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College of Management

Department of Management



Title in English

**The Impact of Artificial Intelligence on the Health Sector in the
Kingdom of Saudi Arabia: An Application to Al-Mouwasat Hospital
in Al-Khobar**

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Abstract

The current study investigates the impact of artificial intelligence (AI) on the healthcare sector at Al-Mouwasat Hospital in the Kingdom of Saudi Arabia. It aims to assess the application of AI within the hospital, evaluate the challenges faced, and offer recommendations for enhancing AI's influence on healthcare delivery. Utilizing a descriptive analytical approach, the study employed a questionnaire distributed to 41 participants. Results reveal that AI-driven decision support systems significantly improve the decision-making process of healthcare professionals, with an average rating of 3.81. This finding aligns with theoretical perspectives on AI's role in providing data-driven insights and predictive analytics. Additionally, AI technologies facilitating remote patient monitoring and telemedicine services, with an average rating of 3.65, demonstrate a shift towards more efficient healthcare delivery. The study recommends integrating AI-based decision support and remote monitoring technologies to improve patient care, streamline administrative tasks, and enhance overall healthcare services.

Keywords: Artificial Intelligence, Healthcare Sector, Al-Mouwasat Hospital, Decision Support Systems, Remote Monitoring, Telemedicine, Predictive Analytics, Healthcare Delivery, Saudi Arabia

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List of Terminology

Artificial Intelligence (AI): A branch of computer science focused on creating systems capable of performing tasks that normally require human intelligence, such as learning, reasoning, and problem-solving.

Machine Learning (ML): A subset of AI involving algorithms that allow computers to learn from and make predictions or decisions based on data.

Deep Learning: A specialized form of machine learning that uses neural networks with many layers (deep networks) to analyze complex patterns in large datasets.

Predictive Analytics: Techniques that use historical data and AI to forecast future outcomes, such as disease progression or patient readmission rates.

Natural Language Processing (NLP): A field of AI that enables computers to understand, interpret, and generate human language.

Clinical Decision Support Systems (CDSS): AI tools that provide healthcare professionals with evidence-based recommendations and alerts to assist in clinical decision-making.

Telemedicine: The use of digital communication technologies to provide remote medical services and consultations.

Electronic Health Records (EHRs): Digital versions of patients' paper charts that include medical history, diagnoses, treatments, and other health-related information.

Computer-Aided Detection (CAD): AI systems used to assist radiologists by highlighting areas of potential concern in medical images.

Personalized Medicine: Medical care tailored to the individual characteristics, needs, and preferences of each patient, often guided by AI analysis of genetic and other data.

Health Informatics: The integration of IT and healthcare to manage and analyze health information and improve patient care.

Robotic Surgery: Surgical procedures assisted or performed by robotic systems, often enhanced by AI for greater precision and control.

Remote Monitoring: The use of technology to continuously monitor patients' health metrics from a distance, often involving AI for real-time analysis.

Data Privacy: Measures and practices to protect patients' personal and health information from unauthorized access or breaches.

Healthcare Analytics: The use of data analysis techniques and AI to improve healthcare delivery, efficiency, and outcomes.

AI Ethics: The study of ethical issues related to the use of AI in healthcare, including bias, transparency, and the impact on patient care.

Operational Efficiency: The optimization of healthcare processes and resource utilization through AI to improve overall performance and reduce costs.

Healthcare Policy: Guidelines and regulations that govern the implementation and use of AI technologies in the healthcare sector.

Chronic Disease Management: The use of AI to monitor and manage long-term health conditions, aiming to improve patient outcomes and quality of life.

Patient Engagement: Strategies and tools, including AI, that encourage patients to participate actively in their own healthcare and treatment plans.

Risk Stratification: The process of using AI to categorize patients based on their risk levels for developing specific health conditions, enabling targeted interventions.

Healthcare Reimbursement: The process of compensating healthcare providers for services rendered, which may be influenced by AI-driven efficiency improvements.

Fraud Detection: AI techniques used to identify and prevent fraudulent activities in healthcare billing and claims.

Population Health Management: The use of AI to analyze and address health trends and outcomes across different populations, improving public health strategies.

Regulatory Compliance: Adherence to laws and guidelines governing the use of AI in healthcare, ensuring ethical and legal practices.

List of Abbreviations

Machine learning (ML)
Artificial intelligence (AI)
Deep learning (DL)
Personal Data Protection Law (PDPL)
International Medical Informatics Association (IMIA)
Robotic process automation (RPA)
Natural Language Processing (NLP)
Nurse practitioners (NPs)
Registered nurses (RNs)
Clinical Decision Support Systems (CDSS)
Computer-Aided Detection (CAD)
Electronic health records (EHRs).
Magnetic Resonance Imaging (MRI)
Computed Tomography (CT)

Chapter One: Introduction

1.1 Introduction

Artificial intelligence (hence referred to as "AI") offers unrivaled opportunities for economic development, societal improvement, and research by allowing computers and robots to do tasks formerly associated with people. While other academics have attempted to define AI, John McCarthy, who coined the term in 1956, defines it as "the science and engineering of creating intelligent machines, particularly intelligent computer programs" (Chikhaoui et al, 2022, p5).

It is connected to the same goal of using computers to examine human intelligence; however, AI is not limited to biologically observable methods. In recent years, AI has shifted its attention from abstract concepts to data processing and inference. This transformation was made possible by the collaborative interplay of AI and big data. Big data is fed into an AI engine, which learns and improves its decision-making abilities. AI technologies open up new opportunities in a range of fields, including energy, the environment, education, and healthcare. The focus of this research, however, is on the impact of this change on the medical world via transformative digital advancements in healthcare, such as AI systems that scan medical records and information to identify risks or complications associated with a medical procedure and provide preventative care. AI's efficacy in healthcare is becoming increasingly obvious. It has become an indispensable tool for doctors, physicians, and other healthcare workers (Althubaiti et al., 2024, p22).

Artificial intelligence may be used to diagnose, create medications, tailor therapies, and change genes. Furthermore, machine learning may assist physicians in examining patients using digitalized diagnostic information to diagnose lung, breast, skin cancer, or any other sort of cancer problem. It has also contributed to assessing the risk of sudden cardiac death.. AI has detected indicators of diabetic retinopathy in ocular scans. Saudi Arabia's economy is diversifying as it

becomes a worldwide technological powerhouse. It has launched the most ambitious and far-reaching development plan in contemporary history, driven by the 2030 vision. The vision intends to reduce the country's dependency on oil while diversifying the economy. The country adopted an AI strategy as part of its 2030 goal and is investing billions of dollars in AI initiatives. Without a doubt, AI will significantly enhance healthcare in the country, but it will also raise numerous legal and ethical concerns, such as data transfer accountability and intellectual property rights. Few studies have examined the use of AI in the Saudi healthcare industry. For example, the authors released a research on staff experiences and attitudes on the use of AI technology in healthcare companies. However, the Saudi government is attempting to address these concerns and improve the healthcare system's efficiency and effectiveness. One of the key projects is the National Transformation Program 2020, which aims to improve healthcare quality, increase access to treatment, and reduce healthcare costs (Al Kuwaiti et al, 2023, p 23).

The program includes a variety of efforts, such as expanding the number of healthcare practitioners, strengthening healthcare infrastructure, and incorporating modern healthcare technology. Furthermore, the Saudi government's Vision 2030 plan, which was unveiled in 2016, contains a comprehensive strategy for reforming the healthcare system. The plan aims to make healthcare more patient-centered, innovative, and accessible to all residents. It also emphasizes the need of preventative care and health education. Saudi Arabia's healthcare system confronts several challenges, which the government is taking aggressive efforts to overcome. One of the significant activities that can play a critical role in changing the healthcare system is the introduction of artificial intelligence (AI) technologies, which have the ability to improve healthcare by boosting efficiency, cutting costs, and enhancing care quality. In Saudi Arabia, AI technology may be used in a range of healthcare situations, such as diagnosis, treatment, and patient management. Medical

diagnosis is one area where AI technology has the potential to make a significant impact. AI algorithms can analyze large amounts of medical data and help healthcare practitioners make accurate and fast diagnoses. This decreases the workload for healthcare practitioners and enhances accuracy. Artificial intelligence technology may potentially be used to develop personalized treatment plans for patients. AI systems can decide the best treatment options for individual patients by analyzing patient data, including genetic information. This can enhance patient outcomes while decreasing the likelihood of adverse events. In addition to diagnosis and treatment, AI technology can improve patient care. For example, AI-powered chatbots can assist patients in scheduling appointments, accessing medical information, and receiving individualized health advice (Saeed et al, 2023).

This can reduce the strain for healthcare practitioners while enhancing patient satisfaction. However, there are significant challenges to integrating AI technologies in healthcare. One of the primary concerns is the need for high-quality data. AI algorithms require vast amounts of data to train effectively, and data quality is critical to algorithm accuracy. Another problem is establishing standards and guidelines for the use of AI technologies in healthcare. The government must guarantee that AI technologies are utilized responsibly and openly, and that patients' privacy is protected. Finally, AI technologies have the potential to transform Saudi Arabia's healthcare system and enhance patient outcomes. However, implementing AI solutions needs meticulous planning, investment in technology and infrastructure, and the creation of regulations and norms. The authors wanted to assess radiologists' attitudes on the use of AI in Saudi Arabia (Serbaya et al, 2024, p22).

1.2 Research Problem

This paper explores how AI is transforming healthcare in Kingdom of Saudi Arabia, especially in Mouwasat Hospital and offers methods for harnessing these technologies to accomplish Vision 2030's human capital development objectives. The study has practical implications for healthcare practitioners and policymakers seeking to improve care quality through effective AI integration. This study adds to the scientific understanding of AI's impact on the digital revolution of healthcare in Saudi Arabia.

1.3 Research Importance

The importance of the current research is divided into scientific importance and applied importance, which will be presented as follows:

1.3.1 Scientific importance:

The scientific importance of the current study is to shed light on important variables, namely artificial intelligence in the Saudi health sector, and to identify all the scientific and theoretical aspects of the research variables and formulate them in a framework that suits the needs of the researcher, whether in the current research or for the researchers or for everyone who can benefit from the research. And its theoretical and applied content, in order to contribute to achieving the required renaissance in the Saudi health sector through the use of the most prominent modern technologies and identifying the impact of this use, in addition to providing a set of recommendations for future researchers that can be relied upon in formulating future research.

1.3.2 Practical importance:

The practical importance of the current research is to identify opportunities to use artificial intelligence as a new and effective means in the Saudi health sector, in addition to identifying ways to achieve the best performance and benefit from the use of artificial intelligence within the Saudi health sector, as well as identifying the most prominent challenges that hinder the use of artificial

intelligence within the health sector. Saudi Arabia and determine ways to overcome them through the proposed recommendations.

