The Impact of AI Implementation on Business Operations in Hospitals

Thesis

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Abstract:

In this thesis, we will be exploring the implications of artificial intelligence (AI) and its integration across different domains within healthcare sectors. Such domains are as follows; logistics, human resource management (HRM), and business models. Among the increasing pace of digitalization caused by recent global health crises, the healthcare industry is at a crossroads, because of the incorporation of AI, a technology with the potential to transform patient care, operational efficiencies, and organizational dynamics. Although AI promises improved diagnostic accuracy, optimized logistical operations, and novel business models, but its implementation creates ethical, operational, and strategic challenges. The paper is carried out using a comprehensive literature review and empirical research, in which it outlines the transformative impact of AI on healthcare logistics, that demonstrates significant efficiencies in supply chain management and predictive analytics. Also, AI plays a critical role in HRM by speeding up the hiring, training, and performance review processes, on the other hand concerns about data privacy and job displacement still exist. We will also be examining how AI affects business models revealing an important change in healthcare delivery toward one that is more patient-centric and data-driven. However, the implementation of AI raises a lot of critical issues such as data ethics, workforce displacement, and the need for regulatory frameworks to protect patient privacy and ensure equitable access to AI-enhanced healthcare services.

Keywords:

Implementation

Artificial intelligence

Healthcare

Logistics

Human resource management

Business model

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1. Introduction.

Technology has developed massively in the past few years. The development of technology was facilitated by the current condition that allows it to grow. The condition consisting of endless human demand and needs balanced with the creativity of the human mind has allowed the most advanced human technology to be incorporated into our lives. When one technology succeeds in meeting human needs, it comes with the consequences of a problem, or another needs to be covered. It is a positive relationship between the growth of technology and human needs. The more needs covered, the better the technology is, and the better the technology is, the more opportunities to be explored.

The past few years, the world has been focusing on one part of human technology, which is Artificial Intelligence. Artificial intelligence became the hottest topic around because of its capabilities and potential ready to be exploited and are being utilized in all aspects of our lives. This finding opens more opportunities to be explored.

Artificial intelligence, human most advanced piece of technology, was made to assist humans by mimicking how humans behave and think. The main idea was to create a machine that can use all available resources to solve problems and make decisions. Along with the development of technology, new opportunities arise, the changes in the ecosystem have allowed AI to be more than what it was intended for.

Lately, organizations are competing to create their own AI and distribute it to the market. There are many kinds of AI, some are more complex than others, yet its functionality is still useful for solving diverse needs. Many companies in different industries have successfully implemented AI to the system and the impact has already been felt. Surely AI will change the world forever.

This technology was thought to be disruptive; wherever industry is implemented, it will dictate the industry's future. This technology brings so many offers to the table that the industries are overwhelmed and still trying to figure out how to control it. However, there are some industries that are still underdeveloped in terms of AI implementation, one of them is the health care industry.

Triggered by the recent pandemic, like all industries, the healthcare industry is forced to implement digitalization in every system. The pandemic has opened our eyes towards the need for

digitalization and its opportunities. The implementation of AI itself was brought by the wave of digitalization. The opportunity has intrigued us to explore the implications of AI.

The health care industry is one of the most underdeveloped industries in terms of implementation of AI. The endeavor to create a functional AI in this industry is strictly suppressed by the nature of the industry itself. There are many things to consider implementing the innovation in the industry because of the stakes it holds. The abundance of critical aspects in this industry somehow acts as spores for new challenges to occur.

So many aspects of these industries are crucial, for example, the accuracy of diagnosis, patients' data privacy, trustworthiness of a machine, the machine capabilities. There are a lot of things that suppress the innovation and implementation of AI in the industry. If AI is going to be implemented in the industry, it will make a lot of crucial changes.

Derived from the idea of how Covid-19 would be handled if the AI had already existed in the industry. We propose the question on the ramification of AI implementation on the business operation within hospitals. This paper aims to find potential consequences of implementing AI to industry, specifically in the hospitals business. By studying recent research about the functionality of AI in some relevant aspects of business operations that are expected to be influenced by the implementation of AI, this paper can describe the idea of the consequences. This paper will analyze the phenomenon through multiple perspectives of logistics, HRM, and followed by how hospitals' business model will change.

2. Literature review

2.1 Overview of AI Technologies in Healthcare

With the integration of AI in the business operations, it will lead to a transformation that would enable improved and patient-centered healthcare. The fast and quality-changing imperatives demand that healthcare be resource constrained, with AI technologies that appear to provide the key enablers toward the reshaping of the business of hospital management. This would include areas like operational efficiency, patient engagement, financial operations, supply chain management, analytics, and data.

That is not all, AI technologies in healthcare will change healthcare delivery by utilizing solutions that optimize workflow powered by AI, that should ensure uniformity for patients, staff, and general patient flow in any facilities. The AI lets the facilities do this by recognizing the pattern and predicting peaks; therefore, realizing more worthwhile utilization of resources and reduction in waiting times. Another gain is that it boosts the service delivery level and also creates staff morale. Besides, a predictive maintenance algorithm helps in prediction of possible break down mechanisms well before they take place; such mechanics aid in making medical facilities available all through for 24/7 in good working conditions to prevent downtimes and in introduction of interruptions to patients' life, which will further smoothen the virtual health assistants and AIdriven chatbots to make round-the-clock provisions for inquiries, setting up appointments, and giving custom health reminders. For patients, such levels in access and personalization increase satisfaction and engagement; these two, in turn, are critical metrics in any competitive health market.

To add to that, remote monitoring systems will process huge data obtained from wearable devices to produce real-time health insights based on AI algorithms for both the proactive care of a chronic condition and reduction in hospital re-admission rates. Similarly, as with the influence of AI, there are also major revamps in financial operations within the facility. On the part of hospitals, the use of AI is critical in flagging conspicuous anomalies using its fraud detection systems that pore over the billing and claims data following very close detail; this suggests itself to fraud. This, in return, makes the hospital protected from economic loss and enhances integrity in billing. Other areas seem to benefit from AI in such a way that ensures efficiency: revenue cycle management, where one is assured that by automating billing processes and improving the accuracy of submitted claims assures timely financial reimbursement and financial health.

Supply chain management is one of the very sensitive areas of hospital operations that are undergoing invariance with AI intervention. Through AI-assisted predictive forecasting algorithms, hospitals can maintain operationally optimum stocks of their medical supplies and drugs, cutting, and at the same time minimizing wastes related to over-stocking and expiration. The essential supplies are most assuredly found in any eventuality, any day or time, in any environmental setting. Only so much efficiency is revealed, and efficient functionality is totally the best thing during calamity moments like pandemics, where it is most characteristic for the demand for certain

supplies to rise to levels not imaginable. The canvas on which the value of AI in hospital business operations is drawn includes data management and analytics. Applications of AI in this domain will help management have insights into the performance, health outcomes for patients, and resource utilization in operations that would impact key strategic decisions for an improvement across all aspects of the hospital.

