicated, revealing insights into the evolving role of technology, automation, and human capital management within modern organizational frameworks.

The concluding section of this thesis synthesizes the primary findings and extends their implications and significance within the context of Society 5.0's influence on HRM. It promotes essential tools for organizations to navigate the evolving HR landscape shaped by Society 5.0, emphasizing the importance of leveraging technological advancements and adopting a human-centric approach to HRM practices. By highlighting these impactful dynamics, this study endeavors to enrich the discourse surrounding organizational

management in the era of Society 5.0, offering insights that can inform both scholarly research and practical applications within the industry.

1.3 Literature Review

In conducting the literature review for this thesis, the approach involved an extensive exploration of scholarly articles, research papers, and relevant publications across the domains of Industry 4.0, Industry 5.0, Society 5.0, and HRM. This literature review was thoroughly conducted to explore the intersection of Society 5.0 and traditional HRM practices, with a focus on understanding the transformative implications for organizations in the digital era. The review initiated with the foundational concepts of Industry 4.0 and its evolution into Industry 5.0, providing a historical context for the emergence of Society 5.0. Drawing insights from pioneering studies, including those by the European Commission (2021) and key researchers such as Chiaroni et al. (2011), Jevnaker and Olaisen (2022), and Köhler et al. (2022), the initial phase goes through the core principles of Industry 4.0, emphasizing the technological shift toward smart manufacturing. The subsequent transition to Industry 5.0, characterized by a cooperative relationship between humans and machines, laid the groundwork for understanding the broader societal implications and, notably, the role of HRM in facilitating this shift. The exploration then shifted its focus towards Society 5.0, a visionary concept introduced by the Japanese government, which aims at harmonizing technological advancements with human-centric values. Through an extensive review of literature, including studies by Rifai et al. (2022), Cartwright (personal communication, 2022), and Barney (2015), the societal aspects of Society 5.0 were unpacked, emphasizing its commitment to social well-being and the co-creation of knowledge. The role of social capital, the emphasis on open innovation, and the integration of cyberspace and physical space were highlighted as critical elements. The subsequent sections explored the implications of Society 5.0 on organizations, emphasizing the need for comprehensive digital transformation and fostering the culture of continuous lifelong learning. This in-depth literature review sets the stage for a delicate and complex understanding of the dynamic

relationship between Society 5.0 and HRM, providing a foundation for the subsequent analysis and discussion within the thesis.

In 2011, Germany introduced the concept of Industry 4.0, emphasizing the pivotal role of technologies such as the Internet of Things (IoT) and Cyber-Physical Systems (CPS) in manufacturing (European Commission, 2021). While Industry 4.0 prioritized smart technology, it tended to overlook the human element, focusing primarily on the transformative shift induced by novel technologies. This framework facilitated both mass production and mass customization, aspiring, in theory, for fully automated factories, where human presence is replaced by autonomous machines and artificial intelligence (AI) solutions. However, a notable limitation of Industry 4.0 lies in the constrained capability of machines and robots to execute tasks beyond explicit and predefined instructions, a constraint mitigated through human intervention.

In contrast, Industry 5.0 diverges from the competitive nature of Industry 4.0, conceptualizing the relationship between humans and machines as cooperative. Described as an era of "Personalization," Industry 5.0 underscores the importance of providing customized solutions to customers, with a heightened emphasis on human-machine collaboration. Phil Cartwright, the executive director of the UK's Centre for Modelling and Simulation, has stated that Industry 5.0 is an era of "Personalization" where giving personalized touch to the customer's solution is the main focus and also Industry 5.0 would focus on human-machine collaboration. It is crucial to note that Industry 5.0 represents not a mere continuation of Industry 4.0 but a forward-looking extension of digital transformation, framing the harmonious coexistence of industries and evolving human needs. Despite its merits, Industry 5.0 is not without challenges, such as social heterogeneity in value acceptance and return on investment versus productivity outcomes. These aspects necessitate a subtle exploration to comprehend the complexities of Industry 5.0 and its potential impact on various aspects of society, particularly within the realm of HRM.

Society 5.0 and Industry 5.0 collectively embody a profound societal and economic transformation, signaling a departure from conventional paradigms. This shift seeks to

harmonize economic advancement with addressing critical social and environmental challenges, including the complexities inherent in human-machine interactions and skill alignment. Within this emergent paradigm, the significance of knowledge transcends its traditional association solely with competitiveness and productivity. Instead, a broader perspective is embraced, one that considers the generation of social well-being, its influence on overall quality of life, and the collaborative creation of knowledge through public-private partnerships. In this evolving context, the conventional metrics of success are broadened to encompass not only economic growth but also the positive impact on the broader societal fabric. Therefore, the concepts of Society 5.0 and Industry 5.0 promote a comprehensive view of knowledge, recognizing its role not only in driving economic success but also as a catalyst for improving social well-being.

Consequently, it not only envisions technological advancement but also places a premium on the ethical and equitable deployment of knowledge in the service of societal progress. As such, Society 5.0 and Industry 5.0 represent not merely technological advancements but comprehensive frameworks that redefine contemporary societies by promoting a balanced, sustainable, and socially inclusive approach to knowledge and innovation. In the broader context of this fundamental shift in paradigms, the developments for human resource management (HRM) assume a significant role in understanding how both organizations and individuals can adeptly navigate within and contribute to this transformative domain. It is imperative to delve into the intricate dynamics of how HRM practices evolve in response to the changing technological and societal landscape, offering insights into strategies for fostering organizational resilience, talent development, and sustainable growth among the complexities of the modern era.

In the context of this research, the main focus is directed towards the examination of Society 5.0. Central to the ideology of Society 5.0 is the argument for the "Systemization" of services and projects, fostering advanced systems and enhancing coordination among multiple systems. Positioned as a "Smart Bridge", Society 5.0 seeks to harmonize the technologically driven and human-centric perspectives, envisioning a future society characterized by scientific and technological innovations. This visionary concept, introduced

by the Japanese government in January 2016, aspires to cultivate a human-centered, exceptionally intelligent, and streamlined societal framework. The origin of Society 5.0 emerged from the imperative to address multifaceted social challenges in Japan, such as an aging population, declining birth rates, and diminished competitiveness. Consequently, the notion of Society 5.0 serves as a strategic response, seeking to harmonize and reconcile economic progress with the resolution of pressing social issues, aligning with the broader objectives of this research in exploring the impact of Society 5.0 on HRM.

The objective of Society 5.0 is to establish a human-centric super-smart society, where the well-being of all citizens is prioritized, ensuring access to high-quality lives well provided with comfort and vitality. This vision is actualized through the seamless integration of cyberspace and physical space, facilitated by cutting-edge technologies such as 5G, Big Data, and AI. It is imperative to underscore that within the paradigm of Society 5.0, social capital emerges as a fundamental asset, signifying a departure from traditional economic-centric approaches. This transformative vision upholds globally targeted open innovation, emphasizing human-centric priorities in shaping technological advancements.

Social capital refers to a positive product of human interaction within a society or group. It encompasses both tangible and intangible resources that emerge from social relationships. Social capital represents the value of connections among individuals, enabling them to work together effectively. It can manifest as favors, useful information, innovative ideas, and future opportunities. Unlike other forms of capital (such as financial or human capital), social capital is not held by an individual; it emerges from the interactions between people. Within an organization, social capital contributes to trust and respect among employees, effective collaboration and knowledge sharing, enhanced company performance. Beyond the organization, social capital influences recruitment and talent acquisition through networks, business partnerships and industry collaborations, organizational reputation and brand image.

The essence of Society 5.0 lies in its commitment to leveraging technological progress and digital transformation for the collective benefit of society. By emphasizing the merging of

cyberspace and physical space, this vision envisions a society where essential goods and services are effortlessly provided to individual citizens where and when they are needed.

Moreover, the prioritization of social capital as a key asset underscores the paradigmatic shift toward a more inclusive and socially oriented perspective. Society 5.0's emphasis on globally targeted open innovation underscores a commitment to collaboration and collective problem-solving on a global scale, thereby extending the reach and impact of technological advancements. This visionary approach introduces a new perspective in comprehending and utilizing the potential of technological innovation and digital transformation for the collective advancement and well-being of society involved in the field of HRM.

In the face of general technological advancements and their rapid integration into human activities, organizations find themselves compelled to undergo comprehensive reinvention, necessitating the transformation of all operational processes. This imperative shift towards digital transformation goes beyond a mere technological upgrade; it entails a fundamental change in focus and necessitates innovation in both technology and institutional culture. As underscored earlier, the transformative journey authorizes a commitment to education and training, encompassing the re-skilling of employees and fostering the culture of continuous and lifelong learning. Digital transformation, being an extended and multistage process, demands substantial resources, active participation, and the support of regulatory agencies, institutions, and policies.

Effectively responding to digital transformations requires the formulation of forward-looking strategies and a paradigm shift in organizational dynamics, fostering an environment advantageous to understanding and embracing a digital culture. In this context, digital transformation is not confined solely to technological advancements; rather, it is a comprehensive transformation that encompasses both individuals and organizational structures. The extended duration of this transformation necessitates sustained efforts and strategic alignment with evolving technological landscapes, necessitating a comprehensive and adaptive approach. As we delve into the implications of Society 5.0 on HRM, it is crucial to perceive how these principles may reshape organizational structures, workforce

dynamics, and the overall approach to talent management in the contemporary digital landscape. This exploration is essential for understanding the complex relationship between the envisioned super-smart society and the dynamics of human resource (HR) practices in organizations.

1.4 Gap in Literature

In summary, the complicated connection between Industry 4.0 and Society 5.0 underscores the symbiotic relationship where Industry 4.0 technologies lay the preliminary work for the realization of Society 5.0 objectives. Through the strategic utilization of Industry 4.0 capabilities, Society 5.0 aspires to address pressing societal issues, enhance quality of life, and foster sustainable development. A crucial aspect illuminated by existing literature is the recognition of the imperative for organizational and competency transformations within enterprises operating within the scope of both Industry 4.0 and Society 5.0. This acknowledgment has led to the establishment of the research objectives for this study, which include defining the conceptual scope of Society 5.0, identifying differences between Industry 4.0 and Society 5.0, and explaining the changing role of HRM in the context of evolving skills and competences and digital transformation.

As we delve into the literature, it becomes evident that the intersection of Industry 4.0 and Society 5.0 has attracted scholarly attention due to its implications for organizational dynamics and societal progress. Researchers have explored the synergies between Industry 4.0 technologies and the primary objectives of Society 5.0, emphasizing the transformative potential of these advancements.

This body of literature provides the foundation for the current study which aims to clarify the characteristics of Society 5.0 and differentiate it from the preceding Industry 4.0 paradigm. Notably, the subtle examination of HRM in the context of these technological shifts remains an understudied area. While Smith et al. and Johnson and Brown touch upon organizational adaptations, there is a noticeable gap in understanding the specific implications for HRM competencies and practices within the context of Society 5.0. Therefore, this study seeks to

contribute to the existing literature by providing a comprehensive research of the changing role of HRM among the dual forces of Industry 4.0 and Society 5.0, thereby bridging a crucial gap in our understanding of the transformative effects of these technological paradigms on HR practices.

In conclusion, the literature review illuminates the complex relationship between Society 5.0 and HRM, focusing on the need for a comprehensive understanding of the evolving dynamics resulting from this technological paradigm shift. The existing body of work establishes a strong foundation by exploring the integration of Society 5.0 principles with traditional human resource practices, emphasizing the transformative potential of emerging technologies such as AI, IoT, and big data. However, a notable gap persists in the literature concerning the specific implications of Society 5.0 on HRM, particularly in terms of talent acquisition, development, and retention. While prior research acknowledges the broader organizational changes necessitated by Society 5.0, there is a distinct lack of in-depth research regarding the subtle adjustments required in HR strategies and competencies. By addressing these gaps, the research endeavors to contribute valuable insights to the evolving field of HRM within the context of Society 5.0, providing a foundation for future research and guiding practitioners in navigating the challenges and leveraging the opportunities presented by this transformative technological era.

CHAPTER 2: HYPOTHESIS AND METHODOLOGY

2.1 Research Questions

This section serves as a pioneer to the formulation of hypotheses that aims to elucidate the intricate dynamics between Society 5.0 and HRM. Society 5.0, an emergent phase in technological evolution, envisions the harmonious fusion of the physical and digital domains, promising innovative solutions to societal challenges, heightened quality of life, and sustainable development. Within this dynamic context, understanding how HRM functions adapt to the multifaceted changes introduced by Society 5.0 is of primary importance.

Current scholarly discourse recognizes the broader organizational implications of Society 5.0; however, a noticeable gap exists concerning the subtle impact on HRM practices. This section endeavors to address this gap that studies the specific ways in which Society 5.0 shapes HRM strategies and functions. Thereby, to answer fundamental questions referring to the impact of Society 5.0 on HRM. This research aims to contribute not only to the theoretical understanding of the subject but also to comprehend the practical insights of HR practitioners navigating the challenges and opportunities presented by the integration of Society 5.0 principles. This comprehensive investigation endeavors to contribute to the ongoing academic discussion surrounding the convergence of technology, society, and HRM. By delving into the intricate dynamics at the interconnections of these domains, this study aims to offer valuable insights and deepen the understanding of how organizations can formulate and implement HRM strategies that align with the principles and challenges of Society 5.0. Through rigorous analysis and empirical research, this endeavor seeks to

equip both scholars and practitioners with the necessary knowledge and tools to navigate the complexities of HRM in the rapidly evolving landscape shaped by Society 5.0.

The research in this study is guided by the following key questions:

- I. To what extent has the current literature investigated the integration of Society 5.0 principles with traditional HRM practices, and what insights does it offer regarding the evolution of HRM in the context of Society 5.0?
- II. How does the advent of Society 5.0 influence the dynamics of the workforce, and what gaps in knowledge persist regarding its implications for talent acquisition, development, and retention within organizations?
- III. What distinct challenges and opportunities do Society 5.0 present for HR professionals, and how can an enhanced understanding of these aspects contribute to the development of effective HRM practices in the era of Society 5.0?

2.2 METHODOLOGY

As the theme and the topics under study are new and emerging, we consider that the systematic review of the literature, in an integrative way, will be the most appropriate methodology to address the problem under analysis, as described by Torraco: "a form of research that reviews, critiques, and synthesizes representative literature on a topic in an integrated way such that new frameworks and perspectives on the topic are generated". According to Transfield et al. , the systematic review must follow certain methodological characteristics. That is, it starts with the planning of the review, continues with its realization, and ends with its disclosure. Thus, in the first phase, the search strategy was based on the SCOPUS database. However, in order to include peer-reviewed publications

from other important databases such as Google Scholar and Science Direct, the same search strategy was also applied.

The criteria used in the search strategy was the search for the following terms "Society 5.0" for the period 2019 to 2023, in the articles, title, abstract, and keywords, in the subject area "Business, Management & Accounting". The procedure was repeated for the terms "Industry 5.0". Then in order to be more specific and limited, the search was conducted online with the following search query: TITLE-ABS-KEY(Industry 5.0 AND Society 5.0) AND (PUBYEAR > 2019) AND (LIMIT-TO (LANGUAGE , "English")). The specific literature for journals, conference proceedings, title words, and years was searched. The initial search returned a total of 214 scientific literacy articles. Among them, 75 articles, 75 conference papers, 34 book chapters, 17 review papers, and 9 books. However, in order to refine the search query and include only high-quality research works, not only newspaper articles and reports were excluded from the dataset, but also the query was refined and limited to the following: TITLE-ABS-KEY ((digit*) OR (Society 5.0)) AND TITLE-ABS-KEY (("Human") OR ("social") OR ("sociotechnical") OR ("socio-technical")) AND TITLE-ABS-KEY (("managerial practice*") OR ("management practice*")) AND (LIMIT-TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English")). As result, the search returned a total of 158 scientific literacy articles. Among them, 98 articles, 14 conference papers, and 9 review papers. In order to be more specific and precise with the papers, just papers with the key words of "Society 5.0", "Human resource management", "Digital transformation" and "management practice" were included, the number of which was 35.

It is worth mentioning that, regarding the year range, in 2015, the first discussions and publications regarding Industry 5.0 and Society 5.0 were made online to the research community, especially from the Japanese Government. However, there may have been discussions or precursors to these concepts before 2015, but they were not widely recognized or formalized. Therefore, searching past 2015 for Industry 5.0 and Society 5.0 would return no results. However, since Industry 5.0 will heavily rely on the developments made under the framework of Industry 4.0, which dates back to 2010 in several manuscripts from that year range (i.e., 2010–2023), it was included. Consequently, the inclusion of these

research works facilitates tracking the most recent trends, shedding light on challenges and gaps in the literature, which ultimately are the goals of a state-of-the-art investigation.

For a comprehensive understanding of the literature review findings, a detailed summary of all the papers and journals utilized in this research is presented in the subsequent table (Table1). This systematic approach aims to enhance the transparency and accessibility of the literature review's key contributions, providing a structured reference for the themes and insights derived from the selected sources. This methodological step ensures that the research outcomes are systematically organized.