1.4 Objectives of the Study:

There are several objectives of the study:

1. Uncover whether there is a statistically significant impact of artificial intelligence on health sector in Mouwasat Hospital in Kingdom of Saudi Arabia.
2. Identify the reality of artificial intelligence application in the health sector in Mouwasat Hospital in Kingdom of Saudi Arabia.
3. Measure the challenges facing artificial intelligence application in Mouwasat Hospital in Kingdom of Saudi Arabia.
4. Provide recommendations that can enhance the impact of artificial intelligence on the health sector in the Kingdom of Saudi Arabia and in Mouwasat Hospital

1.5 Study Questions:

The current study tries to answer the following questions:

1. Is there a statistically significant impact of artificial intelligence on health sector in Mouwasat Hospital in Kingdom of Saudi Arabia?
2. What is the reality of artificial intelligence application in the health sector in Mouwasat Hospital in Kingdom of Saudi Arabia?
3. What are the challenges facing artificial intelligence application in Mouwasat Hospital in Kingdom of Saudi Arabia?
4. What are the recommendations that can enhance the impact of artificial intelligence on the health sector in the Kingdom of Saudi Arabia and in Mouwasat Hospital?

1.6 Theoretical Premises of Study

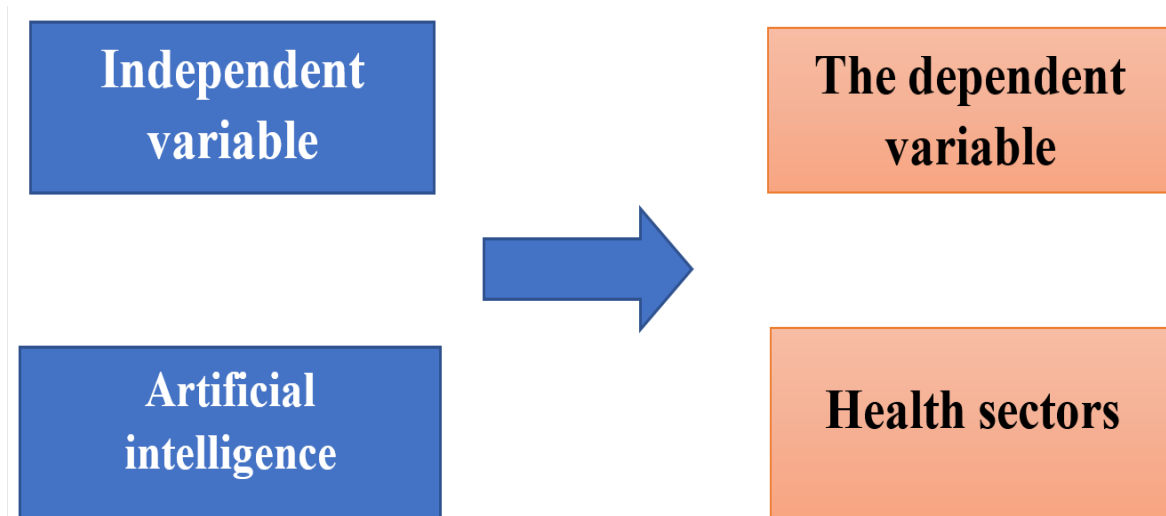


Figure 1 Research Variables

From the previous figure, it is clear to see the study variables can be mentioned as the following:

- **Independent variable:** The independent variable is (artificial intelligence).
- **Dependent variable:** The dependent variable is (the health sectors).

1.7 Study Hypothesis:

H1: There is no statistically significant impact of artificial intelligence on the health sector in Mouwasat Hospital in Kingdom of Saudi Arabia at the level of (0.05).

1.8 Study Limits

- ✚ **Topic boundaries:** The impact of artificial intelligence on the health sector in the Kingdom of Saudi Arabia.
- ✚ **Human limitations:** The current study will be applied on doctors and employees in Mouwasat Hospital in Kingdom of Saudi Arabia in the Kingdom of Saudi Arabia.
- ✚ **Spatial limitations:** The current study will be applied to the health sector in the Kingdom of Saudi Arabia, especially in Mouwasat Hospital in Khobar city.
- ✚ **Time limits:** This study will be carried out in 2024

Chapter Two: Literature review

Literature review

- 1. Study by (Muafa & Al-Obadi, 2024) Titled: The Impact of Artificial Intelligence Applications on the Digital Transformation of Healthcare Delivery in Riyadh, Saudi Arabia (Opportunities and Challenges in Alignment with Vision 2030).**

The study's objectives were to assess the current applications of artificial intelligence in the healthcare sector in Riyadh and their impact on digital transformation, to identify opportunities for improving healthcare services in line with Vision 2030 by expanding the adoption of artificial intelligence, and to investigate the challenges associated with further integrating artificial intelligence technologies into the system. Healthcare in Riyadh. The study employed a survey approach with a sample size of 300 people. The research found that artificial intelligence has the potential to significantly revolutionize the health-care industry in Riyadh, contributing to the achievement of Vision 2030. The study emphasized the need of effectively using intelligence. Artificial technology in the health system, emphasizing the relevance of the health sector and the future of health care in the Kingdom.

- 2. Study by (Esmaeel et al, 2024) Title: Perceptions of healthcare providers on artificial intelligence integration into dermatology clinical practice; A cross-sectional study in the Kingdom of Saudi Arabia.**

The study sought to explore the opinions of health care practitioners in the field of dermatology in the Kingdom of Saudi Arabia regarding the usage of artificial intelligence, as well as their attitudes and expectations concerning applications of artificial intelligence in dermatology. The study employed a descriptive analytical technique, with the questionnaire serving as the primary tool. The study found that dermatologists in Saudi Arabia had a good view toward artificial

intelligence in dermatology. In general, gender and nationality had no effect on their sentiments regarding AI ($p\text{-value} > 0.05$). It is worth mentioning that the majority of participants (75.5%) were previously acquainted with AI, demonstrating a level of familiarity within the healthcare sector. Furthermore, a substantial majority of participants (72.9%) agreed that AI technology may minimize mistakes in clinical practice and variations in judgment among medical practitioners.

3. Study by (Syed et al, 2024). Title: Assessment of Saudi Public Perceptions and Opinions towards Artificial Intelligence in Health Care.

The study aims to assess the Saudi public's perceptions and attitudes about artificial intelligence in health care. The study employed the descriptive analytical approach. The questionnaire was used as a tool in this investigation. The sample size was 830 persons. The study revealed that 69.4% of the sample participants were male, with 46% being above the age of 41. A total of 84.1% of participants are aware of AI, while 61.1% feel that AI is a tool that aids healthcare workers, and 12.5% believe that AI may replace a doctor, pharmacist, or nurse in the healthcare system. When it comes to the widespread usage of AI, 45.8% of the studied population believes that it will benefit healthcare practitioners. The mean AI perception score among men was 38.4 ($SD = 6.1$), which was higher than among females at 37.7 ($SD = 5.3$); nevertheless, no significant difference was discovered ($p = 0.072$). Similarly, young persons aged 20 to 25 years had a higher average cognitive score of 38.9 ($SD = 6.1$) than other age groups, although there was no significant connection ($P = 0.198$). The survey found that the Saudi people had a good impression and perspective of AI in healthcare. This implies that health management should make advice on how to properly integrate.

4. Study by (Serbaya et al, 2024) Title : Knowledge, Attitude and Practice Toward Artificial Intelligence Among Healthcare Workers in Private Polyclinics in Jeddah, Saudi Arabia

The study sought to analyze healthcare personnel' understanding, attitudes, and behaviors about artificial intelligence (AI) in private clinics in Jeddah, Saudi Arabia. Methods: We performed a cross-sectional study of health-care professionals at private clinics in Jeddah. The study employed the descriptive analytical approach. The questionnaire was used as a tool in this investigation. The sample size was 361 persons. The survey found that around 62% of healthcare professionals were women. The bulk of healthcare personnel (36%) were nurses, while 25% were doctors. The median awareness, attitude, and behavior scores were 5/6 (IQR 3-6), 5/8 (IQR 4-7), and 0/3 (IQR 0), respectively. Almost three-quarters (74%) of healthcare personnel say they comprehend the fundamental computational concepts of AI. Only half of the participants agreed to employ AI in future medical decisions. We discovered that male healthcare professionals had higher knowledge scores about AI than female healthcare workers (beta = 0.555, 95%, p-value = 0.010), however being a manager had a negative influence on attitude ratings as compared to male others. Attitude toward AI (beta = 0.049, 95%, p-value = 0.03), the study also found that healthcare staff had a generally positive awareness and attitude toward AI. Despite this, the majority are concerned about the long-term effects of replacing their occupations with artificial intelligence. There is an urgent need to educate and alert healthcare workers on.

5. Study by (Nallamotheu & Cuthrell, 2023) Title : Artificial Intelligence in Health Sector: Current Status and Future Perspectives

The study sought to determine the role of artificial intelligence in the health sector, as sophisticated technologies such as artificial intelligence (AI) and machine learning (ML) have enormous potential for enhancing health-care services. Many areas of clinical practice, scientific research, and healthcare administration have incorporated AI/ML technologies, and the study discovers that there are significant barriers to widespread use of AI/ML in healthcare, including

high installation and maintenance costs, potentially harmful medical errors, a lack of ethical frameworks for AI, unemployment, and low-capacity building within the human workforce. Several commercial efforts have been launched in the realm of AI/ML healthcare innovation. Their offerings range from sophisticated diagnostics to crucial monitoring. In summary, AI/ML can be very important in addressing difficulties related to the complexity and data explosion in the healthcare system. AI/ML is a component of contemporary health care, and its further reliance depends on comprehensive treatment of relevant issues.

6. Study by (Sabra et al, 2023) Title: Utilization of artificial intelligence in health care: Nurses' perspectives and attitudes

The study aims to assess nurses' perspectives and attitudes on the use of artificial intelligence in healthcare. The study took a descriptive analytical method. The questionnaire was used as a tool in this investigation. The sample size was 200 persons. The survey found that 92.0% of participants had a moderate opinion of the use of artificial intelligence in health care, while 64% had a positive attitude toward the use of artificial intelligence in healthcare. There was a statistically significant difference in nurses' perceptions of AI, gender, and marital status. Similarly, there were statistically significant variations in nurses' opinions towards. Artificial intelligence, age, credentials, marital status, and years of experience. Conclusion: No, the majority of nurses had a moderate perception and positive attitude toward the use of AI in health care. The study recommended that health policy makers develop strategies to increase institutions' readiness to apply artificial intelligence and increase nurses' capabilities. Appropriate usage of artificial intelligence requires proper training. Doctors, nurses, and patients must employ artificial intelligence in the workplace.