From data privacy to upfront cost, everything really comes down to a demand for high-quality, compatible data and ongoing regulatory compliance. Added to the above discussion are very crucial points existing within the subject area of AI, concerning ethical considerations where algorithms have to be transparent, orthodox, and not episodically support the many forms of discrimination.

2.2 Business Operations in Healthcare

Now, concerning business operations in the hospital, they are multifaceted. They are critical in making sure that the institution runs normally, takes care of patients, and maintains organizational financial health. At the core center of all these activities is financial management, which encompasses budgeting, accounting, billing, and financial planning. The hospital should always work within their means and manage payer contracts proactively and develop investment approaches that offer sound financial stability for the long run.

To start with we have the management, which includes hiring and selection systems, training, and motivation of sufficiently qualified medical and managerial personnel, which is another equally critical part of work organization at the hospital. Administration of benefits, payroll, and staff professional development, and ensuring the law that relates to labor and healthcare regulation is adhered to.

Another important business operation is the supply chain management, in which it encompasses the whole process from procurement, storage, and distribution of medical supplies, pharmaceuticals, and equipment, to ensuring that the medical staffs have all the tools and materials required in their hands. It focuses on organizational maintenance of the hospital's physical infrastructure: repair, safety, and cleanliness management. The other duty should be in a position

to make decisions on the expansion and renovation, since the number of patients coming in increases.

To add to that, modern IT information management is an integral aspect of patient records and organizational databases management for the hospital, including the maintenance of cybersecurity for the information held. The usage of electronic health records and compliance with data privacy maintenance through technology secure improved patient care and operational efficiency. Quality assurance and compliance lead to surety in meeting regulations and standards by hospitals for sustaining patient safety with quality care. This includes handling all the processes of accreditation and going for quality improvement programs.

Without any doubt, marketing and public relations are also the other very critical operations that basically help the hospital attract enough number of patients to it and assist with the management of the reputation of the hospital. The institution will need to convince not just potential patients, but also the regulators, that using this piece of technology is trustable and will benefit the masses more than they realize. However, the last two points mentioned above are not going to be discussed in this paper. This paper will have the business operation, logistics, and HRM to be the center of discussion.

2.3 Previous Studies on AI Impact on Business Operations

2.3.1. The Impact of AI on Healthcare Logistics:

2.3.1.1. Integration of AI in Healthcare Logistics:

The integration of artificial intelligence (AI) into healthcare logistics represents a significant advancement in the industry's technological landscape. AI-driven solutions offer the potential to optimize various aspects of logistics operations, from supply chain management to inventory control and transportation efficiency. By harnessing the power of AI algorithms, healthcare organizations can enhance their logistical capabilities, resulting in improved patient care, cost savings, and operational efficiency.

AI has become a game-changer in healthcare logistics, offering innovative solutions to complex challenges. One of the key areas where AI integration is making a substantial impact is in supply chain management. AI algorithms analyze vast amounts of data to predict demand accurately, optimize inventory levels, and identify cost-effective suppliers. This predictive capability enables

healthcare facilities to ensure that essential medical supplies are always available when needed, minimizing the risk of stockouts and overstocking.

Furthermore, AI-powered inventory management systems automate the process of tracking inventory levels and reordering supplies, reducing the administrative burden on healthcare staff, and improving overall efficiency. These systems can also help healthcare organizations identify opportunities for cost savings by optimizing inventory levels and reducing excess inventory holding costs.

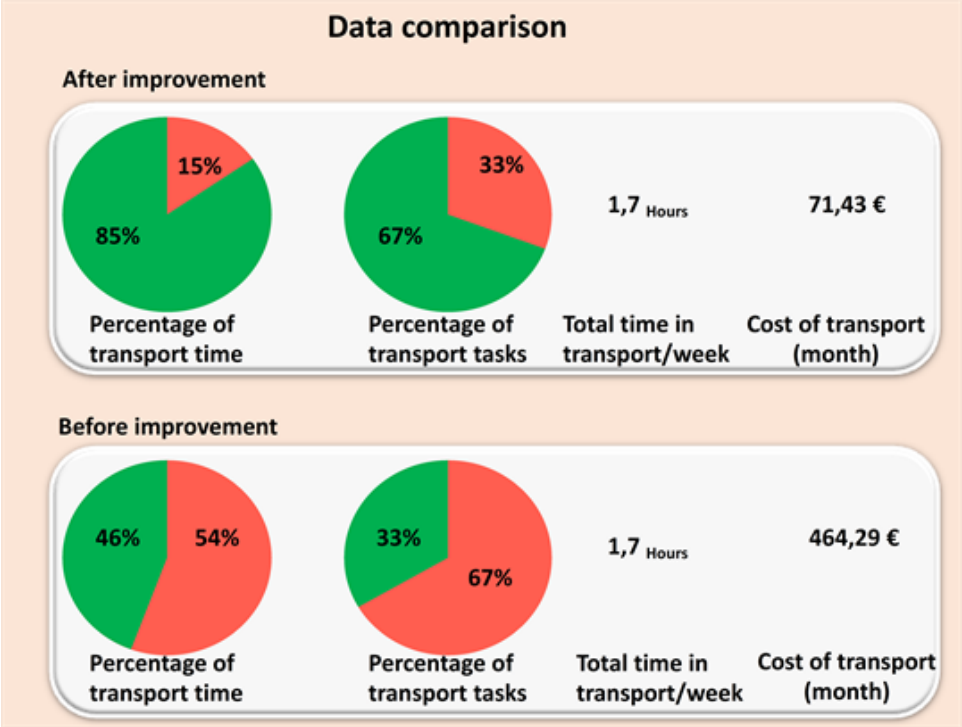
2.3.1.2. Supply Chain Management:

In terms of supply chain management, AI enables healthcare facilities to streamline the procurement process by predicting demand, optimizing inventory levels, and identifying costeffective suppliers. AI algorithms analyze historical data, current market trends, and other relevant factors to forecast demand accurately, ensuring that healthcare providers have the right supplies available when needed. Additionally, AI-powered inventory management systems can automatically track inventory levels, reorder supplies as needed, and minimize the risk of stockouts or overstocking.

2.3.1.3. Transportation Logistics:

AI plays a crucial role in optimizing transportation logistics within the healthcare industry. By leveraging real-time data and predictive analytics, AI algorithms can optimize delivery routes, reduce transportation costs, and improve the efficiency of supply chain operations. For example, AI-powered route optimization software can dynamically adjust delivery schedules based on factors such as traffic conditions, weather forecasts, and vehicle availability, ensuring that medical supplies reach their destination on time and in optimal condition.

According to Tortorella et al. (2021), the implementation of AI in healthcare logistics has resulted in significant improvements in transportation time and costs. Before AI integration, 46% of the time was spent on transportation tasks, while 54% was spent on other activities. However, after the integration of AI, transportation time decreased to 15%, allowing more time to be allocated to essential tasks. Similarly, the cost of transport decreased from 67% of the total cost to 33%, resulting in substantial cost savings for healthcare organizations.



