



Midocean University
College of Management
Master of Business Administration

**Assessing the Impact of Artificial Intelligence Adoption and
Governance Maturity on Executive Strategic Planning and
Performance in the Saudi Arabian Healthcare Sector**

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List of Abbreviations

Abbreviation	Definition
AI	Artificial Intelligence
KSA	Kingdom of Saudi Arabia
TMTs	Top Management Teams
KPIs	Key Performance Indicators
HSTP	Healthcare Sector Transformation Program
UHC	Universal Health Coverage
PPP	Public-Private Partnerships
RCM	Revenue Cycle Management
NSDAI	National Strategy for Data and AI
EHR	Electronic Health Record
SDAIA	Saudi Authority for Data and Artificial Intelligence
RPA	Robotic Process Automation
MOH	Ministry of Health
GOSI	General Organization of Social Insurance
IT	Information Technology
NTP	National Transformation Program
DT	Digital Transformation
Nphies	National Platform of Health Information Exchange
SVH	Seha Virtual Hospital
KFSHRC	King Faisal Specialist Hospital and Research Centre
NGHA	National Guard Health Affairs
KAUST	King Abdullah University of Science and Technology
SDG	Sustainable Development Goals
CHI	Council of Health Insurance
ANN	Artificial Neural Network
ML	Machine Learning
DL	Deep Learning
CT	Computed Tomography Images
MRI	Magnetic Resonance Imaging
NLP	Natural Language Processing
HIPAA	Health Insurance Portability and Accountability Act
GDPR	General Data Protection Regulation
IT	Information Technology
CEOs	Chief Executive Officers
PDPL	Personal Data Protection Law
AGM	AI Governance Maturity
BSC	Balanced Scorecard

RBV	Resource-Based View
SMEs	Small and Medium-sized Enterprises
PPS	Probability Proportionate to Size
CEO	Chief Executive Officer
CMO	Chief Medical Officer
CIO	Chief Information Officer
COO	Chief Operating Officer
CFO	Chief Financial Officer

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Abstract

This study examines the impact of AI adoption and governance maturity on executive strategic planning and organizational performance within the Saudi Arabian healthcare sector. A quantitative research approach was employed using a structured questionnaire distributed to senior healthcare executives working in both public and private healthcare institutions. A total of 103 valid responses were collected and analyzed using statistical techniques to evaluate the relationships between the study variables. The results indicate that healthcare executives generally perceive a high level of AI adoption within their organizations and recognize the importance of governance frameworks in guiding the ethical and effective use of AI technologies. AI adoption was found to enhance executives' ability to utilize data-driven insights, evaluate strategic alternatives, and improve the responsiveness of strategic planning processes. Furthermore, governance maturity plays a critical role in ensuring accountability, ethical compliance, and risk management in AI implementation, thereby strengthening the reliability of AI-driven decisions. Regression analysis confirmed that AI adoption significantly influences executive strategic planning, while the combination of AI adoption and governance maturity further improves planning effectiveness and overall organizational performance. The findings suggest that healthcare organizations that integrate advanced technologies with robust governance structures are better positioned to improve service quality, optimize operational efficiency, and achieve sustainable performance outcomes. The study highlights the strategic value of AI in healthcare management and emphasizes the need for healthcare organizations to invest in technological capabilities, governance mechanisms, and executive competencies to fully leverage the benefits of AI-driven transformation.

Keywords: Artificial Intelligence Adoption, AI Governance Maturity, Executive Strategic Planning, Organizational Performance, Healthcare Management, Saudi Arabian Healthcare Sector, Strategic Decision-Making.

Chapter One

Introduction

1.1. Introduction

The global healthcare landscape is currently undergoing its most profound transformation in decades, driven fundamentally by the rapid maturation and integration of Artificial Intelligence technologies. For national health systems, particularly those engaged in high-velocity modernization efforts, the adoption of AI is not merely an operational enhancement but a foundational strategic pillar. This study focuses on the KSA healthcare sector, where the imperative for digital transformation is embedded within the core national development strategy, Vision 2030. Understanding how this technological shift affects the highest levels of executive strategy formulation and what factors enable or inhibit success is paramount to ensuring the multi-billion-dollar transformation achieves its intended goals.

➤ The Global Strategic Shift towards AI-Augmented Leadership

AI represents a radical departure from conventional strategic management practices, redefining the capabilities and responsibilities of Top Management Teams (TMTs) (Kiron, 2025). Historically, strategic management relied on structured, often slow, processes to clarify purpose and align organizational goals (Dennis, 2019). Today, AI systems move far beyond legacy decision-support tools; they act as strategic collaborators, coaches, and subject matter experts for executives. This progression from traditional decision support to strategic partnership necessitates a profound re-evaluation of executive skill sets.

Globally, the integration of AI is transforming executive planning by utilizing massive data volumes for enhanced foresight, guiding optimal resource allocation, and continuously assessing strategic assumptions (Kiron, 2025). This augmentation allows TMTs to develop more effective strategies by systematically identifying strategic options, evaluating complex trade-offs, and sensing subtle shifts in the external environment, thereby countering inherent human cognitive biases. The strategic influence of AI is profoundly adaptive rather than purely predictive. AI enhances strategic measurement systems, such as Key Performance Indicators (KPIs), to more quickly perceive performance shortfalls and reveal otherwise hidden interdependencies among metrics. This capability provides a significant new feedback mechanism that aligns operations, outcomes, and strategy, enabling timely strategy refinement and adaptation. This rapid, data-driven organizational learning is essential for avoiding reliance on outdated metrics or business

assumptions, a crucial capability in KSA's fast-paced transformation environment where strategic alignment must be dynamic and high-velocity (Kiron, 2025).

➤ **Saudi Arabia's Strategic Imperative: Vision 2030 and Healthcare Transformation**

Saudi Arabia's healthcare sector is undergoing a massive overhaul mandated by Vision 2030 and executed through the Healthcare Sector Transformation Program (HSTP) (Vision 2030, 2025). This program aims to create a healthcare system that is more comprehensive, effective, and integrated, with a strong focus on innovation, financial sustainability, disease prevention, and the rapid expansion of e-health services and digital solutions (Vision 2030, 2025).

The scale of this transformation is immense. The KSA system, currently ranked 26th globally, is backed by substantial government spending, exceeding USD 66.6 billion in 2023, and targets substantial infrastructure expansion, adding 26,000 to 43,000 hospital beds to accommodate projected population growth (Global Health Saudi, 2025). Key policy levers driving this effort include achieving Universal Health Coverage (UHC), the widespread adoption of technology, and the development of health clusters leveraging privatization and Public-Private Partnerships (PPP) (Global Health Saudi, 2025). Demonstrations of digital commitment are already operational, notably the SEHA Virtual Hospital, launched in 2022, which is recognized as the largest of its kind globally, connecting over 150 hospitals.

This context highlights a major executive challenge: successfully merging technological innovation with new, value-based financial and organizational models. The structural shift toward privatization and PPP 6 makes effective AI integration critical for managing financial risk and ensuring service continuity. For instance, the transition is expected to increase annual healthcare claims dramatically, from SAR 25 billion to over SAR 80 billion by 2026 (Santechture, 2025). AI adoption, particularly through automation and predictive analytics in complex financial systems like Revenue Cycle Management (RCM), is therefore crucial to stabilizing this expanding financial system, reducing costs, and ensuring the financial sustainability required under the new value-based paradigm. The strategic success of the HSTP rests on the ability of executives to integrate technology not just for clinical improvement but as a core enabler of financial viability.

➤ **AI as a National Priority: Alignment with NSDAI**

AI adoption in healthcare is a direct mandate of the National Strategy for Data and AI (NSDAI), which aims to position the KSA among the top 15 countries globally in AI capabilities and establish it as a regional hub for data and AI by 2030 (SDAIA, 2025). Healthcare is explicitly designated as a Priority Sector for integrating data and AI systems with the purpose of enhancing access, improving preemptive care, and accommodating rapidly growing demand (SDAIA, 2025).

KSA hospitals and research centers are actively implementing specific AI applications across the healthcare value chain. These applications demonstrate the breadth of executive strategic concerns addressed by AI, moving beyond mere clinical tools to core administrative efficiency, research capacity, and population health management. Examples include AI utilization in hospitals to streamline billing processes and reduce errors in claims (RCM) (Kumar et al., 2025), adoption of AI for efficient Electronic Health Record (EHR) management in Riyadh hospitals, and the deployment of AI in early detection programs for chronic conditions like diabetes and heart disease across the Kingdom (Kumar et al., 2025). These applications underscore that AI adoption in KSA is fundamentally shaped by national goals for economic growth, sustainability, and global leadership. Strategic planning must therefore address a complex mandate linking AI deployment to patient outcomes, financial sustainability, and adherence to broader national, social and environmental objectives.

1.2. Problem Statement

While governmental policy strongly mandates AI adoption and KSA healthcare executive's express high optimism with 83% believing AI improves clinical decision-making and 75% expecting it to reduce operational costs a critical knowledge gap exists regarding the strategic execution of these goals. There is insufficient empirical understanding of AI's direct impact on executive strategic planning functions (formulation, adaptation, resource allocation) and the specific internal prerequisites necessary for successful deployment within the uniquely complex, transforming KSA healthcare environment. The problem is multidimensional, encompassing process deficiencies, executive preparedness, and governance immaturity. The failure to effectively integrate AI at the executive level risks undermining Vision 2030's multi-billion-dollar investment in the sector.

1.3. Research Questions

Main Research Question

How does the artificial intelligence adoption and governance maturity impact the executive strategic planning and organizational performance in Saudi Arabian Healthcare organizations?

1. **RQ1:** How does the adoption of AI technologies influence the comprehensiveness, adaptability, and speed of strategic planning processes among KSA healthcare C-suite executives?
2. **RQ2:** To what extent does the artificial intelligence adoption and governance maturity of impact the executive strategic planning in the Saudi Arabian healthcare sector?
3. **RQ3:** To what extent does the artificial intelligence adoption and governance maturity of impact the organizational performance in the Saudi Arabian healthcare sector?
4. **RQ4:** What specific managerial and regulatory challenges related to accountability and liability do KSA healthcare executives face when integrating AI technologies solutions, and how are strategies utilized to address these risks?

1.4. Research Objectives

- To examine how the adoption of AI technologies affects the comprehensiveness, adaptability, and speed of strategic planning processes among C-suite executives in the Saudi healthcare sector.
- To evaluate the impact of AI adoption and governance maturity on executive strategic planning within Saudi healthcare organizations.
- To assess the influence of AI adoption and governance maturity on the organizational performance in the Saudi healthcare sector.
- To identify the managerial and regulatory challenges related to accountability and liability that Saudi healthcare executives face when integrating AI solutions, and to examine the strategies employed to address these risks.

1.5. Study Significance

➤ Policy and National Alignment (Vision 2030 Validation)

The research provides direct, empirical evidence necessary for validating and refining KSA's national strategies. The findings will offer specific feedback to governmental bodies, including the Ministry of Health and SDAIA, on the institutional readiness and precise success factors for technology adoption at the executive level, crucial for realizing Vision 2030's healthcare and AI objectives. By analyzing the degree of adherence to SDAIA's AI Ethics Principles and the implementation of PDPL requirements, the study directly informs the necessary evolution of KSA's regulatory and governance frameworks, ensuring they support innovation while rigorously maintaining ethical, safety, and privacy standards.

➤ Organizational and Financial Sustainability

AI is fundamental to achieving the financial sustainability goals of the HSTP, largely through enhanced operational efficiency and advanced Revenue Cycle Management (RCM). The research provides a quantifiable assessment of strategic value by linking robust AI governance and high executive literacy to measurable performance improvements. Studies indicate that hospitals implementing AI-assisted RCM have achieved substantial gains, including up to 30% faster reimbursements, 20% fewer denials, and 25% lower administrative overheads (Santechture, 2025). Additionally, automation in RCM operations, often leveraging technologies like RPA and AI, is linked to significant productivity gains (15% to 30% in areas like call centers) (American Hospital Association, 2024). By empirically linking governance maturity and executive literacy to these financial outcomes, the research provides necessary strategic data to justify large-scale, high-cost AI implementation, mitigating executive hesitancy regarding the substantial resources required for effective adoption.

➤ Addressing the Human Factor (Talent and Culture)

The pervasive skills deficit and talent gap identified in the KSA healthcare sector represents a strategic vulnerability (CISIN, 2025). This study directly addresses this by focusing on the AI literacy requirements for leadership, validating the need for targeted executive training programs that align with national frameworks like SDAIA's National Strategy for Data and AI (Nucamp, 2025). Furthermore, by exploring executive perceptions, the research illuminates the critical cultural and trust factors (such as concerns over medicine becoming impersonal) that may

impede full executive and professional buy-in, which is vital for managing organizational change amid radical transformation.

1.6. Hypothesis

H1: There is a statistically significant relationship between the adoption of AI technologies and the comprehensiveness, adaptability, and speed of strategic planning processes among KSA healthcare C-suite executives.

H2: There is a statistically significant relationship between AI adoption, governance maturity and executive strategic planning effectiveness in the Saudi Arabian healthcare sector.

H3: There is a statistically significant relationship between AI adoption, governance maturity and organizational performance in the Saudi Arabian healthcare sector.

Chapter Two

Literature Review

This chapter reviews the key theoretical concepts and previous studies related to artificial intelligence adoption, governance maturity, strategic planning, and organizational performance in the healthcare sector. The chapter also examines relevant studies to highlight current knowledge and identify research gaps.

2.1. Saudi Arabia Healthcare

2.1.1. Overview of the Saudi Healthcare System

The healthcare system in Saudi Arabia is dual in the sense that the public sector is managed by the Ministry of Health (MOH), and the private sector has been growing at a high rate. The Saudi constitution ensures free healthcare services to the citizens, and government expenditure on healthcare is about 9.4 percent of the national budget in 2023. This has led to the operation of almost 60 percent of all hospitals or 499 hospitals in the country by the MOH so that many people have access to healthcare services in the Kingdom (MOH, 2023).

The MOH is the main healthcare facility, where Saudi citizens and government employees have free medical care. The publicly run healthcare facilities consist of general hospitals, primary healthcare facilities and specialized hospitals like King Faisal Specialist Hospital and Research Centre, which offers complex medical services. Also, military and security hospitals, such as National Guard Health Affairs and Armed Forces Medical Services, are providing services to military members and their families.

The size of a hospital depends on the bed, location and population density. The hospitals are mostly bigger in large cities such as Riyadh, Jeddah and Dammam, which have high population density and, consequently, more medical needs. Conversely, the rural and less populated locations have fewer hospitals with fewer special services, which may force people to move to urban areas to obtain advanced care (Hawsawi & Abouammoh, 2022).