Table 1. Data Analysis by Author Name, Year and Title

Num.	Reference	Title	Discussion
1	S. D. Ganer, S. O. Kediya, A. K. Suchak, S. K. Dey, and G. Band. 2023	Analytical Study of HRM Practices in Industry 5.0”	This study delves into HRM practices within the context of Industry 5.0. It explores how HRM adapts to the technological advancements and human-centric ecosystems in the Industry 5.0 era
2	A. Erro-Garcés and M.E. Aramendia-Muneta. 2023	The Role of Human Resource Management Practices on the Results of Digitalization: From Industry 4.0 to Industry 5.0	This article investigates how HR practices impact digitalization outcomes, particularly during the transition from Industry 4.0 to Industry 5.0. It provides insights into aligning HR strategies with technological advancements.
3	Bankins et al. 2022	AI Decision Making with Dignity? Contrasting Workers’ Justice Perceptions of Human and AI Decision Making in a Human Resource Management Context	The findings demonstrate that most workers don't trust machines or AI to make HRM choices, think it's cruel, and don't think it's fair.
4	Rodgers et al. 2022	An artificial intelligence algorithmic approach to ethical decision-making in human resource management processes	The study's findings regarding HRM's use of in judgement will benefit businesses and institutions by assisting HRM in improving their time management, assisting HRM in analyzing training and career development needs, and assisting HRM in developing the demographic characteristics of the office social environment
3	Budhwar et al. 2022	Artificial intelligence – challenges and opportunities for international HRM: a review and research agenda	The findings of this analysis broaden our understanding of AI adoption's effects and judgement based on AI in HRM. They also alert readers to the expanding scope of future research
4	Charlwood and Guenole, 2022	Can HR adapt to the paradoxes of artificial intelligence?	This study examines the advantages and disadvantages of AI in HRM as well as the foundation for future coexistence of AI and people in development and management.
5	Jaiswal, Arun, and	Rebooting employees:	Employees must be given more training in data

	Varma 2022	upskilling for artificial intelligence in multinational corporations	analysis, electronic, advanced intellectual, judgement, and lifelong improvement if AI is to be completely integrated into HRM.
6	Pan et al. 2022	The adoption of artificial intelligence in employee recruitment: The influence of contextual factors	In connection to the costs of AI implementation as well as the barriers to AI acceptance in HRM policy development, this research describes the technical, organizational, and ecosystem paradigms of scientific work on HRM information systems.
7	Langer et al. 2022	Trust in Artificial Intelligence: Comparing Trust Processes Between Human and Automated Trustees in Light of Unfair Bias	It is necessary to evaluate and enhance the algorithmic system put in place as a preventative measure because AI's usage to the HR role generates various ethical concerns by professionals concerning biases that may occur in the process.
8	Saju Mathew, D., Oswal, N., & Ateeq 2021	Artificial Intelligence (AI): Bringing a New Revolution in Human Resource Management (HRM)	In this study, the author discusses the benefits and drawbacks of implementing AI in the context of HRM, as well as the history of AI in HRM and how it might assist Professionals with recruiting.
9	Kieslich, K., Lünich, M., & Marcinkowski 2021	The Threats of Artificial Intelligence Scale (TAI)	The information in this research shows how the AI threat scale is structured, with the consequences of the findings and practical applications supporting it. Recommendations for the future application of AI in HRM are also examined.
10	Cheng, M. M., & Hackett 2021	A critical review of algorithms in HRM: Definition, theory, and practice	This research emphasizes the methodology and theory of using AI in HRM. In recent times, professionals and specialists' interest in the algorithmic HRM decision making has expanded tremendously.
11	Newman, D. T., Fast, N. J., & Harmon 2020	When Eliminating Bias Isn't Fair: Algorithmic Reductionism and Procedural Justice in Human Resource Decisions	In this study, methodologies offer a potential point of view for increasing equality and reducing bias in personalized HRM decision making. They can also be used to evaluate HR achievement using machine learning standards to be more objective with the presumption that algorithm-based decisions are more accurate.
12	Jatobá et al. 2019	Evolution of Artificial Intelligence Research in Human Resources	The poor outcomes of applying AI to HR over the years will cause research deficits and/or apathy in the field. The construction of multiple disciplines that include engineers and human resource specialists will aid in the development of research areas and the bolstering of study groups related to the use of AI in HRM. Other findings demonstrated that the current focus of AI research in HRM is restricted to hiring and selection.
13	Demir, Döven and Sezen, 2019	Industry 5.0 and Human-Robot Coworking	According to the study's conclusions, industry 5.0 will change a number of things, most significantly the way that humans and robots work together to execute jobs. However, because to inaccurate information spread by the media, negative responses to AI
14	Tambe, P., Cappelli, P., & Yakubovich 2019	Artificial intelligence in human resources management: Challenges and a path forward	The diversity of HR phenomena, HRM's operational drawbacks, legal and ethical considerations, effectiveness in the workplace to analytic

			judgements, and employee reactions to algorithmic decisions were all identified as four challenges of AI implementation in HRM. They also made a number of recommendations regarding potential effects on HRM.
15	Haenlein, M., & Kaplan 2019	A Brief History of Artificial Intelligence: On the Past, Present, and Future of Artificial Intelligence	This review of the literature includes seven papers that present distinct AI viewpoints and give a thorough analysis of the potential applications of AI in HRM
16	George* and Thomas 2019)	Integration of Artificial Intelligence in Human Resource	According to this viewpoint, the incorporation of AI into HRM provides a frame of reference to support the successful and efficient operation of HRM operations as well as its effects on business and personnel.
17	Hmoud, B., & Laszlo 2019	Will artificial intelligence take over Human Resources Recruitment and Selection?	All organizational work, especially hiring and selecting procedures for new employees, will be replaced by computers as AI becomes more frequently used by HRM professionals in order to achieve better and result-oriented performance.

CHAPTER 3: UNDERSTANDING THE CONCEPTS

In the evolving landscape of organizational dynamics, thanks to the collaboration among technology, society, and human resources, a new era known as Society 5.0 has emerged. Before going through how organizations integrate the principles of Society 5.0 into their HR practices, it is essential to establish a solid foundation. Society 5.0 represents more than just digitalization; it envisions a seamless integration of cyber-physical systems, AI, and human collaboration, going beyond industry boundaries to prioritize societal well-being, sustainability, and inclusivity. Industry 5.0, a product of this societal shift, embraces both automation and craftsmanship, recognizing the enduring value of human skills such as creativity, empathy, and adaptability. In this context, effective knowledge management becomes crucial, as organizations strive to capture tacit knowledge, promoting continuous learning, and fostering knowledge-sharing ecosystems in the digital realm. The evolution of HRM is evident and tangible, with digital tools streamlining processes, enhancing employee experiences, and enabling evidence-based decision-making. The infusion of AI into HR practices demands a new set of digital competencies, requiring HR professionals to navigate data ethics, interpret algorithmic outputs, and cultivate digital fluency. In the era of AI, learning and knowledge become imperative, with individuals needing to upskill and engage in lifelong learning to remain relevant. This chapter embarks on an intellectual exploration, synthesizing theory and foresight to clarify the complexities of Society 5.0 and envision a future where technology enhances human potential.

3.1 Industry 5.0

Although the primary objective of this research is to examine the impact of Society 5.0 on HRM, it is also worthwhile to provide a brief overview of Industry 5.0.

The ideology of Industry 5.0 emerged in 2020, after discussions and sharing of ideas in two virtual workshops, and officially in January 2021, with its formal publication in the European Commission (EC) document. The focus of the EC document is to foster transformation and drive change in companies and industries to make them more sustainable and human-centric.

In the contemporary landscape, the pervading influence of Industry 4.0 has not attained universal implementation and seamless integration across global enterprises. Nevertheless, businesses and industries find themselves at the edge of the upcoming 5th Industrial Revolution. This forthcoming phase envisions autonomous manufacturing processes, yet uniquely emphasizes a substantial reliance on human intelligence. As organizations navigate the transitional nuances and adjustments necessitated by Industry 4.0, the distinct emergence of the 5th Industrial Revolution becomes increasingly noticeable. Concurrently, the conceptualization of Industry 5.0 principles gain prominence.

It is essential to recognize Industry 5.0 as not merely an independent paradigm but rather as a logical and chronological extension of the preceding Industry 4.0. This sequential evolution implies a continuity in the transformative path, where Industry 5.0 builds upon the foundational technologies and concepts established during Industry 4.0. The coexistence of these industrial revolutions introduces an intricate interplay between advanced automation and the preservation of meaningful human involvement.

Industry 5.0 presents a visionary perspective on the forthcoming industrial revolution, emphasizing the collaborative utilization of human creativity in conjunction with exceptionally efficient, intelligent, and precise systems. The transformative shifts occurring at the industrial echelon, coupled with advancements in technology, necessitate a reconsideration of the roles assumed by industries and their societal positioning. At its core, Industry 5.0 strives for the harmonious collaboration between humans and machines, with the main purpose of prioritizing and amplifying human desires and intentions.

From a technological perspective, Industry 5.0 may be construed as a paradigm characterized by a "Social Smart Industry," where social business networks seamlessly

merge with individuals to enhance communication efficiency. This convergence of technology and social dynamics underscores the transformative nature of Industry 5.0. Industry 5.0 is a forethoughtful concept on the future of industry towards a human-centric, sustainable, and resilient manufacturing system, which provides a flourishing development vision of industry as shown in the left circle of Fig. 1. Furthermore, this industrial evolution prioritizes a human-centric approach, depicting a division of labour where machines are designated for tasks demanding high levels of repetition or labour-intensity. Simultaneously, human involvement takes precedence in activities requiring personalization and critical thinking. This intricate coordination of technological integration and human engagement illustrates the essence of Industry 5.0, marking a significant departure from previous industrial paradigms.

Conversely, Industry 5.0 is recognized as a constituent element within a broader initiative termed Society 5.0, as defined by the Japanese government. Society 5.0 envisions the creation of a highly intelligent, super-smart, and human-centered societal framework that utilizes cutting-edge technologies, including AI, the Internet of Things (IoT), robotics, and eXtended Reality (XR). This visionary concept is aimed at deploying these advanced technologies to address and resolve societal challenges. Within this framework, Industry 5.0 serves as a specialized domain within the comprehensive societal initiative, contributing to the realization of the broader objectives outlined by Society 5.0. This alignment underscores the interconnectedness of industrial advancements and societal aspirations, marking a crucial intersection that this thesis seeks to explore in depth, emphasizing on the intricate dynamics and implications of this transformative paradigm shift. Critical domains in the evolution of intelligent factories involve automation and robotics, facilitated by an array of information and communication technologies (ICTs), infrastructure, and control systems. Within the framework of Industry 5.0, the comprehensive vision is to establish a manufacturing environment characterized by high efficiency and sustainability. Moreover, the principles of Industry 5.0 extend beyond mere industrial advancements, aspiring to generate social and economic advantages for workers and communities (societies) alike. This visionary outlook encompasses a holistic perspective on industrial development,

aiming not only for technical proficiency but also for broader societal and economic enrichment.

Industry 5.0 endeavors to cultivate a more human-centric approach by synergizing the ingenuity, problem-solving vision, and emotional intelligence of human workers with the precision and efficiency of machinery. This initiative specifically concentrates on utilizing and amplifying existing technological breakthroughs to realize the vision of a highly intelligent and super-smart society, with a deliberate emphasis on the human dimension of technology. Integral to Industry 5.0 is the imperative for a socio-technical evolution for individuals, signifying a paradigmatic shift in the role of operators as the central focus within manufacturing and production systems. This transformative evolution is facilitated through intelligent strategies and methodologies supported by advanced information and communication technologies, marking a decisive progression toward a more integrated and harmonized human-machine collaboration.

In conclusion, Industry 5.0 emerges as a forward-thinking paradigm, charting the trajectory of future industry development towards a human-centric, sustainable, and resilient manufacturing ecosystem, presenting a robust vision for the industry's prosperous evolution. This paradigm underscores the importance of system agility and resiliency achieved through the deployment of flexible and adaptable technologies. Furthermore, Industry 5.0 is actively engaged in promoting sustainability, fostering diversity, and empowering talents. Originating several years ago, the concept has garnered substantial attention within research institutes and funding agencies, and has seamlessly integrated into the contemporary business domain. In 2021, the European Commission suggested that European industry should reposition their roles in society and promote this concept in order to describe the future prosperity of European industry. At its core, Industry 5.0 recognizes the industry's capacity to serve societal goals, emphasizing resilience and prosperity while ensuring production aligns with boundaries set by our planet and prioritizes the well-being of industry professionals. Distinguishing itself from the predominant emphasis on digitalization and AI-driven technologies in Industry 4.0, Industry 5.0 provides a unique perspective, highlighting the importance of research and innovation in guiding the industry towards long-

term service to humanity within the confines of limitations of our planet's resources. This distinctive viewpoint positions Industry 5.0 as a pivotal paradigm for shaping the future landscape of industry. Consequently, it would be wise to state that Industry 5.0 is characterized by three keywords, namely, (i) human-centric, (ii) sustainable, and (iii) resilient. However, the ideologies and concepts of Industry 5.0 are open, evolving, and expansive, but always based on the three fundamental pillars described above.

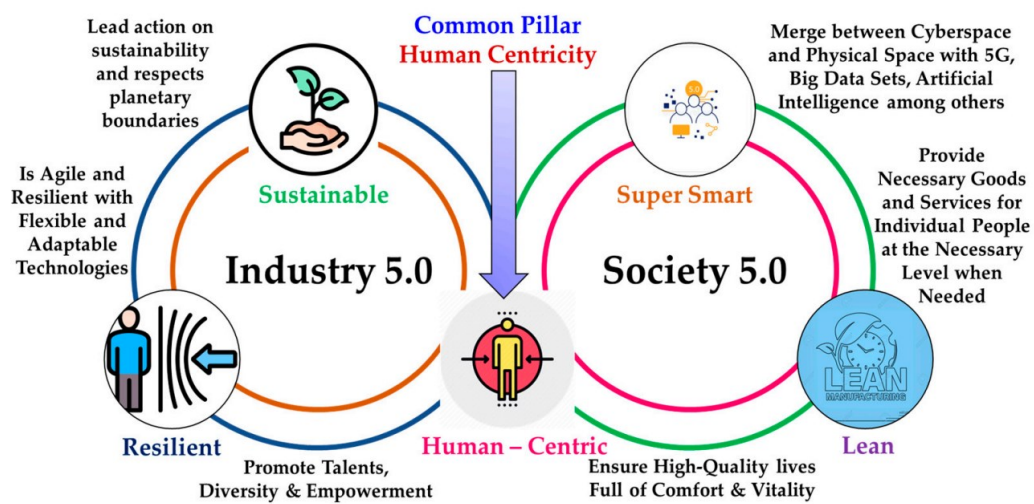


Figure 1. Vision of Industry 5.0 and Society 5.0 (Sihan Huang et.al 2022)

3.2 Society 5.0

Society 5.0 (Super Smart Society) is a new guiding principle for innovation. It promotes convergence between cyberspace and physical space enabling AI-based on big data and robots to perform or support as an agent the work and adjustments that humans have done up to now (Fukuyama, 2018). Broadly speaking, the concept of Society 5.0 envisions a collaborative synergy between humans and machines, allowing for creative human engagement alongside the automation of other tasks in various locations and contexts. As stated in the Cabinet Office of Japan:

“Society 5.0 takes a systemic approach but focusing on human beings with the aim to involve a wide variety of actors that in the past have only participated in non-visible ways (e.g. women and young people). It is a space for accommodating various bottom-up ideas.”

The foundational structure of Society 5.0 involves the gathering of data from the “real world” (physical world) and subsequently processed by computational systems, and ultimately implemented in practical, real-world applications. While this schema may not be inherently novel, its significance lies in its application within the broader societal context. The systematic integration of data acquisition, computational processing, and real-world application constitutes a fundamental aspect of Society 5.0, a concept that, although not revolutionary in its individual components, attains significance through its comprehensive arrangement within the framework of societal development. In more straightforward terms, the expression "Information Society" refers to a societal framework where various systems systematically gather data, undergo processing, and subsequently employ the derived outcomes within specific real-world contexts. In Society 5.0, the resulting information will not just guide the operation of a system; it will directly shape our actions and behavior. Within the context of Society 5.0, the concept of cyberspace (cyberspace refers to a digital space in which real-world data are collected and analyzed to derive solutions) goes beyond a mere channel for the exchange of extensive data; it assumes the role of a domain crafted by computer networks for the purpose of analyzing complex problems and formulating real-world solutions. The analytical processes of Society 5.0's computer systems necessitate an approach that mirrors the authentic physical world when interpreting unprocessed real-world data. This intricate interplay between cyberspace and the emulation of the physical world underscores the sophisticated nature of Society 5.0's computational methodologies in striving for practical problem-solving applications. In this manner, Society 5.0 makes it possible to encourage economic growth and discover resolutions to social difficulties through thinking about advanced designs and systemics that enable a futuristic sustainable society in harmony with the natural environment. Society 5.0 undertakes to integrate real-world models into cyberspace, facilitating the generation of solutions for real-life challenges.

The vision of society that Society 5.0 describes, requires us to think about two kinds of relationships: firstly, the intricate interplay between technology and society, and secondly, the relationships mediated by technology between individuals and the broader societal context. In summary, Society 5.0 will feature an iterative cycle in which data are gathered, analyzed, and then converted into meaningful information, which is then applied in the real world; moreover, this cycle operates at a society-wide level. Society 5.0 is envisioned as the merging of cyberspace and physical space for economic advancement, while also resolving social challenges (Deguchi et al., 2020). The term "merging" denotes the systematic process of collecting raw data from the real world, employing this data to formulate models within the cyber domain, and iteratively enhancing these models. This convergence signifies a sophisticated approach to extracting value from the dynamic interplay between physical world and cyberspace within the societal context.

It is imperative to note the significance of comprehending the concept and history of Society 5.0. Introduced by the Japanese government in January 2016, Society 5.0 is a vision that strives to forge a human-centered, highly intelligent, and super-smart, and lean society. The concept of Society 5.0 was proposed to balance economic advancement with the resolution of social problems (e.g. aged tendency, low birth rates and lack of competitiveness) in Japan. The concept of society 5.0 combines the history of human civilization, starting from the hunter gatherer society, the agricultural society, industrial society and information society. Changes in the times that have given birth to the concept of Society 5.0 are not without purpose. Throughout the historical progression of societal frameworks, passing over from Society 1.0 to 4.0, a great number of complex challenges emerged, encompassing the management of energy resources, fulfilment of food requirements, navigation of international competition, and negotiation of the escalating complexities surrounding issues of equality and justice. The distinctive characteristics of Society 5.0, outlining noticeable deviations from the features of Society 4.0 with regards to value creation, diversity, decentralization, resilience, sustainability, and environmental equilibrium, are explained and explored within the context of this discourse. It is within this complex historical context that the visionary concept of Society 5.0 was conceived as an alternative solution, aspiring to

achieve optimal efficiency and effectiveness. This innovative paradigm sought to seamlessly integrate mobility into a sophisticated framework while concurrently upholding the primary importance of privacy considerations. The emergence of Society 5.0 can be understood as a response to the multifaceted challenges encountered across historical societal evolutions, aiming to lead the way in a transformative era marked by comprehensive solutions and heightened societal adaptability.

Society 5.0 serves as a bond intersecting technological, digital, and informational transformations, with its primary orientation directed towards fostering the sustainable development of societies. As a novel guiding principle for innovation, Society 5.0 defines a paradigm that strategically aligns technological advancements with the imperative of achieving enduring societal development. This conceptual framework underscores the complex interaction between evolving technologies and the broader objectives of sustainable societal progress, embodying a progressive vision that seeks to navigate and exploit transformative changes across various domains and areas.

3.2.1 Objectives of Society 5.0

The broad range of literature discussing Society 5.0 offers different viewpoints and criticisms regarding its application and implementation, yet there are perceptible alignments among these varied perspectives, all aimed at achieving a shared ultimate objective. The objective of Society 5.0 is to afford every individual the autonomy to pursue their paths towards personal fulfilment and lifestyles. Simultaneously, it envisions an active participation from individuals in the pursuit of sustainable development harmonized with nature, thereby addressing prevalent social issues. This vision highlights an approach to societal progress, aiming not only for individual well-being but also collective flourishing, all within the framework of a sustainable and harmonious coexistence with the natural environment. The emphasis lies in fostering a dynamic equilibrium between individual aspirations, societal needs, and environmental considerations. Society 5.0 seeks to

eliminate constraining factors on individuality, encompassing aspects like gender, race, nationality, as well as disparities in wealth and information concentration. Furthermore, it aims to establish safety measures to tackle unemployment and poverty, promoting an inclusive societal structure where each person can contribute meaningfully, within a setting marked by safety, harmony with the environment, and freedom from current limitations. In contemporary work environments, employees struggle with the challenge of navigating through an flow of information, a situation intensified by the absence of robust technological support for efficient information retrieval and analysis. Addressing this issue, the principles of Society 5.0 advocate for the integration of contemporary information technologies and solutions. The pervasive goal is to liberate individuals from monotonous and intense routine tasks, while concurrently optimizing the utilization of available information resources. Society 5.0 envisions a substantial reduction in the workload imposed on employees, mitigating physical constraints associated with job tasks and continuous, challenging work. This paradigm promotes the integration of robotic assistance, novel organizational methodologies, enhanced working conditions, and the refinement of operational processes, thereby empowering employees to redirect their capabilities and potentials toward more creative and engaging endeavors. The multifaceted strategies employed by Society 5.0 aim to foster an environment where human potential flourishes through meaningful and innovative work experiences.