Source: Dossou, P.-E., Foreste, L., & Misumi, E. (2021). Title of the article. *Journal of Software Engineering and Applications, 14*(6), xx-xx. DOI: 10.4236/jsea.2021.146014

2.3.1.4. Asset Management:

Another area where AI is making a significant impact on healthcare logistics is in the management of medical equipment and assets. AI-powered asset tracking systems use sensors, RFID tags, and other technologies to monitor the location, condition, and utilization of medical assets. This allows healthcare providers to optimize asset utilization, prevent loss or theft, and ensure that critical equipment is available when needed. Additionally, AI algorithms can analyze equipment maintenance data to predict potential failures and schedule proactive maintenance, minimizing downtime and reducing costs.

2.3.1.5. Several types of analytics:

The four different types of analytics: descriptive, inquisitive, predictive, and prescriptive provide a comprehensive understanding of each analytical approach's purpose and methodologies. Descriptive analytics focuses on summarizing past events, utilizing techniques such as dashboards, scoreboards, and advanced data visualization to answer the question of "Why did it happen?"

Inquisitive analytics, also known as diagnostic analytics, delves deeper into understanding causality through techniques like data mining, statistical analysis, and query tools.

Predictive analytics leverages historical data to forecast future events, employing techniques such as regression analysis, clustering analytics, and association rule mining to answer the question of "What is likely to happen?"

Finally, prescriptive analytics surpasses prediction by recommending actions to influence outcomes, utilizing techniques like decision trees, neural networks, and what-if simulators to address the question of "What should be done about it?"

Each type of analytics is accompanied by specific techniques tailored to its analytical approach, such as k-nearest neighbor (knn) and Bayesian for clustering analytics, and linear and non-linear programming for optimization modeling. This comprehensive framework facilitates a nuanced understanding of analytics methodologies and their application in driving informed decisionmaking across various domains.

2.3.1.6. Healthcare 4.0:

The framework for implementing Healthcare 4.0 concepts provides a structured approach for integrating innovative technologies and tools into the healthcare system. It comprises three main sections, each addressing critical aspects of the implementation process.

First, the "New technologies & tools" section introduces emerging technologies such as the Internet of Things (IoT), big data analytics, and artificial intelligence (AI), which are foundational to healthcare 4.0.

Second, the "HOSPITAL" section focuses on practically implementing these technologies within hospital settings, delineating a six-step process involving data collection, modeling, simulation, analysis, and optimization. This process leverages methodologies like DMAIC and Design of Experiments (DoE) to ensure systematic integration.

The "SUSTAINABILITY" section underscores the importance of considering the long-term viability of modern technologies, advocating for flexibility and adaptability to changes in the healthcare industry landscape.

The framework draws parallels to concepts like Industry 4.0 and Logistics 4.0, borrowed from the manufacturing sector, highlighting the application of lean principles to healthcare.

Overall, this framework serves as a practical roadmap for hospitals seeking to embrace Healthcare 4.0 principles, facilitating improvements in efficiency, sustainability, and the delivery of quality patient care.

2.3.1.7. AI applications in hospitals:

A thorough picture of the unique difficulties encountered by healthcare organizations and the related AI applications that can help them overcome these difficulties is provided by the interrelation structure of AI application fields for hospitals. The graphic highlights several significant issues that hospitals face, such as the growing number of elderly, multimorbid patients, the diversity of diseases, increased medical complexity, and chronic ailments. Hospitals also struggle with unanticipated emergencies like the COVID-19 epidemic, a lack of qualified medical personnel, and economic strain.

Several AI applications that might improve patient care and hospital efficiency in response to these issues. These applications include route modeling, computerized simulation for prognosis, and sophisticated decision-making tools. Furthermore, integrating robots can enhance security on hospital grounds and raise the standard of treatment. Simplifying hospital operations and improving information management are further aided by autonomous knowledge management systems and automated resource planning systems.

The diagram's accompanying article goes into further detail on the requirements and configurations needed to develop AI applications in medical facilities. The report identifies key areas of AI use, including care, diagnosis, and logistics, through a survey of European hospitals and an analysis of pertinent initiatives. In addition to highlighting the enormous medical and financial potential of AI in these fields, it offers 11 application examples from nine European hospitals.

The study also discusses the need to give AI use cases a fundamental framework to guarantee their applicability in various medical environments. To provide a comprehensive strategy for AI application deployment and transfer inside the healthcare industry, it suggests three fundamental support areas.

2.3.2. Previous Studies on AI Impact in HRM

The present business practices are ever-changing, and Artificial Intelligence (AI) in Human Resource Management (HRM) sets up new trends and is a new direction for companies to adapt to transformation that can bring about change and impact the way in which companies used to connect with the workforce. Katarzyna Łukasik-Stachowiak comprehensively examines this phenomenon and points to a great number of ways in which AI technologies are redefining HRM and placing immense opportunities and mighty challenges in the way of such a transition. It basically means that the type of analysis is going to offer a deep dive into the type of transformational effect anticipated from the addition of AI to HRM functions in medium and large enterprises, selected carefully to offer a point where technology and human resources are meeting.

2.3.2.1. Demographics of Responding Enterprises

Table 1.
Study sample characteristics (in %)

Enterprise size					
	Medium			Large	
Sample size	28			72	
Business type					
	IT technologies	Media & communication	Life sciences	Production	Other
Sample size	58	30	6	4	2
Business track record					
	Less than a year	1-5 years	6-10 years	Over 10 years	
Sample size	2	6	32	60	
Market					
	National			International	
Sample size	35			65	

Łukasik-Stachowiak, K. (2023). Uncertainties and challenges in human resource management in the era of artificial intelligence. Scientific Papers of Silesian University of Technology. Organization & Management / Zeszyty Naukowe Politechniki Śląskiej. Seria Organizacji i Zarządzanie, (181), 341-356.https://doi.org/10.29119/1641-3466.2023.181.23 (Page 9)

One of the most prominent features of the in-depth research by Łukasik-Stachowiak is participation from the company in the demographic build of the study. As brought out in Table 1, the study captures a broad spectrum of enterprises, with a skew towards large entities (72%), predominantly from the IT sector (58%). Here comes the sharp sectoral representation when it comes to the IT industry, which has not only led the adoption and advancement of technological innovations but also helped power and strengthen every other industry. They emerge from participating companies characterized by their operational occupation in the business. This is because such companies provide a good platform from which the effect of AI across different contexts can be measured in more depth, thus providing valuable insights into the intersection of AI and HRM across the world.

2.3.2.2. Skills Acquisition and AI Training Needs

Table 2.