Vision 2030 has seen the expansion of the private sector at a high rate with the involvement of the private sector being encouraged to minimize the government spending on healthcare and improve the quality of the services. Expatriates (who must also be insured by health insurance) as well as insured Saudi citizens and self-paying patients are the major consumers of services of the private hospitals and clinics. It also plays an important role in the medical tourism industry where the

industry provides specialized services, shorter waiting lines, and quality services (International Trade Administration, 2024; Suleiman & Ming, 2025).

A large city has large hospitals which are private hospitals that are specialized and even larger which forms the network of the hospitals, whereas a smaller city has smaller clinics that are owned by private persons and operate on an outpatient and elective basis. The concentration of private healthcare facilities is more at the urban centers where income earners and insured citizens are the ones who demand the healthcare services.

Along with the framework of both public and private healthcare, the healthcare financing model of Saudi Arabia is based on three major models reimbursement models, which are government-based healthcare financing, private health insurance, and out-of-pocket care. The model funded by the government is mostly controlled by the MOH, which makes sure that free healthcare services are provided to Saudi citizens by the state-run hospitals and primary care centers. Also, it is essential to note that the General Organization of Social Insurance (GOSI) is instrumental in financing medical costs of the employees and retirees of the public-sector people by providing health insurance on a private basis (MOH, 2023). Although this system offers universal access to healthcare, it generates a lot of financial strain on government resources, creating a rising pressure to bring the private sector into the frame.

The system has now adopted a fundamental role of the system with private health insurance being a mandatory requirement of the expatriates with the employer being mandated to cover the insurance by using the plans of private health insurance. Moreover, more Saudi nationals are choosing to go voluntarily or be provided with private health insurance by their organizations as a means to receive special treatment, reduced waiting lists and high quality healthcare services.

The out-of-pocket payments are still an important part of the private healthcare industry especially when it comes to making the elective processes and specialized treatment not covered by insurance. Cosmetic surgery, fertility services, and executive health check-ups are among the other services that patients pay out of their own pocket.

One of the changes to the healthcare system of Saudi Arabia is the alteration in the models of the healthcare services to the value-based care model where the healthcare provider is paid according to the patient outcomes instead of the number of services offered. The strategy will improve the quality of healthcare and eventually minimize costs, which is in line with the strategic objectives of Vision 2030.

The healthcare system in Saudi Arabia is in the process of transformation, and the country invests in the infrastructure, digital health, and AI to achieve efficiency and accessibility. The growth of intelligent hospitals, artificial intelligence-enhanced diagnostics, and telehealth portals is likely to make the future of healthcare in the Kingdom even more prominent.

2.1.2. Saudi Arabia's Vision 2030 and Healthcare Technological Advancements

The Kingdom of Saudi Arabia (KSA) has experienced a rapid digital transformation process in the sector over the past few years. This has been triggered by national Vision 2030 plan aimed at eliminating reliance on oil revenues and shifting to knowledge-based economy. The healthcare industry, in particular, has undergone significant changes and the implementation of modern technologies such as artificial intelligence (AI) to enhance service delivery as a part of the human capital development objectives of the Vision 2030 (Aboalshamat et al., 2022). The Saudi government considers AI and digital health as key to enhancing access, efficiency, and quality of healthcare as proposed in Vision 2030.

Riyadh is the capital and the largest city in Saudi Arabia which has been leading in digital development in the medical field. The Saudi government has encouraged partnerships between government and the private sector to hasten the integration of AI and the Health Ministry has collaborated closely with IT companies to integrate AI into care delivery. Administrative functions, diagnosis, monitoring, robot-assisted surgeries and data analytics of major hospitals and clinics in Riyadh have already been deployed using machine learning and automation. As an example, the oncology treatment planning at King Faisal Specialist Hospital and Research Center in Riyadh is planned with the help of the Watson AI platform created by IBM (Chikhaoui et al., 2022).

The Vision 2030 project of Saudi Arabia is expected to change the healthcare sector in the country and make it more efficient, accessible, and patient-centered. Within the framework of the Saudi National Transformation Program (NTP), the healthcare sector aims to become more efficient and effective by means of strategic utilization of Information Technology (IT) and Digital Transformation (DT) (Saudi Vision, 2020). It has led to significant digital health infrastructure development, such as the adoption of Electronic Health Records (EHRs), the National Platform of Health Information Exchange (Nphies), telehealth solutions, including Sehhaty and Mawid, and the creation of Seha Virtual Hospital (SVH). The purpose of these innovations is to make healthcare services modern, enhance patient care, and create a healthcare ecosystem nationwide (MOH, 2023). Early adopters like the King Faisal Specialist Hospital and Research Centre (KFSHRC) and the National Guard Health Affairs (NGHA) have attained HIMSS Stage 7 that has resulted in EHR standardization, causing a digital transformation (HIMSS, 2024).

KSA's adoption of digital health technologies, including AI, data mining, genomics, and bioinformatics, is explicitly aimed at enhancing healthcare standards and addressing the importance of data security and patient-centricity. The documented use cases in KSA are highly diverse, spanning administrative functions (RCM, EHR management), predictive health (disease detection), specialized services (SEHA Virtual Hospital), and scientific development (drug discovery at KAUST). KSA's AI adoption is intrinsically shaped by national objectives for sustainability and global leadership. Strategic planning in this context must therefore address a complex mandate linking AI deployment to superior patient outcomes, ensuring financial sustainability for the privatized system, and adhering to broader national social and environmental goals. For instance, AI literacy must encompass knowledge of the environmental impact of AI systems, such as optimizing transportation and supply chain routes to reduce carbon footprints, thereby aligning operations with SDG.

Saudi Arabia has come up with the National Platform for Health Information Exchange (Nphies) to tackle the nationwide issues in the areas of interoperability and facilitate the seamless transfer of data between healthcare institutions (MOH, 2023). Nphies is a managed system that offers a single platform to share patient records throughout the healthcare system, which is operated by the Council of Health Insurance (CHI) in partnership with the MOH (CHI, 2025). This system will guarantee real-time availability of vital patient information, which will lead to better coordination

of care and minimize redundancy. Moreover, Nphies enhances the surveillance of the health status of the population enabling the authorities to monitor the dynamics of the diseases and apply effective preventive measures. It additionally has the benefit of simplifying the insurance claims procedure as well as improving efficiency in the public and the private healthcare sectors in regard to electronic health transactions (CHI, 2025).

Besides the data integration work, Saudi Arabia has become one of the leading countries in terms of telehealth services, implementing such platforms as Sehhaty, Wasfaty, and Mawid and allowing patients to book appointments with physicians, chat with them remotely, and manage prescriptions online. By cutting down on the amount of in-person visits, healthcare has become much more accessible to rural and underserved regions and has reduced hospital overcrowding (Sayem et al., 2023). They were crucial especially during the COVID-19 pandemic when Sehhaty and Mawid helped to conduct remote patient surveillance and virtual consultations to provide continuity of care and remove the risk of infection.

Further developing these innovations, Saudi Arabia developed an even stronger telemedicine network by introducing the Seha Virtual Hospital (SVH), a dedicated facility, which ensures the use of the high-quality medical services by using the latest technology and supporting healthcare facilities throughout the Kingdom. SVH has 170 hospitals benefitting the entire country and specializing in 29 core areas and over 73 sub-specialties, and has the capacity to attend over 480,000 patients annually. This program promotes the availability of specialized medical treatment despite the geographical location, closes gaps in the availability of specialized personnel, and increases the effectiveness of healthcare services delivery. Also, by encouraging clinical excellence and knowledge transfer, SVH leads to innovation in the health sector (MOH, 2024).

The innovations based on AI in the Saudi Arabian healthcare industry are founded on these technological innovations. With a digitally connected healthcare ecosystem, Saudi Arabia is preempting AI-based diagnostics and predictive analytics, and personalized medicine. These technologies will be important in enhancing clinical decision-making, optimization of patient care, and medical research as the healthcare system keeps on changing.

2.2. AI in Healthcare

2.2.1. The History of AI

Since the invention of computers, it has always been an endeavor to substitute human efforts and expertise with computers operated machines. Most of these attempts are preceded by the effort of trying to imitate the power of human intelligence. The attempts are most commonly referred to as Artificial Intelligence. The human intelligence powers encompass comprehending language, executing logic, learning and experience, knowledge building, memory and identifying patterns, problem solving, planning, making judgments, which are complicated at times and retaining information and communicating. Artificial intelligence science attempts to produce systems that can think and behave humanely. These systems are referred to as artificial intelligence systems (Kaul et al., 2020).

The idea of the use of machines in performing tasks similar to human beings was first coined by Alan Turing in the 1950. He came up with an idea of how machines can program themselves to perform tasks such as human beings do automatically. John McCarthy is the first person to coin the word Artificial intelligence in 1956 as the study of creating intelligent machines. Artificial intelligence has since passed through numerous phases of development until it reached the advanced level of modern applications particularly in the medical field as it is depicted in the figure 1.

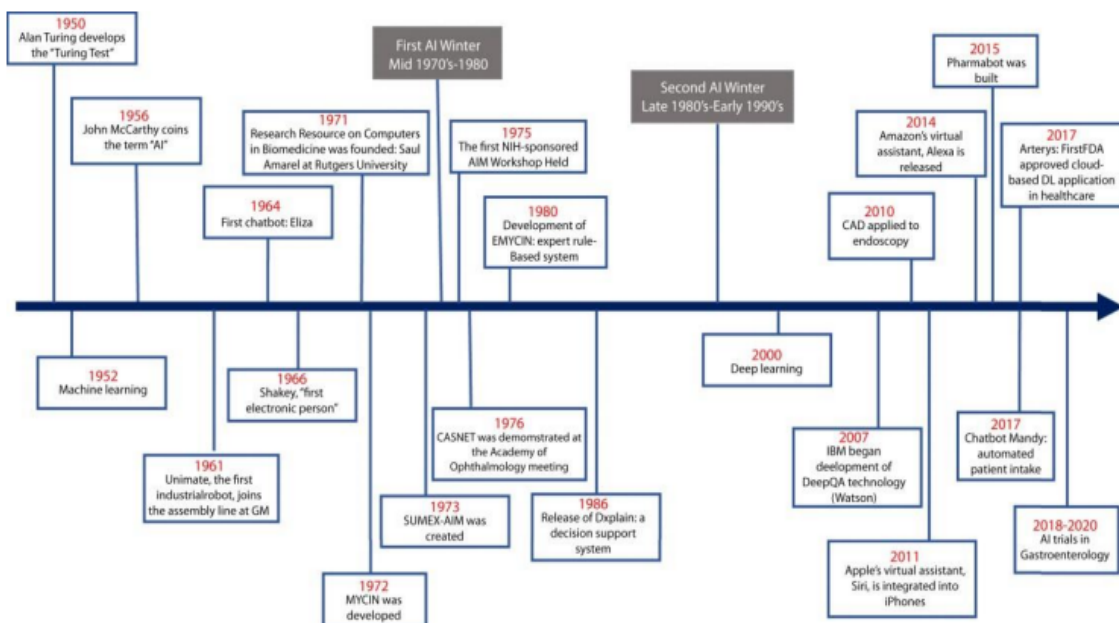


Figure 1: Chronology of Artificial Intelligence (Abdullah, 2024)

It has since evolved into numerous branches since its invention of artificial intelligence that may be used to create software and applications that can be described as smart or intelligent. The key technology employed in imitating human thinking is known as artificial neural network which is replicative of the human brain structure. Billions of biological cells (neurons) are interrelated and used to think and make decisions by the human brain (Bitkina et al., 2023). The artificial neural networks are based on the same type of structure called neurons that are linked together in layers and can be trained using varying weights and alternative functions. This type of ANN resulted in the creation of machines that could be trained and recognize patterns in the data and then be applied to new sets of data. The concept of revolution gave rise to new AI concepts like Machine Learning (ML) and Deep Learning (DL).

The application of AI in healthcare has evolved at a high rate during the past 50 years. As the machine learning and deep learning algorithms have been improved, artificial intelligence has become an inseparable part of any medical technology, whether it is a disease diagnosis like cancer diagnosis or a personalized treatment, a medical data analysis, improved healthcare and much more aspects providing a patient with healthcare. The development of computer technology like processing capability and larger storage has contributed immensely in the use of AI technology in the medical fraternity. Such developments and the improved algorithms and programs adopted in

the medical sector resulted in increased confidence of such technologies by all stakeholders interested in the same including doctors, nurses, health administrators, and patients.

2.2.2. Concept of Artificial Intelligence in Healthcare

AI in healthcare is the implementation of technologies based on artificial intelligence, including machine learning and natural language processing, to enhance healthcare provision, diagnosis, treatment planning, monitoring patients, and administration. It implies the application of algorithms to process sophisticated medical data and provide predictions or recommendations to aid clinical decision-making and improve patient outcomes. In healthcare, the goal of AI is to automate, personalize care, eliminate medical mistakes, and eventually improve the efficiency and effectiveness of healthcare.

Ghosh & Thirugnanam, (2021) stated that Artificial Intelligence (AI) is the ability of computer systems and machines to fulfill the tasks traditionally done by human intelligence, such as learning by experience, recognizing patterns, interpreting complex information, and decision-making. AI systems aim to replicate cognitive processes that are related to the human mind, such as reasoning, problem solving and perception. The use of AI technologies helps healthcare professionals to process and interpret medical data faster and more accurately compared to other traditional methods, which makes them even more significant tools in the field of the modern healthcare system.

Medical Artificial intelligence (AI) is generally described as the application of computer algorithms which are capable of simulating cognitive processes including learning, reasoning, and problem solving in the medical context. These systems are based on past healthcare information, such as electronic health records, medical imaging, lab findings, and genomic information, to identify associations and come up with predictive models (Bohr & Memarzadeh, 2020). During this learning process, AI systems can be trained to help medical workers diagnose a disease, prescribe medication, and predict future outcomes of a patient.

Conceptually, AI in healthcare can be viewed as the combination of smart digital technologies into healthcare operations to aid in making diagnoses, treatment plans, monitoring patients, and managing the administration. Unlike the traditional health information systems, which mainly store and retrieve information, AI systems can learn with the past data and keep on bettering their services with time. This learning ability enables AI algorithms to determine concealed patterns in extensive data, including electronic health records, medical imaging information, genomic data, and real-time monitoring data of a patient.