7. Study by (Imam et al., 2023) Title: Employing artificial intelligence applications in health awareness among sports leaders in light of national health standards.

The study aims to determine the feasibility of using artificial intelligence apps to raise health awareness among sports leaders in light of national health guidelines. The study employed a descriptive analytical technique, with the questionnaire serving as the primary tool. The sample size was 250, and the study came to a conclusion that sports leaders may apply. Artificial intelligence has moderate applications in health awareness. The vast majority of responders think that adopting artificial intelligence approaches saves them time and effort. The use of artificial intelligence techniques - chatbot applications in sports health awareness is a current and effective way of providing a complete explanation of numerous themes in the sports health area. Users follow the applications' instructions regarding proper nutrition and sleeping habits. The sample members do not have sufficient knowledge of the uses of artificial intelligence applications. The sample members do not rely on smart chat applications (chatbot) to obtain general health and sports information or to obtain answers to my frequent questions about sports health. One of the most important recommendations was to benefit from the results of the study and the questionnaire form. In implementing the proposals presented by Al-Durra to employ artificial intelligence applications in health awareness in educational institutions and sports.

8. Study by (Elnaggar et al, 2023). Titled Assessment of the perception and worries of Saudi healthcare providers about the application of artificial intelligence in Saudi health facilities

The study aimed to evaluate the perceptions and concerns of Saudi health care providers about the application of artificial intelligence in Saudi health care facilities. The study used the descriptive analytical approach, and the questionnaire was relied upon as a tool for this study. The

sample size was (1026) individuals, and the study concluded that more than half (55.2%) of the participants have good knowledge of artificial intelligence, and (48.1%) of them are familiar with the application of artificial intelligence in their specialty. A good percentage of participants (57.9%) knew at least one term about the difference between machine learning and deep learning. More than half of participants (69.9%) indicated that they had at some point used a speech recognition or transcription application in their work. A large portion (73.3%) of healthcare providers believe that AI will replace them in their work. The vast majority (84.9%) of participants agreed that collaboration between medical schools and colleges of engineering and computer science could be a game-changer and provide a path to integrating AI into medical curricula. The mean perception of AI in this study was 37.6 (SD = 8.41; range 0–241). Age, health level, health profession, and work experience all significantly influenced the positive perception score ($P = 0.021$; $P = 0.031$; $P = 0.041$; $P = 0.026$). However, there was no significant association between gender, nationality, and Saudi regions with an average positive perception score.

9. Study by (Wazgar et al, 2022) Title : The Use of Artificial Intelligence and Deep Learning in Medical Imaging: A Nationwide Survey of Trainees in Saudi Arabia

The study aimed to identify the role of artificial intelligence in the health sector in the Kingdom of Saudi Arabia. The descriptive analytical approach was used, and the questionnaire was relied upon as a tool for this study. The sample size was (98) individuals, and the study concluded that the level of use was low. Few of them used it in routine practice (7%). The impact of AI on radiology workflow was positive across all steps of the radiology workflow (range, 3.64-3.97 out of 5). There was a positive impact on the radiology profession more frequently in technical and performance aspects (81%-85%) than in prestige and legal aspects (64%-71%). Ease of use and behavioral intention to use AI were associated with current professional activity, level of AI

use, and perceived impact on the profession and on radiology workflow ($P < 0.05$). In short, AI is being used at a very low level in radiology. The perceived positive impact of AI on radiology workflow and the profession is associated with increased behavioral intention to use AI. Therefore, increasing awareness about the positive impact of AI can improve its adoption.

10. Study by (Chikhaoui et al, 2022) Title : Artificial intelligence applications in healthcare sector: ethical and legal challenges

The study aimed to present the main healthcare applications based on artificial intelligence; Exploring the use of artificial intelligence in the Saudi healthcare sector; Addressing ethical and legal challenges, as well as policy issues in Saudi healthcare; Also studying the benefits of these AI-based applications and the acceptance of professionals to use AI in daily practice; Introducing the new Personal Data Protection Law (PDPL) in Saudi Arabia; Discussing the importance of artificial intelligence for the future of Saudi health care, a survey method was used, and the study showed that artificial intelligence should not only lead to better health, but it should also lead to saving manpower and simplifying health care operations. Participants agreed that artificial intelligence helps reflect human intellectual competencies and goes beyond their limits.

11. Study(Albinsaad et al, 2022), Title: The Saudi Community View of the Use of Artificial Intelligence in Health Care

The study aimed to evaluate society's views regarding the use of artificial intelligence in health care. The study used the descriptive analytical method, and the questionnaire was relied upon as a tool for this study. The study reached 771 individuals, 42.5% of whom had a positive view of the use of artificial intelligence in health care, and 31.8% have a neutral point of view, and 7.5% have a negative point of view. The only factor associated with positive opinion was regional

differences ($P = 0.006$). Furthermore, participants who used medical apps or software ($P = 0.026$), and wearable devices ($P = 0.027$), felt more confident in using technology ($P < 0.001$), enjoyed using technology ($P < 0.001$), and found that Easier to recognize. new hardware or software ($P < 0.001$), had more knowledge about AI ($P < 0.001$) and had more positive views regarding the use of AI in healthcare. Conclusions: The study found that most Saudis, especially those who were familiar with the use of technology, supported the use of artificial intelligence in healthcare, with a positive or neutral view. However, targeted campaigns in specific regions are also needed to educate the entire community about the potential benefits of AI.

12. Study by (Al-Dhafiri et al, 2022) Title: The role of using artificial intelligence technologies and their impact on the quality of health services and their outcomes in Hafr Al-Batin Governorate.

The study aimed to identify the role of the use of artificial intelligence and its impact on the quality of health services in government medical centers in Hafar Al-Batin Governorate. The study used the descriptive analytical approach, and the questionnaire was relied upon as a tool for this study. The sample size reached (592) individuals, and the study concluded that there is a positive relationship between the role of artificial intelligence and the performance and behavior of employees within the health institution, in addition to the existence of a strong relationship between smart programs and artificial intelligence techniques and the efficient and effective work of employees, and the contribution of artificial intelligence to solving many problems. The results also indicated that there is a discrepancy between the training and development process and the use of available technologies, with the presence There is a positive relationship between the uses of artificial intelligence and the quality of health services, and the results indicated the presence of administrative deficiencies represented in some departments, especially in the vocational training

process. The study presented a number of recommendations, including expanding the field of vocational training and working to spread the culture of technology and artificial intelligence further to motivate employees to professionally develop their performance.

13. Study by (Al-Khalayla, 2021). Titled The impact of artificial intelligence applications on the quality of health care: an applied study on Jordanian Ministry of Health hospitals.

This study aimed to identify the applications of artificial intelligence on the quality of health care in hospitals of the Jordanian Ministry of Health. The study used the descriptive analytical approach. The questionnaire was relied upon as a tool for this study. The sample size reached (239) individuals. The study concluded that the general arithmetic mediation level of applications Artificial intelligence was rated average, and the general arithmetic average level of quality of health care in Jordanian Ministry of Health hospitals was rated average. There was also a statistically significant effect at the level of significance (as 0.05) Dimensions Applications of artificial intelligence on quality Health care in Jordanian Ministry of Health hospitals. The study recommended the necessity of conducting continuous training programs to develop and develop the skills of workers in the health sector on using artificial intelligence applications, and intensifying introductory and awareness courses on the importance of using artificial intelligence applications in providing health care services, especially in government sector hospitals, due to the increase in patients, in addition to working to survey opinions. Visitors after providing the health service to them. Their degree of satisfaction with the quality of service, with the need for Ministry of Health hospitals to adhere to the speed and accuracy of providing health services on time, and to pay more attention to the cleanliness of health facilities inside hospitals.

14. Study by (Al-Jehani et al, 2021)Title : Development of artificial intelligence techniques in Saudi Arabia: the impact on COVID-19 pandemic.

The study aimed to identify advanced artificial intelligence technologies in the Kingdom of Saudi Arabia, which are divided into two types. The first type is the NEOM project, a planned city that will integrate smart city technologies in the northwest of the Kingdom, located in the city of Tabuk, Saudi Arabia. The second type is robots, which are machines that can perform a complex series of actions automatically, especially those that can be programmed by a computer such as the Sophia robot, the Sarah chatbot robot, the medical robot, etc. The paper also described global artificial intelligence efforts to confront the Covid pandemic. -19. In addition, the study concluded that the speed with which artificial intelligence is implemented in various fields will lead to a revolution that will be consistent with the aspirations of Saudi Arabia's Vision 2030. Artificial intelligence technology occupies most positions in workplaces, factories, and even hospitals in the Kingdom of Saudi Arabia. It will work to increase productivity, enhance decision-making processes in all sectors, provide the Saudi people with more innovative services, and open new horizons for promoting entrepreneurship. Digital transformation and artificial intelligence are critical drivers of these large-scale reforms, and the study also showed that educational reform is the most important step in these initiatives, starting with introducing digital skills in K-12 education to meet changing demands in the workplace, and the Ministry of Education is working on These schools and universities meet the needs of the future and develop expertise in the field of education. Areas of artificial intelligence, data science, data security, etc. This is important to prepare for the future jobs of the next generation. Healthcare systems in the Kingdom of Saudi Arabia have recently begun to rely on artificial intelligence applications, because they can store and process massive patient data, which leads to improving the quality of medical care, improving the decision-making process, and reducing costs.

15. Study by (Abdullah & Fakieh, 2020)Title : Health care employees’ perceptions of the use of artificial intelligence applications: survey study

The study aimed to explore the perceptions and attitudes of health care employees towards the application of artificial intelligence technologies in health care institutions in the Kingdom of Saudi Arabia. The study used the descriptive analytical approach, and the questionnaire was relied upon as a tool for this study. The sample size was (250), and the study concluded that 3.11 of 4 Participants feared that AI would replace employees and had a general lack of knowledge regarding AI. In addition, most participants were not aware of the most common advantages and challenges of AI applications in the health sector, indicating a need for training. The results also showed that technicians are most affected by AI applications due to the nature of their jobs that do not require much direct human interaction. The study also showed that the Saudi healthcare sector represents a useful market potential that should be attractive to researchers and developers of artificial intelligence solutions.

16. Study by(Abdullah, & Fakieh, 2020). Title: Health care employees’ perceptions of the use of artificial intelligence applications: survey study.

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nature of their jobs that do not require a lot of direct human interaction. The study showed that the Saudi healthcare sector represents a useful market potential that should be attractive to researchers and developers of artificial intelligence solutions.