Changes, concerns and uncertainties related to the implementation of AI to the HRM (%)

Enterprise size	Compulsion to acquire new skills related to the use of AI technology		Numerous training courses in AI technology for use in the HRM		Increasing investments in the implementation of AI solutions to the HRM		Possibility of loss of jobs due to replacement of human work in the HRM with solutions offered by AI – AI taking control		AI's bias in the HRM activities	
	yes	no	yes	no	yes	no	yes	no	yes	no
Medium	89	11	87	13	74	26	57	43	34	66
Large	94	6	89	11	91	9	78	22	46	54
Total	**183**	**17**	**176**	**24**	**165**	**35**	**135**	**65**	**80**	**120**

Łukasik-Stachowiak, K. (2023). Uncertainties and challenges in human resource management in the era of artificial intelligence. Scientific Papers of Silesian University of Technology. Organization & Management / Zeszyty Naukowe Politechniki Śląskiej. Seria Organizacji i Zarządzanie, (181), 341-356.https://doi.org/10.29119/1641-3466.2023.181.23 (Page 10)

The other very important emanation from the Table 2 findings is, by all means, pointing to new skill areas and special training relevant for AI, which most definitely need to be spearheaded by HR divisions. The data indicate an overwhelmingly strong agreement across most surveyed businesses, even at medium (89%) and large (94%) levels, towards acute needs of upskilling among their employees to cater to the changing requirements in AI. This may signal an even broader indication of industry recognition for the move to more technologically integrated HRM functions. This, in turn, puts the responsibility on being proactive in shaping the workforce and, in

turn, places added importance on the need to prepare the workforce with AI skills and knowledge. The training should be having this as an objective not only to answer the changing technological landscape but to strategically invest in future readiness and adaptability of the HR workforce (ŁukasikStachowiak, 2023).

2.3.2.3. Financial Investment and Job Security Concerns

Added to this is the dimension of the financial aspect of AI integration, coupled with job security; it makes another big deal in Łukasik-Stachowiak's analysis. Basically, what may be derived from Table 2 is the considerably high proportion of the companies foreseeing the need to make great financial investments, especially the largest of them—91%—as an underpinning process for the adoption of AI within HRM. A sense of trepidation was felt, with regards to the extent of AI replacing human jobs in HR operations; after all, 78% of the big ones have said they worry about displacement. This mixed feeling toward embracing AI reflects the ambivalence in complex dynamics. While on one hand, there is a promise of better efficiency and productivity, concerns are also raised regarding the stability of employment, which includes economic implications of switching over to AI-driven practices.

2.3.2.4. AI's Application in HRM Functions

Table 3.
In which areas of the HRM is AI technology used most often? (in %)

Enterprise size	Recruitment and selection	Evaluation, promotions and dismissals	Remuneration and reward system	Training and development
Medium	26	20	13	28
Large	70	32	38	68

Łukasik-Stachowiak, K. (2023). Uncertainties and challenges in human resource management in the era of artificial intelligence. Scientific Papers of Silesian University of Technology.

Organization & Management / Zeszyty Naukowe Politechniki Śląskiej. Seria Organizacji i Zarządzanie, (181), 341-356.https://doi.org/10.29119/1641-3466.2023.181.23 (Page 10)

Now let's discuss practical implementation. It is written that "recruitment, selection, and training and development" are the three segments of HR where Table 3 supports that AI has the greatest impact. An increasing reliance on technology-based solutions to drive key HR functions is finding

preferences for AI in process optimizations for better recruitment and enrichment of training initiatives. The trend reflects an inclination in the strategic orientation of businesses to effectively leverage the capabilities of AI for aiming at better operational efficiency and enhanced outcomes for their human capital management. The incorporation of AI into such core areas represents a very important watershed in the application of technology for the simplification of HR-related activities and may indicate a complete change with regard to the way talent is hired and human resources developed (Łukasik-Stachowiak, 2023)

2.3.2.5. Positive Outlook on AI's Impact

Table 4.

Assessment of the possibilities of using AI in different areas of the HRM? (in %)

Enterprise size	Very slight	Slight	Average	Good	Very good
Medium	0	2	2	2	21
Large	0	2	6	9	56
Total	0	4	8	11	77

Łukasik-Stachowiak, K. (2023). Uncertainties and challenges in human resource management in the era of artificial intelligence. Scientific Papers of Silesian University of Technology. Organization & Management / Zeszyty Naukowe Politechniki Śląskiej. Seria Organizacji i Zarządzanie, (181), 341-356.https://doi.org/10.29119/1641-3466.2023.181.23 (Page 11)

Łukasik-Stachowiak's study also reveals a positive outlook on the impact of AI on HRM practices. The answers compiled in Table 4 present very rosy results, with most of the respondents thinking that AI's impact on HRM would be "good" or "very good." This forms, therefore, one of the major perspectives that highlight the probable benefits from the implementation of AI, from easing logistical planning for complex recruitments to developing individual and efficient training courses. This view is hence promising in establishing that AI is potentially significant in augmenting HR operations and thus points toward strategic AI application within HRM. This unlocks transformative potential toward enhancing efficiency and the overall employee experience.

2.3.2.6. Readiness for AI-Driven Changes in HRM

Table 5.
Readiness for changes related to the implementation of AI in HRM

Enterprise size	Definitely yes	Rather yes	No opinion	Rather not	Definitely not
Medium	11	9	4	2	2
Large	45	23	0	2	2
Total	56	32	4	4	4

Łukasik-Stachowiak, K. (2023). Uncertainties and challenges in human resource management in the era of artificial intelligence. Scientific Papers of Silesian University of Technology. Organization & Management / Zeszyty Naukowe Politechniki Śląskiej. Seria Organizacji i Zarządzanie, (181), 341-356.https://doi.org/10.29119/1641-3466.2023.181.23 (Page 11)

Finally, the research approached through the enterprise readiness for AI-induced changes in HRM, as summarized in Table 5, it underscores the following critical theme: It is rather indicative that nearly every other large company (45%) demonstrates a loud willingness to embed AI into their HR practices, showing an even higher strategic focus on adaptation to and adoption of the latest technologies. This readiness reflects not only the adaptive corporate culture but also the recognition that AI is inevitable in the reshaping of HRM models. He explains that such proactive stances are important in maneuvering such complexities with the integration of AI, helping ensure businesses remain competitive and can respond timely, whereas technology moves quickly.

2.3.3. Implementation of AI in the Healthcare Industry

Based on recent research, the immersion of Artificial Intelligence in the industry has opened many opportunities for the healthcare industry. Many start-ups, research firms, and big companies are in competition to create the best artificial intelligence. Some of them are competing to create an AI that can solve the healthcare industry's problems. Currently there are a lot of AIs that can be utilized in the industry, however there are still many problems unsolved and opportunities unexplored. The relationship between innovation and problem is positive, when innovation appears there will be problems aroused by it.