The artificial intelligence in healthcare is based on the various technology sub fields that facilitate various forms of data analysis as well as automation as represented in Fig 2. Machine learning is one of the most popular types of technologies that presuppose training algorithms to recognize patterns and relationships in the data and apply them to make predictions or classifications. Machine learning models can process clinical data to forecast the risk of diseases, possible complications, and suggested individual treatment. Machine learning is further advanced in deep learning where the computer utilizes artificial neural networks that resemble the human brain structure. Deep learning algorithms are especially useful with medical images, including X-rays, CT images, and MRI images, and they can easily identify abnormalities with the necessary accuracy (Lekadir et al., 2022).

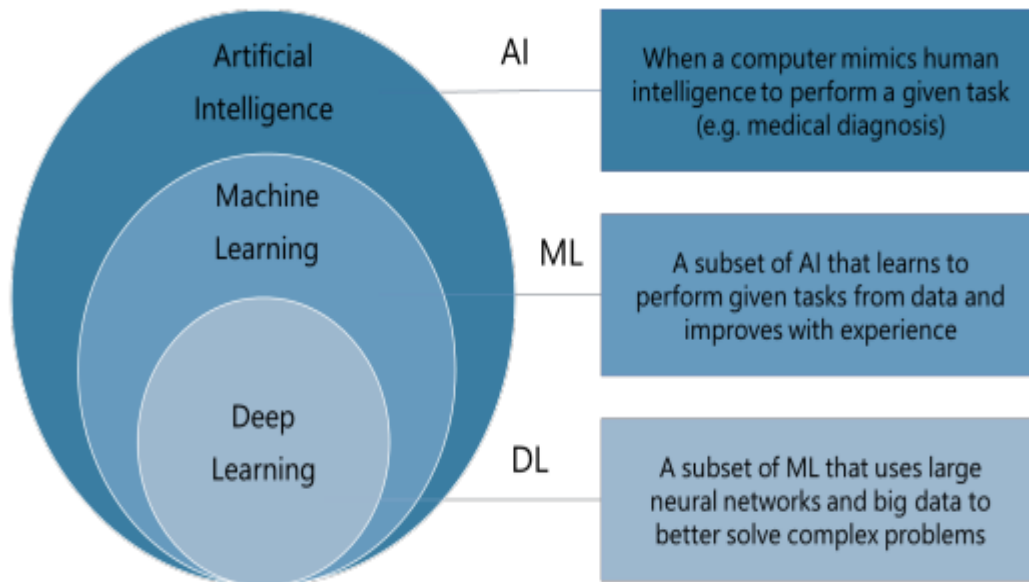


Figure 2: The Interconnection of Artificial Intelligence, Machine Learning, and Deep Learning (Lekadir et al., 2022)

The healthcare AI concept is also not limited to clinical practice, but also to healthcare management and operational practices. The AI technologies may help healthcare administrators enhance their hospital efficiency, resource allocation, as well as patient flows. As an illustration, predictive analytics can be used to predict the number of hospital admissions, which can better direct the allocation of resources and personnel by health care organizations. Artificial intelligence-based scheduling solutions have the potential to streamline appointment booking, decrease wait time and enhance patient satisfaction. Moreover, AI can be used in healthcare supply chain management, forecasting the demand of the medical equipment and drugs. These practical uses indicate that AI is not a clinical innovation only, but a strategy that can enhance the operation of healthcare organizations on the whole.

2.2.3. Core AI Technologies in Healthcare

The technologies of artificial intelligence as used in the healthcare sector are made up of a number of special methods through which computers can process medical information, assist in making clinical judgments and enhancing healthcare administration. Some of the most significant categories of AI in the medical field are machine learning, deep learning, natural language processing, and robotics. All these technologies have their role in healthcare systems, which is the ability to predict diseases and analyze medical images, as well as automated clinical records and support during surgery.

➤ Machine Learning in Healthcare

One of the most commonly used types of artificial intelligence in the field of healthcare is machine learning. It can be defined as a collection of computing methods through which computer systems acquire patterns and relationships based on past data without having to be programmed. Ngiam & Khor (2019) state that machine learning algorithms in a healthcare setting process massive amounts of clinical data including electronic health records, laboratory reports, image data, and patient history to find the patterns that may help healthcare providers to diagnose illnesses and predict medical outcomes. The typical applications of machine learning models are disease predictive risk, early disease diagnosis, treatment recommendation and patient outcome prediction. As an example, machine learning algorithms can be used to examine patient health records and determine the people who are at the highest risk of developing chronic diseases, including diabetes, cardiovascular disease, or cancer (Battineni et al., 2020). These proactive features enable health practitioners to introduce preventive measures and enhance patient outcomes.

Another significant use of machine learning in the field of healthcare, Siddiq (2022) also mentioned, is clinical decision support systems. Machine learning algorithms are used in these systems to interpret patient data and provide recommendations to healthcare professionals on the diagnosis, treatment options, or medication management. Machine learning systems can also enhance the quality of diagnosis and lower the rate of medical errors by applying large datasets and finding trends that will not be easy to identify by human clinicians. Moreover, machine learning models can assist healthcare administrators to optimize their hospital operations by predicting the rate of patient admissions, better scheduling of the staff and utilizing health care

resources more efficiently. The abilities render machine learning an essential part of the contemporary data-driven healthcare.

➤ **Deep Learning in Healthcare**

Mishra & Gupta (2017) added that Deep learning is a higher end of machine learning, which runs through artificial neural networks that replicate the structure and functionality of the human brain. These neural networks are multilayered networks, which enable deep learning systems to compute extremely complex data and automatically identify meaningful features in large datasets. Deep learning has attracted much interest in the medical field due to its remarkable results in the analysis of medical images, genomic information, and sophisticated clinical data. More specifically, deep learning algorithms are popular in medical imaging (radiology, pathology, dermatology, ophthalmology), as well as medical research.

X-rays, CT scans, and MRI images can be analyzed using deep learning models and thus identify abnormalities, including tumors, fractures, or neurological problems with extremely high accuracy. There have been instances where the diagnostic performance of deep learning systems has been equivalent to or even better than that of the experienced medical specialists. Genomic medicine is another field of application of deep learning, as it performs a genetic analysis to determine genetic changes related to diseases and guide individual treatment (Suura, 2025). Deep learning is another use in healthcare in terms of disease progression and patient outcomes prediction. With the help of deep learning models, it is possible to detect some complicated patterns in the large datasets of clinical trials and electronic health records and provide healthcare providers with more information about their choices of treatment.

➤ **Natural Language Processing in Healthcare**

Natural Language Processing (NLP) is one more essential subdivision of artificial intelligence, but it is dedicated to helping computers to comprehend, interpret, and analyze human language (Fanni et al., 2023). Clinical information, in particular, in healthcare settings is stored in large amounts as text data, unstructured in that they are often in the form of notes made by physicians, discharge notes, pathology reports, and medical research articles. Conventional data analysis systems are incapable of handling this form of unstructured data, and NLP technologies enable healthcare organizations to derive meaningful insights out of textual data (Derek & Collings, 2025).

NLP systems have the potential of automatically process clinical records and transform unstructured text into structured data that can be utilized in research, clinical decision support, and healthcare administration. Dreisbach et al., (2019) discovered that NLP models have the ability to recognize medical diagnosis, medications, symptoms, as well as treatment outcomes, based on physician notes on electronic health records. This can enable healthcare organizations to better manage patient data and have a better clinical decision-making process in place. In medical research, NLP is also utilized to allow the researcher to analyze voluminous amounts of scientific literature and clinical trial data to determine emerging trends in medicine and treatment innovations. Also, NLP technologies are becoming common in virtual health assistants, and chatbots, used to enable patients to schedule appointments, obtain medical information and communicate with medical professionals. These applications enhance better access to healthcare and a higher level of interaction with patients and less paperwork on the part of healthcare personnel.

➤ **Robotics in Healthcare**

Another significant branch of artificial intelligence technologies in the field of healthcare is robotics. Medical robots are smart machines that are meant to help healthcare professionals overcome their clinical tasks with more accuracy, efficiency, and safety (Ness et al., 2024). Robotics in robot-assisted surgery, surgical robots are specifically used to enable surgeons to carry out complex operations using surgical robots, which are more precise and less invasive. The surgical systems come with better visualization, good dexterity and stronger control that surpasses human hands in surgical operations and this is capable of reducing surgical complications, shortening hospitalization, and favorable patient outcomes.

Robotics also finds applications in rehabilitation therapy, patient care, and hospital logistics besides its use in surgery. Rehabilitation robots, as described by (Banyai & Brişan, 2024), help patients recovering after injuries or neurological diseases to sustain their physical therapy activities and track their improvements. Such robots assist patients in recovering and being independent with personal therapy programs. Robots are also beginning to be utilized in hospitals to transport medical supplies, deliver drugs, and help healthcare employees with some of their routine duties. Due to automation of these logistical processes, healthcare organizations can optimize their work and give healthcare professionals more time to concentrate on treating patients (Holland et al.,

2021). Moreover, AI algorithms are being combined with robotic technologies to help provide autonomous decision-making capabilities thus improving the abilities of healthcare robots to be more intelligent and adaptive to assist with clinical and administrative activities.

Although artificial intelligence technologies are very different, the most sophisticated healthcare systems are turning more and more towards integrated AI ecosystems, a combination of machine learning, deep learning, natural language processing, and robotics. As an illustration, an AI-based medical system can implement machine learning to process patient information, deep learning to process medical images, NLP to assist with learning clinical notes, and robotics to help with surgical operations or patient care. This interconnection enables healthcare organizations to establish holistic digital health environments with the ability to improve clinical decision-making, patient outcomes, and healthcare operations.

With the medical sector steadily turning to digital technologies and offering more and more medical data, the role of artificial intelligence will become more significant in changing the healthcare delivery. Nevertheless, these AI technologies cannot be successfully implemented without effective governance structures, proper infrastructures, and qualified medical practitioners who are capable of interpreting the AI-produced data successfully. As such, it is important to learn the various AI technologies and its applications in healthcare to devise effective strategies to adopt AI and govern it in healthcare organizations.

2.2.4. Benefits of AI Adoption in Healthcare

One of the most revolutionary technologies that has occurred in the current healthcare systems is artificial intelligence (AI). The growing sophistication level of medical information, the escalating prices of health services, the growing patient expectations, as well as the lack of healthcare providers, contributed to the high demand of innovative technological solutions. AI is important in overcoming all these challenges as it will empower healthcare organizations to process large volumes of clinical data, increase the accuracy of diagnoses, enhance the efficiency of operations, and assist in making clinical decisions. Following the global shift in the healthcare sector towards a digital transformation, AI technologies have become the key to enhancing the quality, access to, and sustainability of healthcare.

Among the greatest advantages of AI in healthcare, it is possible to mention that it can enhance the accuracy of the diagnosis and early detection of the disease. It is common in medical diagnosis

to have to analyze multidimensional clinical data including laboratory results, imaging findings, and medical histories. These datasets can be analyzed with unprecedented speed and accuracy by AI algorithms, especially machine learning and deep learning algorithms. According to Valavanidis (2023), AI systems are able to identify anomalies in medical images, including X-rays, CT scans, and MRI scans, assisting doctors in detecting diseases, including cancer, heart disorders, and nerve tissue, among others, in earlier stages. Disease early diagnosis greatly enhances the success of treatment and lowers the healthcare costs since a patient will be in a position to undergo early interventions before the disease becomes worse. Research (Khalifa and Albadaawy, 2024; Alanazi et al., 2024) has demonstrated that AI-based diagnostic systems can be as accurate as or even more accurate than the experienced medical specialists in some medical imaging processes.

The other significant feature of AI in healthcare is its use in assisting the process of clinical decision-making. Medical practitioners are faced with the challenge of making complicated choices which include diagnosis, treatment planning, medicine dosage, and patient monitoring. Elhaddad & Hamam, (2024) stated that AI-based clinical decision support systems use patient data and medical knowledge to produce evidence-based recommendations that can help healthcare providers make informed choices. Such systems are able to measure the treatment choices, drug interactions and how patients will respond to various therapies. According to Singh (2019), AI can assist healthcare providers in making more uncertain clinical decisions and enhancing patient care outcomes by giving them real-time insights and predictive analytics. Moreover, AI systems have the ability to constantly be informed out of new clinic information, which enables them to become better at their advice with the progress of time.

According to Faiyazuddin et al., (2025), patient flow management, scheduling of staff, resource allocation, and supply chain management are some of the critical challenges that healthcare organizations experience. AI technologies can process information about operations and find healthcare patterns with the help of which the administrators will be able to optimize these processes. According to Fagbenle (2025), predictive analytics can be used to predict the rate of patient's admission, thereby helping hospitals to spend less on staff and hospital beds. The waiting period can be minimized by scheduling appointments and enhancing patient flow using AI-controlled scheduling systems. Vadaga et al., (2025) also included that the AI systems can assist

in the supply chain management, anticipating the demand of the medical supplies and pharmaceuticals, making sure that the healthcare facilities will have proper inventories without wasting them. These operational areas are beneficial in ensuring that healthcare organizations save the expenses even as they deliver high standards of care.

The other significance of AI in healthcare is that it can be used in personalized medicine and precision healthcare. Conventional medicine practices are usually systematic and might not take into account the differences that are peculiar to patients like genetic variations, lifestyle, and environmental factors. AI technologies can assist healthcare providers to differentiate big datasets such as genomic data, clinical records, and lifestyle information to build individualized treatment plans that can be applied to each specific patient. As Taherdoost, & Ghofrani (2024) stated, with the help of AI, genetic data can be used to find the most effective medications to treat particular patients, enhancing their treatment efficacy and decreasing DNR. AI-assisted personalized medicine can enable healthcare practitioners to provide more targeted treatment and patient outcomes.

As (Khan & Alotaibi, 2020) found through the analysis of large-scale health-related data using electronic health records, wearable devices, and population health databases, one can discover patterns linked to disease outbreaks and population health trends by using AI systems. Predictive analytics enables healthcare organizations to provide information regarding the people who are really at risk of getting chronic diseases like diabetes, hypertension, or cardiovascular problems. Timely detection of such risks allows the health care provider to put in place preventive measures, lifestyle changes, and surveillance schemes that can minimize the chances of disease advancement. Consequently, AI assists in the shift towards reactive healthcare services that are focused on treating diseases post-factum to proactive healthcare models that are more oriented at disease prevention and early interventions.