3.2.2 Opportunities and Challenges

The literature review of Busisiwe Simelane (2023) showed that there are opportunities for Society 5.0 to benefit from the smart technologies introduced by Industry 4.0. Society 5.0 offers opportunities for HRM to enhance efficiency through the integration of smart technologies in talent acquisition, training, and performance management. The human-centric nature of Society 5.0 highlights the importance of HRM in fostering a workplace culture that values creativity, emotional intelligence, and adaptability. Striking a balance between leveraging technology for operational efficiency and preserving the human element

in the workplace will be a central challenge and opportunity for HRM in the era of Society 5.0. The implementation of Society 5.0 presents a lot of opportunities that extend across various facets of societal development. By utilizing the potential of advanced technologies such as AI, IoT, and robotics, Society 5.0 offers the prospect of enhanced efficiency, innovation, and connectivity within diverse sectors. This paradigm envisions a society where technological advancements not only relieve individuals from monotonous tasks but also contribute to the resolution of complex societal challenges. The integration of smart technologies can revolutionize healthcare delivery, urban planning, and environmental sustainability, fostering a more resilient and adaptive societal framework. Moreover, Society 5.0 emphasizes a human-centric approach, aiming to empower individuals by leveraging technology for personalized, meaningful experiences. All of these efforts pave the way for Society 5.0 to bridge societal gaps and promote inclusivity. By providing equal access to technology and opportunities, it aims to address issues of inequality, ensuring that the benefits of technological advancements are distributed more equitably across diverse demographic segments. The opportunities inherent in Society 5.0 align with a vision of sustainable development and societal progress. This transformative approach aligns with the standards of fostering a more inclusive and diversified workforce, achieved through the strategic deployment of remote work modalities, flexible work arrangements, and collaborative platforms. This shift not only addresses the evolving nature of work but also strives to mitigate barriers and promote equitable participation within the professional domain. Concurrently, Society 5.0 advocates for the cultivation of a sustainable and resilient industry, emphasizing the adoption of environmentally conscious and circular practices. This commitment extends to the reduction of environmental impacts and the enhancement of worker well-being, thereby forging a harmonious synthesis between industrial activities and ecological considerations. The holistic integration of these principles within the framework of Society 5.0 underscores its commitment to progressive industrial practices that prioritize skill enhancement, inclusivity, environmental sustainability, and the overall resilience of the workforce and industry. In essence, Society 5.0 envisions a future where technological advancements harmoniously merge with societal values, creating a

transformative impact on the nature of work and industry. Therefore, these opportunities which may arise from the instantiation of Society 5.0 will be summarized as below:

- **Creating new value and solving social issues:** Society 5.0 endeavors to leverage technology as a means of effectively confronting the multifaceted challenges confronting humanity, including but not limited to, an aging population, environmental degradation, poverty, and societal inequality. Furthermore, the primary goal of Society 5.0 encompasses the creation of novel value propositions and opportunities for both individuals and organizations. These opportunities manifest in the form of personalized services, tailor-made products, and the cultivation of innovative business models. By intertwining technological advancements with societal needs, Society 5.0 seeks to create and foster a harmonious synergy that not only addresses existing challenges but also accelerates a paradigm shift towards a more resilient, inclusive, and technologically enriched societal framework.
- **Enhancing the quality of life and well-being:** The fundamental aspiration of Society 5.0 is to enhance the overall quality of life and well-being for individuals by providing heightened levels of convenience, comfort, and security. It seeks to establish a societal framework where individuals are not only recipients of technological advancements but are also empowered to pursue their passions, interests, and personal aspirations. Society 5.0 envisions a landscape where people can authentically express their creativity and individuality, fostering a sense of fulfillment and self-actualization. An integral facet of its vision is the commitment to bridging existing societal gaps and fostering inclusivity. By ensuring equal access to cutting-edge technology and associated opportunities, Society 5.0 endeavors to harmonize issues of inequality, thereby facilitating a more equitable distribution of the advantages engendered by technological progress across diverse demographic segments. In this paradigm, inclusivity is not merely an auxiliary objective but a foundational principle that underlines the ethical and human-centric standards of Society 5.0. Through this comprehensive approach, Society 5.0 aspires to cultivate a

harmonious and technologically enriched societal environment where the benefits of progress are accessible and shared by all.

- **Fostering human-centric and sustainable development:** At the core of Society 5.0 lies a constant emphasis on human dignity, rights, and values, positioning individuals as the focal point of innovation. This paradigm not only supports the fundamental principles that underpin human existence but also strives to harmonize technological advancements with the broader aspirations of sustainable societal development. In alignment with the United Nations Sustainable Development Goals, Society 5.0 is committed to fostering an environment where human well-being merges with ecological sustainability. A pivotal facet of this commitment involves the rational application of technology to overcome environmental challenges. Society 5.0 envisions a future where technological innovation plays a transformative role in ecological conservation. Through the inception of eco-friendly solutions, adept management of energy resources, and the promotion of sustainable practices, Society 5.0 endeavors to contribute significantly to environmental preservation. The integration of intelligent technologies into societal frameworks serves not only to enhance human experiences but also to actively respond to the imperative of environmental conservation, thereby illustrating the symbiotic relationship between technological progress and sustainable development within the principles of Society 5.0. Consequently, Society 5.0 can help reduce the environmental impact of human activities through the development of smart cities, green energy solutions, and sustainable transportation systems.
- **Improved healthcare:** Society 5.0 has the capacity to accelerate the evolution of individualized healthcare interventions by harnessing the potential of AI and IoT. In this transformative framework, cutting-edge technologies are positioned to have a central role in real-time monitoring and diagnosing of health conditions. Through the integration of AI-driven algorithms and the expansive connectivity offered by the IoT, healthcare systems can go beyond traditional boundaries. This requires not only the continuous and personalized monitoring of an individual's health parameters but also the swift identification and diagnosis of potential health concerns. The intersection

of AI and the IoT in the healthcare domain within the context of Society 5.0 signifies a departure from conventional healthcare models, promising a more proactive and personalized approach. By ensuring real-time insights into health status, Society 5.0 envisions a future where healthcare interventions are not merely reactive but are proactively designed to cater to the unique needs and conditions of each individual. This paradigm shift in healthcare exemplifies the transformative potential of Society 5.0 in optimizing the well-being and health outcomes of individuals through innovative and personalized healthcare solutions.

- **Digital transformation:** Society 5.0 enhances the operational efficiency and productivity of businesses and organizations through the discreet utilization of advanced technologies, including robotics, automation, and AI. In the dynamic landscape of Society 5.0, the deployment of IoT and other connectivity solutions emerges as a transformative force, fostering a heightened level of communication and connectivity. This interconnectedness serves as a crucial point for rapid information sharing, seamless collaboration, and effective coordination within and among organizations. The integration of these advanced technologies within the framework of Society 5.0 not only optimizes existing business processes but also induces a paradigm shift towards more agile, responsive, and technologically sophisticated organizational structures. By fostering an ecosystem where businesses leverage the synergies of robotics, automation, and AI, Society 5.0 envisions a future where organizations operate at the highest level of efficiency, responding adeptly to the challenges and opportunities presented by the contemporary technological landscape.
- **Economic growth:** Within the framework of Society 5.0, the potential emerges to cultivate novel industries and employment prospects, thereby promoting economic growth and comprehensive development. The assimilation of state-of-the-art technologies within the scope of Society 5.0 constitutes a crucial driver with the capacity to launch economic expansion. This accelerating effect is realized through the cultivation of an environment that actively nurtures innovation and fosters the evolution of cutting-edge business models. The complicated interplay of these

factors not only stimulates entrepreneurship but also results in the creation of employment opportunities, effectively contributing to the dynamic and complex growth of industries. Society 5.0 thus envisions a paradigm where technological advancements act as a transformative force, not only enriching the economic landscape but also fostering an ecosystem beneficial to the generation of diverse employment avenues and the sustained development of industries characterized by their adaptability and dynamism. In essence, the integration of advanced technologies within Society 5.0 serves as a crucial point for the initiation of a new era marked by economic vitality and innovative prosperity.

While Society 5.0 discloses a range of opportunities, its realization necessitates a comprehensive acknowledgment and resolution of various challenges inherent in its pursuit, thereby ensuring the fulfillment of its objectives. These challenges encompass complicated dynamics such as workforce adaptation, ethical considerations, and the establishment of robust technological infrastructures, each requiring thorough attention and strategic intervention for the successful implementation of Society 5.0 principles. Society 5.0, with its emphasis on the seamless integration of advanced technologies into the socio-economic framework, presents both significant challenges and promising opportunities for the field of HRM. On one hand, the swift pace of technological innovation may lead to workforce displacement, requiring HR professionals to navigate transitions and address the potential skills gap. The emergence of automation and AI necessitates an evaluation of job roles and the cultivation of new skills among employees. Society 5.0 is a new paradigm that aims to create a human-centered society by leveraging modern information technologies and solutions. Having said that, one of the recent challenges that Society 5.0 addresses is the overflow of information that employees face in their work environment. This challenge makes it difficult for employees to find and analyze information, and the available technological solutions are not appropriately supporting them. Society 5.0 foresees the use of modern information technologies and solutions to free humans from exhausting routine work and improve the use of available information. By using robots, new approaches to

organization of work and working place, advanced work conditions, and enrichment of work operations, Society 5.0 tries to eliminate a lot of work of employees, limitation of employees' physical abilities on job, and physical constraints related to extended routine and exhausting work. This enables employees to use their resources and potentials for creative and interesting works. Kravets et al. (2022) present topics regarding new energy management in global and local limitations. The novelty of this research can be found in its application of the spherical fuzzy approach to examine the impacts of Society 5.0 smart technologies on achieving sustainable development, by addressing five major dimensions (governmental, economic, social, environmental, and technological) (Kumar et al., 2023). Furthermore, Japan's new blueprint for a super-smart society, Society 5.0, envisions completely transforming the Japanese way of life by blurring the frontier between cyberspace and the physical space (UNESCO, 2023). The other major and contemporary societal challenges and issues include the demographic complexities of an aging and diminishing working population, intensified global competition demanding infrastructural enhancements, the persistent threats posed by natural disasters and terrorism, and the overarching concerns related to environmental sustainability. Furthermore, the consumption of natural resources poses a critical challenge with profound implications for sustained development. The convergence of these challenges requires a comprehensive and strategic approach to address the complicated dynamics inherent in the contemporary societal landscape. The implementation of Society 5.0 exhibits a pronounced optimism and idealism, seemingly overlooking potential negative impacts that may arise from the deployment of digital technologies on fundamental aspects such as human rights, privacy, democracy, and social justice. This overly positive outlook may hide critical considerations and hinder the development of robust safeguards. Furthermore, Society 5.0 appears to suffer from a lack of clarity, as it is characterized by vagueness and ambiguity, lacking a definitive definition, coherent vision, and a detailed roadmap for its practical realization. This ambiguity raises concerns about the feasibility and effective execution of the envisioned societal transformation. Additionally, there is a noticeable exclusivity in the approach of Society 5.0, as it tends to favor the interests of developed countries, corporations, and experts. This bias could potentially neglect the perspectives and needs of developing countries, civil society,

and ordinary citizens, thereby hindering the inclusivity required for the successful and impartial implementation of Society 5.0 on a global scale.

Addressing these challenges is leading to ensuring the responsible and effective realization of Society 5.0 objectives. Furthermore, it is critical to consider additional challenges that may be introduced by the implementation of Society 5.0 as it is mentioned below:

- **Inequality (Social Disparities):** The integration of technology into society (societal frameworks) has the potential to intensify existing social inequalities, particularly in terms of accessibility to essential services, such as access to healthcare, education, and employment opportunities. It is fundamental to establish mechanisms that guarantee universal access to these technologies, regardless of their socio-economic status, to reduce the persistence of societal inequalities.
- **Inequality (Digital divide):** The digital divide denotes the disparity existing between individuals who possess access to technological resources and those who lack such accessibility. Ensuring universal access to technology is imperative to prevent situations of exclusion and foster societal equality. The digital divide encompasses complicated dimensions, ranging from disparities in technological infrastructure and connectivity to variations in digital literacy skills. Addressing this divide requires comprehensive strategies that transcend mere technological provision, incorporating initiatives that enhance digital literacy, bridge infrastructural gaps, and promote inclusivity across diverse demographic segments. As technological advancements continue to play a pivotal role in shaping contemporary societies, the need to narrow the digital divide emerges as a critical agenda for fostering equitable participation and enhancing social connection in the digital era.
- **Security and privacy of data and systems:** In the context of Society 5.0, which heavily depends on extensive data collection, analysis, and the complex interconnection of diverse devices and systems, there arises an inherent sensitivity to potential cyber threats, data breaches, and unauthorized access. Consequently, it becomes fundamental to institute and rigorously enforce strict security and privacy standards and protocols. Additionally, a crucial aspect of this imperative involves the

education and empowerment of users regarding their rights and responsibilities in the utilization of such technologies. In essence, the establishment of comprehensive regulations and protocols is preeminent to safeguard sensitive data and either prevent or anticipate any potential misuse of technological advancements.

- **Ethical and social aspects of technology:** The integration of cutting-edge technologies prompts ethical inquiries into society and the potential for unintended consequences. This necessitates the formulation of comprehensive ethical guidelines and principles to guarantee the responsible and ethical utilization of these technologies. The ethical discourse surrounding advanced technologies encompasses a wide range of concerns, including issues of privacy, accountability, transparency, explainability of AI decisions, the impact of technology on human dignity, autonomy, and values, and the role and responsibility of humans in the governance and oversight of technology. Establishing robust ethical frameworks is essential to guide the ethical development, deployment, and usage of these technologies, fostering a conscientious approach that safeguards societal values and ensures equitable outcomes. This proactive attitude toward ethical considerations becomes dominant as technology continues to evolve, demanding a subtle understanding and cautious governance to mitigate potential ethical issues and promote the responsible integration of advanced technologies into the fabric of society.

In conclusion, the challenges and opportunities presented by Society 5.0 necessitate the need for effective management to not only diminish but also avoid the consequences of these challenges. Mitigating the potential result of these challenges necessitates a subtle approach, one that underscores the pivotal role of knowledge management. Therefore, achieving optimal management within the context of Society 5.0 relies on implementing effective learning and teaching methodologies. This implies that by empowering the workforce with continuous learning opportunities, it will lead to the cultivation and enhancement of their skills and abilities. This strategic investment in knowledge acquisition and skills development is essential for ensuring the seamless integration of individuals

within the societal fabric and their adept adaptation to the dynamic working environment. By doing so, Society 5.0 can be leveraged to create a human-centered society that balances economic and technological advancement to solve society’s problems with super-smart AI data systems, while proactively addressing the imperative of environmental responsibility. Thus, the successful navigation of the challenges and the realization of opportunities in Society 5.0 are intrinsically linked to a robust foundation of knowledge management and comprehensive educational strategies.

All of these points and topics are summarized in the following table in order to give an overall view of how society 5.0 can influence and make changes.

Table 2. Outcomes Of Society 5.0

OBJECTIVES OF SOCIETY 5.0	OPPORTUNITIES OF SOCIETY 5.0	CHALLENGES OF SOCIETY 5.0
<ul style="list-style-type: none"> ● Enable individuals to pursue personal fulfillment and lifestyles autonomously. ● Foster a dynamic equilibrium between individual aspirations, societal needs, and environmental considerations. ● Eliminate constraints on individuality, including gender, race, nationality, wealth, and information disparities ● Advocate for the integration of contemporary information technologies to optimize information retrieval and analysis. ● Empower employees to redirect their capabilities toward more creative and engaging endeavors, fostering an environment where human potential flourishes 	<ul style="list-style-type: none"> ● Creating new value and solving social issues ● Enhancing the quality of life and well-being ● Fostering human-centric and sustainable development ● Improved healthcare ● Digital transformation ● Economic growth 	<ul style="list-style-type: none"> ● Social Disparities ● Digital divide ● Security and privacy of data and systems ● Ethical and social aspects of technology

3.3 Knowledge Management

Certainly, it is relevant to provide a brief explanation of Knowledge Management. In the context of Society 5.0, knowledge management (KM) plays a crucial role in fostering innovation, enhancing efficiency, and facilitating the seamless integration of advanced technologies. Concurrently with the progression of Information Technology (IT), there is a parallel imperative to cultivate industrial innovation and enhance the information literacy of the population, thereby fostering a people-centric way of life. This proposition underscores the emergence of Society 5.0 as a responsive paradigm to the emergence of Industry 4.0, signifying a progressive shift beyond the information age that was marked by a focus on internet and communication technologies. At the core of this paradigm is the strategic emphasis on digitizing both the economy and society through the deployment of Industry 4.0 technologies. Society 5.0 encloses the route toward societies driven by knowledge and characterized by high intelligence. Traditionally, the process of analyzing data and information to derive knowledge necessitated significant human resources and time investments. The tight integration of cyberspace and the physical space with the availability of knowledge, along with structure, will see a transformation of both organizations and society (Deguchi et al., 2020; Mavrodieva & Shaw, 2020; Potočan et al., 2020).

As the enablement of the vision of Society 5.0 continues, complexities on how to manage this knowledge will arise, emphasizing the need for knowledge management requirements to be considered (Yıkılmaz, 2020; Zbucea & Vidu, 2018). Knowledge management lacks a universally accepted methodology due to its diverse requirements across different domains. This diversity necessitates a tailored approach, underscoring the significance of both frameworks and methodologies in the effective implementation of KM initiatives. In the context of this thesis, exploring the impact of Society 5.0 on human resource management, understanding the complex dynamics of KM becomes fundamental. As diverse sectors integrate KM principles, the absence of a standardized methodology highlights the need for adaptable frameworks that can accommodate the varied demands of different domains.

This recognition reinforces the importance of assessing and incorporating context-specific methodologies, contributing to the development of robust KM strategies within the evolving landscape of Society 5.0.

A KM framework provides the structure, which comprises KM elements, their relationships and the principles of interaction (Heisig, 2009), while a KM methodology provides more detail than the framework that underpins it (Heisig, 2009; Smuts et al., 2009). The importance of Society 5.0-specific KM initiatives is acknowledged, which require KM methodologies to be identified for implementation. In terms of KM processes and procedures, there exists a set of shared elements among various KM methodologies, including activities such as identification, organization, storage, and creation. In the examination of technology's role in KM implementation, it was evident that technology played a prevalent role across all publications, although Industry 4.0 technologies were not prevalent in the dataset. The most comprehensive studies emphasized the necessity of both technology and a well-defined framework, addressing all facets of KM processes. Considering the key components of a KM methodology, including a framework guiding KM, the processes involved, and the technology enabling these processes, organizations within the context of Society 5.0 can adeptly manage their knowledge by harnessing KM capabilities effectively. This inference suggests that, in the backdrop of Society 5.0, organizations persist in requiring KM initiatives rooted in methodologies connected in frameworks, integrating KM processes supported by Industry 4.0 technologies to optimize operational efficiency. Furthermore, the connection between Industry 5.0 and Society 5.0 is intricate, as the fifth industrial revolution is anticipated to drive societal progress through the ongoing societal transformation. This interconnectedness underscores the significance of aligning KM strategies with the evolving technological landscape and societal paradigms within the framework of Society 5.0, thereby ensuring the synergistic advancement of organizations in the contemporary landscape.

Several key aspects of knowledge management within Society 5.0 include Technology Integration, Data-driven Decision Making, Agile Knowledge Creation, Human-Centric Design, Ethical Considerations, Lifelong Learning, Innovation Ecosystems, Adaptability to Change.

As it mentioned before, in Society 5.0, advanced technologies like AI, IoT, and data analytics serve as crucial and fundamental components. KM processes must align with and utilize these cutting-edge technologies to optimize information handling, facilitate informed decision-making, and enhance problem-solving capabilities. The era of Society 5.0 is characterized by an unprecedented abundance of data, necessitating effective KM strategies for comprehensive data collection, analysis, and interpretation. Organizations are required to adopt KM practices that empower data-driven decision-making, ensuring insights derived from thorough analyses.