To explain more about AI, it will be divided into two groups of business archetypes based on their main purpose. Some AI were created outside the purpose of solving healthcare problems and some were created to solve problems existing inside the healthcare industry. However, AI that

can be utilized in businesses can still be utilized as well in the healthcare industry as the ecosystem of healthcare industry is involving the business part as well. Some AIs functionalities are being adapted into the healthcare industry. When the power of artificial intelligence was met with current technology, many obstacles in the process can be eliminated resulting in a more effective and efficient process. This will help the healthcare operations to have more profit, it can help reduce costs, and have better time efficiency.

2.3.3.1. General Artificial Intelligence

The type of AI that can be a crucial tool for healthcare industry is the data/ information management AI. Even though this AI was created outside the purpose of solving the problem of healthcare industry, the functionalities are effective to improve the healthcare industry. All kinds of artificial intelligence share the same crucial functionality which is processing mass volume of data in a short time horizon. All AI has the capability to process data, as the nature of AI itself being a computing machine that is trained to process datasets and prompts. This kind of artificial intelligence can be used by the healthcare industry to solve problems related to data being the most fundamental type of AI. These AI can be used by hospitals to manage patients' data in the hospital, that way it can substitute the nurse in data managing processes.

One incremental piece of technology that will have a mutual relationship with AI is IOT (internet of things). IOT itself is a network of interconnected devices in the predetermined scope of operation. IOT will connect devices in the same scope of operation and will enable them to communicate with one another. These devices in scope will exchange information with one another. Combined with the automatization of technology and the processing power of artificial intelligence, the information flow in the system will be extremely fast and efficient. The devices in the IOT scope will have the ability to act by themselves.

Not only that, but some AIs are also created to undergo quick analysis and produce instant solutions or recommendations. Imagine the technology combined under one work structure; this will be a huge benefit for organizations. The information gathered from the devices and processed by the AI resulting in solutions or recommendations, then sent back to the device or a supervisory system, everything happened in an instant.

Based on (Garbuio & Lin, 2019) there are six types of AI businesses archetype that are not created to solve the problems of the healthcare industry. These six archetypes consist of: promotor, discriminator, trusted broker, platform, SaaS (Software as a Service), and PaaS (Platform as a Service). All these business archetypes have one thing in common, they are all utilizing AI outside of the healthcare industries and adapt it to solve the needs of the healthcare industry.

2.3.3.2. Artificial for Healthcare

With the current wave of transformation, the healthcare industry is one of the most impacted by the changes. Even though being the late implementer in terms of artificial intelligence, there are many opportunities that arise in this industry. More companies and start-ups are creating new AI to solve the problems in the healthcare industries. This is caused by the situation of AI competition in the healthcare industry.

The healthcare industry being one of the most underdeveloped industries in terms of artificial intelligence. The opportunities are there to grab; this industry has many possibilities to explore by AI. Anyone who steps first into the field will lead the race of AI development in healthcare industry. With the combination of systems, devices, and knowledge, various powerful AI can be created.

According to (Garbuio & Lin, 2019) there are four types of business archetype that are specific to the healthcare industry. The four created AI and utilized them specifically for the healthcare industry. The four are specialized diagnostics, aggregator, personal health companion, and smart prevention companion. The four AI were created with the aim of solving problems in the healthcare industry using clinical and these kinds of AI will work because of the support by the right technologies and devices that could be the touchpoints with patients.

2.3.3.2.1. Specialized Diagnostics

The specialized diagnostics type is created to provide analysis on a specific type of data. This kind of archetype utilizes AI to be trained on making analysis on specific data like images retrieved from a CT scan. This AI will only process one data without collecting data from other sources. The AI will make an analysis and create a summary of the findings, the summary will be

a guide for the clinicians to diagnose the issue. The AI itself will be utilized as an analysis tool to help accelerate the process.

2.3.3.2.2. Aggregator

The aggregator type uses AI similar to the first type of archetype, however there is a slight upgrade to this type. This type is created to make an analysis and summarize findings of datasets that are gathered through various sources. This type utilizes AI to collect data of individuals from different sources to be summarized and analyzed together. It will create more specialized advice for diagnosis and treatments, also giving clinicians more insightful information. It will help to improve speed and accuracy of the diagnosis because of the ability to gather various data and conclude from it.

2.3.3.2.3. Personal Health Companion

This kind of archetype utilizes AI to be a personal helper, it is applied to assist patients in having a preliminary diagnosis by themselves. This AI functions to reduce the information asymmetry between the patients and clinicians. It will help to answer questions from the patients by giving them solid evidence and customizable explanations. The AI will give personalized answers as it has access to patients' personal data. However, this kind of AI is not yet perfect, the companies still need to find the best way to monetize it while maintaining its value.

2.3.3.2.4 Smart Prevention Companion

This kind of archetype offers the most out of the four types. It utilizes AI to give a reminder to alter the behavioral patterns of the patients. This AI will learn from big data of a particular disease and personal data collected from a remote monitoring system. Rather than giving diagnosis towards the patients, it analyses behavior patterns of the patients and makes a warning or a nudge to disrupt the patterns. Because of this, patients were encouraged to be more responsible for themselves. This archetype aims to reduce hospital readmission rates through accessibility and clinical effectiveness.

3. Methodology

To explore the influence of artificial intelligence (AI) on logistics, human resource management (HRM), and business models, in healthcare sector, a comprehensive research methodology was designed, incorporating both quantitative and qualitative approaches.

These included a systematic literature review (SLR) coupled with content analysis to provide a comprehensive overview of existing knowledge. Quantitative methods were emphasized, particularly in data analysis, to quantify trends and patterns effectively. Additionally, the integration of quantitative and qualitative approaches enabled a nuanced understanding of AI's impact. In the HRM domain, methodologies included literature review complemented by an online survey of HR managers, utilizing the computer-assisted web interviewing (CAWI) approach for data collection. Observational techniques, literature review, interviews, systematic literature review, and case study methodologies were also employed to gather insights into various aspects of AI's impact on business models, ensuring a multifaceted analysis of the subject matter.

4. Findings

4.1. Impact of AI on healthcare logistics.

An important technical development in healthcare logistics is the application of artificial intelligence (AI), which holds the promise of better patient care, cost savings, and operational simplification. Healthcare companies can enhance supply chain management and transportation logistics, among other aspects of planning operations, with AI-driven solutions. These artificial intelligence (AI) systems examine large datasets to precisely forecast demand, optimize inventory levels, and pinpoint affordable suppliers. This ensures that necessary medical supplies are constantly available while lowering the possibility of stockouts and overstocking.

Predictive analytics powered by artificial intelligence (AI) is transforming supply chain management by projecting demand using past data and market patterns. AI-powered inventory management solutions also automate tracking and reordering procedures, which lowers the expenses associated with retaining surplus goods and administrative workloads. By streamlining

the procurement process, this automation guarantees that healthcare practitioners have prompt access to the resources they need.