17. Study by (Lau,2019). Titled Artificial intelligence in health: new opportunities, challenges, and practical implications.

The study aimed to summarize the latest developments during 2018 in the field of consumer health informatics and education, with a particular focus on the special theme of the 2019 International Medical Informatics Association (IMIA) Yearbook: “Artificial Intelligence in Health: New Opportunities, Challenges and Implications.” In the process, the study used a descriptive approach. The study found that only a small number of 2018 papers on artificial intelligence (AI) research for patients and consumers found any studies on AI applications specifically designed for patients or consumers, nor were there any studies Eliciting Patient and Consumer Input on AI Currently, the most common use of AI for patients and consumers lies in secondary analysis of social media data (eg, online discussion forums. In particular, the top three papers shared a common methodology for using algorithms. Data-driven e.g., text mining, topic modeling, latent Dirichlet personalization modeling), combined with vision-driven methods (visualization, qualitative analysis, manual review). To uncover patients' and consumers' experiences regarding health and illness in online communities.

Theoretical frameworks

2.1. Artificial intelligence Background

AI can be broadly defined as computerized systems that function and react in ways that are usually assumed to need intelligence, such as the capacity to learn, solve problems, and attain goals under uncertain and changing environments, with variable levels of autonomy. AI is not a single concept; rather, AI systems

can span a variety of approaches and application areas, including natural language processing, robotics, and face recognition. Machine learning (ML), deep learning (DL), and neural networks are common concepts used in the field of artificial intelligence. ML, sometimes referred to as a subsection of AI, explores how to develop computer programs that automatically improve their performance at specific tasks via experience, without depending on explicit rules-based programming (Prentice et al., 2020).

One of the aims of machine learning is to educate algorithms how to properly interpret new data. DL systems learn from vast volumes of data and then detect and categorize related but previously unseen data. Neural networks, a sort of deep learning that is loosely based after the human brain, are made up of hundreds or millions of processing nodes (also known as computing units). DL techniques have been applied in a variety of AI research systems, including autonomous cars and speech recognition technology (Brill et al.,2022).

Historically, there has been discussion about whether technology should be categorized as AI. For example, robotic process automation (RPA) has been defined as the use of rules-based software to automate highly repetitive, regular processes that are typically handled by knowledge workers. Because it automates human-performed tasks, it is frequently referred to as AI technology. However, some contend that RPA is not AI since it lacks a learning component. Others see RPA as a fundamental technology that may be used with AI to build complicated process automation, or intelligent process automation, along a "intelligent automation continuum" (Al-Hyari et al., 2023).

The phrase "artificial intelligence" originated during the Dartmouth Summer Research Project on Artificial Intelligence, a conference planned in 1955 and held the following year. Since then, the area of artificial intelligence has gone through what some call "summer and winter" periods of intense study and innovation, followed by lulls in activity and growth. The reasons for AI winters have included an emphasis on theory over practical applications, research issues that were more difficult than anticipated, and technological restrictions at the time. Much of the current growth and research in AI, which began about

2010, has been linked to the availability of massive datasets (i.e., big data), enhanced machine learning methodologies and algorithms, and more powerful computers (Ameen et al., 2021).

2.2. Artificial Intelligence (AI)

Defined by (Abu Salma ,2021) it as “a science that specializes in studying computers and studying systems that display a form of intelligence, meaning that artificial intelligence expresses a group of computer systems capable of learning new concepts and tasks so that they are able to think, analyze, and draw conclusions.” “. "In a short time and then making a difference in people's lives."

Defined by (Malik, et al., 2021) it as “the field that models elementary learning skill just like a human and examines the ability to respond to certain behaviors that are very similar to human behaviors, which in turn succeed in solving complex problems with abilities beyond those.” Humanity in non-human data processing Digital and symbolic in nature.

As defined by (Agarwal, 2021), it is “the study of ideas that will form machines capable of simulation through a set of computer systems compatible with traditional human responses by looking at the human ability to intend, to think, to think, and to think.” and infer data logically.

2.3. The importance of artificial intelligence:

Artificial intelligence and its various applications are of great importance due to its advantages and effective role in many areas of life, through the development of computer systems, so that they work with high efficiency similar in efficiency to the efficiency of a human expert. Therefore, artificial intelligence is considered one of the things that has generated widespread resonance in various fields due to its ability to solve difficult problems, provide the highest quality standards, and improve different work patterns. Therefore, the importance of artificial intelligence is as follows:

- ✓ Preserving accumulated human experiences by transferring them to smart machines.

- ✓ The possibility of using human language to interact with machines instead of using computer programming languages (Milne-Ives, 2020).
- ✓ The possibility of artificial intelligence contributing to many sensitive fields, such as diagnosing diseases, prescribing medications, legal consultations, and interactive education, of which artificial intelligence has become an essential part.
- ✓ It contributes to supporting access to further exploration, and thus supporting continuous development in all fields.
- ✓ It contributes to completing missing information and data in a manner commensurate with the available data, and thus contributes to achieving many yet-to-be-discovered successes in various fields (Sun, 2021).

2.4. Types of AI

2.4.1. Type 1

Today, artificial intelligence is more correctly described as narrow AI (or weak AI), which is non-sentient machine intelligence meant to do a specific job (e.g., only face recognition, only internet searches, or only driving a car) (Rane, 2023). However, many researchers' long-term objective is to construct an artificial general intelligence (AGI or strong AI), which is a computer that can apply intelligence to any problem, rather than just one specific problem, and is often defined as "at least as smart as a typical human". While narrow AI may surpass humans at whatever their specialized task is, such as playing chess or calculating mathematics, AGI would exceed humans at practically every cognitive task (Alnaser et al., 2023).

The ultimate hypothetical goal is achieving superintelligence (ASI) which is far surpassing that of the brightest and most gifted human minds. Due to recursive self-improvement, superintelligence is expected to be a rapid outcome of creating artificial general intelligence.

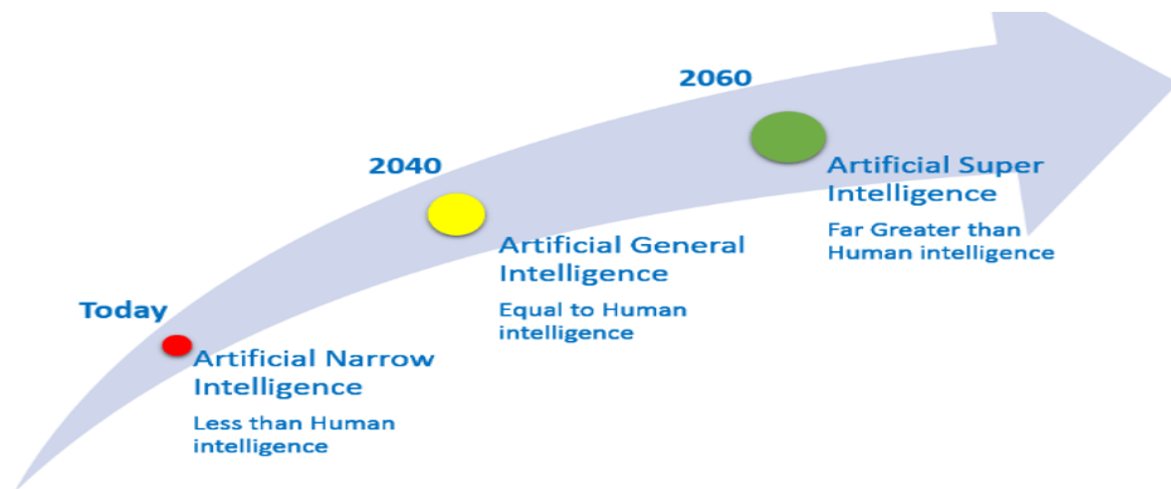


Figure 2 AI Type

2.4.2. Type 2 (based on functionalities)

➤ **Purely Reactive**

Reactive machines are simple in that they do not store 'memories' or utilize previous experiences to predict future behaviors. They just sense the world and respond to it. IBM's Deep Blue, which defeated chess grandmaster Kasparov, is a reactive system that perceives and reacts to chess pieces. It cannot draw on any past experiences and cannot develop by practice (Zhang et al., 2024).

➤ **Limited Memory**

Machines with limited memory can only preserve data for a short length of time. While they can utilize this data for a limited time, they cannot incorporate it into a library of their experiences. Many self-driving vehicles employ Limited Memory technology: they retain data such as the most recent speed of surrounding automobiles, the distance between such cars, the speed limit, and other information that might assist them traverse roadways (Nguyen & Malik, 2022).

➤ **Theory of Mind**

According to psychology, people's conduct is driven by their ideas, emotions, memories, and mental models. Theory of Mind researchers aim to create computers that mimic our mental models by generating representations of the environment and other agents and things in it. One of the researchers' goals is to create computers that can interact with humans and assess human intellect, as well as how events and the environment affect people's emotions. While many computers employ models, no computer with a'mind' yet exists. Examples are C-3PO R2-D2 from Star Wars Universe and Sonny from the 2004 film (Chen et al., 2021).

➤ **Self-Awareness**

Self-aware computers are the stuff of science fiction, yet many AI enthusiasts believe they are the future of AI research. Even if a computer can function in the same way that a human does, such as conserving itself, forecasting its own wants and demands, and interacting with people as an equal, the issue of whether a machine can become really self-aware, or 'conscious', is best left to philosophers. Examples include Eva in the 2015 film Ex Machina and Synths in the 2015 television series Humans (Zhao et al., 2022).

2.5. Field of AI

Artificial Intelligence (AI) encompasses various fields that focus on creating systems or machines capable of performing tasks that typically require human intelligence (Song et al.,2022). These fields can be broadly categorized into several key areas:

1. **Machine Learning** This field involves the development of algorithms and statistical models that enable computers to learn from and make predictions or decisions based on data. Machine learning techniques include supervised learning, unsupervised learning, semi-supervised learning, reinforcement learning, and deep learning.