Society 5.0 advocates a holistic approach where diverse sectors collaborate to address complex societal challenges. KM plays a critical role in facilitating cross-disciplinary collaboration, ensuring the sharing and utilization of knowledge across various domains to foster the creation of innovative solutions. The rapid pace of technological advancement in Society 5.0 necessitates agile knowledge creation processes. KM should empower organizations to adapt swiftly to changing circumstances, fostering a culture of continuous learning and innovation.

Despite the technological importance, Society 5.0 places a significant emphasis on human-centric design. KM strategies should prioritize the development of human skills, creativity, and problem-solving capabilities, ensuring that technology complements and enhances human potential. Ethical considerations are central as Society 5.0 integrates technology into various aspects of life. KM practices should incorporate ethical guidelines to guarantee the responsible and transparent use of knowledge and information.

Society 5.0 advocates for a culture of lifelong learning, and KM should actively support continuous learning initiatives. This involves providing mechanisms for employees to acquire new skills and adapt to evolving technologies throughout their careers. KM in Society 5.0 extends beyond organizational boundaries, involving the creation and participation in innovation ecosystems. Organizations collaborate with external entities, including startups, research institutions, and government bodies, to collectively drive progress.

Characterized by rapid technological changes, Society 5.0 demands KM to focus on creating adaptive organizations capable of embracing change, learning from experiences, and continuously refining their knowledge processes. In essence, proficient KM practices play a crucial role in navigating the complexity of Society 5.0, ensuring that organizations flourish among dynamic technological landscapes and evolving societal paradigms.

Knowledge Management capabilities refer to the organizational abilities and competencies in effectively acquiring, organizing, storing, sharing, and applying knowledge to achieve strategic objectives. These capabilities involve a range of activities and skills aimed at optimizing the creation, transfer, and utilization of knowledge within an organization. The effective integration of technology, such as AI, data analytics, and collaborative platforms, enhances KM processes. Organizations with strong technology integration capabilities leverage these tools to boost the effectiveness of their knowledge management initiatives. Nevertheless, a noteworthy discovery from the Wharton School in the United States underscores that despite the emphasis on the role of AI, most companies are struggling to make any progress building data analytics capabilities: 41% of CEOs report that they are not at all prepared to make use of new data analytic tools, and only 4% say that they are “to a large extent” prepared.

fundamental capability lies in the proficient acquisition of knowledge from diverse sources, both internal and external. Organizations equipped with strong knowledge acquisition capabilities can strategically gather relevant information to meet their evolving needs. Furthermore, the organizational capability to thoroughly organize knowledge plays a pivotal role. The capability to structure and categorize information ensures that the knowledge base is easily navigable, facilitating quick retrieval and understanding. A seamless blend of technological integration enables efficient storage and management of knowledge assets, safeguarding their accessibility when required.

Knowledge sharing is another key capability that defines an organization's collaborative culture. The ability to foster an environment where information flows freely among employees, teams, and departments promotes a collective intelligence that moves the

organization forward. Moreover, the application of knowledge is a critical capability for problem-solving, decision-making, and innovation. Organizations that excel in this aspect leverage their intellectual capital to drive meaningful change and stay ahead in dynamic environments. Retention of critical knowledge, especially during personnel changes, is an essential capability. This involves strategies to capture and preserve expertise to prevent the loss of valuable insights and maintain continuity. A commitment to continuous learning is integral to fostering an organizational culture that adapts to change. By encouraging employees to continually update their skills and knowledge, organizations ensure they remain agile and responsive in the face of evolving challenges. Another significant fact for organizations is to be committed to responsible and transparent knowledge use, considering privacy, security, and societal impact, build trust and integrity into their KM practices. Facilitating cross-disciplinary collaboration is a capability that encourages the exchange of knowledge across different disciplines, departments, and external entities. This collaborative approach enables organizations to address complex challenges and stimulate innovation by combining diverse perspectives and expertise. They represent a strategic toolkit for organizations seeking to harness the full potential of their intellectual assets in an increasingly knowledge-intensive environment.

In conclusion, the strategic alignment of Knowledge Management with the objectives of Society 5.0 demands a comprehensive understanding of societal challenges and goals specific to this transformative era. Mapping the knowledge landscape, identifying critical areas for contribution, and prioritizing human-centric design principles are essential steps. KM strategies must actively support lifelong learning initiatives, enabling individuals to adapt continuously to the dynamic needs of Society 5.0. Expanding the scope of KM practices beyond organizational boundaries to foster innovation ecosystems and embracing agile knowledge creation processes are vital. The flexible integration of technology, emphasis on human skills, and collaboration with external entities contribute to KM's role as a key enabler in realizing the societal vision of Society 5.0.

3.4 Human resources aspects of Industry 4.0 and Society 5.0

Human resource management, often referred to as HRM, plays a pivotal role in organizations, and has evolved significantly over time ensuring the effective management of people and their interactions within the workplace. Initially known as personnel or people management, its scope was limited. However, in today's dynamic business landscape, HRM is a formal and integral part of any organization. At its core, HRM encompasses a range of functions related to managing people within a company or organization. These functions include: Recruitment and Talent Acquisition, Selection Employee Engagement, Training and Development, Performance management, Team dynamics, Human resource Allocation. These functions will be explained briefly in the following paragraphs. In summary, HRM is about managing the workforce, fostering positive relationships, and optimizing organizational performance.

Recruitment and Talent Acquisition: In the contemporary landscape of organizational recruitment, the task of attracting suitable candidates is both challenging and indispensable. Traditional web searches, often time-consuming, have led modern organizations to undergo transformative shifts in recruitment processes, aligning with the ideals of Society 5.0 that emphasize the seamless integration of technology and humanity. Machine learning (ML) emerges as an essential solution, promising rapid and enhanced matchmaking between candidates and job positions while automating the extraction of candidate information from resumes through tools like Python's Natural Language Processing Toolkit and models such as Conditional Random Fields and Maximum Entropy Markov Models. This technological evolution, in accordance with Society 5.0 principles, significantly enhances process efficiency and accuracy. A comprehensive exploration of ML's impact reveals its integration into evaluating candidates' suitability, considering diverse aspects such as personality traits and skills. Researchers, responding to candidates' demands, adopt a reverse approach by assessing job relevance and offering personalized recommendations based on varied datasets, from candidates' profiles to their network of friends. This holistic transformation underscores the role of ML in reshaping recruitment, promoting efficiency, and personalization in line with the ideals of Society 5.0.

Selection: The infusion of ML into the employee selection process has led to a concerted effort to identify and utilize attributes as effective selection criteria. Studies by Gupta and Suma (2014) and Hu (2017) have highlighted the identification of demographic features, including age, gender, marital status, and past annual income, along with more personalized traits like reaction capability, comprehensive ability, and psychological quality. This comprehensive exploration aligns with the principles of Society 5.0, emphasizing a more holistic understanding of individuals. The subsequent step involves the development of selection models employing decision tree classification algorithms. Shehu and Saeed (2016) present a distinctive model with adaptable decision rules, responsive to changes in recruitment strategy. This adaptability, mirroring Society 5.0's emphasis on continuous evolution, aligns strategically with the dynamic needs of organizations and their subsidiaries. For HRM leaders in multinational corporations (MNCs), the potential to create similar decision models signifies a strategic advantage, offering customization to address unique strategic variations among subsidiaries. This forward-looking approach in HRM, leveraging technology to enhance agility and responsiveness, reflects a dynamic and effective talent acquisition strategy.

Employee engagement: Fostering employee engagement is a highly-desired goal for organizations as highlighted by Al Mehrzi and Singh (2016) and Anitha (2014). To enhance employee engagement, various approaches have been employed to analyze employee-related data. Initially, text mining techniques have been applied to data extracted from employees' social media profiles, offering insights into their brand engagement, as demonstrated in the study by Pitt et al. (2018). Another avenue involves sentiment analysis, where data from employees' Twitter accounts are subjected to analysis to gauge their sentiments, as illustrated by Strohmeier and Piazza (2015). Additionally, a correlation-based feature selection coupled with regression has been utilized to establish relationships between selected factors and the work environment's impact on job stress, a method explored by Lee and Shin (2010). These innovative applications of data analysis in understanding employee sentiments, brand engagement, and the impact of various factors on the work environment present MNCs with a valuable opportunity. By leveraging these

applications, MNCs can compare and contrast employee sentiments and brand engagement practices across different geographical locations. This comparative analysis allows for the customization of employee engagement strategies, aligning them with the unique cultural and contextual nuances present in diverse regions. This tailored approach resonates with the principles of Society 5.0 as organizations actively adapt their employee engagement practices to diverse cultural landscapes, fostering a more inclusive and responsive work environment.

Training and development: As skills become obsolete over time, the imperative for continuous learning and skill acquisition emerges. In the context of Society 5.0 ML plays a pivotal role in automating various facets of the training process. Notably, association rules mining aids in the automated identification of employees' training needs and recommends relevant courses. Major technology players, exemplified by IBM, collaborate with MNCs like the Royal Bank of Scotland Group, introducing chatbots as personalized career coaches to guide employees and suggest pertinent training and readings (Castellanos, 2019). Classification algorithms are deployed to automate the assessment of training effectiveness, gauging trainees' performance and learning behaviors (Wang et al., 2015). Innovative ML approaches, such as the survival analysis developed by Li et al. (2017), offer organizations the ability to predict employees' occupational trajectory at different career intervals. These predictions serve as a foundation for providing career guidance and tailored training programs throughout employees' tenure. IBM's Blue Match software exemplifies how ML can suggest career advancement opportunities within the organization (Rosenbaum, 2019), aligning with Society 5.0's vision of leveraging technology to enhance individual and organizational growth.

Performance management: Performance management, encompassing the evaluation of employees' task duties and responsibilities, faces challenges with traditional methods like 360-degree feedback being time-consuming and costly. Studies by Gui et al. (2014) highlight ML's potential to automate performance evaluation, leading to cost savings. ML algorithms can categorize employees based on performance and job satisfaction levels, allowing for targeted strategies to enhance performance and morale. Additionally, ML is employed to

predict employees' performance levels based on background data and performance characteristics (Augusto et al., 2013; Huang et al., 2006; Li et al., 2016; Sharma and Goyal, 2015). However, caution is advised in adopting this approach, as Deloitte's research suggests that automated access to personal information for performance management may decrease motivation levels, especially among average performers. In alignment with Society 5.0's principles, ML applications in performance management extend to detecting subjectivity in performance appraisal through text analysis and natural language processing (Abed and El-Halees, 2017), estimating employees' expertise levels using data mining and ordinal regression clustering (Horesh et al., 2016), analyzing the impact of financial incentives on efficiency using classification algorithms and profiling employees for personalized incentives using classification techniques. This integration underscores the role of ML in enhancing the efficiency and effectiveness of performance management, aligning with the broader societal goals of seamless human-technology collaboration.

Team dynamics: ML applications in team management are organized into four key themes: team compositions, team performance, sentiments and opinions of team members, and collaboration patterns within teams. Drawing insights from various sources such as bibliographic databases, social networks, intranets, and employee opinions on team leaders, these systems, as highlighted by Brindha and Santhi (2012), Datta et al. (2014), Masuda et al. (2016), and Schönig et al. (2018), suggest suitable team compositions under different team leaders. This aligns with Society 5.0's emphasis on technology facilitating collaborative decision-making. MNCs can leverage AI to recommend team compositions for projects, especially in the case of virtual teams, where coordination challenges are prevalent. ML's predictive capabilities, exemplified through techniques like cox regression, consider team members' characteristics (Masuda et al., 2017) and collaboration patterns (Fan et al., 2017) to forecast team performance and efficiency. Moreover, ML applications extend to analyzing team sentiments and opinions, as demonstrated by Hans and Mnkandla (2017), who developed an ML-powered tool to detect sentiment polarity and analyze its duration for each team member. Similarly, Heil et al. (2015) created a platform that assesses members' activity levels and moods to provide insights into the overall team climate. This integration

of ML in team management supports the principles of Society 5.0 by enhancing collaboration, decision-making, and overall team effectiveness.

Industry 4.0, a transformative paradigm, envisions the integration of digital solutions throughout the value chain, presenting advantages for companies, such as heightened productivity, cost efficiency, and the assimilation of cutting-edge technologies like advanced robotics. This vision extends beyond the mere implementation of technological innovations, emphasizing the need for a comprehensive digital strategy, effective leadership, a well-defined organizational structure, and a collaborative culture fostering the adoption of digital tools to enhance competitiveness. Rooted in the principles of Society 5.0 and human resource management, Industry 4.0 underscores the importance of cultivating digital capabilities in employees, necessitating the establishment of collaborative networks with external partners. The evolution towards increased automation and integration necessitates a workforce equipped with advanced cognitive and analytical skills, highlighting the intersectionality of human skills and technological advancements. These requirements are pivotal not only for internal organizational development but also for fostering collaborative research and development initiatives in the domain of digital technologies. It is crucial to acknowledge that the influence of Industry 4.0 extends across product, process, and the entire production system within enterprises, reflecting its profound impact on contemporary business ecosystems.

The complexity of human resources finds their inherent place within the eras of both Industry 4.0 and Society 5.0. Evidently, processes unfold through the complicated cooperation between human and machine interactions, leading to the dynamic adjustment of the human-to-machine contribution ratio. This transformation, marked by shifting roles and heightened dependence on sophisticated technologies, introduces novel demands for the workforce, encompassing the acquisition of new skills, particularly in the digital domain. The evolving landscape poses potential challenges for industry workers, as their roles may undergo transformations or even face threats, as highlighted by the European Commission in 2021. With regard to production processes, the diversity of employees in terms of experience, productivity and physical capabilities pose a challenge for companies, especially

those with high staff turnover and manual, labor-intensive processes with poor ergonomics (Battini et al., 2022). This necessitates a comprehensive understanding and strategic approach to human resources management that aligns with the demands and opportunities arising from the convergence of Industry 4.0 and the vision of Society 5.0.

In response to the evolving domains of Industry 4.0 and Society 5.0, there arises a compelling need to strategically address human resources challenges. This involves not only the attraction and cultivation of new talent but also a comprehensive re-skilling initiative for existing employees through robust training programs. Concurrently, there is a crucial demand for the redesigning of work processes to mitigate the skill mismatch between job requirements and the capabilities of employees. This realignment, often necessitating advanced cognitive and critical-thinking skills, seeks to optimize the human-machine collaboration integral to the contemporary workforce paradigm. The current era underscores a growing preference for employees possessing highly developed digital knowledge, therefore, nowadays, the workforce is increasingly looking for employees with highly skilled digital knowledge that stimulates the creation and dissemination of ideas and information (Laar et al., 2019). However, this transformative journey is not without its challenges. There emerges the potential risk of a skilled workforce shortage, compounded by the prevailing issue of insufficient digital competence within many companies, as highlighted by Paschek et al. (2019). Consequently, addressing these multifaceted challenges requires proactive measures at the management level to ensure a workforce that aligns with the digital expertise demanded by the dynamic and technologically driven landscape of contemporary industries.

The emergence of both Society 5.0 and Industry 5.0 within the ongoing industrial revolution is anticipated to accelerate substantial job growth rather than job loss, fundamentally transforming the employment landscape. Industry 5.0 holds the promise of revolutionizing manufacturing processes through the seamless integration of human-robot collaboration and advanced automation technologies. This paradigm shift is expected to generate a growth in job opportunities, particularly in developing, maintaining, and managing these sophisticated systems. The complexity of Society 5.0 technologies will necessitate a skilled

workforce capable of navigating the subtle distinctions of human-machine collaboration, thereby paving the way for the creation of diverse employment roles. Furthermore, the emergence of Industry 5.0 is poised to give incentive to the establishment of entirely new industries and markets, fostering economic growth and innovation on a global scale. The resultant expansion of employment opportunities, accompanied by the cultivation of novel economic sectors, reflects the transformative potential of Society 5.0 and Industry 5.0 in not only safeguarding existing jobs but also launching forward-looking job creation initiatives that contribute to the goals of sustainable economic development.

In the evolving landscape of Society 5.0, innovation assumes a central role as a critical determinant for the survival and prosperity of large companies. The effective execution of innovation demands significant time and effort, requiring a subtle and strategic approach that not everyone possesses. Insights gleaned from a 2011 study conducted by MIT Sloan Management Review, alongside the findings of Chiaroni et al. (2011), Jevnaker and Olaisen (2022), and Köhler et al. (2022), contribute to our understanding of the experiences of companies embarking on innovative initiatives within the unique framework of Society 5.0. Addressing organizational challenges becomes pivotal in taking apart barriers that hinder greater innovation, aligning with the observations of Torres de Oliveira et al. (2022). The application and management of innovation are intricately entwined into the company's goals, necessitating a complete overview that considers both internal and external dimensions within the societal construct of Society 5.0. The active involvement of human capital across all organizational echelons, from management to operational and technical staff, emerges as a critical factor for the successful adoption of innovation. Consequently, in order to be innovative, ideas, technology, and actions must be merged through the process of identifying, making a selection, execution, and evaluating the preferred innovation (Hitt et al, 1998; Basant and Jaiswal, 2022; Luntovskyy and Gütter, 2022). This emphasis on human-centric principles aligns seamlessly with the principles of Society 5.0, where the convergence of human intelligence and technological capability is at the forefront. This comprehensive understanding underscores the multi-faceted nature of innovation management in large companies within the societal framework of Society 5.0. It emphasizes

the interactions of factors and strategic considerations involved in navigating the dynamic landscape of innovation within this human-centric, technologically advanced society. In light of recent research findings, numerous organizations find themselves struggling with environmental, policy, and structural vulnerabilities that could disrupt their capacity to fully harness the transformative forces of globalization and engage in effective innovation practices. The contemporary business landscape demands a detailed comprehension of the intricate relationship between an organization's management strategies and its ability to foster innovation. Despite the acknowledgment that innovation alone may not guarantee a company's survival and growth, its indispensability cannot be overstated, as articulated by Skare (2022).

In this context, the role of HRM becomes pivotal in orchestrating and restructuring the human elements of innovation, from talent acquisition and development to fostering a culture that nurtures creativity and adaptability. HRM, as a strategic partner, plays a central role in aligning the organizational goals with the broader societal objectives of Society 5.0, ensuring that innovation remains a driving force in the dynamic business environment.

In the context of Society 5.0, the responsibility of senior management extends beyond traditional roles, encompassing the imperative of ensuring successful innovation aligned with the broader societal vision. This necessitates a profound restructuring of the organizational culture to adapt to the evolving paradigms of Society 5.0. As companies strive to maintain a competitive edge, this cultural transformation becomes instrumental in fostering innovative practices, processes, and systems. As information technology develops at a rapid pace, companies are faced with rapid changes, making it challenging for them to establish synergic relationships between quality and productivity (Qureshi et al., 2008; 161; Sharma, and Garg, 2022). The integration of Society 5.0 principles highlights the need for companies to navigate these changes effectively. The primary objective of investing in and nurturing innovation is to facilitate the implementation of robust innovation processes, leading to advancements in products, services, and processes that enhance overall business performance. The significance of innovation capabilities goes beyond the mere addition of physical assets, becoming a vital engine of wealth creation. The cultural attributes of a firm,

as highlighted by Qureshi et al. (2008) and Sharma and Garg (2022), need to align with the values of Society 5.0, emphasizing the importance of a valuable, rare, and imperfectly imitable culture. This alignment is crucial as the culture not only shapes the identity of employees but also influences the public perception of the organization. Employee behavior is intricately linked to the prevailing organizational culture, serving as a guiding factor (Ho et al., 2022; Minghui, 2022). Organizational culture can be leveraged as a competitive advantage, especially when it is unique to the business (Bamidele, unknown; Heskett, 2022; Kasperson and Kasperson, 2022). In the era of Society 5.0, the strategic integration of human-centric HRM practices becomes of supreme importance in nurturing and sustaining a culture that not only promotes innovation but also aligns with the societal goals and values of Society 5.0. This strategic alignment ensures that the organizational culture not only contributes to competitive advantage but also becomes a fundamental substance for societal progress within the Society 5.0.