The discovery and development of a new drug is a highly expensive process since it takes many years and involves several scientific and administrative processes before a new drug can be developed to the stage of human trials. It is also tedious, multifaceted, costly and not always successful. This general procedure is depicted in the diagram that is shown in Figure 3. The AI technologies can speed up this process by performing analysis of biological data, discovering potential drug targets and predicting the efficacy of new compounds (Tiwari et al., 2023). Machine

learning algorithms have the capacity to analyze clinical trials and biomedical research in large volumes to draw patterns that can potentially result in new medical discoveries. Moreover, AI can be used to assist researchers to create more effective clinical trials by finding suitable populations of patients and forecasting possible results. Such capabilities can greatly save time and cost incurred in the development of new medical therapies.

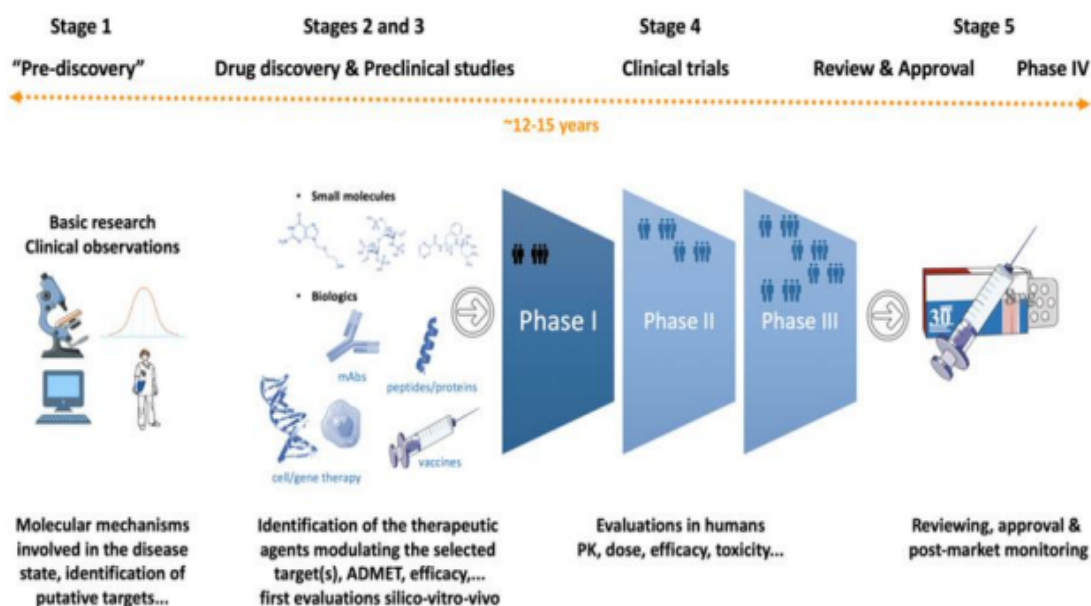


Figure 3: Novel Pharmaceutical Development Process (Abdullah, 2024)

2.2.5. The Concept of AI Literacy in Healthcare

With the continued growth of artificial intelligence (AI) in the healthcare field, the need to provide professionals with the knowledge, skills and judgment to effectively interact with these technologies has never been more pressing. Although everyone is agreeing that AI literacy is significant, healthcare education has not yet validated tools to determine the readiness of the learning processes and practitioners in navigating AI-imbedded care settings (Charow et al., 2021). The scope of AI literacy includes a wide variety of skills, such as technical knowledge and critical thinking, ethical arguments and clinical synthesis, depending on the job functions and settings of professionals. Nevertheless, the existing evaluation habits tend to be limited, immature, and non-linked to the health care realities.

Artificial Intelligence (AI) literacy in healthcare as explained (Kimiafar et al., 2023) is the degree of understanding, skills and knowledge that healthcare professionals such as executives, managers, and clinicians have on AI technologies and their use. It entails the capacity to decipher AI outputs, comprehend the constraints and dangers of AI systems and be able to apply AI perspectives to clinical and strategic choices. The concept of AI literacy is regarded as a crucial competency in the contemporary healthcare setting since it, directly, impacts the successful adoption, implementation, and governance of AI technologies. According to Fantoni & Sasmita, (2025), AI-literate leaders have the ability to bridge the divide between technical innovations and strategic goals, so that AI tools can be used to improve performance and patient outcomes in organizations instead of causing needless risks.

The multidimensional AI literacy in healthcare is technical, operational. Technical literacy is knowledge of concepts and tools of AI, including machine learning, deep learning, natural language processing, and robotics. Technically literate healthcare professionals are able to determine the AI algorithm reliability, identify biases, and evaluate the predictive validity of machine-based AI. Operational literacy relates to the knowledge of how AI can be used in healthcare operations and processes, such as patient monitoring, clinical decision support, and administrative management. Operationally literate professionals are able to see points of efficiency, streamline processes, and facilitate effective assimilation among teams.

As it is stated in (Arunachalam, 2025), AI Literacy helps in the context of decision-making, allowing the executives and clinicians to comprehend AI outputs correctly, make evidence-based decisions, and enhance patient care and operational efficiency. The leaders who are AI-literate can also easily identify and address the obstacles to AI adoption like data privacy issues, cybersecurity risks, employee resistance, ethical concerns, and budgetary limitations. Goktas & Grzybowski, (2025) also contributed the fact that AI literacy helps implement governance models and adherence to ethical and legal requirements, which is essential when dealing with sensitive patient data or when considering AI as a part of clinical affairs. Leader AI literacy can also enhance faster AI implementation, better resource distribution, and organizational flexibility to swift technological and healthcare transformations.

The AI literacy is of special concern to the Saudi healthcare context where the nation is experiencing a quasi-digital transformation in accordance with the Vision 2030. Although the adoption of AI is on the increase, Alsehani (2026) reports that the executive level of AI literacy is disproportionate in the healthcare institutions. The lack of literacy may lead to a slower adoption, misunderstanding the AI insights, underestimating risks, or not properly addressing the obstacles, including workforce preparedness, ethical standards, and infrastructures (Kumar et al., 2025). Specific training programs, workshops, and exposure to AI application are necessary to improve AI literacy among executives so that they would be able to utilize AI in their strategic planning, risk management, and operational decision making. In this regard, executive AI literacy can be considered one of the most important aspects of the benefit of AI adoption and ensuring sustainable organizational performance and patient care.

2.2.6. Challenges for AI Adoption in Healthcare

In spite of it, the implementation of AI in healthcare is associated with some serious difficulties that could impede its mass adoption and success. The barriers present here are technical, ethical, organizational and leadership gaps, and the barriers need keen attention to make AI implementation successful and in tandem with the healthcare objectives. This part discusses these challenges to enable the establishment of the groundwork on their implications on the adoption strategies in the future.

➤ Technical Challenges

The implementation of AI in healthcare is too vulnerable to numerous technical challenges, such as data quality and availability, interoperability, the transparency of algorithms, prejudice, the risks of information security, and compliance with regulations.

Availability and quality of structured data is a big problem. AI models need large volumes of labeled data, whereas the access to varied and complete medical records is not possible because of multiple factors. To begin with, institutions have broken records, and electronic health record (EHR) systems are incompatible, which results in a silo phenomenon that does not allow AI to use a full patient history. Second, unequal and irregular data gathering methods and use of outdated IT systems also limit the effectiveness of AI. Finally, omitted values and training set errors may result in false predictions, which is not beneficial to patient safety.

Interoperability and transparency are also another hindrance based on different factors. The inability to exchange data seamlessly is also a limitation to the EHR systems that are not compatible with AI technologies (Singh et al., 2020). This has been a major problem due to a lack of standardized data-sharing models which allow institutions to get full patient records thus limiting the potential of AI in the field of clinical decision-making. Also, the vendors of AI usually do not provide a lot of transparency when it comes to the functionality of models, which makes it challenging to evaluate and implement AI in healthcare organizations (Kim et al., 2023). Finally, the issue of privacy and regulatory limitations causes hospitals to be uncooperative with AI developers, which limits real-world AI learning and optimization.

The other major problem is the transparency and explainability of the algorithm. Most AI models are black boxes, which do not provide a clear rationale on how they arrived at the prediction, and it is not easy to validate the results by clinicians (Donins & Behmane, 2023). The AI does not always have an audit trail, unlike the traditional process of decision-making, which allows healthcare providers to confirm the way the conclusions have been made. It is particularly problematic with regards to such fields as radiology, where AI helps with the detection of anomalies. Clinicians might be reluctant to use the advice of AIs in the care of their patients unless it justifies its claims.

The topic of bias in AI models is another important issue because unrepresentative training data may generate systematically biased results. The AI-based diagnostics rely on the past medical records, and in case these records do not represent a wide range of populations, AI will make poor forecasts, which will harm some specific groups (Hassan et al., 2024). Prejudice may also strengthen the existing differences resulting in misdiagnosis and unequal treatment among various groups of people. Additionally, automation bias is another risk factor, which assumes that clinicians trust AI recommendations too much without critical analysis that may lead to the higher chance of medical errors.

Cybersecurity risks, as well as regulatory limitations, are also barriers to AI adoption. The healthcare systems based on AI, need access to sensitive patient data, which means that they need the security measures to be strong. Nevertheless, strict laws like Health Insurance Portability and Accountability Act (HIPAA) and General Data Protection Regulation (GDPR) restrict the ability to share data constraining the learning and predicting power of AI. Also, AI models may be subject

to cyberattacks and adversarial manipulations that may result in patient data compromise, misdiagnosis, and identity theft (Al Badi et al., 2022). The security issues also hinder the implementation of cloud based AI solutions since the healthcare providers are cautious about moving to cloud based systems due to regulatory uncertainty. Most of them continue to use on premise storage services, which does not have the computing power and security resources to scale AI.

➤ **Ethical Challenges**

The use of AI in the healthcare setting poses ethical issues of patient privacy, accountability, fairness, autonomy, and trust.

The privacy of patients and the security of their data are two of the most important ethical issues. AI uses large quantities of patient data, and it is important that it remains confidential and does not violate legislations, including HIPAA and GDPR (Donins & Behmane, 2023). Although such regulations safeguard patient rights, they also limit the access of AI to various datasets, which slows progress. Moreover, patients are not willing to use AI-powered healthcare devices due to the fear of unauthorized access, data breaches, and other possible misuse.

Responsibility of AI-inspired decisions is also another significant issue. Historically, medical decisions are the responsibility of physicians and institutions, whereas AI makes liability difficult. The question of accountability when an AI system makes a wrong diagnosis or treatment suggestion arises as outlined by Singh et al. (2020). A lack of legal frameworks puts doctors in a state of confusion regarding whether they should override the AI-generated information or not, discouraging the complete implementation of AI.

Ethics is also a problem related to bias in AI models, where training data that is not representative may result in the occurrence of disparities in healthcare results. The AI-driven diagnostics tend to replicate the biases existing in past medical records, discriminating against or favoring some groups of patients (Hassan et al., 2024). By way of illustration, diagnostic models, which have been trained on a limited population sample, can be less precise on underrepresented communities, further contributing to healthcare disparities.

Another ethical issue is autonomy and power to make decisions. Although AI improves the efficiency of the clinical process, excessive trust in the automated recommendations can diminish the role of a physician. Doctors in the context of AI-driven diagnostics might also be put under pressure to implement AI produced recommendations and not use their own expert knowledge, which brings up the issue of medical autonomy and professional responsibility.

Lastly, there is the role of trust and informed consent in AI adoption. Uncertainty is caused by the fact that many patients have little knowledge about the impact of AI on their care (Chew & Achananuparp, 2022). In contrast to human doctors, AI does not possess emotional intelligence, which may have an effect on the doctor-patient interactions and diminish patient trust in AI-based recommendations.

➤ **Organizational Challenges**

Besides technical and ethical issues, organizational ones, such as resistance to change, workflow impediments, AI illiteracy, financial limitations and regulatory uncertainties, are barriers to integrating AI in healthcare.

The problem with AI adoption is still strong. The doubt about the reliability of AI, especially when the suggestions offered by AI go against the conventional medical education and clinical practice is widespread among most healthcare professionals. Moreover, possible job displacement and the perceived risk of automation and the removal of human knowledge are other factors that make people unwilling to implement AI-based solutions (Donins & Behmane, 2023).

This resistance is further aggravated by the problems of workflow integration. Although AI improved clinical processes, inadequately integrated systems tend to add administrative pressure and cause alert fatigue, which results in less efficiency. Healthcare professionals who are overworked will not accept AI when it makes the tasks of serving patients more complex instead of simplifying the decision-making process.

One of the factors that created a serious hurdle in adopting AI is the AI illiteracy of medical professionals. In the absence of proper training and education, AI tools are likely to be abused or not used to full capacity, which constrains their potential in healthcare facilities. According to Trivedi & Patel (2021), a number of clinicians are deficient of technical skills to comprehend AI

outputs. Moreover, there are no standardized programs on AI literacy taught in medical schools and future physicians are not ready to use AI in clinical practice.

The financial constraint is also a significant challenge to healthcare institutions. The use of AI involves a high initial investment in infrastructure, computer programs, and employee education. A significant number of hospitals and care providers find it difficult to plan financially in the long term to implement AI, especially as AI technologies are constantly changing, and thus require up-to-date and continuous support (Davenport & Glaser, 2022).

Bureaucratic vagueness contributes to the further complexity of AI implementation because medical institutions are required to maneuver through the changing legal regulations, reimbursement systems, and liability issues. It is impossible to guarantee that traditional regulatory approval processes can keep abreast with many AI models that are constantly being developed. The absence of specific guidelines on certification and implementation of AI puts healthcare institutions at a loss when it comes to meeting compliance requirements.

Though most AI solutions demonstrate effectiveness in pilot projects, the application of the technologies in large-scale settings among a variety of health care institutions is still a problematic area. Small scale experimental projects are usually known to be the initial projects in AI implementation, yet most of them fail to move to fully operational systems. Especially the clinical AI applications are more prone to hurdles of scalability as compared to administrative AI because of the necessity of stringent validation, regulatory controls, and clinical testing in the real world.

Leadership, strategic planning, and good governance are the key to the successful implementation of AI in healthcare. Nonetheless, numerous health institutions are unable to establish a clear vision of AI, ethical governance, stakeholder buy-in, risk management, and effective resource allocation. These are leadership difficulties that pose enormous obstacles to the use of AI in clinical practice.

One of the reasons why most healthcare organizations have not yet adopted AI is the absence of a strategic vision and roadmap of implementation. In the absence of a roadmap, the implementation of AI is usually done in an uncoordinated way, which results in departmental integration inconsistency. The difference in the funding also makes this problem worse, as more specialties such as radiology can take advantage of AI than less-invested ones such as pediatrics and general practice. Such unequal distribution restricts the fair use of AI developments (Davenport & Glaser,

2022). Healthcare leaders are also faced with major challenges in AI governance and compliance with regulations. Numerous organizations do not have an effective governance system, which leads to the absence of ethical monitoring and the growing threat of bias, regulatory offenses, and misuse of AI. The leadership has a significant role to play in the resolution of such problems as it is necessary to develop clear ethical standards that will guarantee the use of AI with the purpose to promote patient safety, fairness, and compliance with regulations.