2. **Deep Learning** Deep learning is a subset of machine learning that deals with neural networks composed of many layers (hence "deep"). Deep learning models are particularly adept at tasks such as image and speech recognition, natural language processing, and playing strategic games like Go and chess.
3. **Natural Language Processing (NLP)**: NLP focuses on enabling computers to understand, interpret, and generate human language. This field encompasses tasks such as text analysis, sentiment analysis, machine translation, question answering, and dialogue systems.
4. **Computer Vision**: Computer vision involves teaching computers to interpret and understand visual information from the real world. Applications of computer vision include image recognition, object detection, facial recognition, and medical image analysis (Trawnih et al.2022).
5. **Robotics**: Robotics combines AI with engineering to design and build intelligent machines, often with physical capabilities. These robots can perform tasks in various domains, including manufacturing, healthcare, agriculture, exploration, and entertainment.
6. **Expert Systems**: Expert systems are AI programs designed to mimic the decision-making abilities of a human expert in a specific domain. These systems use knowledge bases and inference engines to provide advice, make diagnoses, or solve problems within their area of expertise.
7. **Reinforcement Learning**: Reinforcement learning is a type of machine learning where an agent learns to make decisions by interacting with an environment to achieve specific goals. It involves learning from feedback in the form of rewards or penalties and is commonly used in applications such as game playing, robotics, and autonomous vehicle control.
8. **Cognitive Computing**: Cognitive computing aims to simulate human thought processes in a computerized model. It involves integrating various AI techniques, such as natural language processing, machine learning, and pattern recognition, to create systems that can reason, learn, and interact with humans in a more natural way.

These fields of artificial intelligence often intersect and overlap, with advancements in one area frequently contributing to progress in others. As AI technologies continue to evolve, they have the potential to revolutionize numerous industries and reshape society in profound ways (Zahra et al.,2023).

2.6. AI Objective

The objective of Artificial Intelligence (AI) is to develop systems that can perform tasks that typically require human intelligence. This encompasses a wide range of goals and objectives, including(Luo et al.,2019).

1. Automation: AI aims to automate repetitive and mundane tasks, allowing humans to focus on more creative, strategic, or high-level activities. This can lead to increased productivity, efficiency, and cost savings across various industries.
2. Problem Solving: AI seeks to develop algorithms and systems capable of solving complex problems across diverse domains. These problems may involve optimization, decision-making, planning, and reasoning under uncertainty.
3. Understanding and Learning from Data: AI endeavors to develop techniques for extracting valuable insights, patterns, and knowledge from large volumes of data. This includes tasks such as data mining, pattern recognition, and predictive analytics (Dantsoho et al.,2021).
4. Natural Interaction: AI aims to enable natural and intuitive interactions between humans and machines. This involves advancements in natural language processing, speech recognition, gesture recognition, and computer vision to facilitate seamless communication and collaboration.
5. Adaptability and Flexibility: AI seeks to create systems that can adapt to changing environments, learn from experience, and improve over time. This includes the development of learning algorithms, adaptive control systems, and autonomous agents capable of continuously refining their behavior.

6. Enhancing Human Capabilities: AI aims to augment human intelligence and capabilities rather than replace them entirely. By providing tools and technologies that complement human skills, AI can empower individuals to achieve greater levels of productivity, creativity, and innovation.
7. Ethical and Responsible AI: AI research and development also focus on ensuring that AI systems are designed and deployed in a manner that aligns with ethical principles, fairness, transparency, accountability, and societal values. This includes addressing issues such as bias, privacy concerns, safety, and the impact of AI on employment and society (Pillarisetty& Mishra,2022).

The overarching objective of Artificial Intelligence is to create intelligent systems that can perceive, reason, learn, and act autonomously in ways that mimic or surpass human intelligence, ultimately leading to widespread societal benefits and advancements.

2.7. Characteristics of artificial intelligence:

Artificial intelligence is characterized by many characteristics that distinguish it from other methods used to accomplish tasks with the highest quality and accuracy and the least effort and cost. Among these characteristics are what will be presented as follows:

- Rapidly inventing the mechanism used to solve a specific problem, relying on objective judgment and logical and accurate analysis of the problem and thus providing solutions that suit this problem.
- The ability to enjoy the characteristics of human intelligence, such as thinking, analysis, estimation, and the ability to develop and perform work that is difficult for the human element (Marwan, 2019)
- Artificial intelligence includes a large database that includes many concepts, methods and technologies related to all fields and how to employ them in the appropriate manner so that they mimic the human capabilities qualified to work in each field separately.
- Relative stability, which is the most prominent characteristic that distinguishes artificial intelligence due to its ability to study the logical thinking of the human element and attempt to implement this on computers.

- The ability of artificial intelligence to self-develop due to its ability to learn and develop continuously (Abdel Razek, 2022)

2.8. Reasons for interest in artificial intelligence:

Given the importance of artificial intelligence and its entry into many fields, many reasons for paying attention to it have emerged, which will be presented in an optimal manner:

- ✓ These systems represent a successful means in times of crises through modern and innovative systems and applications.
- ✓ The ability of artificial intelligence to find solutions to complex problems, analyze and process them, and reach the best results in record time.
- ✓ The possibility of artificial intelligence providing an organized knowledge database that allows storing data and information that allows workers in various institutions to benefit from expertise and experiences that are not available in books or traditional sources.
- ✓ The ability of artificial intelligence to create a mechanism that is not subject to human feelings such as anxiety and fatigue, especially when it comes to stressful work, which in turn poses a mental and physical danger at the same time.
- ✓ The ability to retain the expertise of workers within institutions even when they are not present, which allows institutions to optimally increase the expertise of their workers (Al-Sayyad, 2023).

2.9. Health Sector

The health sector is a crucial component of any society, encompassing a wide range of activities, services, and institutions dedicated to the maintenance and improvement of public health. It includes hospitals, clinics, primary care centers, and various other healthcare facilities, as well as public health agencies and research institutions. The primary objective of the health sector is to provide medical care, prevent diseases, and promote overall health and well-being among populations (Bertl et al.,2023).

Historically, the health sector has evolved significantly from rudimentary medical practices to sophisticated systems integrating advanced technologies and evidence-based practices. This evolution has been driven by advancements in medical science, changes in public health policies, and the increasing complexity of healthcare needs (Hashiguchi et al.,2022).

The health sector operates within a complex framework influenced by numerous factors, including socio-economic conditions, technological advancements, and political and regulatory environments. It is characterized by a diverse array of services ranging from preventative care and diagnostic procedures to therapeutic treatments and palliative care (Alhashmi et al.,2020).

2.10. The Role of Healthcare Professionals

Healthcare professionals play a central role in the health sector, serving as the primary agents in delivering medical care, promoting health, and preventing disease. Their responsibilities and functions are diverse and critical to the functioning of healthcare systems(Ali et al.,2023).

1. Clinical Care Providers

- Physicians: Physicians diagnose, treat, and manage a wide range of medical conditions. They perform examinations, order and interpret diagnostic tests, prescribe medications, and develop treatment plans. Specializations within this group include general practitioners, surgeons, and various specialists.
- Nurses: Nurses provide direct patient care and support across all healthcare settings. They administer medications, monitor patient progress, assist with medical procedures, and educate patients and families about health management. Nursing roles range from registered nurses (RNs) to nurse practitioners (NPs) and nurse anesthetists.

- Allied Health Professionals: This group includes various specialists such as physical therapists, occupational therapists, and speech-language pathologists. They provide rehabilitative and therapeutic services aimed at improving patients' functional abilities and quality of life (Khan et al.,2023).

2. Diagnostic and Therapeutic Services

- Medical Technologists: These professionals perform and analyze diagnostic tests, including blood tests, imaging studies, and pathology exams. Their work is essential for accurate diagnosis and treatment planning.
- Pharmacists: Pharmacists manage the safe and effective use of medications. They dispense prescriptions, provide medication counseling, and work with healthcare teams to optimize pharmacotherapy.

3. Public Health and Preventive Services

- Public Health Professionals: They work on disease prevention and health promotion initiatives. Their roles include developing public health policies, conducting epidemiological research, and implementing vaccination programs.
- Health Educators: These professionals focus on educating individuals and communities about health practices and healthy lifestyles. They develop educational materials, conduct workshops, and advocate for health behavior changes (Puaschunder, 2019).

3. Administrative and Support Roles

- Healthcare Administrators: They manage healthcare facilities and systems, overseeing operations, budgeting, and strategic planning. Their work ensures that healthcare organizations run efficiently and comply with regulations.

- Medical Records and Health Information Technicians: These professionals handle patient records, ensure data accuracy, and manage health information systems. They play a crucial role in maintaining patient privacy and supporting clinical decisions.

5. Research and Innovation

- Medical Researchers: They conduct studies to advance medical knowledge, develop new treatments, and improve healthcare practices. Their research contributes to evidence-based medicine and innovative solutions in healthcare.
- Biomedical Engineers: These professionals design and develop medical devices and technologies, working to improve patient care and treatment outcomes through technological innovation (Mukherjee et al.,2022).

6. Interdisciplinary Collaboration

- Healthcare professionals often work as part of interdisciplinary teams to provide comprehensive care. Effective collaboration among physicians, nurses, therapists, pharmacists, and other professionals ensures holistic patient management and better health outcomes.

7. Ethical and Legal Responsibilities

- Healthcare professionals are bound by ethical standards and legal regulations. They must maintain patient confidentiality, obtain informed consent, and provide care that adheres to professional guidelines and legal requirements.

2.11. Measuring Healthcare Quality and Performance

Measuring healthcare quality and performance is essential to ensure that healthcare systems provide effective, safe, and patient-centered care. This process involves evaluating various

aspects of healthcare delivery to assess whether services meet established standards and to identify areas for improvement (Amjad et al.,2023).

One key aspect of measuring healthcare quality is the use of quality indicators. These indicators are specific metrics that reflect different dimensions of care, such as patient outcomes, safety, and satisfaction. Common quality indicators include rates of hospital-acquired infections, readmission rates, and patient satisfaction scores. By analyzing these indicators, healthcare organizations can gauge the effectiveness of their services and identify patterns or trends that may require attention (Whig et al.,2022).

Performance measurement often involves the use of benchmarking and comparative analysis. Benchmarking entails comparing an organization's performance against established standards or best practices, either within the same institution or across similar organizations. This process helps identify performance gaps and sets targets for improvement. Comparative analysis, on the other hand, involves evaluating performance data from different organizations to determine relative standing and best practices (Saxena et al.,2024).

Patient safety is a critical component of healthcare quality. Measuring safety involves tracking incidents such as medication errors, surgical complications, and adverse events. Tools such as safety checklists and incident reporting systems help monitor these factors, ensuring that care processes are safe and reliable. Implementing safety protocols and conducting regular safety audits are also essential for minimizing risks and enhancing patient safety (Sukums et al.,2023).

Patient satisfaction is another vital measure of healthcare quality. Patient satisfaction surveys collect feedback on various aspects of the patient experience, including communication with healthcare providers, comfort, and overall care. High levels of patient satisfaction are often associated with better clinical outcomes and more efficient healthcare delivery. Analyzing survey

results can provide insights into patients' perceptions and help organizations address areas of concern (Alhashmi et al.,2019).