Understanding the dynamics of organizational operations is significant for recognizing and adapting to continuous changes within the framework of Society 5.0 and human resource management. This recognition is a continuous process that underscores the need for a comprehensive understanding of organizational culture, which plays a pivotal role in fostering an environment advantageous to innovative endeavors and aligning with the values of Society 5.0. The intent of cultivating a healthy culture is to promote openness to innovation, strategically managing human capital to move forwards innovative initiatives. The influence of top management on shaping organizational culture is emphasized by Rifai et al. (2022), highlighting the pivotal role that leadership plays in driving cultural transformations aligned with the principles of Society 5.0. The success of a high-performance culture is contingent upon individuals who are self-aspirational and conscious about their impact on others, as discussed by Guillory (2022) and O'Malley and Burke (2022). Successful organizations consciously focus their efforts on creating a culture designed to yield desired results, as noted by Atkinson (2012; 3) and Burke (2022). Drawing on the insights of Barney (2015; 656) and Liu et al. (2022), it becomes evident that robust organizational cultures incorporate excellent management mechanisms, driving continuous

corporate cultural advancement and contributing to sustained competitive advantage in Society 5.0.

Certain firms are able to gain a competitive advantage that is untainted by imitation, and this results in sustained superior performance, although it isn't guaranteed to last forever (Kharub et al., 2022; Le and Ikram, 2022; Turkcan et al., 2022). Weick and Quinn (1999; 361) assume that the growth in the pace of change within organizations is intricately linked to the pattern of work. Distinguishing between various types of change, such as discontinuous, intermittent, continuous, evolving, and incremental, provides a perspective on organizational dynamics within the framework of Society 5.0 and human resource management. Notably, pockets of workers within many organizations have already embraced adaptation to the new environment. However, the persistent challenge lies in fostering a culture that embraces continuous change, allowing isolated innovations to extend throughout and remain relevant to the evolving needs of innovators within the organizational context.

Within the context of the transformative paradigm of Society 5.0 and the evolving domain of HRM, an integral aspect deserving investigation is the cultivation of digital skills and talent within organizations. A critical evaluation of the company's initiatives reveals a comprehensive approach to nurturing digital competencies among its workforce. This multifaceted strategy includes the implementation of structured training programs designed to impart essential digital skills, the strategic recruitment of individuals possessing advanced digital expertise, and targeted upskilling initiatives aimed at enhancing the proficiency of existing employees. In the domain of Society 5.0, where technological integration is supreme, the organization's commitment to fostering a digitally literate and adept workforce not only aligns with contemporary HRM principles but also positions it to thrive among the complex and dynamic technological landscape. This strategic emphasis on digital skills underscores the relationship between HRM practices, Society 5.0's human-centric standards, and the imperative of staying alongside digital advancements.

3.5 HUMACHINES:

In the contemporary era marked by the integration of Industry 4.0 and the visionary framework of Society 5.0, the concept of "Humachines" emerges as a pivotal intersection where human resourcefulness intersects with the efficiency of machines. This shift underscores a deliberate effort to synergize the distinctive qualities inherent to humans—ranging from creativity and intuition to refined and sophisticated judgement—with the mechanical precision and computational capability characteristic of machines. Coined by scholars such as Sanders and Wood (N.R. Sanders & J.D. Wood. 2020), a Humachine embodies a strategic combination, seeking to overcome the constraints and limitations inherent in both human and machine capabilities, while amplifying their respective virtues. Within the evolving domain of Society 5.0, this conceptual framework not only addresses the complications of human-machine collaboration but also aligns with the core principles of a super-smart society that emphasizes the harmonious integration of technology and human values. This exploration investigates the profound implications of Humachines, unravelling the intricate dynamics that shape their role in contemporary organizations and, in particular, their impact on HRM. Through this lens, we embark on a comprehensive inquiry into how organizations can strategically navigate the intersection of human and machine capabilities, fostering an environment where Humachines become integral agents in the pursuit of technological advancement and societal well-being.

The concept of Humachines represents the combination of human and machine attributes, representing both a process and an outcome that utilize the ideal strengths of each entity while preserving their distinct identities. Aligned with the central tenet of Society 5.0, emphasizing human-centricity and a nuanced exploration of the human dimension in technology, the term "Humachine" serves as a catalyst for advancing this initiative. In the context of Society 5.0's theme, where the convergence of human and machine capabilities is instrumental, the humachine concept emerges as a driving force poised to intensify the potential of humanity through the incorporation of machine capabilities. Within the paradigm of Society 5.0, Human–Machine Interaction (HMI) assumes pivotal significance, as technology becomes a powerful tool for addressing societal challenges and enhancing

overall quality of life. At the heart of HMI lies the objective of fostering a seamless and synergistic connection between humans and machines, paving the way for collaborative endeavors as they collectively strive toward shared goals. This exploration unravels the intricate dynamics of "Humachines" within the evolving era of Society 5.0, shedding light on how the harmonious integration of human and machine capabilities contributes to societal advancement and addresses the multifaceted challenges of our time.

Therefore, the key to achieving this objective lies in emphasizing the unique strengths of each component, with machines adeptly handling tasks demanding speed and precision, while humans concentrate on activities that necessitate creativity, critical thinking, and empathy. Effectively navigating HMI in Society 5.0 entails addressing the primary challenge of ensuring user-friendly, transparent, and accessible machine designs. Ethical considerations, notably privacy protection, are integral aspects that must be thoroughly integrated into the design process. Another noteworthy facet of HMI within the Society 5.0 framework involves the creation of human digital twins, virtual representations facilitating simulations and predictive analyses. The full realization of HMI's potential in Society 5.0 hinges on collaborative efforts spanning technology, social sciences, and humanities. This demands a multidisciplinary approach that places a premium on diversity and inclusivity. To enhance HMI, a profound understanding of their distinct characteristics and capabilities is indispensable. Distinguishing features, such as creativity, intuition, empathy, and common sense, set humans apart. Human cognitive abilities enable them to comprehend intricate scenarios and respond appropriately, whereas machines are constrained by pre-programmed instructions. Additionally, humans possess the capacity for rapid learning and adaptation to novel situations, contrasting with machines that require training and reprogramming.

Human constraints, such as fatigue, boredom, and emotional biases, have no impact on machines. Thereby underscoring the imperative of synergizing human and machine strengths to enhance HMI and facilitate the integration of humans and machines in Industry 5.0. It is crucial to emphasize that machines should not be perceived as threats or competitors to humanity; instead, they should be regarded as invaluable tools that

significantly broaden our capacities and mitigate human limitations. For instance, machines can efficiently undertake repetitive and time-consuming tasks, liberating human resources to engage in more creative and strategic endeavors. Additionally, machines excel in data analysis and processing, presenting information to humans in an easily comprehensible format. Furthermore, there is a pressing need to enhance the design of HMIs, fostering greater intuitiveness, user-friendliness, and the provision of real-time feedback and guidance.

3.6 Digital HRM

In the dynamic landscape of contemporary HRM, the integration of digital technologies has instigated a revolutionary paradigm termed Digital Human Resource Management (Digital HRM). This transformative shift redefines traditional HR practices by harnessing technology to not only enhance operational efficiency but also elevate decision-making processes and empower employees, as highlighted by Nitsche (2021). This departure from conventional practices signifies that organizations are no longer viewing technology merely as a facilitator but as a strategic enabler, optimizing and streamlining various facets of HR processes and functions. As articulated by Palumbo, Hinna, and Manesh (2023), Digital HRM represents the strategic application of digital technologies and tools to enhance the entire spectrum of human resource management. This emergence represents the fusion of technology and human capital management, presenting a holistic approach to address the challenges and opportunities presented by the digital era.

Gigauri (2020) underscores that Digital HRM, in its essence, leverages technology to automate routine HR tasks, driving efficiency and furnishing data-driven insights for informed decision-making. Encompassing a broad spectrum within HR, as detailed by Atmaja et al (2023), Digital HRM covers various domains such as recruitment, onboarding,

employee data management, performance monitoring, training, development, employee engagement, and self-service portals. Beyond enhancing efficiency, accuracy, and productivity, as suggested by Chatterjee, Chaudhuri, Vrontis, and Siachou (2022), Digital HRM allows HR professionals to redirect their focus towards strategic tasks, employee development, and the cultivation of a positive work environment. However, a crucial aspect lies in striking a harmonious balance between technology and human interaction to preserve the intrinsic elements of human touch and empathy. The benefits brought forth by Digital HRM to organizations are diverse and impactful, including increased efficiency, reduced administrative burdens, improved employee experiences, enhanced decision-making through data insights, and a more aligned HR strategy with overall business goals, as emphasized by Dundon and Rafferty (2018).

At the core of Digital HRM lie several key elements, each representing a critical facet of the digitization journey in HR practices. From sophisticated HR Information Systems (HRIS) providing a centralized repository for employee data to the application of AI and automation for routine inquiries, Digital HRM encapsulates a spectrum of technological interventions.

Digital HRM relies heavily on advanced Human Resource Information Systems (HRIS) platforms, serving as a foundational pillar for the storage and administration of extensive employee data. This encompasses a wide array of information, including personal details, employment history, performance records, and training particulars. According to insights from Prikshat et al. (2023), HRIS not only acts as a facilitator for seamless access to information but also plays a pivotal role in diminishing the reliance on paperwork. Its significance lies in establishing a centralized database, thereby contributing to the efficacy and expediency of data management within the organizational HR framework. The utilization of HRIS in Digital HRM reflects a strategic commitment to harnessing technological advancements for the enhancement of HR processes and functions.

Digital HRM revolutionizes the recruitment and onboarding procedures by capitalizing on online platforms, job portals, and state-of-the-art applicant tracking systems. This contemporary methodology encompasses diverse elements such as online job postings,

streamlined resume screening, video interviews, and digital onboarding processes. According to insights provided by Boon, Hartog, and Lepak (2019), the incorporation of these digital interventions stands out for its ability to significantly amplify the efficiency of hiring and onboarding processes for new employees. This strategic integration aligns seamlessly with the evolving dynamics of the digital era, reflecting a commitment to leveraging technology for optimizing and modernizing HR functions related to talent acquisition and assimilation. Directors are increasingly recognizing the substantial benefits of leveraging artificial intelligence in their recruitment processes. By employing AI-guided strategies, they can effectively evaluate and select potential candidates. Notably, AI has the potential to drastically reduce screening time by up to 90%, allowing organizations to focus on the most promising applicants, as investigated by Black, J.S. & van Esch, C. (2020).

Performance management undergoes a paradigm shift within Digital HRM, incorporating advanced digital tools such as automated performance appraisal systems, goal-setting platforms, and real-time feedback mechanisms. Mousa and Othman (2020) note that these digital solutions enable continuous performance tracking, facilitate feedback exchange, and provide data for comprehensive performance evaluation.

Learning and development programs are revolutionized through Digital HRM, offering digital learning platforms and e-learning modules. These platforms grant employees access to online courses, webinars, and interactive content, fostering self-paced learning and skill development. As observed by Armstrong and Taylor (2020), this transformation aligns with the evolving needs of the workforce in a digitized landscape.

HR Analytics becomes a vital component within Digital HRM, utilizing sophisticated data analytics tools to gather and analyze HR data. This practice allows organizations to gain insights into workforce trends, employee performance, turnover rates, and other critical metrics. De, Greco *et al.* (2018) emphasize that these insights contribute to data-driven decision-making and the formulation of effective HR strategies.

Employee engagement and collaboration are actively fostered by Digital HRM through digital communication and collaboration tools. These encompass platforms for internal

communication, virtual team collaboration, and social recognition, aiming to promote employee interaction and a profound sense of belonging within the organizational context. Carnevale and Hatak (2020) elucidate the significance of these digital initiatives in enhancing overall employee engagement.

Artificial Intelligence (AI) and automation technologies are integral components of Digital HRM, incorporating AI-powered chatbots and virtual assistants. According to Kaplan and Haenlein (2019), AI is the system's ability to understand and learn from external data, and to utilize it to perform particular tasks and meet objectives through versatile adaptation, while machine learning is an important but limited part of AI. AI uses emerging technologies that enable machines to perform tasks in a similar way to humans in areas such as cognition, sensing and performing (Akerkar 2019; Malik et al. 2020a, b). Pereira et al. (2021) characterize artificial intelligence as the ability to make real-time decisions utilizing pre-installed methodologies, supported by computing technology, and relying on data analysis. It involves learning and automatic adjustment to provide more logical and context-specific responses to real-world situations. These technologies play a crucial role in handling routine HR inquiries and providing real-time support. By enhancing the user experience during the execution of human resource management tasks within corporations or businesses, technologies and applications associated with artificial intelligence are also employed within the realm of human resource management. Tambe et al. (2019) emphasize that automation technologies streamline repetitive tasks, allowing HR personnel to redirect their focus towards more strategic initiatives in the ever-evolving digital landscape. In other words, the progressive utilization of AI tools is becoming prevalent in automating HR tasks, facilitating decision-making processes, and enriching employee experiences. These tools encompass various AI technologies such as machine learning (ML), natural language processing (NLP), and other advanced applications. Their integration fosters data-driven methodologies in areas such as talent acquisition, employee advancement, and retention, concurrently addressing and minimizing biases inherent in traditional approaches. For hiring, for example, we might see which applicant characteristics have been associated with better job performance and use that to select candidates in the future. For current employees,

algorithms are principally used to make recommendations to employees about actions they may take. IBM, for example, uses algorithms to advise employees on what training makes sense for them to take, based on the experiences of similar employees. Moreover, based on the research which has been done by George and Thomas (2019), organizations derive multiple benefits from incorporating AI into HRM, including a significant 71% reduction in the expense associated with recruiting new employees. This reduction is achievable through the implementation of AI-powered software in the hiring process, mitigating biases and ensuring equal job opportunities for candidates regardless of age, gender, or color. Additionally, companies can streamline the hiring process, cutting its duration by 50%, leading to enhanced profitability and increased productivity.

On the other hand, the application of AI to HR introduces distinctive challenges, varying from practical to conceptual considerations. These challenges extend beyond technical issues and involve potential conflicts with societal values, particularly regarding significant decisions about individuals. A pertinent example is the use of algorithms to predict suitable hires. In such scenarios, machine learning techniques develop algorithms based on employees' attributes and their correlation with job performance. However, issues arise if there's a perceived causal relationship between an attribute (e.g., gender) and job performance. Trusting an algorithm that suggests hiring more individuals with specific attributes, like white men, could be problematic due to potential biases in job performance indicators, historical distortions in workforce attributes and data, and the legal and social implications associated with past hiring practices.

Illustrating this challenge with a real-world example, Amazon experienced an issue with its hiring algorithm in 2018. The algorithm, developed using historical job performance data, without noticing favored white male applicants, reflecting the historical dominance of white men in the workforce and their association with top-performing roles. This resulted in higher scores for white male candidates. Moreover, when sex-related measures were excluded, attributes linked to female candidates, such as coursework in "Women's Studies," led to their exclusion. Recognizing these biases, Amazon discontinued the use of the system,

highlighting the complexity of resolving such issues (based on a study by ESSEC Business School, Cergy, France).

In the realm of HRM, it is required to carefully consider the values and expertise of HR managers when making crucial decisions. This approach becomes particularly crucial to mitigate the ethical and social risks entailed by the implications of incorporating artificial intelligence into human resources practices as stated by Charwood and Guenole (2022).

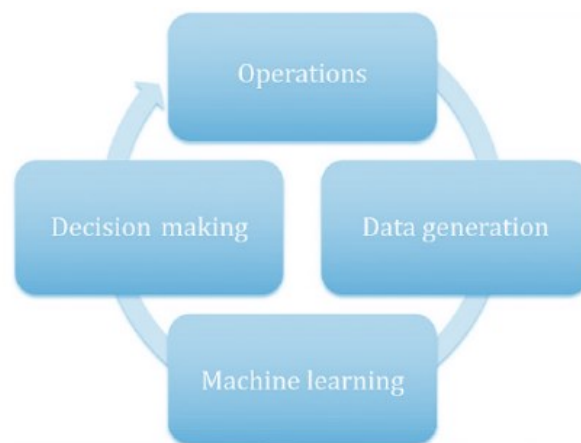


Figure 2. The life cycle of an AI-supported HR practice (Prasanna Tambe et.al 2019)

The integration of AI into HRM has witnessed a significant growth covering a variety of tasks within the HR domain. For example, IBM and Microsoft have strategically embraced AI and machine learning applications in the identification of applicants tailored for specific job roles (Castellanos, 2019). This approach has led to the standardization of applicant sourcing and resume screening methodologies across all their subsidiaries. In a parallel manner, Club Med has investigated its employee information to identify the factors influencing job satisfaction (Bolton et al., 2019). This insightful analysis serves as a foundation for the formulation of personalized incentives aimed at enhancing overall job satisfaction levels. As our attention turns to organizing these diverse activities in utilizing data science, we explore a way of categorizing systems. Figure 2 explains a conventional AI Life Cycle, containing operations, data generation, machine learning, and decision-making phases. Explaining each phase in detail is crucial to provide a comprehensive understanding.

1. Operations: “Operations” are the tasks of HR, such as how an organization hires employees. HR performs a great many tasks involving considerable amounts of money, which makes it an attractive target for improvement in processes. Each administrative operation within an organization, encompassing specific offices, job roles, written instructions, and guidelines, holds significance as it impacts the organization's overall performance. The execution of these operations generates substantial data, comprising texts, recordings, and various artifacts. Table 3 lists the most common tasks in HR with the corresponding prediction tasks they raise for workforce analytics.

Table 3. HR operations and tasks

HR Operation	Prediction Tasks
Recruiting: Identifying possible candidates and persuading them to apply	Are we securing good candidate
Selection: Choosing which candidate should receive job offers	Are we offering jobs to those who will be the best employees
On-boarding: Bringing an employee into an organization	Which practices cause new hires to become useful faster
Training	Which interventions make sense for which individuals and do they improve performance
Performance management: identifying good and bad performance	Do our practices improve job performance
Advancement: Determining who gets promoted	Can we predict who will perform best in new roles
Retention	Can we predict who is likely to leave and manage the level of retention
Employee benefit	Can we identify which benefits matter most to employees to know what to give them and what to recommend when there are choices and what are the effects of those benefits

2. Data generation: HR information systems, applicant tracking systems and various indicators constitute essential inputs during the “data generation” stage. Ordinarily, this

information needs to be extracted from diverse databases, standardized into a common format, and integrated before analysis can commence. Professionals frequently highlight the inherent difficulty of these database management tasks as a fundamental challenge in analyzing HR practices and outcomes.