The implementation of AI has its own risks, and the healthcare leaders need to evaluate the possible difficulties and make the correct decisions regarding the implementation of AI. One of the central points of risk management is to guarantee future validation of AI models prior to their application in the real clinical contexts (Trivedi & Patel, 2021). AI models can also bring errors, biases, or unintended consequences without strict testing and validation, which will threaten patient safety and trust. The best approach to leadership is to create strong risk management procedures that would make AI solutions safe, reliable, and congruent to medical best practices.

The use of AI also need the participation of several stakeholders, such as clinicians, administrative teams, IT teams, and policymakers. Nevertheless, the amount of AI knowledge in healthcare leaders does not always speed up the process of decision-making. Most hospital administrators and executives do not have the technical knowledge of AI, and it is challenging to estimate AI potentials, risks, and integration plans.

2.2.7. Regulatory Frameworks, Governance, and Accountability

KSA has proactively established a robust governance ecosystem through SDAIA's AI Ethics Principles and the implementation of the PDPL. These frameworks emphasize transparency, accountability, responsible use, and strict adherence to privacy, which is crucial given the sensitivity of health data.

However, the integration of complex AI systems introduces a high-stakes accountability dilemma. When AI leads to strategic failure or medical error, the “black box” nature of certain algorithms complicates the assignment of blame and organizational liability. Legal tensions emerge regarding executive responsibility, especially given PDPL's mandate for strict access controls over health data, requiring careful auditing based on seniority and need-to-know principles. For KSA executives, establishing a high AI Governance Maturity (AGM) is therefore a primary strategic requirement for ensuring compliance and mitigating risk. Effective governance demands a

multidisciplinary approach, integrating legal, clinical, compliance, and bioethics expertise. Strategically, this necessitates moving away from opaque models towards "white box" or Explainable AI (XAI) solutions to enhance transparency and implementing integrated governance maturity matrices to track progress against strategic AI objectives annually.

The lack and incompleteness of the legal regulation of AI accountability in most countries and regions, Saudi Arabia is not an exception (Khammassi & AlShanqityi, 2025). The current legislation frequently fails to specify the distribution of responsibility in the case of AI-related clinical outcomes, and it lacks the benchmarks of appraising the safety and efficacy of AI prior to its mass implementation. Regulatory uncertainty can stifle strategic decision-making to implement or expand AI solutions without explicit regulatory direction on the matter, potentially delaying this process.

The ethical factors that present another managerial challenge are those of fairness, bias, and informed consent. The healthcare AI system may reproduce the biases inherent in the training data, and consequently, discriminate some patient groups (Ali, 2025). The possible consequences of such outcomes not only cause ethical issues but might also result in legal actions in case of discrimination whose impacts are detrimental to the patients. Executives should, therefore, adopt governance frameworks that deal with the issue of algorithmic bias, equitable treatment, and informed consent (patients) in case clinical decision-making is conducted with the help of AI systems. These ethical protection measures are managerial and legal requirements that should be incorporated into organizational policies.

2.2.8. Mitigation Strategies for AI Implementation Challenges in Healthcare

The mitigation measures to the challenges of AI implementation in healthcare are the premeditated approaches, policies, and interventions that organizations use to address obstacles related to the implementation of AI. Some of the challenges faced by healthcare systems in the implementation of AI technologies are the issue of data privacy and security, resistance of the workforce, ethical issues, regulatory requirements, financial constraints, and technical incompetence. Sound mitigation measures should help to deal with these challenges in a systematic way so that successful AI implementation can be achieved, and the advantages of AI applications may be maximized, and patient outcomes can be kept safe. In healthcare contexts, such strategies are

especially important because patient information is sensitive, the importance of clinical decisions is extremely high, and the organizational processes are complicated.

Among such major mitigation mechanisms is the development of AI governance and ethical systems. The governance structure outlines roles, responsibilities and accountability procedures of AI decision-making. They also define the data access guidelines, validation of algorithms, risk evaluation, and the performance of AI (Janakiraman, 2025). Ethical frameworks can be used to verify that AI systems are deployed and designed in accordance with issues like fairness, transparency, privacy, and patient safety. As an example, hospitals that have deployed predictive analytics or AI-powered diagnostic apps may establish committees to regulate the concept of algorithmic fairness, informed consent, and ethical implications to guarantee the correct use of such technologies prior to their implementation. Formalized governing and ethical principles help organizations to minimize the dangers of prejudice, mistakes, and misuse of AI technologies.

The other valuable tool is the training and capacity-building of the healthcare workers and the executives. Adoption of AI will not be successful in the absence of required skills among personnel to learn, interpret, and apply AI tools. Organized training initiatives promote technical expertise, operational knowledge and strategic consciousness of the AI systems (Rane et al., 2024). In regard to executives, the training can be based on the introduction of AI knowledge to strategic planning, resource distribution, and risk management. Training may include practical examples of how AI can be applied to clinical workflows, patient monitoring or administration to clinicians and operational staff. Enhancing AI literacy of various organizational levels can improve the quality of decision-making, as well as enhance resistance to adoption and boost confidence in AI systems in healthcare institutions.

AI solutions are based on vast amounts of sensitive patient data, and their abuse or violation can be ethically and legally disastrous. The mitigation strategies are set clear policies regarding data management, anonymization policies, secure data storage and adherence to local and international standards of data management including HIPAA or other standards in Saudi Arabia. Continuous audits, penetration testing, and monitoring systems contribute to the provision of safe work of AI tools that protect patient trust and integrity of the organization. Effective data governance helps avoid risks, as well as aids AI performance by providing quality and reliable data on training and deploying the algorithms (Alhoussari, 2025).

Incremental implementation and pilot testing are other strategies that are largely suggested. Rather than implementing AI systems on a company-wide basis, healthcare institutions can begin with pilot programs or constrained deployments. The given approach enables the testing of AI tools in practical situations, detecting the problematic matters in their functioning, modifying the working process, and measuring the results prior to the implementation on the large scale. Pilots are also involved in the identification of potential risks as well as refining on mitigation efforts such as user training, system integration, and process adaptation. Gradual implementation helps to make the process of adopting AI manageable, minimize the impact on clinical processes, and develop organizational trust in technology.

Stakeholder engagement and change management are approaches that help organizations to surmount opposition to AI adoption. Involving clinicians, executives, IT personnel, and policymakers in the process of planning and implementing the change will help to make sure that the different views and issues are taken into account, and buy-in is reached. Communication campaigns, workshops, and feedback mechanisms are the change management activities that allow the stakeholders to learn about the advantages of AI, minimize fear or skepticism, and develop an innovative culture. The strategies are very relevant especially in health care organizations, where the adoption success may be affected by professional autonomy, cultural norms, and hierarchical decision making structure.

2.3. AI Governance Maturity

The concept of AI governance maturity is used to denote how successfully an organization is to establish organized policies, procedures, and capabilities to successfully manage, control, and monitor the creation, execution, and utilization of artificial intelligence technologies. It demonstrates the capacity of the organization to make sure that AI systems work in a responsible, ethical, transparent, and strategic way (De Almeida et al., 2021). Since AI technologies are becoming more and more part of healthcare systems, the level of governance has become a key determinant of whether the technologies offer value or present risks in terms of data privacy, algorithmic bias, ethical issues, and adhering to regulations.

The concept of AI governance maturity is derived from broader governance maturity models used in information technology management and digital transformation research. These models explain that the development of governance is a step process whereby organizations build on their governance abilities. Within the framework of AI, governance maturity entails creating AI governance mechanisms, risk management, accountability, data governance, transparency, and regulatory compliance (Kubilay & Celiktaş, 2025).

As (Duggireddy, 2025) explains, the organizations that are characterized by lower AI governance maturity generally do not have established policies that guide the management of AI technologies and the AI initiatives can exist in the firms without any explicit controls or strategic integration. Contrarily, companies that have high AI governance maturity adopt formal governance structures which govern AI development, data responsible use, and integration of AI strategies into wider organizational planning and performance management structures.

The maturity of AI governance is usually measured by a scale of consecutive maturity levels which indicate the maturity of governance capabilities. Organizations can test AI technologies at the first level with no formal governance systems. At this point, the AI projects are mostly individual efforts by one department or teams working on technology. As the organizations proceed to the next phase, they start to put in place the simplest form of governance like data management policies, ethics and compliance policies. At more sophisticated levels, companies come up with integrated governance systems that comprise risk evaluation processes, control committees, and uniform procedures in the development and deployment of AI systems. Top maturity is often described as the ongoing optimization of governance where organizations have performance monitoring, auditing facilities, and feedback systems to keep on improving their AI governance exercises.

The maturity of AI governance is especially significant in healthcare organizations because healthcare information is very sensitive, and clinical decisions have a significant effect on patient safety. Patient data, medical records, and diagnostic information play a very important role in the healthcare institution; therefore, they must be managed with high confidentiality and security (Bani Issa et al., 2020). The AI systems processing such data should be therefore under strict regulations that will prevent breaching privacy controls, ethical standards, and healthcare policies. Being at the high stage of AI governance maturity allows healthcare organizations to develop clear rules on

how data is used, the transparency of algorithms, and the responsibility of AI-driven decisions (Rahul & Kakade, 2026). This form of governance is useful to make healthcare leaders ensure that AI technologies do not harm clinical practice as well as protect patient rights and ensure that people would not question the healthcare system.

The other relevant area of AI governance maturity is its strategic alignment and organisational decision-making. Proper governance will make sure that AI initiatives are not applied in isolation but that it is in line with the long-term strategic goals of the organization. This translates to the incorporation of AI technologies in the processes of strategic planning in healthcare organizations that are associated with the enhancement of service quality, operational efficiency, and innovation in patient care. Established systems of governance have structures of making decisions that include executive, technology, clinicians, and policy experts. This model of collaborative governance allows organizations to weigh opportunities of AI, review possible risks, and focus on AI investments that would allow organizations to achieve their performance and the betterment of the healthcare system. Consequently, the maturity of AI governance has a direct effect on the success of AI adoption and its ability to affect strategic planning and organizational performance.

The level of AI governance is also critical in the management of risks and the ethical implementation of AI. AI technologies are capable of posing great risks when they are not appropriately regulated. Such threats are algorithmic bias, the absence of transparency in automated decision-making, security vulnerabilities, and unforeseen effects of AI-enhanced clinical recommendations. The maturity of governance also allows organizations to develop risk assessment processes that measure the possible ethical and operational risks related to AI systems, prior to their implementation. Also, developed governance systems can have surveillance systems to monitor the performance of AI and raise any anomalies or undesirable results. By conducting continuous monitoring and auditing, organizations will be able to make sure that AI technologies do not compromise the ethical standards, are reliable, fair, and consistent across their lifecycle.

Moreover, AI governance maturity assists organizational learning and constant enhancement of the management of AI technologies. Medical institutions get experience of implementing AI, and as time passes, they will get knowledge on the best practices, legal standards, and technological constraints. Established forms of governance make use of this knowledge in new policies, training and rules and regulations of operation. The processes of continuous improvement make sure that

AI governance platforms are constantly updated in accordance with the changes in technology and new regulatory conditions. It is thus seen that healthcare organizations that have high governance maturity can more readily adjust to new technological advancements and retain strong measures of overseers and accountability.

2.4. Strategic Planning in Healthcare

Execution of strategic planning in healthcare The planning process through which the highest health-related executives, such as hospital CEOs, chief medical officers, and healthcare executives, establish their long-term goals, allocate resources, and create strategies that can increase the provision of healthcare and improve the work of the organization, is called executive strategic planning in healthcare. Strategic planning helps healthcare organizations to deal with the multidimensional problems such as rising healthcare costs, changing technology, regulatory pressures, and increasing patient demands (Soyege et al., 2024). The executive level of strategic planning presupposes internal organizational strength analysis, the analysis of the external environmental situation to simplify the decision-making process and guarantee sustainable development of healthcare institutions, as well as the maintenance of the high patient care level. According to healthcare management literature, strategic planning enables healthcare leaders to align the organisational resources, policies and the operations activities with the long term goals and priorities of the healthcare system (Esfahani et al., 2018).

AI's role in decision-making frameworks represents a paradigm shift, providing unprecedented capabilities for efficiency and predictive power. While the consensus in the literature is optimistic about AI's potential and views its use as inevitable, its influence is growing beyond that of a cognitive assistant (a tool for data collection and evaluation) to a strategic collaborator whose role will expand as the technology becomes more institutionalized. In the healthcare sector, this translates to measurable strategic advantages. AI-driven predictive models substantially improve diagnostic accuracy and patient care, which strategically corresponds to improved patient outcomes (projected 40% improvement) and reduced treatment costs (estimated 50% reduction for AI-assisted diagnoses). This powerful dual impact on quality and cost directly ties the strategic decision to invest in AI to the crucial mandate of managing the financial pressures inherent in complex health systems. Consequently, high initial investment in AI, particularly in RCM systems,

is justifiable due to the strategic potential for substantial cost reductions and improved financial transparency, elevating AI integration to a C-suite financial imperative.

Environmental analysis is a fundamental part of the executive strategic planning and it involves assessment of the internal and external forces that might influence healthcare organizations. Inside, the executives take into account organizational weaknesses and strengths like workforce strengths, financial resources, technological base, and service quality (Ndungi, 2018). The healthcare leaders analyze political, economic, social, technological, legal, and environmental forces, which may affect the provision of healthcare, on the outside. These areas are assessed with the help of SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) and PESTEL analysis which are the most common tools and instruments used in the healthcare strategic planning. Thorough environmental scanning allows healthcare leaders to see the new opportunities and threats in order to develop proactive strategies that would lead to increased organisational resilience and flexibility in the rapidly changing healthcare environment.

The other valuable aspect of executive strategic planning is goal setting and strategy formulation. In this step, the healthcare leaders establish the long-term organizational objectives in terms of the quality of services delivered to the patients, efficiency and sustainability of the organizational functioning, and innovativeness. These are strategic objectives that are mostly in line with the policies and regulations of the healthcare in the country. In several countries, most healthcare institutions have included the strategic plans of the healthcare institution into the national health strategies so as to have a synergistic development in healthcare. As an example, strategic objectives can be patient outcomes, expanding access to healthcare, applying up-to-date technologies, or capacity of workforce. Another aspect that should be formulated in strategy formulation is prioritizing, resource allocation and development of implementation plans that transform strategic goals in operations in different departments within the healthcare organization.