Integration of AI has tremendous benefits for transportation logistics as well. Artificial intelligence (AI) algorithms optimize delivery routes, save transportation costs, and improve supply chain efficiency by utilizing real-time data and predictive analytics. To ensure that medical supplies are delivered on time, AI-powered route optimization software, for example, constantly modifies delivery schedules depending on variables like traffic patterns and weather forecasts.

Tortorella et al. (2021) found that AI integration in healthcare logistics has concrete benefits, including considerable savings in transit time and costs. Before AI integration, 46% of time was spent on transportation activities, which decreased to 15% after integration. Similarly, transportation expenditures fell from 67% to 33% of overall costs, resulting in significant cost reductions for healthcare institutions.

The framework for applying Healthcare 4.0 principles provides a systematic way to incorporate novel technology into the healthcare system. It presents upcoming technologies such as the Internet of Things (IoT) and artificial intelligence (AI), presenting a methodical approach to practical deployment in medical settings. This framework prioritizes sustainability and adaptation, connecting connections with concepts such as Industry 4.0 and Logistics 4.0.

Benefits of AI Integration in Healthcare Logistics:

Higher Speed and Accuracy: AI processes data more rapidly and precisely, increasing operational efficiency.

Quick Detection and preventative: AI can detect health problems early on and proactively focus preventative strategies.

Improved Pandemic Response: AI evaluates health patterns quickly, allowing for the early discovery and management of pandemics.

Availability and Remote Access: AI systems can function around the clock, guaranteeing continuous availability and remote access.

AI accelerates pharmaceutical discovery by analyzing large datasets to identify novel medications and treatment choices.

Aid for Emotional Decisions: AI algorithms help stakeholders make educated decisions, especially in crucial times.

Increased Profit Potential: AI optimization can result in cost reductions and operational efficiency, thereby enhancing earnings.

Disadvantages of AI Integration in Healthcare Logistics:

Job Displacement: AI may replace certain human tasks, raising concerns about job losses.

Inability to Explain judgments: While AI algorithms can simplify difficult judgments, they lack openness in decision-making processes.

Patient Data Privacy issues: Because AI requires access to vast datasets, there are issues concerning patient data privacy and security.

Built-in Bias: AI systems may have biases based on non-representative healthcare data, reducing decision accuracy.

Unethical Data Use: AI's dependence on healthcare data creates ethical questions regarding data collection and oversight.

Limited evidence and qualification have led to a lack of faith in AI's capacity to make critical healthcare choices.

Dependence and Vulnerability: AI and machinery are vulnerable to malfunctions, defects, and cyber-attacks, posing a threat to operational continuity.

Ongoing maintenance. expenses: While the initial implementation costs may be cheaper, ongoing maintenance expenses for AI systems might be significant.

4.2 Impact of AI on healthcare HRM

The use of Artificial Intelligence (AI) with Human Resources Management (HRM) systems for the health sector provides a tipping point toward more efficient, predictive, and strategic practice in human resources. AI technologies, like data mining, machine learning, and neural networks, have totally transformed HRM, allowing the dawn of new-age workplace capabilities that began only in thoughts. Against this background, one begins to appreciate the shift from conventional HR approaches that were significantly trial-and-error management systems, to a new radical heavy reliance on technology and data-driven approaches. This new approach seeks to present substantive improvements to organizational performances, capitalizing on the swift pace that technologies are developing.

The promise of AI in HRM is huge, it is providing a much-needed acceleration into a variety of core functions that include recruitment, selection, performance evaluation, remuneration, employee training, and development. Of note is the process of recruitment where AI has greatly enhanced acquiring candidates. That helps, partly due to the use of AI-powered bots that effectively manage communication, in which it furthers giving objectivity and efficiency at the selection stage. The AI systems themselves are not capable of managing all the subtleties involved in performance appraisal and management but they do provide, perhaps, the quickest and resource-light methods of appraising human efforts. This supports an approach whereby decisions on promotions and dismissals are done from a point of evidence in complete and reliable data analyses.

To add to that, AI is redefining how reward and compensation systems work. Fairer and wider performance in an organization relative to employee contribution becomes possible through large data that includes every element across the board. The personalized learning experiences indicates the next revolution in the field of training and development, as AI-driven simulations and interactive modules greatly enhance the efficiency and effectiveness of such programs. So, apart from aligning with the kind of training outcomes required by the organizations, these AI-driven tools would be more useful and adaptive to the learning styles and requirements of the employees.

Despite the promising advantages of AI in HRM, the path to integration is fraught with challenges. The primary dependencies could be data security concerns and resistance to change from the HR professionals, considering that they are responsible for the system and that there is a larger workforce involved with them. These clearly show the skills gap that current HR departments face,

and concerted efforts toward upskilling are called for. That is to say, therefore, that organizations have to put in place and take seriously the ongoing development of HR professionals so that they can fully realize the benefits AI can bring to HRM. So up-skilling initiatives should work to bridge the gap between current competencies and the demands of a technology-driven HR landscape, giving HR professionals the technical capability to handle AI systems and develop a flair to use these tools strategically for creating organizational value.

And so, the integration of HRM with AI, especially in the health service, demonstrates not only the level of technology's sophistication that is achieved but rather a kind of forced development that helps to ensure the growing complexity of modern organizations in human resource management is coped with. As HRM moves on to more strategic and predictive models, AI will have a more integral role. Routine tasks need to be automated for the HR to be capable of dedicating efforts to strategic human resource initiatives, like workforce planning and talent management, parts of the organization that mean a lot for long-term organizational success. Also, the ability of AI to process huge volumes of data at astonishing paces and remarkably high accuracies benefits HR an opportunity to head the organizational strategy with the right, data-driven insights.

Although that requires more than investment in technology, the organizations need to shift their culture toward embracing change, supporting a learning culture, and building adaptability in the members. Moreover, the human resources department, just like any other, would need to manage the ethical aspects of deploying AI, including privacy, and avoiding the potential bias by algorithms in decision-making, while evolving their operations to be AI-driven. Dealing proactively with these issues is through transparent practices and strong guidelines for the processes involved.

4.3. Impact of AI on healthcare business model.

Based on the papers collected, it is stated that AI will improve healthcare industry collectively through many aspects of the industry. Experts believe the changes will be radical and AI will revolutionize the industry. Experts say that the condition of this industry has made the industry fertile for AI to grow. This opens the doors for the actors to perform.

AI with its various functionality will have three main impacts on the industry. First, clinical outcome. AI directly related to the diagnosis remains one of the uncharted areas in the industry.

This allows companies to have an experiment with their creation to solve one of the problems that this industry has. AI will improve the accuracy, speed, and volume of processing data. The implementation of AI will help clinicians to have a faster and more accurate diagnosis and change their access to information.

Second, financial outcome. The implementation of AI will help the organization to reduce costs in various ways. AI will improve the effectiveness of the processes by having a quicker and bigger performance. AI with its capabilities has substituted the need for human specialist. This will change the role of human force in the industry. However, it will not replace the human force in the industry because the norms of trusting crucial decision to machine was never done before. Moreover, the capabilities of machinery in the industry have not yet been proven to be fully trusted by humans.