3. Machine learning: “Machine learning” stage encompasses a diverse range of techniques that leverage data to construct algorithms, primarily aimed at predicting outcomes. Machine learning uses many variables to generate one algorithm and typically one score to assess a candidate. In business contexts, the prevailing application of machine learning has centered around ‘supervised application.’ In this approach, data scientists train machine learning algorithms using a subset of relevant data. They then select appropriate metrics to evaluate the algorithm’s performance. Common prediction algorithms, including ‘logistic regression,’ deduce the outcome variable of interest based on statistical correlations among observed variables. Given an example for this, IBM’s Blue Match software uses algorithms to drive career advancement by suggesting career advancement moves and new jobs for employees. Based on the research done by Eric Rosenbaum, the algorithms are based on employee interests and prior jobs, training, and ultimately the characteristics of individuals who have succeeded in those jobs in the past; 27% of the company’s employees who changed jobs in 2018 did so based on recommendations from the company’s Blue Match software.

4. Decision-making: “Decision making”, the final stage in the life cycle, which refers to the application of insights derived from the machine learning model in daily operational processes. In HR decision-making, organizations might depend entirely on algorithmic scores to guide their decisions, or they may grant individual managers the discretion to determine how to incorporate these insights.

This widespread application of AI technologies in HRM represents a paradigm shift, reshaping the approach to human resources functions. AI's extensive role, spanning activities from coaching, skill development, assessment, hiring processes, to reward systems, signifies a transformative trajectory in HRM. This evolution leverages advanced

technologies to not only augment efficiency but also elevate decision-making and overall workforce management strategies. HR managers play a pivotal role in shaping major decisions that influence the workforce, and their values and expertise serve as essential guiding factors in navigating the complex landscape of artificial intelligence integration. Striking a balance between technological advancements and ethical considerations is leading to fostering a work environment that not only embraces innovation but also upholds ethical standards. By acknowledging and incorporating the insights and values of HR managers, organizations can navigate the challenges posed by AI adoption, ensuring a harmonious integration that aligns with the principles of Society 5.0 and human-centric approaches to technology in the workplace. As noted above, HR faces some issues such as complexity of HR outcomes, accountability regarding fairness, ethical norms, and labor laws or even employee reaction when integrating AI into HR practices. In Table 4, you can find a summary of corresponding solutions toward these issues. One of the reasons that “Operations” is placed at the end is to reflect companies’ need to respond to the reality modified by AI algorithms.

Table 4. Responses to Challenges of AI’s Introduction in HR Management

Data Generation	Machine Learning	Decision Making	Operation
Solicit employee contributions into outcomes’ metrics and create consensus around them	Train algorithms for a few outcomes	Managers’ discretion on the basis of the algorithm’s predictions Run experiments whereby an algorithmic or human decision is randomly assigned to individual cases	Monitor the medium and long-term validity of AI-based decisions Periodically review and retrain the algorithm
Integrate HR data with financial and operational data Use fine-grained real-time data	Use causal models	Let managers act on algorithm’s recommendations according to prespecified guidelines	Specify a code of ethics for AI-related initiatives
Assess the consistency of	Create consensus around fairness	Make random choices with	Regularly solicit employee feedback

human-made decisions used for training the algorithm	criteria Weigh multiple fairness criteria Ask data scientists to explain the model	probabilities predicted by the algorithm	
Collect data to improve processes first	Create employee consensus around the features used to train the algorithm	Maintain managers' responsibility for AI-based decisions	Monitor employee engagement

3.7 AI and Digital Competencies in HRM

Today, due to the rapid development of AI and robotics, we are on the cusp of the next industrial revolution, known as "Industry 5.0". Revolutionary changes are emerging through the use of smart technologies that enable new and more efficient processes, products and services. This change presents risks, challenges and opportunities for industry stakeholders and for communities. These transformations will have varying effects on companies and society. While society tends to adapt more gradually, maintaining stability, companies face distinct challenges due to the integration of AI and HRM practices. Companies encounter significant hurdles when incorporating AI into HRM processes. The primary challenge lies in the scarcity of employee competencies and skills needed to drive transformative changes across the organization. Outplacement activities, developing new business models, reinvestments in new industrial products and equipment and new services also change the employment scenario (Berger and Frey 2016). Some jobs will disappear and be replaced, while other, completely new jobs will emerge. As a consequence, technology significantly influences several critical HRM practices. Notably, these practices span recruitment, training and development, resource allocation, internal communications, and talent management (Malik et al., 2020a, b). This digital transformation is reshaping how organizations attract, assess, and engage talent, emphasizing the need for HR professionals to adapt swiftly to technological advancements. As we transition into Society 5.0, HRM must proactively

embrace these changes, leveraging technology to enhance workforce capabilities, foster collaboration, and drive organizational success.

In the context of the smart industry, the challenges related to labor shortages and employment figures merely scratch the surface. A broader examination reveals the profound influence of the human element, extending well beyond production activities. It encompasses various aspects such as workforce dynamics, labor conditions, educational frameworks, and the demand for specific skills and national policies. Of particular significance are qualifications and proficiencies, crucial for enterprises navigating the ever-evolving technological landscape. Specifically, qualifications and competencies will be critical as companies are obliged to adapt to constant technological changes (Harkins 2008), making knowledge management (Nonaka et al. 1996) and knowledge of information technologies (IT) (Pfeifer 2016) the keys to success for highly innovative companies (ITU 2016; Gehrke et al. 2016). These proficiencies serve as foundational elements for highly innovative firms, enabling them to excel the pervasive influence of digital technologies. Undoubtedly, digital competencies stand as central components of a company's digital strategy, a point accentuated by Kindermann et al. in 2020.

While digital technologies serve as the foundation for innovation, they alone do not create it. True innovation is driven by people, making human capital a critical competitive asset (Díaz-Fernández et al., 2014; van Laar et al., 2017), as per the resource-based view (RBV) proposed by Barney (1991). Within the RBV framework, human capital emerges as a pivotal factor in achieving sustainable competitive advantage (Barney, 1991), as competencies account for the variations in competitive strengths within human resources (Hayton and McEvoy, 2006).

A competency represents a blend of skills, attitudes, and behaviors possessed by an individual or expected by an organization from specific employees (Hayton and McEvoy, 2006). Among various competency types, digital competencies emerge as a pivotal human capital resource in the context of Society 5.0 (van Laar et al., 2017). The European Commission, through the DIGCOMP project, defines digital competency as a comprehensive set of knowledge, skills, attitudes (encompassing abilities, strategies, values, and

awareness), essential for effectively utilizing ICT and digital media. These competencies enable individuals to perform tasks, solve problems, communicate, manage information, collaborate, create and share content, and construct knowledge efficiently, ethically, and reflectively across work, leisure, learning, and social contexts (Ferrari, 2012, p. 3).

Additionally, digital competencies encompass fundamental knowledge, skills, abilities, and other attributes that empower individuals to proficiently fulfil their job responsibilities concerning digital media (Oberländer et al., 2020, p. 5). As technological advancements reshape societal and business landscapes, digital skills contribute not only to technical proficiency but also to cultural transformation, emphasizing knowledge acquisition, values, attitudes, ethics, and regulatory awareness within digitization processes.

The impact of AI on the role of HR within companies is a relevant consideration (Malik et al., 2020a, b). HRM is characterized by a high degree of complexity, particularly in tasks such as measuring employee performance, which significantly affects both employees and the organization (Tambe et al., 2019). Employees engage in various types of tasks, including mechanical tasks (such as equipment repair and maintenance), cognitive tasks (such as information processing, analysis, and interpretation), and affective tasks (such as interpersonal communication). Empirical research by Huang et al. (2019) suggests that in the future, human employees will increasingly occupy positions involving affective tasks, while AI systems will handle cognitive tasks—paralleling the way machines and robots took over mechanical tasks. However, some of the traditional competencies such as emotional intelligence, creativity, flexibility and managing others cannot be performed by machines. For this reason, the need to attract workers who are active, adaptable and able to quickly accept new ideas and responsibilities becomes especially relevant (Cantoni et al. 2018).

In the context of Society 5.0, traditional HRM practices within organizations require adaptation. Recent years have witnessed significant changes in HRM, particularly concerning planning, recruitment, selection, remuneration, performance appraisal, employee relations, organizational culture, health and safety, and training and development. As organizations explore the advantages and disadvantages of digital transformations, there is a growing emphasis on developing new employee competencies and assessing

performance (Fenech et al., 2019). Notably, recruitment and selection practices must prioritize candidates possessing the requisite competencies and the highest potential. Furthermore, training and career development programs should foster continuous learning among employees, enabling them to effectively adapt to the demands imposed by technological advancements.

In summary, the preceding arguments underscore how AI and technological advancements have reshaped the competencies sought by organizations. Specifically, digital competencies and non-cognitive skills are now imperative to unlock the full potential of AI while also addressing tasks beyond machines' capabilities. Furthermore, AI has influenced HRM practices in dual dimensions: firstly, by necessitating the cultivation of new competencies (both digital and non-cognitive) aligned with organizational demands; and secondly, by actively contributing to the implementation of certain HRM practices.

In closing, the continuous development of AI will significantly shape the operational fabric of companies. This phenomenon empowers comprehensive exploration, particularly regarding the competencies that will drive and harness AI within organizations. Consequently, HRM plays a pivotal role in facilitating organizational success by leveraging the skills employees bring to the table.

3.8 Digital Transformation in Workforce Management (DTWM)

In the era of Digital Transformation in Workforce Management (DTWM), digital tools and analytics are harnessed to innovate the entire work management process. Over the last decade, digital transformation (DT) has empowered HR to have real-time visibility into talent data and analytics to adopt employee-centric talent management strategies. DT has streamlined the entire talent management process for HR professionals by adopting and implementing employee-centric talent management strategies, ensuring agile people are in the right place and in real-time (Frankiewicz and Chamorro-Premuzic 2020; Wiblen and

Marler 2021). As highlighted by Nicolas-Agustin, Jimenez-Jimenez, and Maeso-Fernandez (2022) and Bansal et al. (2023), DTWM embraces a comprehensive approach to work, influencing both on-site and remote work processes in the most efficient and effective manner. This transformative approach aligns seamlessly with the principles of Society 5.0, where the integration of technology aims not only to streamline processes but also to prioritize human-centric practices and foster a harmonious blend of technological advancements and workforce dynamics. DTWM is defined as the strategic utilization of digital tools and technologies to either create novel or adapt existing business processes, structures, and cultures. The main purpose is to optimize and streamline the organization's people management systems, fostering operational efficiency and enhancing engagement among individuals. This transformative process contributes to the development of innovative products and services, thereby bolstering both individual and organizational competitiveness. The multi-faceted impact of DTWM is evident in its ability to improve operational efficiency, enhance engagement levels, boost productivity, and elevate overall organizational performance, all within the context of a dynamically competitive environment (Nadkarni and Prugl € 2021). The integration of AI into the recruitment process has revolutionized traditional face-to-face interviews, replacing them with asynchronous videos (AVIs). This shift not only enhances efficiency but also offers unique advantages for both employers and candidates. For instance, research by Torres and Mejia (2017) highlights that AVIs lead to more productive job interviews. Candidates can record their responses at their convenience, allowing hiring managers to review them efficiently. This approach reduces scheduling complexities and accelerates the assessment process.

Beyond AVIs, facial recognition technology plays a pivotal role in registration and teleconferencing. Its capabilities extend beyond mere identification; it can recognize a person's gender and even assess their behavioral psychology. Organizations can leverage this data to gain insights into employees' moods, mental states, and emotional well-being. Consequently, managers and HRM teams can foster stronger emotional connections with their workforce, leading to increased employee commitment, career satisfaction, and overall engagement .

Another example for proving the importance of this phenomenon is the Oracle Talent Management Cloud suite which assists the HR department in recruiting, developing, and retaining their top talents by setting and measuring KPIs, employee engagement, career planning, and succession planning (Wilkins 2012). Therefore, HR professionals need to continuously familiarize themselves with the evolving digital landscape to optimize the full potential of their talents (Kim-Schmid and Raveendhran 2022).

Highlighting the importance of adjusting to the changing workforce dynamics, Unilever embarked on a transformative initiative in 2016 to prepare its extensive workforce of 155,000 employees for the dynamic nature of work. Termed the 'future-fit plan,' this project tailored individualized plans for each employee, outlining specific goals, forecasting potential shifts or obsolescence in their current roles, and identifying the necessary skills to adapt to future positions. The outcome of this initiative proved promising, with notable achievements such as an approximate 49% surge in intrinsic motivation observed among employees who engaged in purpose workshops (Harvard Business School, 2020). This strategic approach demonstrates Unilever's commitment to navigating the shifting trends in the contemporary work environment, emphasizing the proactive integration of digital tools and forward-thinking strategies within the principles of Society 5.0.

For instance, L'Oréal, a global cosmetics company, has adopted a similar approach to that of Unilever. Both companies utilize AI-driven tools to assess and survey thousands of potential interns, streamlining their recruitment efforts and ensuring a more efficient process. Across industries, AI-based applications such as LinkedIn, Glassdoor, Applicant Tracking Systems (ATS), and organization-specific E-recruitment platforms have gained importance. These tools leverage algorithms to enhance the recruitment process, resulting in better outcomes for both employers and candidates. In countries like Indonesia, this adoption of AI-driven recruitment methods has become widespread, promising more effective and satisfactory results. In summary, the integration of AI into recruitment practices aligns with the principles of Society 5.0, where technology serves as an enabler for human-centric solutions.

DTWM can streamline onboarding using online platforms, interactive training modules, and virtual mentoring programs. Through digital transformation, HR professionals can deliver personalized onboarding experiences, facilitate knowledge transfer, and ensure new hires quickly become productive team members (Landers and Sanchez 2022; Babic et al. 2021). They can use gamification and the company's products or services to onboard new hires and familiarize them with the brand, values, and culture (Silic et al. 2020).

Here is another notable illustration of this when Deloitte innovatively designed an onboarding game called 'Zombie Apocalypse' tailored for new analysts. This interactive game immerses newly hired analysts in simulated crisis situations, fostering collaboration to solve problems. Beyond the immediate challenges, participants gain insights into Deloitte's culture and values, earning badges and rewards as they navigate through the game (Kim, 2015). Implementing an approach using games with a strategic focus not only enhances the onboarding experience but also contributes to cultural assimilation and skill development within the organization.

By utilizing the power of data and analytics, HR managers acquire valuable insights into pivotal employee metrics, encompassing workforce trends, engagement levels, turnover rates, and productivity measures. This analytical capability empowers HR professionals to discern patterns, anticipate forthcoming HR requirements, and devise tailored strategies for effective talent management, retention initiatives, and strategic succession planning (Akter et al., 2019; Shet et al., 2021; Margherita, 2022). The utilization of data-driven approaches in HR practices becomes instrumental in cultivating a proactive and informed human resource management paradigm. With that being stated, the responsibilities traditionally managed solely by human practitioners are now seamlessly integrated through the assistance of virtual assistants, marking a notable transformation in the execution of these tasks. This shift involves the collaborative engagement of human professionals and advanced digital tools, particularly virtual assistants, contributing to a more interconnected and efficient operational framework within the designated domain. In this context, the integration of virtual assistants serves as a catalyst for increased productivity, streamlined processes, and the combination of human expertise with cutting-edge technological solutions, aligning with

the evolving landscape of Society 5.0. In the context of Society 5.0, where technology harmonizes with human needs, AI-driven tools empower organizations to create a more empathetic and connected workplace. For instance, e-recruiting via social networks has emerged as an innovative and cost-efficient reality (Böhmová and Chudán, 2018). By understanding employees on a deeper level, businesses can cultivate a positive work environment and drive long-term success.

The future of performance management is becoming more data-driven, flexible, continuous, and development-oriented (Schrage et al., 2019). In the era of DT, HR professionals are equipped with cutting-edge technologies that enable real-time monitoring of employee engagement and job performance in alignment with key performance indicators.

Simultaneously, these technologies identify skill gaps and propose tailored training and development opportunities to facilitate career advancement (Jaiswal, Arun, and Varma, 2022; Li, Rao, and Wan, 2023). This paradigm shift aligns with the principles of Society 5.0, where the integration of digital tools aims to create a more dynamic, adaptive, and development-oriented approach to performance management within organizations. In order to make it easier for managers to evaluate employee productivity, suggest enhancements, or take appropriate action based on those recommendations, several businesses have integrated AI into their performance management rating systems (Azadeh, A., Yazdanparast, R., Zadeh, S. A., & Keramati 2018).

Performance measures are essential for evaluating and improving employee performance, as well as aligning it with organizational goals. However, designing and implementing fair and accurate performance measures can be challenging and complex. Rather than searching for the ideal measure, it is more effective to select sensible measures (for example, would you have hired this new employee if you could go back?) and monitor them consistently to identify trends and variations in outcomes. HR data analytics relies heavily on decisions about individual employees, such as who to recruit, who to retain, and what to suggest for their development and progression. These decisions require sensible performance measures to be meaningful and useful. The best way to measure how well employees are doing is to use clear and specific criteria that are set in advance and reflect

the important goals and indicators of the organization. However, these criteria are not enough to capture everything that matters. Sometimes, there are other aspects of employee performance that are harder to measure, such as how well they get along with others and fit the values and norms of the organization. Even though these aspects may be based on personal opinions and feelings, they should also be considered when evaluating employees. Otherwise, employees may focus only on meeting the clear and specific criteria and ignore everything else that is also important.

In optimizing their performance management processes, Deloitte employs a digital tool named "ConnectMe", facilitating various aspects of performance assessment. This tool empowers employees to establish performance profiles, define goals, obtain feedback, assess their skills and competencies, and access performance ratings (Buckingham and Goodall, 2015). mirroring this change, Accenture strategically utilizes its digital learning platform, MyLearning. This platform provides employees with an extensive array of resources, including courses, podcasts, videos, and books covering diverse subjects and skills. Moreover, MyLearning tailors learning paths for employees based on individual goals and interests, aligning with the organization's commitment to fostering personalized and goal-oriented professional development initiatives.

Having said that, there must be some possible strategies for implementing a fair and accurate performance measurement in HR. Setting clear and measurable goals is a practice that ensures reliable outcomes. Performance metrics should be rooted in specific, observable, and quantifiable results that align with both the employee's role and the organization's mission. Engaging employees in the process of defining and concurring on their goals is crucial, and providing regular feedback on their progress further enhances the effectiveness of this approach. It is essential to be taken into account that performance measures should not rely solely on the manager's perspective, but also incorporate feedback from multiple sources, such as peers, customers, subordinates, and self-assessments. This can provide a more balanced and holistic view of employee performance, as well as identify areas of strength and improvement. The other important point to consider is that instead of relying on annual performance reviews, which can be biased or outdated,

experts recommend conducting frequent mini-reviews throughout the year. This allows managers and employees to monitor performance in real time, address any issues or challenges, and adjust goals as needed. Performance measures should be applied fairly and equally to all employees, regardless of their role, level, or department. Managers should use the same criteria and standards to assess employee performance, and avoid favoritism or discrimination.