One of the factors that can lead to the success of strategic planning in health care organizations is the executive leadership, as per (Khalilov et al., 2025). The healthcare executives are also to develop the strategic plans and convey the strategic vision, staff motivation and organize the implementation process of the strategic initiatives. Leadership brings a feeling of congruency in an organization such that clinical units, administrative staff as well as support services work towards a common goal. Research has also been used to argue that a strong executive leadership

makes strategic decisions better since it encourages innovation, cross-cultural collaboration, and evidence-based management (Mahajan, 2024). Leadership commitment has been noted to play a major role in healthcare settings whereby strategic decisions are likely to have consequences on patient safety, clinical outcomes as well as the long-term sustainability of the institution.

The past years have experienced the significant influence of technological change and information-based technologies on the executive strategic planning in healthcare. The healthcare organizations are increasingly relying on advanced information systems, big data analytics, and artificial intelligence to support the process of making strategic decisions. The technologies provide the healthcare executives with real-time data regarding the trends of patients, resource utilization, and performance. An evidence-driven decision-making process will also allow the executives to make more precise predictions, reveal the areas of inefficiencies and make more precise interventions that can enhance healthcare outcomes. Specifically, artificial intelligence will transform the strategic planning process, which will be able to foresee analytics, suggest, and strategize the scenarios. Through AI technologies, healthcare leaders can make more effective strategic decisions that can be used to make the clinical and organizational performance effective.

Despite the importance of it, executive strategic planning in healthcare is prone to several challenges. Healthcare systems are highly dynamic in terms of many stakeholders, regulation provisions, and changing technologies. The strategic choices must put into consideration the clinical ethics, patient safety, financial constraint, and the priorities of the public health. In addition to that, healthcare organizations are more likely to operate under the circumstances of uncertainty that involve pandemics, policy shifts, and technological interruptions. The challenges provide that the healthcare executives must adopt flexible and adaptive strategic planning, which will allow the stated organizations to respond swiftly to the emerging changes. Soyege et al. (2024) are eager to observe that strategic agility, constant oversight, and participation of the stakeholders are key drivers of maintaining an effective strategic planning process within fluctuating health care environments.

Efficient executive strategic planning as a component of the healthcare performance contributes to the improvement of organizational performance. Strategic plans help medical institutions to invest in the most optimal manner, enhance the quality of services offered and also offer a competitive positioning. The strategic planning will help in the integration of the new technologies and the governing systems that will make the company sustainable in the long run also. As the number of healthcare organizations that embrace the concept of artificial intelligence and other types of digital technologies grows, executives must integrate the latter into their strategic planning processes and ensure that they have adequate governance and risk management practices. Therefore, it has become an important line of research to study how the adoption of artificial intelligence and the maturity of governance affects executive strategic planning specifically in the context of the fast-evolving healthcare systems, like the one in Saudi Arabia.

2.5. Organizational Performance in Healthcare

Organizational performance in healthcare is the capacity of healthcare institutions like hospitals, clinics and healthcare systems to accomplish their strategic goals in addition to providing high quality, efficient and accessible healthcare services. The healthcare organizations are multidimensional in their performance as the organizations need to be able to balance clinical quality, operational efficiency, financial sustainability and patient satisfaction at the same time. As opposed to most other industries, healthcare performance is not determined only by its profitability; it encompasses the outcomes of public health, the quality of care, the safety standards, and an effective utilization of the resources. The researchers tend to refer to the organizational performance as the level at which the healthcare organizations unravel the intended results due to effective service delivery, streamlined management, and optimal allocation of the available resources (Al Hammadi & Hussain, 2019). These dimensions are especially important since the demands on the healthcare systems of all countries are growing, costs are escalating, and there is a need to raise the quality of healthcare systems and at the same time be able to operate at high efficiency.

Financial and non-financial indicators are considered as one of the most popular methods of assessing the performance of healthcare organizations. Some of the financial indicators are the cost efficiency, revenue generation, return on investment, as well as financial sustainability. Nevertheless, financial aspects are not the only measures of healthcare performance since the main goal of a healthcare institution is to enhance patient health outcomes. Thus, non-financial indicators are very instrumental in measuring performance. These measures are patient satisfaction, clinical quality, safety outcomes, waiting time, healthcare service accessibility, and staff productivity. The Balanced Scorecard (BSC) model has frequently been implemented in health care management to gauge its performance on various fronts, such as financial, patient-related, internal, and organizational learning and development. Combining these dimensions, the healthcare organizations will be able to create a more complex picture of their functioning efficiency and sustainability in the long run.

Operational efficiency is another significant healthcare organizational performance dimension, which is concerned with the use of healthcare resources (medical staff, technology, infrastructure, and financial assets) effectively. Effective healthcare institutions can provide quality services at a low resource wastage. This involves streamlining of hospital operations, minimization of waiting durations, increasing turnover of patients, and advancement of interdependency among healthcare workers. Digital technologies and electronic health records, as well as advanced analytics, help healthcare organizations to simplify operational processes and enhance effectiveness. It has been demonstrated through studies (Şişu et al., 2024; Olayinka, 2021) that the incorporation of digital technologies can have a tremendously positive effect on the performance of the operational activities, including the flow of information, faster decision-making, and the timely allocation of resources. Consequently, the use of technological solutions has been one of the major driving factors of the performance gains in the current healthcare systems.

Another key element of healthcare organizational performance that is described in (Andrieiev et al., 2023) is quality of care. The healthcare organizations are supposed to provide safe, effective, patient-centered, and timely care. Measures of mortality rates, readmission rates, infection rates, and compliance with clinical guidelines are some of the quality indicators. The quality of care is not only beneficial in improving patient outcomes, but also in strengthening patient reputation and credibility of the healthcare institutions. In most healthcare systems accreditation boards and other

regulatory agencies assess hospitals and healthcare providers on the basis of quality standards and performance indicators. This means that healthcare managers should constantly observe and enhance quality performance to have compliance with regulatory requirements and adequately high standards of patient care.

The performance of human resource is also a key factor of the overall performance of healthcare organizations. The healthcare delivery is closely reliant on skills, knowledge, and cooperation of healthcare personnel, such as physicians, nurses, administrators, and technical staff. Successful healthcare organizations generally invest in employee engagement initiatives, employee development, and learning initiatives (Charles, 2021). These programs help to enhance the productivity of the staff, their job satisfaction, and patient care outcomes. Besides, effective strategic management practices and strong leadership are necessary to align organizational goals with operational activities and make the healthcare teams collaborate towards achieving organizational goals (Andrieiev et al., 2024).

Technological innovation especially the use of artificial intelligence and digital health technologies has become a major determinant of healthcare organization performance in the past few years. Artificial intelligence has the capability to improve performance by aiding clinical decision-making, forecasting patient outcomes, optimizing hospital operations, and enhancing the accuracy of the diagnostic outcomes. The healthcare organization can predict patient demand and allocate its resources more efficiently, and enhance treatment planning, which is an example of how AI-based predictive analytics can be used (Vanaparthi & Rao, 2023). Nevertheless, to make AI technologies successful, proper governance structures, leadership, and organizational preparedness are needed. The absence of these components can make healthcare organizations unable to achieve the maximum performance benefits of AI implementation (Razdan, 2026). Hence, the concept of the relationship between the technological adoption, governance maturity, and organizational performance has been a significant research field in healthcare management.

Altogether, the field of organizational performance in healthcare is a complicated and multidimensional yet embraces financial performance, efficiency of operations, quality of care, patient satisfaction, and effectiveness of the workforce. With the ever-changing healthcare systems being responsive to technological changes and the growing demands of services, healthcare leaders are forced to embrace new solutions and governance systems that will lead to improved

performances. In this regard, the new technologies like artificial intelligence have enormous potential to enhance the performance of healthcare, especially with the good governance systems and effective leadership. The said factors are especially applicable to the Saudi Arabian healthcare industry, which currently experiences a rapid digitalization as a component of national healthcare reform programs.

2.6. Previous Studies

Kumar et al., (2025) explored the perception of the AI by the healthcare workforce and its effect on their performance, where technology readiness would moderate the relationship. This was a cross-sectional study where the close-ended self-report survey questionnaire was utilized to allow it to gather the responses of 434 individuals who were employed in the public hospitals within the Hail health cluster in Saudi Arabia. The demographics of the participants showed that most of the medical field respondents were males with the majority being within the 36-45 years' age bracket. Majority of the participants were aged 9-10 or more in their present position and had graduate degrees in the Saudi Arabian healthcare sector. The research shows that the perception of AI alone does not cause a significant impact on the workforce performance but its impact is evident when it is moderated with the increased levels of technology readiness. Future studies are advised to investigate the role of other elements like organizational culture and availability of resources in shaping AI perceptions in healthcare.

According to (Faiyazuddin et al., 2025) th study outlined AI in healthcare, including key technologies such as robotics, machine learning (ML), deep learning (DL), and natural language processing (NLP), and explore the application of the technologies to the communication with patients, predictive analytics, and remote monitoring. The review examines the effects of AI in healthcare based on the Web of Science (2014-2024) data using the keywords such as AI, ML, and healthcare applications. The results show that AI is elevating the competencies of health care specialists, improving diagnosis, and providing an opportunity to tailor treatment schemes. The basic ones such as remote monitoring and predictive analytics enhance operational efficiency and patient engagement. Nevertheless, problems in data security, and financial limitations are the key hurdles to mainstream use of AI in healthcare. AI can transform healthcare and make it useful, but we must use it ethically and responsibly.

As (Aljehani & Al Naweess, 2025) explain, this research is aimed at conducting a systematic review of the present status, issues, and prospects of artificial intelligence in healthcare in Saudi Arabia. The systematic review approach was employed in the study, where the critical evaluation of the articles on artificial intelligence use in healthcare was used. The existing situation of artificial intelligence use in the healthcare system of Saudi has been delayed by the slow adoption of healthcare technologies and investments needed. The key challenges as identified were absence of policies to facilitate artificial intelligence, insufficient capital of infrastructures and human resources and absence of cultures to embrace the artificial intelligence in Saudi Arabia. As the artificial intelligence is being more privatized and utilized, the future of artificial intelligence in the Saudi healthcare system would experience increased use of the artificial intelligence. There are specific findings that suggest the potential of artificial intelligence in enhancing clinical practice in the use of blockchain and that the investments in artificial intelligence have been broad and that radiology is one of its uses. The issue of skills shortage among healthcare professionals, as well as its integration into new technology, are the challenges affecting the use of artificial intelligence in the healthcare industry. Artificial intelligence applications in the Saudi healthcare system involve the investments into the infrastructure, human resource development, and gradual investments in the technologies of the healthcare system. The advantages of using artificial intelligence would be its effectiveness in care access and capability to achieve the healthcare outcomes.

According to (Osman & Anuar, 2025) this study examined how incorporation of a system of governance structure and performance management systems affect the performance of the organization within the Saudi Arabian healthcare sector. Cross-sectional surveys that were conducted on healthcare professionals in major parts of Saudi Arabia were used to gather primary data, but the systematic reviews of literature were also conducted. The results indicate that governance structures have a significant positive relation with performance management system and organizational performance with employee engagement and commitment playing a significant mediator role. Moderators like the size of the organization and adherence to the local laws play major roles in determining this relationship. This integration will enhance transparency in operations, patient satisfaction, and flexibility to meet the changing Saudi healthcare market. Through using digital tools such as Hospital Information Systems, the systems allow real time tracking of performance and even decision making based on data. The study served as an assistant to health care managers and policy-makers in nurturing a performance excellence culture,

maximizing resource use, and ensuring sustainable strategic targets that will be echoed to patient outcomes enhancement that will be aligned with the Saudi Arabia Vision 2030.

According to (Jafari et al., 2025) this paper is a research into the impact of Artificial Intelligence (AI) on strategic planning and assists industries to gain a better competitive edge. As the digital changes become increasingly more overwhelming, organizations must be swift to respond, and AI offers them the instruments and directions to be considered foresightful, agile and intelligence in their decisions. Investigating over 80 current scholarly publications on the subject matter, the paper examines how AI combines with such approaches as Resource-Based View (RBV), SWOT, and Porters Five Forces and optimizes them, the use of predictive analytics, natural language processing (NLP), and machine learning (ML). The comparison of Amazon, Google, IBM, Tesla, and SMEs shows that AI assists in enhancing efficiency, accelerating the innovation process, creating well-known brands and enhancing communication with the ecosystem. It is also revealed that ethical issues and governance issues and differences that are not managed can be a hindrance to the adoption of AI. The findings indicate that AI ought to be thought of as a helpful technology and an enhanced companion, providing unending value generates unending value when it promotes corporate purposes, morals and management.

2.6.1. Comment on Previous Studies

Having examined the previous studies, some important points can be identified. Most of the research indicates the increased involvement of AI in enhancing the performance and efficiency of healthcare. Kumar et al. (2025) selected the aspect of perceptions of the healthcare workforce and discovered that the effect of AI on performance is considerable with the moderating effect of technology readiness. Faiyazuddin et al. (2025) and Aljehani and Al Naweess (2025) highlighted such AI technologies as ML, DL, NLP, and robotics and discussed their application in terms of diagnosis, predictive analytics, and patient engagement but mentioned issues like lack of data security, infrastructure, and shortages of skilled labor. Osman and Anuar (2025) discussed the governance system and performance management and demonstrated its positive characteristics on organizational performance, Jafari et al. (2025) reviewed the strategic role of AI in different industries with an emphasis on its influence on decision-making and competitiveness.

The studies vary in their focus and methods some are empirical surveys in Saudi healthcare, others are systematic or literature reviews. There is a notable gap in the research which is there is few studies examine the combined effect of AI adoption and governance maturity on executive strategic planning and organizational performance in the Saudi healthcare sector. The lack of this indicates that research combining AI and governance systems with strategic decisions and performance at the executive level is necessary.

Chapter Three

Methodology

This chapter describes the research design that should be employed to examine how the adoption of artificial intelligence and AI governance maturity affects executive strategic planning and performance within the Saudi Arabian healthcare industry. This chapter is aimed at explaining the research approach, the data collection procedures, the population and the data analysis techniques that were used to answer the research questions of the study.

3.1. Study Design

Research design denotes the comprehensive plan, framework, and methodology that directs the gathering, processing, and interpretation of data inside a research study (Asenahabi, 2019). It is a structured framework that delineates the techniques and methodologies researchers will employ to tackle their research questions or hypotheses. The research design is a vital component of the research process, since it affects the validity and reliability of the study's results.