Last, is the organizational outcome. A lot of AIs have been adapted to the industry and AI that were not created for the industry might as well help the organization. AI implementation in the system will improve the organizational processes by the capabilities to automatically process big data quickly resulting in a better flow of information throughout the structure of the organization. This will change the way the administrative staff manage the resources and financial outcomes.

These showing of AI capabilities when implemented in the industry have generated the idea of how this industry will be run in the future. Businesses and hospitals are shifting their focus towards customer satisfaction. How they will create the value chain and optimize AI in the chain. Continuing the preliminary evolution of digitalization, the implementation of AI will have a significant impact on the industry. AI will be in almost every aspect of the industry, therefore resulting in a change of human roles. Current AI technology also conveys the idea that one day, the need for narrow specialists will be reduced because of the effectiveness of the AI.

Based on (Venkatraman & Miah , 2022) the implementation of AI in the healthcare industry will have their advantages and disadvantages.

4.3.1. Advantages:

Higher Speed and Accuracy, AI has the power to process data quickly and accurately. It learns from the datasets created by combining wide knowledge in the area.

Quick Detection and Proactive Targeted Prevention, AI have the abilities to discover new biomarkers

Quick Detection of Pandemic and Control, the sensors can pick up anomalies and AI can process the data rapidly. AI can quickly analyze the health trend from news and social media.

Availability and Remote Access, machine can operate longer than humans do, the AI as software can operate 24 hours non-stop and the machinery operates following its capabilities.

Quick Discovery of New Medication, A company has succeeded to create an AI to analyze research paper for less than 1 second, it has analyzed datasets of about 30 million papers, 340,000 clinical trial records, 750,000 patents, and tens of millions company and research profile. This also created a new approach for creating new medication.

Aid for Humans' Emotional Decisions, an organization has created an algorithm that has the capabilities to determine the probability of coma patients to regain consciousness. This will help the stakeholders to take the next move to prepare the next treatment, or to emotionally

Increased Profit, this is still a debatable topic, since it will require a fortune to have implemented the AI to the system itself, though having to cut the workforce down resulting in lower paychecks.

4.3.2. Disadvantage:

Loss of Human Jobs, the opportunities that AI gave is a threat at the same time. It covers a lot of things that humans do, and it does it better. Human position will be in trouble as it will be replaced by the AI. Some hospitals already have plans to replace humans by implementing AI to their systems.

Inability to explain AI healthcare Decisions, one drawback that simplicity gave that it hides the details to things. When the AI gives a quick summary for the clinicians to access, it might not tell them the root cause of the problem with the aim of being as simple and easy to process.

Loss of patient data privacy, AI enabled to do thing by learning from big datasets. They need big datasets so that the analysis will be more accurate, that means more data to be retrieved from the areas they operate in.

Built-in bias from non-representative healthcare, this point is related to the one above. The AI depends on its datasets and algorithm, therefore AIs that are given different datasets have the

possibilities to give different outcomes. This is called bias, it is caused by the non-representative healthcare data, which is prone to be retrieved since the patient's data privacy is still in the conversation.

Unethical use of healthcare data, AI will use every data possible, that will include confidential healthcare data. However, it still needs the supervisor role of humans, therefor the data were not very secured since the supervisory role might be outsourced, if these data falls into the wrong hand

Machines make vital human healthcare decisions, the degree of trust from human to machine is still low, this is caused by the lack of evidence and qualification for a machine to make such decisions.

Dependence and vulnerability, AI and machinery are still at the early age of development, therefore still leave many weak points in the system. The current state of AI and machinery is still prone towards malfunctions, bugs, and cyber hacks.

The ongoing cost of maintaining ai system, this topic is still vague, whether it can be categorized as a disadvantage or not. The cost of acquiring the AI is just 20% to 35%, the rest majority will be the cost of maintaining the system.

5. Discussion

The trend of competition to create the best AI in the industry is still going. Recent development of AI has opened many opportunities for it to be implemented in the healthcare industry. Balanced by the improvement of technology, it will increase the chances of AI to be implemented fully in the systems of healthcare in a short time.

The improvement seems to be very promising in the eyes of the optimist, however in the meantime there are many drawbacks and limitations to implementing this technology. Many contras opinion appear in the debate of AI implementation in this industry. New topics to be debated appear as new opportunities arise. The debate whether this technology is appropriate to be implemented will always be moving.

The line of worthiness is heavily influenced by many factors such as economic, legal, financial, ethical, and clinical itself. From the economic point of view, it discusses the readiness of the ecosystem to support the implementation of AI and if it is feasible. Also, this implementation

requires a deep assessment of cost-effectiveness and return on investment, there may be significant upfront expenses and considerations such as scalability and compatibility with existing systems.

From the legal perspective, the whole area of AI still needs to be governed by and regulated due to the relatively young age of the technology.

To add to that, the adoption of AI in HRM is also not without its challenges. The dependency on technology could potentially undermine human judgment and diminish the personal touch in HR processes, especially in tasks requiring emotional intelligence. A problem that might raise many eyebrows regarding that topic, is the sole fact of allowing AI to take over the judgment of deciding whether or not it is right to dismiss employees; after all it the word "HR" literally means "human resources" and allowing an AI to take decision for us regarding managing other employees in a firm/organization is still up to debate especially with the current state of AI. Additionally, the use of AI in HRM raises substantial data privacy and security concerns, given the sensitive nature of employee information processed by these systems. Also, the resistance to change from HR professionals and the broader workforce, is driven by fears of job displacement and the challenges of adapting to new technologies, which is another problem to think about before fully integrating it in HRM procedures.

Now logistically speaking, compliance with data protection laws, intellectual property rights, and liability issues in case of system failures or errors. Additionally, there may be regulatory requirements specific to logistics, such as transportation regulations and customs procedures, that need to be considered when deploying AI solutions. On the ethical side, the point of debate is regarding the use of personal data, the risk of misuse and data leaks, the potential replacement of human force in the industry, and the trustworthiness of the technology. In the end, the ethical debate will always move because of the ever-changing standards of ethics that the world poses. From the clinical itself will be about the accuracy of the diagnosis that the AI gave, whether the analysis is coherent with the other factors influencing the health of a patient.

6. Conclusion

6.1 Summary of Findings

AI will have a substantial impact on logistics, human resource management, and business models by being integrated into hospital operations. This will demonstrate the complex connections between healthcare service delivery and technological innovation. This comprehensive analysis synthesizes key findings from the thesis on "The Impact of AI Implementation on Business Operations in Hospitals," offering a nuanced understanding of AI's transformative potential and challenges in the healthcare sector.