The adoption of digital HR solutions by leading companies like Deloitte and Accenture epitomizes a transformative shift in HRM. The core challenges in HR strategic planning involve the intricate task of aligning individuals with the appropriate roles and responsibilities. However, the integration of AI and algorithmic automation technologies, as highlighted by Ashish Malik et al. (2022), significantly simplifies these intricate processes. AI technology emerges as a valuable asset in HR planning, proficiently forecasting future personnel requirements and elevating the effectiveness of the hiring processes, as emphasized in the work of Karatop, B., Kubat, C., & Uygun (2015). This technological integration not only streamlines the allocation of personnel but also contributes to the advancement of strategic workforce planning within the organizational context. In the realm of career progression, AI assumes a pivotal role, facilitating the documentation of employee applications, tracking skill requirements, and devising tailored training initiatives and career trajectories aligned with individual interests and capabilities. Furthermore, AI aids managers in the assessment of performance, gauging the effectiveness of training programs, and evaluating the skill sets of staff, encompassing emotional, intellectual, and experiential dimensions. These initiatives go beyond mere administrative efficiency, representing a strategic embrace of technology to cultivate a more engaging and personalized employee experience. Through digital tools as mentioned before, these organizations demonstrate a commitment to creating streamlined and dynamic performance management processes and comprehensive learning platforms. This aligns seamlessly with the broader industry trend of incorporating data-driven, flexible, and development-oriented practices in performance management (Schrage et al., 2019). The concerted efforts of these companies reflect the realization that the future of HRM lies in the harmonious integration of digital tools to not

only streamline processes but also to empower and engage employees. In this era of digital transformation, where several companies have implemented digital HR solutions to streamline their human resources processes and enhance employee experiences, it is evident that technology is not just a facilitator but a strategic enabler shaping the future of work and human resource management.

3.9 Learning and Knowledge in the AI Era

In the period 1992–2010, the research theme of learning encompasses sub themes related to knowledge and education. Lepak and Snell (1998) assert that HR departments must adopt a strategic approach when navigating virtual HR challenges, particularly in response to the uncertainties posed by technological and market shifts. During this period, underlying competencies such as collaboration, flexibility, and change management emerge as essential skills to navigate technological transformations (Lepak and Snell, 1998). Dyer (1999) further identifies a comprehensive set of competencies for HR managers, including business partnership, technological competences specific to HR functions, change management, and organizational development. His study investigates whether diverse university programs adequately prepare future human resource professionals. Notably, Huston (2008) emphasizes a distinct set of competencies for nurse leaders, encompassing a global mindset, technological proficiency, decision-making abilities, organizational culture creation, political awareness, and collaborative skills. These requisite competencies extend beyond technological aspects, emphasizing the critical need for empathy toward the workforce. This consideration holds true at both educational and organizational levels. Indeed, HR managers recognize the diverse competencies necessary to effectively engage with the workforce, recognizing that people constitute the primary wellspring of competitive advantage (Rowley and Warner, 2007). In a thought-provoking perspective, the Journal of Management Development's Special Issue on competencies in the twenty-first century within organizations proposes that emotional, social, and cognitive intelligence competencies predict effectiveness across professional, management, and leadership roles

in various societal sectors (Boyatzis, 2008). Therefore, Organisations that understand how to collaborate better create and transfer knowledge, and this knowledge can lead to innovation. Innovation and knowledge are key factors for future organizations.

Between 2011 and 2015, the domains of big data and HRM stood out as central themes in the study of AI competencies. During this timeframe, big data emerged as a distinct research area, encompassing subthemes like education, IT, innovation, and knowledge. The Chartered Institute of Personnel and Development has indicated that big data will empower HR functions to harness and utilize critical information effectively. Early adopters of big data have encountered significant hurdles, notably in acquiring the technical expertise necessary to manage big data tools. The variance in the availability of skilled workers may account for the differing rates of IT innovation adoption (Tambe, 2014). Equipping the upcoming generations with creative and technical skills to remain competitive in the 21st century is a pressing issue for national innovation systems, necessitating the integration of education policies within the broader national innovation strategy (Ibata-Arens, 2012). Essential leadership competencies, such as decisiveness, proactivity, innovative decision-making, and intelligent stewardship, are targeted to achieve agile, flexible, and cross-cultural responses to lead effectively and ethically in a dynamic, globalized context (Sheppard et al., 2013). These competencies are fostered through leadership development programs that emphasize action learning and mentoring. The advent of big data and networked activities presents significant implications for HRM models, extending beyond the traditional employer-employee dynamic (Swart and Kinnie, 2014). These models—buffering, borrowing, and balancing the network—are designed to optimize networked operations in light of new technological trends. Overall, there is a growing focus on enhancing employees' skills, leadership abilities, and organizational best practices.

In the period from 2016 to 2020, data science and firm performance have been identified as central themes, with AI, innovation, and the future serving as foundational themes. Competence, outcomes, and self-efficacy are recognized as specialized themes, while analytics is noted as either an emerging or declining theme, indicating its developing or outlying status in the field. The competency in data analytics is conceptualized as a multi-

dimensional index, reflecting a firm's capacity to utilize and integrate data analytics resources for comprehensive and actionable data analysis (Ghasemaghaei et al., 2018, p. 103). Rialti et al. (2019) discuss how big data can influence a company's performance by affecting its capabilities and adaptability, highlighting the importance of developing organizational big data analytics capabilities, such as infrastructure flexibility, management capabilities, and personnel skills, to derive meaningful insights for decision-making. Consequently, data science has rapidly become integral to both traditional business models and organizational knowledge management, promoting the development of new competencies like data analytics. Firm performance encompasses areas like the resource-based view and supply chain management. Dubey et al. (2019) investigate how external pressures affect organizational resources, moderated by big data capabilities, and how these capabilities impact operational and cost performance. Wang et al. (2019) delve into the intricacies of big data analytics in healthcare organizations, examining how big data analytics interact with firm resources and capabilities in various configurations to enhance care quality. Peeters et al. (2020) propose a people analytics effectiveness model, emphasizing the need for the people analytics team to concentrate on four key areas: resources, products, stakeholder management, and governance structure. This reflects a broader interest in enhancing employees' skills, leadership abilities, and organizational best practices.

The research area of analytics is gaining traction, particularly in the realms of information and electronic human resource management (e-HRM). The integration of recent advancements in e-HRM and information has been instrumental in boosting organizational performance. AI is increasingly being utilized to gather a wide array of information from social media, which organizations can leverage for various purposes (Kaplan and Haenlein, 2019), and it plays a crucial role in facilitating decision-making processes, such as in recruitment and compensation. Bondarouk and Brewster (2016) have analyzed the intersection of IT and HRM, offering insights into the advantages and challenges faced by different stakeholders in this convergence, commonly referred to as e-HRM. This term is defined as the execution of HRM activities supported by web-based technologies (Ruël et al.,

2004). Consequently, AI presents opportunities to streamline, oversee, and regulate job processes and tasks effectively, heralding a transformation in the operational methods of HRM professionals (Bondarouk and Brewster, 2016). Indeed, the advent of Industry 4.0, also known as the fourth industrial revolution, emphasizes the integration of technologies like AI and advanced robotics. This era transcends the bounds of technological hurdles, introducing challenges that are inherently human (Rampersad 2020; Santana and Cobo 2020). To thrive future advancements, it is imperative for individuals to possess the skills and competencies necessary to effectively engage with and adapt to these new technological paradigms (Rampersad 2020). In this vein, Kaplan and Haenlein (2019) have devised a 'Three C Model' to guide organizations through the multifaceted challenges posed by AI, which they categorize as Confidence, Change, and Control. This model underscores the need for a strategic approach in HRM that fosters confidence in AI technologies, manages the change associated with their implementation, and maintains control over their influence within the organization. HR professionals must decide what types of capabilities are needed and whether to create their own capabilities or buy them in. Despite the possibilities of big data for the HR function, Angrave et al. (2016, p.1) are critical of the current approach to HR analytics, stating that the HR function must engage operationally and strategically to develop better methods, since it is unlikely that existing practices of HR analytics will deliver transformational change. In the following table (Table 5) it is shown how this model can be implemented in the internal parts of an organization.

Table 5. Three C model by Kaplan and Haenlein

Confidence	Managers need to exude confidence with respect to their employees in a fast evolving work environment
Change	Employees need to constantly change and adapt their functions and skills through lifelong learning
Control	Machines need to be controlled to avoid autonomous decisions and implicit biases

It is acknowledged that to mitigate concerns about job displacement by robots and AI, employees must exhibit innovation, seize opportunities, and develop key competencies, particularly in sectors like tourism and culture (Rampersad 2020). The disparity between current employee digital competencies and those needed is widening, necessitating greater efforts to address the challenges posed by digitalization in the 21st century (Oberländer et al. 2020). Through interviews, Sousa and Rocha (2019) identified essential managerial skills needed to navigate the advent of disruptive technologies, categorizing them into three areas: innovation, leadership, and management. Similarly, Sousa and Wilks (2018) pinpointed vital competencies for navigating the modern technological landscape, including critical thinking, problem-solving, network collaboration, influential leadership, agility, adaptability, initiative, entrepreneurship, effective communication, information evaluation, and creativity, along with competencies specific to disruptive technologies such as AI, nanotechnology, robotization, the IoT, and augmented reality. In turn, Alharthi et al. (2017) also consider that organizations are not ready to make use of the big data capabilities, listing a number of recommendations to address big data barriers. For example, technological barriers can be infrastructure readiness and complexity of data, human barriers can be privacy and a lack of skills, and an organizational barrier can be the organizational culture (Alharthi et al. 2017; Manyika et al. 2011). With respect to human barriers, Alharthi et al. (2017) indicate that organizations need to collaborate with educational institutions in order to develop or acquire the requisite skills for the big data era, and that organizations should include privacy protection measures to enhance existing processes related to big data.

In consequence, certain digital competencies must be brought together in this Industry 4.0, such as problem solving, non-routine tasks and creation of digital outputs (Djumalieva and Sleeman 2018), since some technologies, such as IoT, big data and AI, will automate many of the HR processes, resulting in small and efficient HR teams. As with any type of competency, the classifications of digital competencies are multiple and there is still no consensus on them. However, a review of the literature on AI and competencies allows us to identify those that are most needed to leverage AI in organizations. Specifically, these are communication and problem solving, followed by collaboration, teamwork and technical

skills, which include all those aspects related to programming and the use of software and hardware tools linked to AI and big data. To sum up, the different classifications of digital competencies reviewed in this systematic study are shown in the following table (Table 6).

Table 6. Classifications Of Digital Competencies Based On Different Lr

Ferrari (2012)	Information management, collaboration, communication and sharing, creation of content and knowledge, ethics and responsibility, evaluation and problem solving, technical operations
Murawski and Bick (2017)	Information processing, communication, content creation, security, problem solving, digital rights, digital emotional intelligence, digital teamwork, making use of Big Data, self-interruption, making use of AI and virtual leadership
van Laar et al. (2017)	Technical competencies, information management, communication, collaboration, creativity, critical thinking and problem solving
OECD (2018)	Cognitive and meta-cognitive skills (e.g. critical thinking, creative thinking, learning to learn and self-regulation); social and emotional skills (e.g. empathy, self-efficacy and collaboration); and practical and physical skills (e.g. using new information and communication technology devices)
Sousa and Wilks (2018)	Critical skills (i.e., critical thinking and problem solving, collaboration in networks and leading by influence, agility and adaptability, initiative and entrepreneurship, effective oral and written communication, evaluating and analyzing information, and curiosity and imagination) and technological disruptive skills (i.e., AI, nanotechnologies, robotisation, internet of things and augmented reality)
Gonzalez-Vazquez et al. (2019)	Information and data literacy, communication and collaboration, media literacy, digital content creation (including

	programming), safety (including digital well-being and competences related to cybersecurity), intellectual property related questions, problem solving and critical thinking
Oberländer et al. (2020)	Handling of hardware, handling of software, programming, handling of applications, innovative capability and creativity, information processing (recognising one's own knowledge gaps, search, data analysis, evaluation), data organization, effective usage, communication, collaboration, networking, netiquette, sharing data with others, cultural aspects, security law, responsibility, goals and motivation, willingness to learn and openness, ethics and morals, autonomy and Independence, problem solving, training/educating others

In summary, the disparity between existing competencies and those required by the market is well-documented (Acemoglu and Autor 2011; Cukier 2019; Oberländer et al. 2020). However, the integration of work-based learning and the use of technology-driven talent matching platforms can mitigate the impact of novel technological advancements. It is essential to undertake targeted training initiatives by educational institutions and corporate entities to bridge this competency gap (Alharthi et al. 2017), as has been discussed earlier.

CHAPTER 4: CASE STUDIES

In a previous discussion, we thoroughly examined the innovative strategies adopted by several leading companies to exploit the power of digital HR solutions in streamlining their human resource processes. Through this exploration, we uncovered the multifaceted approaches used to integrate these cutting-edge technologies seamlessly into their workflow, ultimately revolutionizing traditional HR practices. These tactics ranged from implementing advanced data analytics for talent management to deploying AI-driven tools for recruitment and performance evaluation. By embracing these transformative tools and strategies, these companies have not only optimized their HR processes but also significantly enhanced the overall satisfaction and engagement levels of their employees, creating a more dynamic and empowered workforce.

- **IBM:** IBM, a global technology leader, has strategically integrated digital HR solutions, exemplifying a forward-looking approach within the context of Society 5.0 and its implications for HRM. IBM has focused on enhancing talent acquisition processes through the strategic implementation of AI and machine learning (ML) algorithms and other innovative approaches, aligning with the evolving concept of Society 5.0. This entails a shift towards more integrated, intelligent systems that enhance human capabilities and improve overall societal well-being through technological advancements. In another word, at the core of IBM's digital HR transformation is the utilization of AI and ML technologies to optimize the talent acquisition lifecycle. IBM leverages AI to transform traditional processes into more efficient, responsive, and personalized experiences. The use of AI in candidate sourcing and hiring accelerates the recruitment process, enabling managers to identify suitable candidates, interact with potential hires efficiently, receive notifications when a candidate applies for a position and analyze resumes in order to streamline the hiring process. AI's role extends to the procurement of short-term workers, where its natural language processing (NLP) capabilities automate manual

tasks, thus saving valuable time for HR teams. Moreover, in alignment with the principles of Society 5.0, AI-powered onboarding processes facilitate smoother information collection and provide personalized guidance to new employees, enhancing their entry experience into the organization. This not only accelerates the recruitment cycle but also aligns with the human-centric ideals of Society 5.0 by enhancing the overall experience for both candidates and hiring teams. The integration of AI and ML in talent acquisition not only aligns with the societal paradigm of Society 5.0 but also emphasizes a harmonious coexistence of technology and humanity, which seeks to leverage technology for the enhancement of human life. By deploying intelligent algorithms, IBM demonstrates a commitment to efficiency and precision in the hiring process, ensuring that candidates are matched with roles that align with their skills and organizational objectives. This approach reflects a nuanced understanding of the interplay between technology and human capital, highlighting the transformative potential of AI in HRM. Moreover, IBM's adoption of digital HR solutions not only modernizes talent acquisition but also underscores the broader societal goals of Society 5.0. The efficient identification of suitable candidates contributes to economic progress while emphasizing the importance of human potential in the organizational context. This strategic alignment with the principles of Society 5.0 displays how IBM is navigating the dynamic landscape of HRM, demonstrating that technological integration is not merely a means of automation but a catalyst for creating value and fostering a human-centric workplace.

IBM also implements AI-powered HR chatbots that support employees around the clock. These chatbots analyze large volumes of business documents to provide accurate answers to employees' queries, assist with onboarding, and automate common HR tasks. This not only improves the employee experience by providing instant support and reducing manual workloads but also collects real-time feedback to further refine HR strategies.

Furthermore, IBM's HR and Talent Transformation Consulting emphasizes the ethical use of AI to balance strategic goals with employee well-being. AI and automation are positioned as tools to modernize the HR function, from talent acquisition and skills development to employee experience enhancement. This approach aims to equip the workforce with future-ready skills, leveraging AI and data to transform talent strategies and HR operations.

The modernization of HR infrastructure is another focal point, advocating for a shift to cloud-based systems to enhance data integration and accessibility. This enables real-time workforce insights and supports evidence-based decision-making. Investing in AI across HR functions is highlighted as crucial for improving the employee experience, with automation and AI analytics playing significant roles in talent decision-making and operational efficiency.

In summary, IBM's initiatives in HRM under Society 5.0 encompass the application of AI and technological innovations to create a more dynamic, responsive, and human-centric HR landscape. These efforts are designed to not only streamline HR processes but also to ensure that these processes are aligned with ethical standards, thereby fostering a more engaged, satisfied, and future-ready workforce.

- **Google:** Google, a pioneer in innovation, extends its groundbreaking approaches to the realm of HRM, positioning itself as a pioneering entity within the landscape of Society 5.0. From talent acquisition to data management, Google's approach reflects a harmonious blend of technology and humanity. Google's HR division is distinguished for its high level of quality, harnessing the power of cutting-edge solutions to progress and elevate various facets of HRM. Google's journey begins with its commitment to excellence across all domains. Beyond its search engine prowess, the company's HR division embodies this spirit. By embracing the transformative potential of technology, Google positions itself as a trailblazer within the Society 5.0 framework. In the early days, Google's HR practices mirrored

traditional approaches—manual processes, paper-based records, and fragmented communication. However, as the digital era unfolded, Google recognized the need for a paradigm shift. The company's leadership understood that HRM could no longer operate in silos; it needed to align with the broader societal context. Thus, the journey toward a Society 5.0-inspired HRM began. In line with the organization's innovation, Google strategically employs digital HR tools, notably powered by AI, to alter crucial aspects and facets of HRM. Google's recruitment process exemplifies Society 5.0 ideals. Google leverages these tools to automate key recruitment processes, ensuring efficiency and precision in talent acquisition. The integration of AI-driven solutions facilitates the identification of suitable and the best candidates, aligning with the human-centric ideals of Society 5.0 by emphasizing a harmonious coexistence of technology and humanity. Efficiency and precision are paramount, but so is treating applicants as valued individuals. The days of manual resume screening and tedious interviews are behind us. Google's algorithms analyze not only qualifications but also cultural fit, diversity, and potential. Consequently, this evidently leads to a more inclusive and dynamic workforce. Google's AI-driven recruitment tools go beyond efficiency. Personalized communication and tailored job recommendations create a positive candidate experience, aligning with the human-centric standards of Society 5.0. Consider receiving an email that not only acknowledges your application but also suggests relevant learning resources based on your interests which may result in enhancing candidate experience. In other words, Google's approach transforms the recruitment journey into a collaborative exploration. Furthermore, Google's digital HR tools extend beyond recruitment, encompassing the proficient management of employee data. Google's commitment to data accuracy extends to employee records, performance metrics, and training histories. AI technologies ensure up-to-date, secure, and accessible data—a crucial aspect of modern HRM. Google's HR portal provides employees with real-time insights into their career progression, feedback from peers, and personalized learning paths. The days of static performance reviews are over; continuous feedback drives growth. The strategic use of AI technologies enables the HR

department to navigate the complexities of data management, ensuring accuracy and accessibility. This corresponds with the innovative framework of Society 5.0 where technology is utilized not just for automation but as a strategic enabler for optimizing HR functions. Self-service options allow employees to access HR information, update personal details, and request leave—all through user-friendly interfaces. This approach fosters not only autonomy and ownership but also empowers its workforce. Employees are no longer passive recipients; they actively shape their HR experiences. This approach aligns with the contemporary dynamics of HRM, where organizations are increasingly leveraging technology not only to enhance operational efficiency but also to create a more inclusive, human-centric workplace. It is evident that efficiency and empathy coexist harmoniously. For instance, chatbots handle routine queries, freeing up HR professionals to focus on strategic initiatives. Therefore, this paves the way to a more agile and responsive HR department. Google's progressive advances in HRM set a precedent for others to follow a harmonious integration of technology and human capital, reflecting a subtle understanding of the transformative potential of AI in fostering a dynamic and collaborative work environment within the principles of Society 5.0. As organizations navigate the future, they can learn from Google's delicate balance—where innovation and compassion intersect. Google's journey isn't just about HR; it's about redefining work itself.