This study relied on the descriptive analytical approach, as this approach aims to describe the phenomenon, study it on the ground, and obtain data from its primary sources. The descriptive analytical approach means “one of the scientific methods for describing the subject to be studied through a correct scientific methodology and depicting the results that are reached in the form of expressive digital information that can be interpreted”.

3.2. Research Approach

Research approaches denote the overarching methodologies utilized by researchers in conducting their study. The procedures utilized in the study might be categorized as quantitative, qualitative, or mixed methods, based on the study's objectives. Quantitative research entails the utilization of numerical data to analyze and elucidate the outcomes of a study, whereas qualitative research centers on descriptive methods and explanations that do not rely on numerical values (Ahmad et al., 2019). Given the nature of the study and its objectives, the researcher opted for a quantitative methodology. A Quantitative Design is the appropriate methodology to empirically test the hypothesized relationships between AI adoption, governance maturity, strategic planning and organizational performance in the KSA healthcare sector.

3.3. Study Population

The term "study population" is employed to refer to the entire group of individuals who possess a common trait or quality for the objectives of a specific study (Sileyew, 2019). It is a critical concept in the design and execution of research, as it establishes the parameters within which the study will operate. The research population defines the individuals or groups that will be the focus of the data collection and analysis process.

The target population consists of C-suite executives (CEO, COO, CIO, CFO, CMO) and high-level strategy and planning directors from three organizational types reflective of the HSTP's structural changes: large public hospitals/health clusters, major private sector healthcare providers, and academic medical centers, specifically located within Riyadh administrative region.

3.4. Data Collection

In order to obtain information and evidence to back up the research aims, data collecting is a crucial part of research methodology. It is a methodical approach to answering research questions by gathering, organizing, and evaluating data from a variety of sources. Gathering factual material to support inferences and conclusions is data collection's principal goal.

The original, first-hand knowledge or evidence provided by primary sources is essential to the research topic and forms the basis of data collection. Due to the lack of interpretation, summarization, or filtering by prior researchers or intermediaries, these sources provide data that is crucial.

Boparai et al. (2018) identify the questionnaire as a prevalent tool for data observation, notwithstanding the researcher's geographical limitations. The questionnaire functions as a translator from study goals to concrete questions and responses. The attributes of an effective questionnaire are promptly categorized, executed, compiled, and assessed. An effective questionnaire must be concise, clear, logical, and systematic. Less complex questions should precede more intricate ones. Questionnaires, being composed of written first-person opinions and responses, guarantee authenticity. The collection of quantitative data involved the distribution of a structured questionnaire to the target population in Saudi Arabia.

The questionnaire was administered to the sample population and was comprised of four primary sections utilizing established, validated measurement scales adapted for the KSA healthcare context:

- **The first part** contains demographic information for the study population, which relates to the demographic characteristics of the study sample, which are: gender, age, educational level, executive role, years of experience, and type of healthcare facility.
- **The second part** which is divided into four main sections:
 - ✓ Section One: It relates to the questionnaire items designed to clarify the first axis which is artificial intelligence adoption and it consists of (5) statements.
 - ✓ Section Two: It relates to the questionnaire items designed to clarify the second axis which is AI governance maturity and it consists of (5) statements.
 - ✓ Section Three: It relates to the questionnaire items designed to clarify the third axis which is executive strategic planning and it consists of (5) statements.
 - ✓ Section Four: It relates to the questionnaire items designed to clarify the fourth axis which is organizational performance and it consists of (5) statements.

Responses to the statements were graded using a five-point Likert scale as follows: (strongly agree - agree - neutral - disagree - strongly disagree) taking scores (1-2-3-4-5) respectively.

Table 1: Scores on a Five-Point Likert Scale

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	2	3	4	5

3.5. Data Analysis

"Data analysis" refers to the systematic and organized process of reviewing, cleaning, altering, and analyzing data collected in order to derive conclusions, answer research questions, or test hypotheses. This is the part where researchers interpret the data that has been obtained using various computational and statistical methodologies (Davidavičienė, 2018). This study's questionnaire data was analyzed statistically using the SPSS program.

3.6. Study Boundaries

The study falls within certain boundaries to provide a precise and narrow research of how Artificial Intelligence (AI) adoption, governance maturity, executive strategic planning, and performance in the healthcare industry in Saudi Arabia relate. The boundaries set the limits of the research study with regards to geography, population, variables, and time.

- **Geographical Boundaries:** The research is confined to the healthcare organizations located in the Kingdom of Saudi Arabia (KSA).
- **Population Boundaries:** The aim population is made up of senior healthcare executives and top management teams that are engaged in strategic decision-making processes.
- **Methodological Boundaries:** The study follows a quantitative methodology based on the survey information gathered among healthcare executives. The statistical analysis was carried out with the help of SPSS with the aim of assessing the effect of AI adoption and the level of maturity of AI governance on the effectiveness of strategic planning and the effectiveness of organizational performance.

These limits aid in keeping the study within a narrow scope that can be addressed by the executive of Saudi healthcare industry concerning the strategic impacts of AI adoption and keeping the scope manageable and clearly defined.

3.7. Ethical Considerations

Participants were informed of the study's purpose, their right to withdraw at any time, and the voluntary nature of participation. Confidentiality was maintained by anonymizing responses, and data were stored securely.

Chapter Four

Results and Data Analysis

This chapter presents the data analysis and empirical results of the study. The results presented in this chapter aim to test the study's hypotheses.

4.1. Demographic Information

1. Gender

Table 2: Gender

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	57	55.3	55.3	55.3
	Female	46	44.7	44.7	100.0
	Total	103	100.0	100.0	

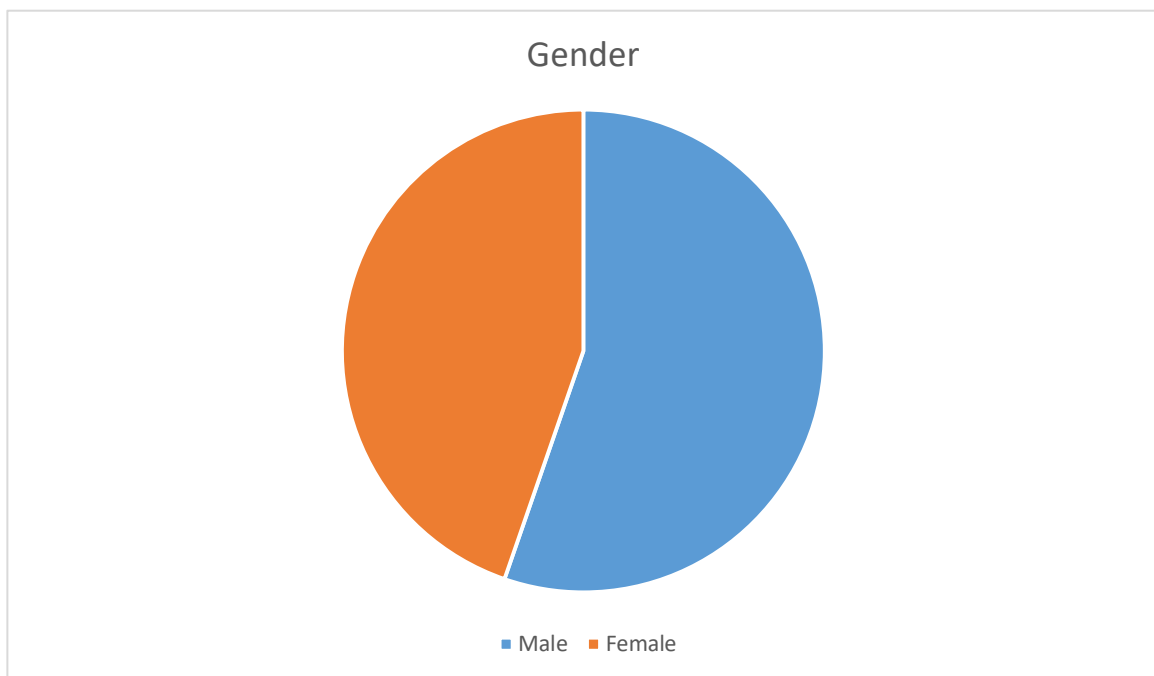


Figure 4: Gender

Table 2 presents the gender distribution of the study participants. The results indicate that the total number of respondents was 103 individuals. Among them, 57 participants (55.3%) were male, while 46 participants (44.7%) were female. The cumulative percentage shows that males account for 55.3% of the sample, and when females are added, the total reaches 100%. This information indicates that the sample is comparatively balanced represented by both genders, though it is men who have a somewhat larger percentage of respondents as compared to women.

2. Age (Years)

Table 3: Age

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	30–39	36	35.0	35.0	35.0
	40–49	46	44.7	44.7	79.6
	50–59	13	12.6	12.6	92.2
	60 years and above	8	7.8	7.8	100.0
	Total	103	100.0	100.0	

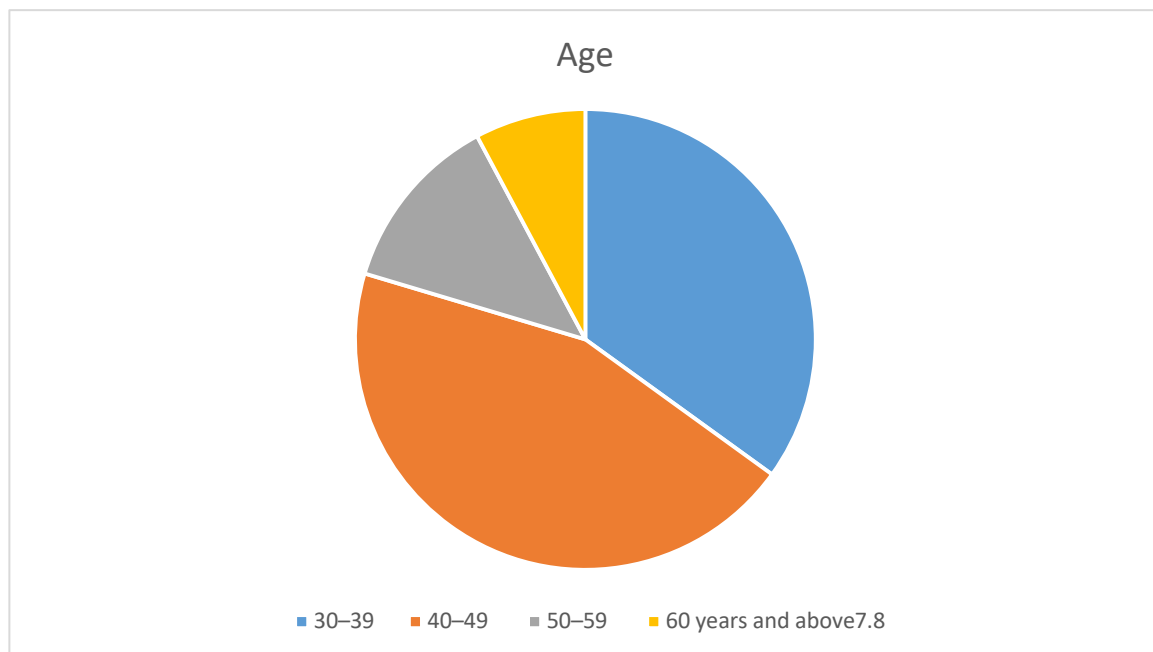


Figure 5: Age

Table 3 presents the age distribution of the respondents in the study. The results show that the largest proportion of participants falls within the 40–49 years’ age group, representing 46 respondents (44.7%) of the total sample. This is followed by the 30–39 years’ category with 36 respondents (35.0%), indicating that a significant portion of the sample consists of individuals in their mid-career stages. Meanwhile, 13 respondents (12.6%) belong to the 50–59 years’ age group, and 8 respondents (7.8%) are 60 years and above. On the whole, the results indicate that the majority of respondents are in the range of active professionals, which could bring valuable managerial and executive insights that could be applied in the study.

3. Education Level

Table 4: Education Level

Education Level					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelor	19	18.4	18.4	18.4
	Master	51	49.5	49.5	68.0
	PhD	21	20.4	20.4	88.3
	MD	12	11.7	11.7	100.0
	Total	103	100.0	100.0	

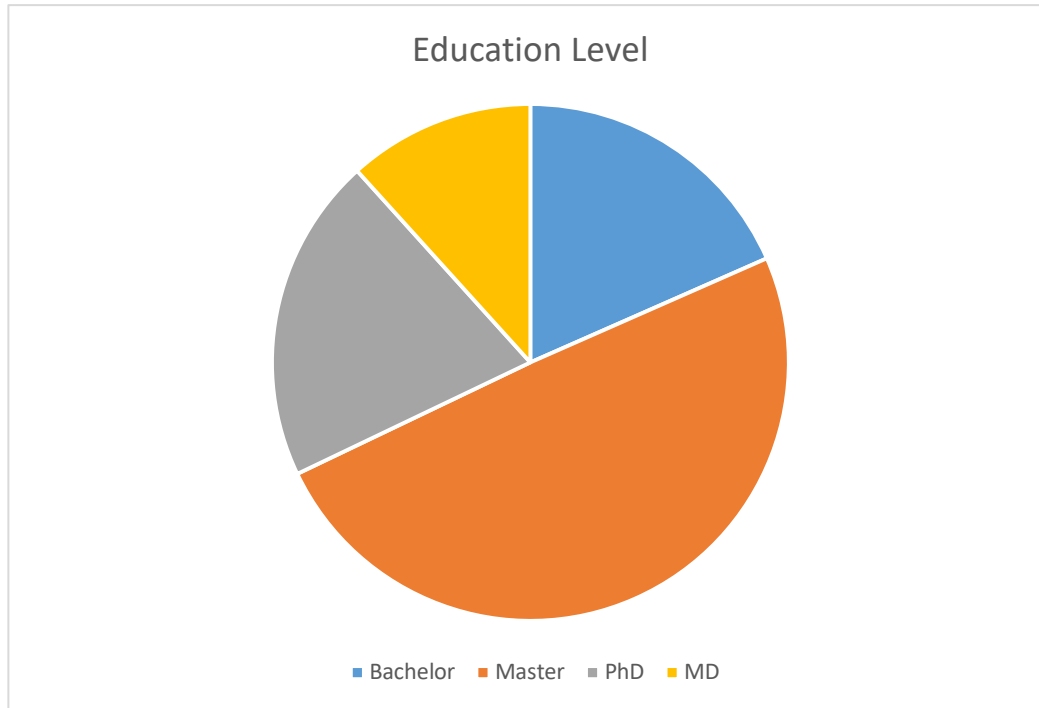


Figure 6: Education Level

Table 4 illustrates the educational level of the respondents participating in the study. The results show that the majority of participants hold a Master's degree, representing 51 respondents (49.5%), which indicates that nearly half of the sample possesses postgraduate academic qualifications. This is followed by PhD holders, accounting for 21 respondents (20.4%), while 19 respondents (18.4%) hold a Bachelor's degree. Additionally, 12 respondents (11.7%) possess a Doctor of Medicine (MD) degree. In general, it can be concluded that the research sample is well-educated, with a substantial level of advanced academic education being represented, which can also lend to the informed opinions regarding strategic planning, the implementation of artificial intelligence, the maturity of AI governance and the outcomes of organizations in the healthcare industry.