The introduction of AI technologies into healthcare logistics brings in a new era of efficiency and precision. Systems powered by AI improve supply chain management by providing predictive analytics for demand forecasting, inventory optimization, and supplier selection. This technological advancement ensures the immediate accessibility of medical supplies, lowering the likelihood of stock shortages or excesses. On top of that, AI's role in automating inventory management and optimizing delivery routes leads to significant cost savings and operational efficiencies. AI's ability to analyze large datasets facilitates strategic resource allocation, which means healthcare facilities are better equipped to respond to patient needs quickly. But integrating AI into logistics presents a number of challenges. There are concerns about the displacement of jobs traditionally performed by humans, as well as the possibility of algorithmic biases, which requires careful consideration and strategic management. Despite these challenges, the benefits of AI in healthcare logistics are undeniable, with the potential to improve patient care and operational effectiveness.

Now, concerning AI technologies in HRM, they are redefining traditional human resource management practices by introducing automation and data-driven decision-making processes. AI applications in recruitment and selection provide more objective and efficient methodologies, which enhance hiring quality. Also, AI's analytical capabilities also benefit performance evaluation and employee training programs, which allows personalized development plans and performance assessments based on reliable data. This shift to AI-enhanced HRM practices promotes a more

dynamic and engaging work environment that values fairness, opportunity, and personal growth. However, the use of AI in HRM raises serious data privacy concerns, emphasizing the need for HR professionals to adapt to new technological frameworks. Overall, the transition to AI-driven HRM demands a commitment to ongoing learning and professional development in order to fully exploit the potential of AI technologies while maintaining ethical standards and employee privacy.

On top of that, AI's impact also extends to the transformation of business models in the healthcare industry, which leads to a shift towards a more patient-centric, efficient, and data-driven operations. To add to that, AI technologies allow new approaches to clinical diagnostics, which results in faster and more accurate decision-making. Also, AI benefits financial operations by improving billing processes and fraud detection systems in which it contributes to better financial health and authenticity. Besides, incorporating AI into organizational processes promotes more efficient information flow, that optimizes resource allocation and decision-making in general. Although this transformation is accompanied by significant ethical concerns and the need for regulatory frameworks in order to guarantee equitable access to AI-enhanced healthcare services. The effective implementation of AI into healthcare business models calls for a balanced approach that addresses the possibility of workforce displacement, data privacy concerns, and the ethical use of AI technologies.

In the end, to synthesize our findings from the exploration of AI's impact on hospital business operations, it basically reveals a landscape marked by significant opportunities and challenges. So, AI holds the promise of revolutionizing healthcare logistics, HRM practices, and business models, by offering pathways to enhanced patient care, operational efficiencies, and organizational agility. As with any innovative technology, it always comes with drawbacks; it is important that we think about this thoroughly before navigating the complexities of AI integration because it demands careful consideration of ethical, legal, and social implications. That is why future directions should focus on developing comprehensive strategies for ethical AI use, fostering interdisciplinary collaborations, and should also promote adaptive learning among healthcare professionals. Nonetheless, the journey towards fully realizing AI's potential in healthcare is ongoing, it will require a united effort to balance innovation with ethical responsibility and equitable access.

6.2 Contribution to Knowledge

This thesis makes significant contributions to the academic and practical understanding of Artificial Intelligence (AI) integration into healthcare operations, specifically logistics, human resource management (HRM), and business models. It points out AI's transformative potential in improving efficiency, patient care, and organizational dynamics, while also critically examining the ethical, operational, and strategic challenges that come with implementing AI in the healthcare sector.

First, in logistics, the thesis advances the understanding of how AI-powered predictive analytics and automation can transform supply chain management, inventory control, and transportation logistics. It also demonstrates AI's ability to optimize resource allocation, ensuring that critical medical supplies are available when needed by reducing the risks of stockouts and overstocking. This thorough study of AI's logistical applications in hospitals lays the groundwork for future research aimed at optimizing healthcare delivery logistics in the digital age. Concerning the domain of human resource management, this research sheds light on AI's role in automating and improving recruitment processes, performance evaluations, and training programs. This would be made possible by focusing on AI's role in streamlining HR operations and encouraging a datadriven approach to employee management, so this thesis also contributes to a better understanding of AI's potential to transform HRM practices in healthcare by also raising important questions about data privacy and the need to increase the basic skills of HR professionals. Other than that, the thesis makes an additional contribution by investigating AI's impact on healthcare business models. It critically examines the shift to more patient-centric, efficient, and data-driven healthcare delivery allowed by AI. The study of AI-driven business model transformation in healthcare not only contributes to academic discourse, but it also provides valuable insights for healthcare administrators and policymakers looking to use AI to improve systems. Plus, this thesis contributes to the discussion of the ethical and regulatory issues surrounding AI integration in healthcare. With the help of addressing issues such as data privacy, workforce displacement, and the need for strong regulatory frameworks, this thesis lays down the foundation for future research into ethical AI use, equal access to AI-enhanced healthcare services, and the development of policies that protect patient interests.

To conclude, the comprehensive analysis presented in this thesis makes significant contributions to the field of healthcare management and technology, by providing multiple perspectives on AI's role in healthcare. It not only identifies the opportunities and challenges that AI presents, but it also lays out the foundation for future empirical research, policy formulation, and practical application in the pursuit of using AI to improve healthcare outcomes, efficiency, and patient care. This collection of work thus makes an important contribution to the knowledge base, guiding stakeholders throughout the healthcare ecosystem as they navigate the complexities of AI integration.

6.3 Limitations and Future Directions

This thesis's research into the impact of Artificial Intelligence (AI) on hospital business operations has not only advanced our understanding of its transformative potential across logistics, HRM, and business models, but has also highlighted significant limitations and areas for future research. Although, there is a key limitation identified in this analysis, which is the reliance on secondary data and literature reviews, which may not fully capture the rapidly evolving nature of AI technologies and their sophisticated applications in healthcare. That is why this limitation shows the need for future investigations to include primary research methodologies, such as interviews with healthcare professionals and on-the-ground case studies of AI integration, in order to paint a more dynamic and detailed picture of AI's role in healthcare. Also, the thesis identifies a critical gap in understanding the ethical and legal, consequences of deploying AI in hospital settings, which shows that, future research directions need to go deeper into these areas, by developing ethical frameworks and regulatory guidelines to ensure a responsible way to use AI in healthcare in order to properly manage the challenges of data privacy, patient consent. On top of that, the thesis emphasizes the need for more interdisciplinary research that bridges the gap between technological innovation and clinical practice. Thus, encouraging future research collaboration among AI developers, healthcare practitioners, and policymakers to ensure that AI tools are designed and implemented in ways that genuinely enhance patient care, operational efficiency.

In conclusion, while this thesis has made significant contributions to our understanding of AI's potential to transform hospital business operations, it also lays the groundwork for future research

to address this thesis' limitations. Which is why future studies should focus on gathering primary data, so that they can build on this foundation to further optimize AI's integration into healthcare, to make sure that it serves the best interests of patients, healthcare providers, and society as a whole.

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