Clinical performance measures focus on the effectiveness of care provided. These measures assess how well healthcare services achieve desired health outcomes. Examples include adherence to clinical guidelines, success rates of treatments, and the management of chronic conditions. Monitoring clinical performance helps ensure that evidence-based practices are implemented and that care is aligned with the latest medical standards. Accreditation and certification are formal processes through which healthcare organizations demonstrate their adherence to established quality standards. Accreditation bodies evaluate healthcare facilities against a set of criteria and provide certification if standards are met. This external validation serves as an assurance of quality and can drive improvements by providing feedback on performance (Sarker,2024).

Data analytics plays a crucial role in measuring healthcare quality and performance. Advanced data analysis techniques, including predictive analytics and machine learning, can uncover trends and patterns in large datasets. These insights enable healthcare organizations to make informed decisions, optimize resource allocation, and enhance care delivery.

2.12. Healthcare Policy and Governance

Healthcare policy and governance are critical components that define how healthcare systems are structured, managed, and improved. They encompass the formulation and execution of policies and the establishment of governance frameworks that guide healthcare delivery, ensuring that systems are equitable, effective, and sustainable (Mucha et al.,2020).

Healthcare Policy refers to the guidelines and regulations that direct healthcare practices and decisions. Policies are created at various levels local, national, and international—and address

a range of issues including access to care, healthcare costs, quality of services, and public health initiatives. Effective healthcare policies aim to improve health outcomes by addressing the needs of patients, healthcare providers, and the broader community. They are often informed by data, research, and stakeholder input to ensure that they are relevant and impactful.

Governance involves the structures, processes, and decision-making mechanisms that oversee and manage the healthcare system. This includes the roles and responsibilities of various entities such as government agencies, healthcare organizations, and regulatory bodies. Good governance ensures that healthcare systems operate transparently, fairly, and efficiently. It involves setting standards, ensuring compliance, and providing oversight to maintain high-quality care and address issues such as fraud, malpractice, and safety.

Regulatory Frameworks play a key role in healthcare governance by setting standards for healthcare practices and ensuring adherence to legal and ethical norms. These frameworks govern the licensing of healthcare professionals, the accreditation of healthcare facilities, and the regulation of medical products and services. Regulatory bodies, such as health departments and professional licensing boards, enforce these standards to protect public health and ensure the integrity of the healthcare system.

Health Policy Development is a systematic process that includes identifying health needs, analyzing data, and formulating policy solutions. This process involves engaging stakeholders, reviewing evidence, and assessing potential impacts to ensure that policies are effective and feasible. Policymakers must address complex issues such as balancing cost and quality, improving access, and integrating new technologies and practices.

Implementation and Evaluation are crucial for the success of healthcare policies. Implementation involves the practical application of policies, requiring coordination among

various stakeholders and adequate resources. Evaluation assesses the effectiveness of policies by measuring their impact on healthcare outcomes, efficiency, and equity. This involves collecting data, monitoring performance, and obtaining feedback to identify successes and areas for improvement.

Healthcare Reform often arises from the need to address systemic challenges within the healthcare system. Reforms may involve changes in policy, governance structures, or both. Effective reform requires careful planning, stakeholder engagement, and ongoing evaluation to achieve desired outcomes and enhance the overall performance of the healthcare system.

2.13. AI in Healthcare

Artificial Intelligence (AI) is revolutionizing the healthcare sector by enhancing the accuracy, efficiency, and accessibility of medical care. AI technologies, which include machine learning, natural language processing, and robotics, are being integrated into various aspects of healthcare to improve patient outcomes, streamline processes, and support clinical decision-making (Gómez-González,2020).

Diagnostic and Predictive Analytics

AI algorithms are increasingly used to analyze medical data and assist in diagnosing diseases. For instance, AI-driven tools can interpret medical images such as X-rays, MRIs, and CT scans with high accuracy, often identifying patterns that may be missed by human radiologists. These tools use deep learning techniques to process vast amounts of imaging data and provide diagnostic suggestions. Predictive analytics powered by AI can forecast patient outcomes and disease progression by analyzing historical and real-time data. This capability is particularly valuable in managing chronic diseases and personalizing treatment plans (Fruehwirt & Duckworth, 2021).

Personalized Medicine

AI facilitates the development of personalized medicine by analyzing genetic, environmental, and lifestyle data to tailor treatments to individual patients. AI systems can process genomic information to identify genetic markers associated with diseases and predict how patients will respond to different therapies. This approach helps in creating targeted treatment plans that are more effective and have fewer side effects compared to traditional one-size-fits-all treatments (Chhaperia & Khanna,2024).

Robotics and Automation

In surgical settings, AI-powered robots assist surgeons with precision and control during operations. These robotic systems enhance surgical outcomes by providing greater accuracy and reducing the risk of complications. In addition, AI is used in automating administrative tasks such as scheduling, billing, and data entry, which helps reduce the administrative burden on healthcare professionals and allows them to focus more on patient care (Sethi et al.,2020).

Natural Language Processing (NLP)

AI-driven NLP tools are used to analyze and interpret unstructured data from medical records, research articles, and patient interactions. These tools can extract relevant information from clinical notes, facilitate the search for specific medical knowledge, and support evidence-based decision-making. NLP can also enhance patient communication by translating complex medical information into language that is more understandable for patients (Mittleider et al.,2024).

Clinical Decision Support Systems (CDSS)

AI-powered Clinical Decision Support Systems assist healthcare providers by offering evidence-based recommendations and alerts. These systems analyze patient data in real time to suggest potential diagnoses, treatment options, and drug interactions. CDSS helps reduce the

likelihood of errors, improve diagnostic accuracy, and ensure that care is aligned with the latest clinical guidelines (York et al.,2020).

Telemedicine and Remote Monitoring

AI enhances telemedicine by providing tools for remote diagnosis and patient monitoring. AI algorithms can analyze data from wearable devices and remote sensors to monitor patients' health status and detect potential issues before they become critical. This capability is especially beneficial for managing chronic conditions and providing continuous care to patients in remote or underserved areas (Yao et al.,2021).

Challenges and Ethical Considerations

While AI offers significant benefits, it also presents challenges and ethical considerations. Issues such as data privacy, algorithmic bias, and the need for transparency in AI decision-making must be addressed. Ensuring that AI systems are trained on diverse datasets and that their decisions can be audited and explained are crucial for maintaining trust and ensuring equitable care (Kosinski et al.,2015).

Future Directions

The future of AI in healthcare promises continued advancements in precision medicine, operational efficiency, and patient care. Ongoing research aims to enhance AI capabilities, integrate them more seamlessly into clinical workflows, and address ethical and regulatory concerns. As AI technologies evolve, they are expected to play an increasingly central role in transforming healthcare delivery and improving patient outcomes.

2.14. AI Applications in Healthcare

Artificial Intelligence (AI) is increasingly becoming an integral part of the healthcare sector, driving improvements in patient care, operational efficiency, and medical research. Its

applications are diverse and impactful, reshaping how healthcare services are delivered and managed (Koonrunsesomboon et al.,2016).

One significant application of AI is in diagnostic imaging and analysis. AI algorithms, particularly those utilizing deep learning techniques, are employed to analyze medical images such as X-rays, MRIs, and CT scans. These algorithms are capable of detecting anomalies, identifying patterns, and assisting radiologists in diagnosing conditions like tumors and fractures with high accuracy. Computer-Aided Detection (CAD) systems further support radiologists by highlighting potential areas of concern in imaging studies, thereby reducing the risk of missed diagnoses and enhancing the accuracy of interpretations (Yasmin et al.,2021).

In the realm of predictive analytics, AI models are utilized to analyze patient data and predict the likelihood of developing specific conditions or experiencing adverse events. For example, AI can forecast which patients are at higher risk of heart disease, diabetes, or hospital readmission. Predictive analytics also play a crucial role in forecasting patient outcomes, such as disease progression and treatment response, by analyzing historical and real-time data. This capability allows for the development of personalized treatment plans and proactive management of patient care (van Oirschot & Ooms,2022).

Personalized medicine is another area where AI has made significant strides. AI facilitates the analysis of genomic data to identify genetic markers associated with various diseases and tailor treatments to individual patients. By integrating genetic, environmental, and lifestyle data, AI enables the creation of personalized therapeutic strategies. Additionally, AI accelerates drug discovery by analyzing large datasets to identify potential drug candidates, predict their efficacy, and streamline the development process, which speeds up the introduction of new treatments.

Robotics and automation in healthcare are also being transformed by AI. AI-powered surgical robots enhance precision during surgeries by providing real-time data and advanced control mechanisms, aiding surgeons in performing complex procedures with greater accuracy and minimal invasiveness. Moreover, AI automates routine administrative tasks such as scheduling, billing, and data entry, reducing the administrative burden on healthcare professionals and improving overall operational efficiency. Clinical Decision Support Systems (CDSS) leverage AI to offer evidence-based recommendations for diagnosis and treatment. These systems analyze patient data in conjunction with clinical guidelines to suggest optimal treatment options. AI-driven CDSS also generate alerts for potential drug interactions, dosage errors, or deviations from clinical protocols, helping to prevent errors and enhance patient safety (Mijwil et al.,2022).

Natural Language Processing (NLP) is used to manage unstructured data in electronic health records (EHRs). NLP tools extract and organize information from clinical notes and medical literature, improving data accessibility and supporting clinical decision-making. NLP is also employed in chatbots and virtual assistants to interact with patients, answer questions, and provide basic healthcare information, thereby enhancing patient engagement and access to information. In telemedicine and remote monitoring, AI supports virtual consultations and remote care by analyzing patient-reported symptoms and health data collected through digital platforms. AI-powered wearables and remote sensors monitor patients' vital signs and health metrics in real-time, allowing healthcare providers to deliver continuous care for chronic conditions and respond promptly to any changes in health status (Ahmed,2024).

In healthcare administration and management, AI aids in optimizing resource allocation by analyzing patient flow, staff availability, and operational data. This improves hospital management and ensures efficient use of resources. Additionally, AI algorithms are employed to detect

fraudulent activities and billing anomalies in healthcare claims, ensuring financial integrity and regulatory compliance. Finally, population health management benefits from AI through the analysis of population health data to identify trends, outbreaks, and emerging health issues. This information supports public health initiatives and helps develop targeted interventions to address health challenges on a broader scale.

2.15. Benefits of AI in Healthcare

Artificial Intelligence (AI) offers numerous benefits in the healthcare sector, transforming the way medical care is delivered and improving overall health outcomes. The integration of AI technologies into healthcare systems presents several key advantages (Chavda et al.,2023).