- **Adobe:** Adobe, a pioneering company in the technology sector, has strategically embraced digital HR technologies to redefine the employee experience. Adobe, which is also known as a leader in the technology sector, acknowledges that HRM isn't just about processes; it centers on individuals and it's about people. By strategically embracing digital HR technologies, Adobe sets a precedent—a blueprint for organizations seeking to harmonize technology and humanity. In line with the principles of Society 5.0 and the developing HRM field, Adobe's HR transformation begins with advanced platforms and therefore Adobe has implemented advanced HR

platforms that seamlessly integrate with diverse systems. These platforms serve as the backbone of HR operations, connecting recruitment, benefits, performance management, and learning and development. This integration goes beyond mere functionality and aims to empower employees by providing them with stress free and user-friendly access delivering a wide array of HR-related services. Adobe ensures that employees efficiently manage their welfare—whether it's health insurance, retirement plans, or parental leave. The consequence of this will be a work environment that prioritizes individual well-being, mirroring the human-centric ideals of Society 5.0. Adobe's commitment to continuous improvement is evident in its performance management tools. Rather than annual reviews, Adobe fosters ongoing conversations. Managers and employees collaborate, set goals, and provide real-time feedback. This dynamic approach aligns with Society 5.0's vision of harmonizing technology and human-centric principles. In other words, it is notable that Adobe's approach extends beyond conventional HR functionalities, encompassing critical aspects such as benefits enrollment, performance management, and learning and development opportunities. The incorporation of digital HR platforms aligns with the principles of Society 5.0, which emphasizes a human-centric approach to technology integration. Adobe's commitment to creating a seamless employee experience is evident in the holistic nature of their digital HR strategy. By streamlining benefits enrollment processes, Adobe ensures that employees can efficiently manage their welfare, contributing to a work environment that prioritizes individual well-being. Moreover, the integration of performance management tools reflects a dedication to continuous improvement and aligns with the Society 5.0 vision of harmonizing technological advancements with human-centric principles. In the realm of learning and development, Adobe leverages digital HR technologies to offer employees accessible and personalized opportunities for growth. This not only enhances the skills and capabilities of individual employees but also fits well with the goals of Society 5.0, which seeks to optimize societal well-being through technological integration and collaboration. Adobe's strategic implementation of digital HR technologies serves as an exemplar of how industry

leaders are navigating the intersection of Society 5.0 and HRM. Through this approach, Adobe reinforces the idea that the integration of advanced technologies in HRM goes beyond mere automation; it fosters a symbiotic relationship between humans and technology, contributing to a workplace that prioritizes both individual and collective advancement.

- **Cisco:** Cisco, a prominent technology conglomerate, stands at the forefront of digital innovation, particularly in the realm of HRM. The company has masterfully implemented digital HR tools in order to transcend conventional boundaries, demonstrating a commitment to the principles of Society 5.0 and its transformative impact on HR practices. The central focus is on developing a workplace atmosphere that seamlessly merges the advantages of technological advancements, promotes a sense of teamwork and cooperation, and enriches the overall well-being of each employee. In alignment with the principles of Society 5.0, Cisco exceeds conventional limits through their strategic adoption of digital HR tools, emphasizing a human-centric approach to employee engagement and communication. Leveraging cutting-edge digital platforms and social collaboration tools, Cisco's HR department pioneers initiatives that go beyond the traditional scope of HRM. These digital tools serve as enablers, fostering a culture of openness, collaboration, and continuous feedback. One notable application of AI in Cisco's HRM strategy is the facilitation of employee engagement through dynamic feedback mechanisms and recognition programs. By deploying AI-driven algorithms, Cisco ensures that employee contributions are acknowledged, fostering a sense of belonging and empowerment within the organization. This resonates with the societal objectives of Society 5.0, where technology is harnessed to elevate human experiences and interactions. Furthermore, Cisco's emphasis on knowledge sharing across the organization aligns with the collaborative spirit of Society 5.0. The digital platforms employed by Cisco enable seamless knowledge transfer, ensuring that employees have access to valuable information for professional development and skill enhancement. Whether

it's best practices, industry insights, or skill enhancement resources, Cisco empowers its workforce. This holistic approach to HRM, where technology is seamlessly integrated into the organizational culture, mirrors the principles of Society 5.0, emphasizing the harmonious coexistence of technology and humanity. Cisco's implementation of AI in HRM serves as a compelling case study, illustrating how forward-thinking organizations navigate the digital landscape to enhance employee experiences, foster collaboration, and contribute to the societal goals of Society 5.0.

- **Unilever:** Unilever, a global leader in consumer goods, has positioned itself as an innovator in the integration of AI within its HRM framework, aligning with the transformative principles of Society 5.0. The company's adoption of digital HR solutions reflects a strategic commitment to optimizing HR operations on a global scale. In the context of Society 5.0, Unilever's implementation of AI in HRM is characterized by a sophisticated utilization of cloud-based HR systems. By leveraging cutting-edge technology, Unilever centralizes employee data in a secure and accessible manner. This aligns with the core ideology of Society 5.0, emphasizing the seamless integration of technology in order not only to ensure transparency but also to enhance overall efficiency while maintaining a human-centric approach. The incorporation of cloud-based HR systems allows Unilever to automate routine administrative tasks, preceding in an era of operational efficiency within their global HR operations. From payroll management to leave requests, these systems streamline processes, freeing up valuable time for strategic HR initiatives. This automation aligns with the objectives of Society 5.0 which explores the impact of digital transformation on HRM practices. Furthermore, Unilever's strategic use of AI in HRM extends to providing self-service functionalities for employees. This empowers individuals within the organization, allowing them convenient access to HR services and information. The self-service approach to HR processes is more than just a time-saving tool. This operational efficiency resonates with the objectives

of Society 5.0, which explores the impact of digital transformation on HR practices and empowers individuals and their experiences. Unilever's commitment to agility is evident. By allowing employees to engage with HR services directly, Unilever fosters collaboration and responsiveness. Whether it's updating personal information or accessing training resources, employees play an active role in their own development. Unilever serves as a compelling example of how AI can be seamlessly integrated into HRM practices to foster efficiency, empower employees, and contribute to the societal goals of Society 5.0.

- **Siemens:** Siemens, a renowned symbol of technological excellence, has established itself as a pioneer in incorporating artificial intelligence (AI) into its human resource management (HRM) strategies within the dynamic global corporate environment. Going beyond the technical aspects associated with Industry 4.0, Siemens demonstrates a seamless alignment with the transformative ideals of Society 5.0. The company's adoption of digital HR technologies reflects a strategic commitment to optimizing talent management processes through cutting-edge AI-driven tools. In the context of Society 5.0, Siemens' implementation of AI in HRM is characterized by a sophisticated use of data analytics. By leveraging AI-driven tools, Siemens identifies high-potential employees within its workforce. This strategic approach resonates with the principles of Society 5.0, emphasizing the fusion of technology and human-centric values to achieve optimal outcomes. It leads to visualising an intricate and sophisticated network of algorithms thoroughly analyzing an array of data points, including performance metrics, skill profiles, and collaboration patterns. This intricate web of digital intelligence delves deep into the employee performance, skill development, and teamwork dynamics, providing valuable insights that inform strategic decision-making within organizations. Siemens' use of AI extends to the personalization of development plans for employees. This reflects a forward-thinking approach to talent management, where AI is employed to tailor growth trajectories based on individual strengths, potential, aspirations, and latent talents. At Siemens,

employees are encouraged to explore unique career paths tailored to their specific skills, interests, and goals, rather than being limited by a one-size-fits-all mentality. Therefore, Siemens values the diversity of experience and expertise that each employee brings to the table. This personalized development strategy aligns with Siemens' commitment to innovation which explores the transformative impact of digital technologies on HRM practices within the context of Society 5.0. This forward-thinking approach isn't just about HR—it's about shaping the future of work. Utilizing the power of AI, Siemens provides personalized learning opportunities, addressing various needs such as mastering quantum computing or enhancing cross-cultural communication skills. Siemens exemplifies this vision through its tailored learning paths and commitment to leveraging technology for individual empowerment. Furthermore, Siemens enables continuous performance feedback through the implementation of AI-driven tools. This real-time feedback mechanism embraces the principles of Society 5.0, where technology is harnessed to create dynamic and adaptive systems that enhance overall efficiency and consequently it creates a dynamic ecosystem where feedback isn't a once-a-year event. Siemens' strategic use of AI in HRM emphasizes the pivotal role of digital transformation in shaping contemporary HRM practices. It means that It's not about rigid structures; it's about agility. When market dynamics shift, Siemens adapts. Through open communication and a willingness to adapt, Siemens demonstrates a commitment to keeping up with the changing aspirations of their employees, ensuring that they feel heard and valued in the workplace. Society 5.0 envisions organizations as living organisms—responsive, resilient, and attuned to individual needs. Siemens embodies this ethos and standards.

- **Accenture:** Accenture, as a prominent global consulting and professional services entity, has strategically incorporated digital HR solutions to elevate its workforce management practices. At the forefront of this initiative is the proficient utilization of advanced analytics, enabling the organization to forecast future workforce needs

with precision. This proactive approach extends further to optimizing resource allocation, ensuring that human capital is strategically aligned with organizational goals. Additionally, Accenture has embraced digital tools for strategic workforce planning initiatives, emphasizing a forward-looking perspective in talent management. This deliberate integration of technology into HRM not only enhances operational efficiency but also aligns with the principles of Society 5.0. As organizations navigate this transformative era, the judicious application of AI in HRM emerges as a cornerstone for fostering agility, strategic talent management, and a harmonious blend of technological innovation with human-centric values.

In summary and as it is shown in the following table (Table 7), top companies like IBM, Google, Adobe, Cisco, Unilever, Siemens, and Accenture have strategically adopted digital HR solutions, incorporating AI and advanced analytics to modernize their HRM practices. These efforts extend beyond traditional methods, aligning with the principles of Society 5.0. The incorporation of AI in HRM not only boosts effectiveness in talent acquisition, employee engagement, and workforce management but also signifies a broader commitment to a people-centered approach. As organizations navigate the changing landscape of Society 5.0, the thoughtful use of digital HR technologies becomes crucial for fostering a dynamic, efficient, and human-focused work environment.

Table 7. companies implemented digital HR

Companies	Implementation Of li In HRM
IBM	Integration of digital HR solutions for improved talent acquisition using AI and ML algorithms. Utilization of AI and ML technologies to optimize the talent acquisition lifecycle and streamline hiring processes. IBM's advanced algorithms are employed to identify suitable candidates and analyze

	<p>resumes.</p> <p>IBM's modernization of talent acquisition ensures efficient matching of candidates with suitable roles, accelerating the recruitment process.</p>
Google	<p>Google strategically utilizes digital HR tools with AI capabilities, focusing on recruitment and data management.</p> <p>Recruitment processes are automated through AI-driven solutions.</p> <p>Self-service options are implemented to provide employees with HR information, fostering a more inclusive, human-centric, and dynamic workplace.</p> <p>Google's advancements set a precedent for effectively integrating technology and human capital.</p>
Adobe	<p>Adobe's advanced HR platforms provide employees with user-friendly access to a comprehensive range of HR services.</p> <p>Critical aspects such as benefits enrollment, performance management, and learning opportunities are emphasized.</p> <p>Aligning with Society 5.0 principles, Adobe prioritizes a human-centric approach to technology integration and individual well-being.</p> <p>Performance management tools demonstrate a dedication to continuous improvement.</p> <p>Adobe leverages digital HR technologies to offer personalized growth opportunities, going beyond mere automation.</p> <p>Advanced HR technologies foster a symbiotic relationship between humans and technology.</p>
Cisco	<p>Cisco's digital platforms emphasize employee engagement and communication.</p> <p>AI-driven algorithms facilitate dynamic feedback and recognition, fostering empowerment.</p> <p>Seamless knowledge transfer across the organization and employees access valuable information for professional development.</p> <p>Cisco seamlessly integrates technology into organizational culture and mirrors Society 5.0's harmonious coexistence of technology and humanity.</p>

	<p>Cisco's AI implementation in HRM exemplifies forward-thinking practices. Enhances employee experiences and contributes to societal goals.</p>
Unilever	<p>Unilever aligns with transformative principles of Society 5.0. Utilizes cloud-based HR systems to centralize secure employee data. Unilever provides self-service functionalities for employees. Streamlines HR processes and promotes autonomy, aligning with societal principles. Fosters efficiency, empowers employees, and contributes to Society 5.0's goals.</p>
Siemens	<p>Siemens integrates AI within its HRM practices, aligning with Society 5.0's dynamic and adaptive systems and principles to optimize talent management processes. Siemens identifies high-potential employees and emphasizes fusion technology and human-centric values for optimal outcomes using AI-driven tools. AI tailors growth trajectories based on individual strengths and potential. Real-time feedback mechanisms enhance efficiency.</p>
Accenture	<p>Accenture utilizes advanced analytics to precisely forecast future workforce needs. Proactive approach ensures strategic alignment of human capital with organizational goals. Resource allocation is strategically optimized to ensure efficient utilization of human capital. Digital tools drive strategic workforce planning initiatives with a forward-looking perspective in talent management. Accenture exemplifies how AI fosters agility and strategic talent management. Contributes to transformative goals of Society 5.0.</p>

With that being stated, it is crucial to highlight that the increasing prevalence of artificial intelligence poses new challenges for HR managers. They need to identify responsibilities

and tasks that can be efficiently handled by algorithms and those that necessitate human involvement . Contrary to a common misconception, the integration of artificial intelligence in HRM does not alter or substitute the roles of employees. Instead, it serves as a valuable addition to administrative tasks, enabling HR professionals to shift their focus towards strategic management planning and decision-making in business operations. This emphasizes a collaborative relationship between AI and human expertise within the HR domain.

CHAPTER 5: CONCLUSION

5.1 Summary

This thesis undertakes an in-depth exploration of the transformative impact of Society 5.0 on HRM practices. Society 5.0, characterized by the integration of cutting-edge technologies, artificial intelligence (AI), and the convergence of physical and digital realms, represents a paradigm shift in societal organization. At its core, Society 5.0 emphasizes a human-centric approach to technology, aiming to address complex global challenges by leveraging technological advancements for the betterment of human society.

Through a thorough examination of literature and case studies, this research delves into the multifaceted implications of Society 5.0 on HRM. It investigates the evolving role of HR professionals in a digitized and interconnected environment, considering the challenges and opportunities presented by the integration of advanced technologies such as digitalization and AI in HRM processes. Moreover, the thesis explores the ethical considerations associated with the adoption of emerging technologies in HRM, advocating for a balanced approach that prioritizes both technological efficiency and human well-being.

Furthermore, the research investigates the impact of Society 5.0 on various aspects of HRM, including workforce dynamics, employee engagement, and talent management strategies. It underscores the necessity of fostering a culture of continuous learning and skill development to meet the demands of a rapidly evolving digital landscape. Additionally, the thesis highlights the pivotal role of HRM in facilitating organizational adaptation to the changes brought about by Society 5.0, emphasizing the importance of proactive measures to shape HRM practices that promote innovation, resilience, and sustainable human development in the digital age. By comprehensively understanding and harnessing the transformative potential of Society 5.0, organizations can proactively reshape their HRM strategies to navigate the complexities of the digital era, fostering a conducive environment for growth, innovation, and long-term sustainability.

5.2 Conclusion

The examination of existing literature reveals a growing interest in exploring the convergence between Society 5.0 principles and traditional Human Resource Management (HRM) practices. While some studies have begun to delve into this intersection, the depth of analysis remains somewhat limited. Insights obtained from the literature suggest that the integration of Society 5.0 principles into HRM has the potential to revolutionize HRM practices and contribute significantly to organizational success in the Society 5.0 era. However, further research is empowered to gain a comprehensive understanding of the long-term implications of this integration on the evolution of HRM. Society 5.0 has instigated a profound transformation in workforce dynamics, emphasizing digitalization, automation, and connectivity. In this evolving landscape, the workforce operates within an environment where technology plays a central role in shaping business operations and employee interactions. Yet, gaps persist in our comprehension of how Society 5.0 influences talent acquisition, development, and retention strategies within organizations. Future research endeavors should delve deeper into these areas to provide a clearer understanding of the effects of Society 5.0 on workforce dynamics and HRM practices.

The emergence of Society 5.0 introduces both specific challenges and opportunities for HR practitioners. Challenges include the adaptation to new technologies, addressing skill gaps resulting from digital transformation, and fostering a digitally competent workforce. Conversely, opportunities abound in leveraging technology for enhanced recruitment, training, and performance management processes. A nuanced understanding of these challenges and opportunities can empower HR practitioners to formulate efficient HRM strategies tailored to the demands of the Society 5.0 era.

In conclusion, the study proposed that the integration of Society 5.0 principles with HRM practices offers a transformative opportunity for organizations to augment their competitiveness and sustainability. By addressing the identified gaps in the literature and comprehending the implications of Society 5.0 on HRM practices, organizations can better equip themselves to navigate the challenges and seize the opportunities presented by this

evolving landscape. Future research endeavors should focus on investigating the practical implications of Society 5.0 for HRM strategies and devising actionable recommendations for HR practitioners navigating this dynamic terrain.

5.3 Limitations

While this thesis endeavors to provide a comprehensive exploration of the implications and impacts of Society 5.0 on HRM practices, it is important to acknowledge certain limitations inherent in the research.

Firstly, the scope of the study may be constrained by the available literature and case studies, which may not encompass all relevant perspectives and insights on the topic. Additionally, the dynamic nature of technology and societal trends means that some aspects of Society 5.0 and its impact on HRM may continue to evolve beyond the timeframe of this research, could limit the extrapolation of the results.

Furthermore, the research primarily focuses on the theoretical and conceptual aspects of Society 5.0 and its implications for HRM, and may not provide extensive empirical evidence or quantitative analysis. As such, the practical applicability of the study's findings may vary depending on the specific organizational context and industry dynamics. Additionally, while efforts have been made to consider ethical considerations associated with the adoption of emerging technologies in HRM, further research may be required to delve deeper into the ethical implications and potential societal consequences of these technologies.

Lastly, the study may be limited by factors such as access to data and resources, as well as the researcher's own biases and perspectives. Acknowledging these limitations is essential for ensuring the integrity and validity of the research findings, and may provide paths for future research to address these gaps and expand upon the insights presented in this thesis.

5.4 Further Research And Recommendations

alongside acknowledging the limitations of this study, it is valuable to propose recommendations for future research and practical implications:

1. Conducting longitudinal studies can provide deeper insights into the evolving nature of Society 5.0 and its impact on HRM practices over time. By tracking trends and developments in technology adoption, workforce dynamics, and organizational strategies, researchers can better understand the long-term implications and challenges associated with embracing Society 5.0 principles.
2. Organizations should invest in training and development initiatives to equip HR professionals with the necessary skills and competencies to navigate the complexities of Society 5.0. This includes enhancing digital literacy, data analytics capabilities, and proficiency in emerging HR technologies. Additionally, fostering a culture of continuous learning and innovation can help HR professionals stay abreast of evolving trends and best practices in HRM.
3. Collaboration between academia, industry practitioners, and policymakers is essential for advancing research and knowledge sharing in the field of Society 5.0 and HRM. Establishing collaborative research networks, hosting interdisciplinary conferences, and fostering partnerships between academia and industry can facilitate the exchange of ideas, insights, and best practices, ultimately driving innovation and progress in HRM practices aligned with the principles of Society 5.0.

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