1. **Enhanced Diagnostic Accuracy** :AI algorithms, particularly those using deep learning, can analyze complex medical images and data with high precision. This enhances diagnostic accuracy by detecting subtle patterns and anomalies that may be missed by human eyes. For instance, AI tools can assist in early detection of diseases such as cancer, leading to timely and potentially life-saving interventions.
2. **Personalized Treatment Plans** :AI enables personalized medicine by analyzing genetic, environmental, and lifestyle data to tailor treatments to individual patients. This approach ensures that patients receive therapies that are most likely to be effective based on their unique genetic makeup and health history, leading to improved outcomes and reduced side effects.
3. **Predictive Analytics for Proactive Care** :AI-driven predictive analytics can forecast patient outcomes and identify individuals at high risk for certain conditions. This allows healthcare providers to implement preventative measures and personalized care plans proactively, reducing the likelihood of disease progression and improving overall health management.

4. **Operational Efficiency** :AI automates routine administrative tasks such as scheduling, billing, and data entry, which reduces the administrative burden on healthcare professionals. This streamlining of operations leads to more efficient use of resources, improved workflow, and reduced operational costs (Rozario et al.,2021).
5. **Improved Patient Engagement**:AI-powered tools, such as chatbots and virtual assistants, enhance patient engagement by providing timely and relevant information. These tools can answer patient queries, provide health information, and support self-management of conditions, thereby improving patient experience and adherence to treatment plans.
6. **Enhanced Precision in Surgery** :AI-driven surgical robots provide surgeons with real-time data and advanced control mechanisms, enhancing precision during complex procedures. This results in fewer complications, reduced recovery times, and better overall surgical outcomes.
7. **Efficient Drug Discovery and Development** :AI accelerates the drug discovery process by analyzing vast datasets to identify potential drug candidates and predict their efficacy. This reduces the time and cost associated with developing new treatments, bringing innovative therapies to market more quickly.
8. **Better Management of Chronic Conditions** :AI-powered remote monitoring tools and wearables track patients' vital signs and health metrics continuously. This real-time monitoring enables timely interventions and personalized adjustments to treatment plans, improving the management of chronic conditions and enhancing quality of life (Comito et al.,2022).
9. **Fraud Detection and Prevention** :AI algorithms can detect anomalies and patterns indicative of fraudulent activities in healthcare claims and billing processes. This helps in maintaining financial integrity, preventing fraud, and ensuring compliance with regulations.

10. Enhanced Population Health Management :AI analyzes population health data to identify trends, outbreaks, and emerging health issues. This insight supports public health initiatives and helps in developing targeted interventions, ultimately improving health outcomes on a broader scale.
11. Streamlined Research and Data Analysis :AI facilitates the analysis of large volumes of research data, uncovering new insights and accelerating the pace of scientific discovery. This can lead to advances in medical knowledge, improved treatment strategies, and more effective public health policies (Morley et al.,2020).

Chapter Three: Methodology

3.1 Introduction

In this chapter, the methodology of the study will be detailed, including the research methods employed, a description of the sample used, and an in-depth explanation of the tools applied. The chapter will outline how these tools were prepared, as well as their validity and reliability. Additionally, the statistical methods and treatments utilized to analyze the study's hypotheses will be discussed, highlighting how they contributed to obtaining reliable scientific results.

3.2 Methodology

This study was conducted to address the research questions posed, and therefore it relied on a quantitative approach to assess the impact of artificial intelligence on the health sector in the Kingdom of Saudi Arabia, with a specific focus on Mouwasat Hospital in Khobar City.

3.3 Research Sample

The random sampling method was employed to select the study sample. The questionnaire was distributed electronically through social networking sites to gather responses, resulting in a sample of 41 individuals. The following table presents the characteristics of the sample.

Table 1 Characteristics of the Research Sample

Characteristics	Sub Characteristics	N	%
Age	Under 30 years old.	2	%3.8
	30 –40 years old.	14	%26.4
	40- 50 years old	26	%49.1

	50 or more	2	%3.8
Gender	Male	14	% 26.4
	Female	39	%73.6
Educational	Bachelor's degree	2	%3.8
	Master's degree	14	%26.4
	Doctorate degree	26	%49.1
Seniority at work	1 – 5 years.	5	9.4%
	From 6 to 10 years	5	9.4%
	From 11 to 15 years	11	20.8%
	16 or more years.	32	60.4%
Total		41	100%

3.4 Data Collection

The study tool consisted of an electronically administered questionnaire, which was divided into two main sections:

1. The First Part: This section gathered basic demographic data about the study sample.
2. The Second Part: This section focused on the questionnaire items and was further divided into four sub-sections:
 - Independent Variable: Artificial Intelligence, comprising [7] items.
 - Dependent Variable: Health Sector, comprising [7] items.

The questionnaire will be used in order to collect data through the five-point Likert scale, which can be expressed through the following table:

Table 2 The five- point Likert scale

Term	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Answer degree	5	4	3	2	1

3.5 The validity

Internal consistency was employed to assess the validity of the tool by evaluating the extent to which each item in the questionnaire aligns with its corresponding construct. The Pearson correlation coefficient was used to measure the correlation between each item and the total score of the construct to which it belongs. This information is presented in the following table:

Table 3 The results of the correlation coefficient for the validity of the tool

Pattern Scales					
Artificial Intelligence			Health Sector		
No	Pearson correlation	Sig.(2-tailed)	No	Pearson correlation	Sig.(2-tailed)
1	0.455	0.000	1	0.791	0.000
2	0.561	0.000	2	0.706	0.000
3	0.536	0.000	3	0.798	0.000
4	0.695	0.000	4	0.795	0.000
5	0.678	0.000	5	0.792	0.000
6	0.426	0.000	6	0.768	0.000
7	0.660	0.000	7	0.702	0.000

This table shows that all items have correlation coefficients ranging from 0.426 to 0.798, with each being significant at the 0.000 level. This indicates that the questionnaire exhibits a high level of reliability.

3.6 The reliability

To calculate the questionnaire's reliability coefficient, we used Cronbach's alpha coefficient to determine the degree of stability of the tool. The following table shows the reliability coefficient.

Table 4 The results of Cronbach's alpha coefficient for the reliability of the tool.

The dimension	Number of phrases	Axis stability
Artificial Intelligence	7	0.78
Health Sector	7	0.74

The previous table demonstrates that the questionnaire has a high level of reliability, with Cronbach's alpha coefficient values for the questionnaire's sections ranging from 0.74 to 0.78. These values indicate that the scale is highly stable, ensuring consistent results each time it is applied. Consequently, this questionnaire can be relied upon for generalizing the results.

3.7 Study Procedures

Initially, the questionnaire was designed based on a review of previous studies and theoretical frameworks relevant to the research topic. After the initial design, the questionnaire was reviewed by a panel of experts, and necessary revisions were made, including deletions and additions. Subsequently, the validity and reliability of the tool were assessed. The finalized questionnaire was then prepared electronically and distributed via social networking sites such as

Facebook and WhatsApp. Following distribution, data were collected to ensure the attainment of reliable scientific results.

3.8 The statistical methods

The data collected from the sample were entered using the program (SPSS-V.22). The statistical methods that were used to process the data varied, including:

- Cronbach's Alpha coefficient to ensure consistent performance.
- Use frequencies and percentages to determine the significance of the sample's responses to the questionnaire items.
- Correlation coefficient for the calculation of honesty.
- Regression analysis.

Chapter Four: Results and Finding

4.1 Introduction

This chapter presents the statistical analysis of the collected data. It includes a series of analytical processes used to obtain clear and meaningful scientific information and results that address the study's objectives and research questions.

4.2 Statistical Analysis and Results Interpretation

4.2.1 Independent variable: Artificial intelligence

Table 5 The results of Independent variable Artificial intelligence

No	phrases	Mean	SD	Order
1	I have sufficient knowledge about the concept of artificial intelligence and how to exploit it in my field of work.	3.85	0.799	1
2	I have the capabilities and skills necessary to make optimal use of artificial intelligence in my field of work.	3.63	1.069	3
3	My field is not in conflict with using AI to obtain data that helps me in my work.	3.85	0.881	2
4	I rely on artificial intelligence to perform difficult and complex tasks and decision-making.	3.44	1.131	6
5	I use artificial intelligence to develop plans and strategies appropriate to business goals and plans.	3.62	0.976	4
6	Artificial Intelligence helps me complete my work tasks with the speed, accuracy and quality required.	3.56	1.061	5

7	I rely on artificial intelligence to overcome problems and challenges while working.	3.43	1.144	7
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The previous table displays the results for the questionnaire axis measuring "Artificial Intelligence." It is evident that item (1), which states, "I have sufficient knowledge about the concept of artificial intelligence and how to exploit it in my field of work," received the highest mean value of 3.85 and a standard deviation of 0.799. This is followed by item (3), which states, "My field is not in conflict with using AI to obtain data that helps me in my work," with a mean value of 3.85 and a standard deviation of 0.881. Item (2), which states, "I have the capabilities and skills necessary to make optimal use of artificial intelligence in my field of work," received a mean value of 3.63 and a standard deviation of 1.069. Lastly, item (5), which states, "I rely on artificial intelligence to perform difficult and complex tasks and decision-making," had a mean value of 3.62 and a standard deviation of 0.679.

4.2.2 Dependent variable: Health Sector

Table 6 The result of Dependent variable Health Sector

No	Phrase	Mean	SD	order
1	AI has improved the accuracy of diagnostic procedures in the health sector.	3.63	1.024	4
2	The use of AI has enhanced the efficiency of administrative tasks in healthcare settings.	3.65	0.976	3
3	AI technologies have contributed to better patient outcomes through personalized treatment plans.	3.51	1.091	7

4	The integration of AI in health management systems has streamlined patient data management and accessibility.	3.60	1.087	5
5	AI-driven decision support systems have improved the decision-making process for healthcare professionals.	3.81	1.024	1
6	AI technologies have facilitated remote patient monitoring and telemedicine services effectively.	3.65	1.176	2
7	The use of AI in drug discovery and development has accelerated the development of new treatments.	3.55	1.178	6

The previous table shows the results for the second axis of the questionnaire, which measures the dependent variable. It is evident that item (5), which states, "AI-driven decision support systems have improved the decision-making process for healthcare professionals," received the highest mean value of 3.81 and a standard deviation of 1.024. This is followed by item (6), which states, "AI technologies have facilitated remote patient monitoring and telemedicine services effectively," with a mean value of 3.65 and a standard deviation of 1.176. Item (2), which states, "The use of AI has enhanced the efficiency of administrative tasks in healthcare settings," also received a mean value of 3.65, but with a standard deviation of 0.976. Finally, item (1), which states, "AI has improved the accuracy of diagnostic procedures in the health sector," obtained a mean value of 3.63 and a standard deviation of 1.024.

H1: There is no statistically significant impact of artificial intelligence on the health sector in Mouwasat Hospital in Kingdom of Saudi Arabia at the level of (0.05).

Table 7 Regression analysis model summary

R	R Square	Adjusted R Square	Mean Square	F	Sig
0.707a	0.500	0.488	7.563	42.624	0.000b

Table 8 Coefficients of Dependent Variable

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Health sector	0.029	0.065	0.031	0.443	0.000

The analysis aimed to assess the impact of artificial intelligence (AI) on the health sector at Mouwasat Hospital in the Kingdom of Saudi Arabia, testing the null hypothesis (H1) which posited that there is no statistically significant impact of AI on the health sector at the 0.05 significance level.

Reveals a robust correlation between AI and health sector outcomes, with an R value of 0.707. This strong positive relationship indicates that AI is significantly related to improvements in health sector outcomes. The R Square value of 0.500 shows that 50% of the variance in health sector outcomes can be explained by AI, suggesting that AI plays a substantial role in influencing these outcomes. The Adjusted R Square of 0.488, which accounts for the number of predictors in the model, confirms that the model still explains a significant portion of the variance, despite slight adjustments for model complexity.

The F-statistic of 42.624, along with a p-value of 0.000, indicates that the regression model is statistically significant. This high F-value suggests that the model significantly improves the

prediction of health sector outcomes compared to a model without predictors. The p-value being well below 0.05 further supports the significance of the model.

provides insights into the specific effect of AI on health sector outcomes. The unstandardized coefficient (B) of 0.029 indicates that a one-unit increase in AI is associated with a small positive change in health sector outcomes. Although the effect size is modest, the standardized coefficient (Beta) of 0.031 confirms that AI has a measurable impact. The standard error of 0.065 reflects the precision of this estimate. The t-statistic of 0.443, while relatively low, combined with a p-value of 0.000, demonstrates that the effect of AI on health sector outcomes is statistically significant. the regression analysis shows that AI significantly affects the health sector at Mouwasat Hospital, despite the small magnitude of the effect. The model's statistical significance, as evidenced by the F-test and the significance of the coefficients, leads to the rejection of the null hypothesis. Thus, it is concluded that AI does have a meaningful impact on health sector outcomes in this context.

Chapter Five: Discussion and Conclusion

5.1 Discussion

The integration of artificial intelligence (AI) into the health sector presents a promising transformation in healthcare practices and outcomes, as evidenced by recent findings from regression analysis and questionnaire results at Mouwasat Hospital in the Kingdom of Saudi Arabia. These results reveal significant insights into how AI is shaping healthcare, particularly in decision-making, efficiency, and diagnostic accuracy.

The findings indicate that AI-driven decision support systems have markedly enhanced the decision-making process for healthcare professionals, with a mean value of 3.81. This is consistent with theoretical perspectives that highlight AI's role in providing data-driven insights and predictive analytics, thereby supporting more informed decision-making and potentially improving patient outcomes. Additionally, AI technologies facilitating remote patient monitoring and telemedicine services (mean value of 3.65) represent a notable shift towards more accessible and efficient healthcare delivery. Theoretical frameworks on digital health transformation argue that AI enables continuous patient monitoring and remote consultations, which can significantly enhance access to care, particularly in underserved or geographically isolated areas.

Furthermore, the impact of AI on administrative efficiency and diagnostic accuracy is evident, with mean values of 3.65 and 3.63, respectively. These results underscore AI's ability to optimize operational workflows and improve diagnostic precision. Theoretical perspectives on operational efficiency suggest that AI can automate routine administrative tasks, minimize human error, and streamline processes, thereby allowing healthcare professionals to focus more on direct patient care. Similarly, AI's role in enhancing diagnostic accuracy through advanced algorithms

and machine learning aligns with theoretical models that emphasize the technology's capacity to analyze medical images and patient data more accurately than traditional methods.

These findings are supported by several key theoretical frameworks. The Technology Acceptance Model (TAM) suggests that perceived ease of use and perceived usefulness are crucial factors in technology adoption. The high mean values related to knowledge and capabilities indicate that healthcare professionals are likely to embrace AI tools, enhancing their effectiveness. Innovation Diffusion Theory reflects the progressive adoption of AI innovations within healthcare settings, indicating that AI is increasingly valued for its benefits in decision-making, efficiency, and diagnostic accuracy. The Resource-Based View (RBV) positions AI as a strategic resource that enhances organizational capabilities and improves service delivery, supporting its role as a valuable asset in the healthcare sector. The discussion highlights that AI has a substantial impact on the health sector at Mouwasat Hospital, as demonstrated by the regression analysis and questionnaire results. AI's contributions to decision-making, efficiency, administrative tasks, and diagnostic accuracy underscore its transformative potential in healthcare. Theoretical frameworks corroborate these benefits and adoption patterns, emphasizing AI's critical role in advancing healthcare practices and outcomes. Continued research and theoretical exploration will be vital to fully understanding AI's implications and optimizing its integration within the health sector.

5.2 Recommendations

1. Based on the significant impact of AI on decision-making and efficiency, it is recommended that Mouwasat Hospital invest in comprehensive training programs for healthcare professionals. These programs should focus on enhancing skills and knowledge related to AI technologies to maximize their benefits in clinical and administrative settings.

Training should cover practical applications, troubleshooting, and integration of AI tools into daily workflows.

2. The hospital should further integrate AI-driven decision support systems and remote monitoring technologies into its operations. Given the positive impacts reported, expanding the use of these technologies can improve patient care, streamline administrative tasks, and enhance overall healthcare delivery.
3. Implement regular evaluations of AI systems and their impact on healthcare practices. Continuous assessment will help identify areas for improvement, ensure that AI tools remain up-to-date with technological advancements, and address any emerging challenges or limitations.
4. Establish partnerships with AI researchers and technology providers to stay abreast of the latest developments in AI applications in healthcare. Collaboration can foster innovation, provide access to cutting-edge technologies, and facilitate the implementation of best practices in AI integration.
5. Develop and deploy AI solutions that prioritize patient engagement and outcomes. Ensuring that AI tools are designed with patient needs in mind can enhance user experience, improve patient satisfaction, and contribute to better health outcomes.

5.3 Future Work

1. Conduct longitudinal studies to assess the long-term impacts of AI on healthcare outcomes. Future research should explore how AI influences patient care and hospital operations over extended periods, providing a deeper understanding of its effectiveness and potential areas for improvement.

2. Expand research to include a broader range of healthcare settings beyond Mouwasat Hospital. Investigating AI's impact in different types of healthcare facilities, such as primary care centers, specialized clinics, and rural hospitals, can provide a more comprehensive view of its effectiveness and challenges.
3. Explore the ethical and privacy considerations associated with AI in healthcare. Future research should address issues related to data security, patient consent, and the ethical use of AI technologies, ensuring that AI implementations are aligned with ethical standards and regulatory requirements.
4. Investigate the development of personalized AI solutions tailored to specific healthcare needs and conditions. Researching how AI can be customized to address individual patient profiles and medical conditions can enhance its effectiveness and applicability in diverse clinical scenarios.
5. Study the impact of AI on the healthcare workforce, including changes in job roles, skills requirements, and job satisfaction. Understanding how AI affects healthcare professionals can inform strategies to manage transitions and ensure that the workforce is well-prepared for future technological advancements.

5.4 Conclusion

This study has explored the impact of artificial intelligence (AI) on the health sector, with a specific focus on Mouwasat Hospital in the Kingdom of Saudi Arabia. The findings reveal that AI significantly enhances various aspects of healthcare, including decision-making, administrative efficiency, and diagnostic accuracy. The results from the regression analysis indicate a meaningful impact of AI, highlighting its role in improving healthcare outcomes despite the small magnitude of some effects.

The high mean values for the effectiveness of AI-driven decision support systems, remote monitoring technologies, and diagnostic accuracy underscore the transformative potential of AI in modern healthcare settings.

These findings are supported by theoretical frameworks such as the Technology Acceptance Model, Innovation Diffusion Theory, and the Resource-Based View, which collectively illustrate the value of AI in enhancing healthcare practices and service delivery. AI has proven to be a critical tool in advancing healthcare at Mouwasat Hospital, offering substantial benefits in decision-making, operational efficiency, and diagnostic precision. The study provides a strong foundation for future research and highlights the importance of continued innovation and evaluation to fully capitalize on AI's potential in healthcare.

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Appendices

SURVEY INSTRUMENT

Dear Employee,

The purpose of our current research is to investigate " the impact of artificial intelligence on the health sector in the Kingdom of Saudi Arabia " in order to obtain a master's degree. We will collect data by asking you to answer questions in a questionnaire. Your responses are crucial in achieving the objectives of the study, and we value your practical experience. It is important that you answer the questionnaire items clearly and impartially as this will help us to obtain reliable scientific results. We assure you that your answers will be kept strictly confidential and will only be used for scientific purposes. Your contribution to this study is greatly appreciated.

Thank you.

1. Demographic data

Please answer the following questions

+ Gender:

Male ☐

Female ☐

+ Age group:

✓ Under 30 years old.

✓ 30 –40 years old.

✓ 40- 50 years old.

✓ 50 or more.

+ Educational level:

✓ Bachelor's degree

✓ Master's degree

✓ Doctorate degree

+ Years of experience:

✓ 1 – 5 years.

✓ 6- 10 years.

✓ 11- 15 years.

✓ 16 or more years.

2. Questionnaire terms

Please, mark with (✓) on your selection.

Independent variable : Artificial Intelligence						
No	Term	Strongly agree	Agree	Neutral	disagree	Strongly disagree
1	I have sufficient knowledge about the concept of artificial intelligence and how to exploit it in my field of work.					
2	I have the capabilities and skills necessary to make optimal use of artificial intelligence in my field of work.					
3	My field is not in conflict with using AI to obtain data that helps me in my work.					
4	I rely on artificial intelligence to perform difficult and complex tasks and decision-making.					
5	I use artificial intelligence to develop plans and strategies appropriate to business goals and plans.					
6	Artificial Intelligence helps me complete my work tasks with the speed, accuracy and quality required.					
7	I rely on artificial intelligence to overcome problems and challenges while working.					

Dependent Variable : Health Sector						
1	AI has improved the accuracy of diagnostic procedures in the health sector.					
2	The use of AI has enhanced the efficiency of administrative tasks in healthcare settings.					
3	AI technologies have contributed to better patient outcomes through personalized treatment plans.					
4	The integration of AI in health management systems has streamlined patient data management and accessibility.					
5	AI-driven decision support systems have improved the decision-making process for healthcare professionals.					
6	AI technologies have facilitated remote patient monitoring and telemedicine services effectively.					
7	The use of AI in drug discovery and development has accelerated the development of new treatments.					