4. Current Executive Role

Table 5: Current Executive Role

Current Executive Role					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Chief Executive Officer (CEO)	16	15.5	15.5	15.5
	Chief Operating Officer (COO)	22	21.4	21.4	36.9
	Chief Financial Officer (CFO)	19	18.4	18.4	55.3
	Chief Medical Officer (CMO)	23	22.3	22.3	77.7
	Chief Information Officer (CIO)	15	14.6	14.6	92.2
	Other	8	7.8	7.8	100.0
	Total	103	100.0	100.0	

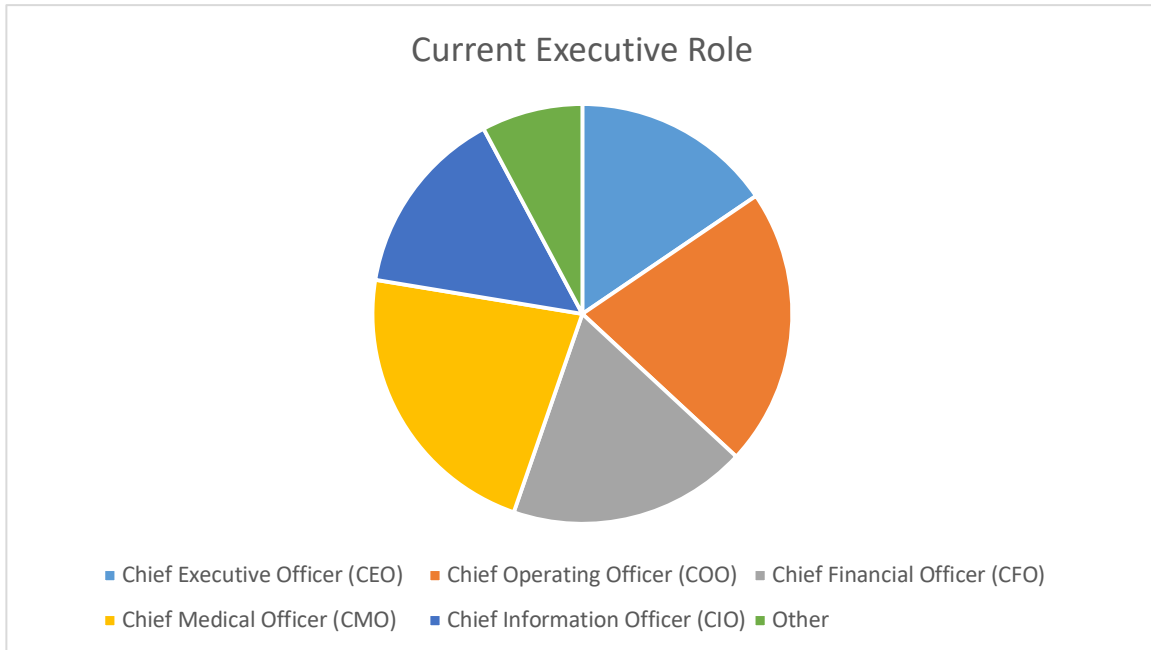


Figure 7: Current Executive Role

Table 5 presents the distribution of respondents according to their current executive roles. The results indicate that the largest group of participants are Chief Medical Officers (CMO), accounting for 23 respondents (22.3%), followed closely by Chief Operating Officers (COO) with 22 respondents (21.4%). Chief Financial Officers (CFO) represent 19 respondents (18.4%), while Chief Executive Officers (CEO) constitute 16 respondents (15.5%) of the sample. In addition, 15 respondents (14.6%) hold the position of Chief Information Officer (CIO), and 8 respondents (7.8%) fall under other executive roles. Altogether, the results show that the sample is quite diverse regarding the type of top management job in a healthcare organization and offers different executive opinions that can be applied to strategic planning, AI implementation, governance maturity, and organizational performance.

5. Years of Experience (Years)

Table 6: Years of Experience

Years of Experience					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5	13	12.6	12.6	12.6
	5-10 years	41	39.8	39.8	52.4
	11-15 years	30	29.1	29.1	81.6
	More than 15 years	19	18.4	18.4	100.0
	Total	103	100.0	100.0	

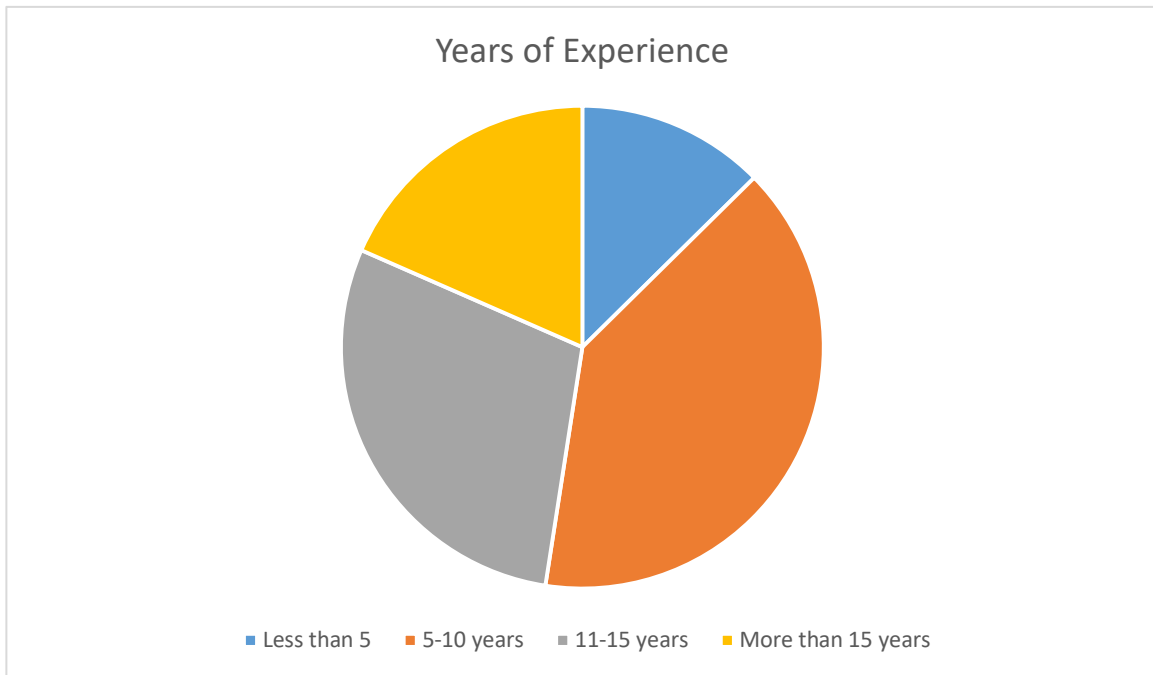


Figure 8: Years of Experience

Table 6 presents the distribution of respondents according to their years of professional experience. The results indicate that the largest proportion of participants, 41 respondents (39.8%), have 5–10 years of experience, representing the most dominant category in the sample. This is followed by 30 respondents (29.1%) who have 11–15 years of experience, while 19 respondents (18.4%) possess more than 15 years of experience, reflecting a considerable level of senior expertise among

participants. In contrast, 13 respondents (12.6%) have less than 5 years of experience. The cumulative percentages show that 52.4% of respondents have 10 years or less of experience, while 47.6% have more than 10 years of experience. Overall, these findings indicate that the sample includes a mix of moderately experienced and highly experienced executives, providing a balanced perspective on strategic planning, AI adoption, governance maturity and organizational performance in the healthcare sector.

6. Type of Healthcare Facility

Table 7: Type of Healthcare Facility

Type of Healthcare Facility					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Public	58	56.3	56.3	56.3
	Private	45	43.7	43.7	100.0
	Total	103	100.0	100.0	

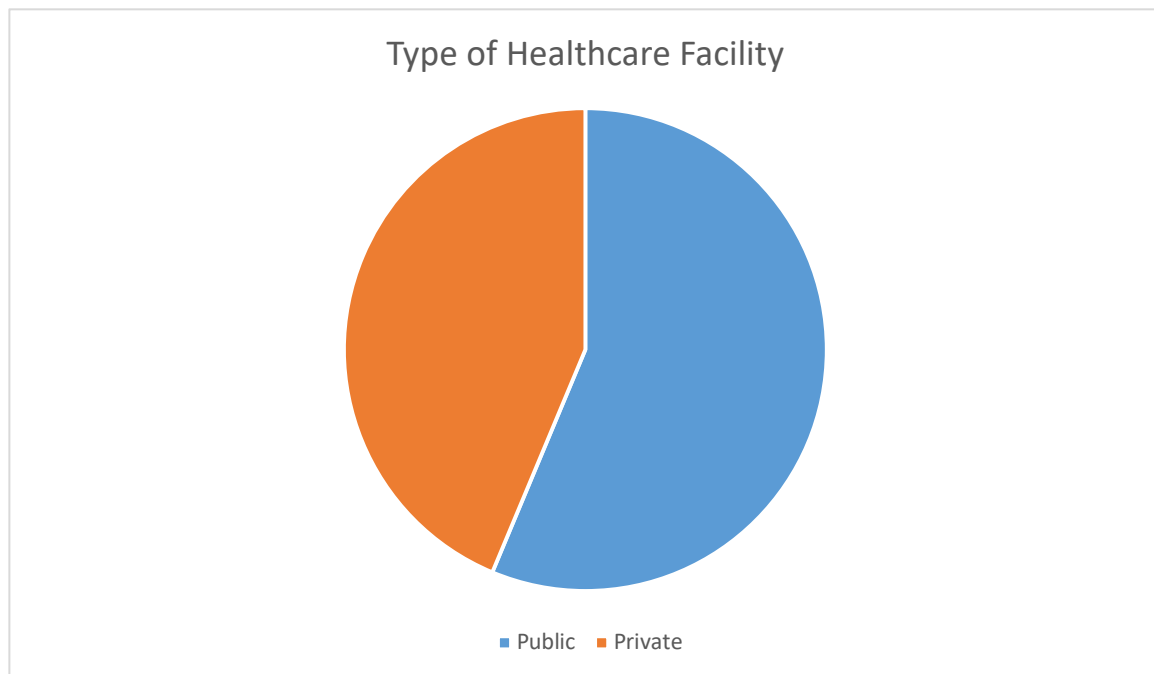


Figure 9: Type of Healthcare Facility

Table 7 presents the distribution of respondents according to the type of healthcare facility in which they work. The results indicate that the majority of participants, 58 respondents (56.3%), are employed in public healthcare facilities, while 45 respondents (43.7%) work in private healthcare institutions. The cumulative percentage shows that public sector respondents account for 56.3% of the sample, and when private sector participants are included, the total reaches 100%. In general, the results indicate that the sample is slightly inclined to the executives of the public healthcare, but the participation of the representatives of the private sector remains high, which offers an opportunity to obtain the views of both categories of healthcare organizations.

4.2. Artificial Intelligence Adoption

Table 8: Descriptive Statistics of Artificial Intelligence Adoption

Descriptive Statistics				
	Mean	Std. Deviation	Arrangement	Direction
Executive leaders in our organization demonstrate adequate literacy in artificial intelligence to guide AI-related initiatives.	2.21	1.081	3	Agree
Artificial intelligence applications are widely utilized across different departments within our organization.	2.13	1.054	4	Agree
The use of artificial intelligence technologies in our organization has increased significantly in recent years.	2.09	1.112	5	Strongly Agree

I am able to interpret and use insights generated by artificial intelligence systems when making strategic decisions.	2.30	1.251	1	Strongly Agree
Our organization actively integrates artificial intelligence technologies into healthcare operations and decision-making processes.	2.28	1.141	2	Agree
Artificial Intelligence Adoption	2.2019	.74228	Agree	

- Statement “**I am able to interpret and use insights generated by artificial intelligence systems when making strategic decisions**” came in first place with a mean of 2.30 and a standard deviation of 1.251. Therefore, the direction of the sample members' responses is “Strongly Agree.”
- Statement “**Our organization actively integrates artificial intelligence technologies into healthcare operations and decision-making processes**” came in second place with a mean of 2.28 and a standard deviation of 1.141. Therefore, the direction of the sample members' responses is “Agree.”
- Statement “**Executive leaders in our organization demonstrate adequate literacy in artificial intelligence to guide AI-related initiatives**” came in third place with a mean of 2.21 and a standard deviation of 1.081. Therefore, the direction of the sample members' responses is “Agree.”

- Statement “**Artificial intelligence applications are widely utilized across different departments within our organization**” came in fourth place with a mean of 2.13 and a standard deviation of 1.054. Therefore, the direction of the sample members' responses is “Agree.”
- Statement “**The use of artificial intelligence technologies in our organization has increased significantly in recent years**” came in fifth place with a mean of 2.09 and a standard deviation of 1.112. Therefore, the direction of the sample members' responses is “Strongly Agree.”

The overall mean for all items related to **Artificial Intelligence Adoption** is **2.2019**, with a standard deviation of **0.74228**. Therefore, the direction of the sample members' responses is “Agree” according to the five-point Likert scale.

4.3. AI Governance Maturity

Table 9: Descriptive Statistics of AI Governance Maturity

Descriptive Statistics				
	Mean	Std. Deviation	Arrangement	Direction
Our organization has a formal, documented process for conducting ethical and risk reviews before deploying new AI applications.	2.06	1.187	5	Strongly Agree
We have a clear and established line of accountability for strategic failures or medical errors resulting from AI system decisions.	2.14	1.221	4	Strongly Agree

Our organization's AI governance practices are fully aligned with SDAIA's AI Ethics Principles.	2.42	1.280	1	Strongly Agree
Ethical considerations and patient data privacy are strongly integrated into artificial intelligence governance practices.	2.36	1.195	2	Agree
Our organization regularly monitors and evaluates the performance and risks of artificial intelligence systems.	2.19	1.221	3	Strongly Agree
Governance Maturity	2.2330	.77211	Strongly Agree	

- Statement “**Our organization's AI governance practices are fully aligned with SDAIA's AI Ethics Principles**” came in first place with a mean of 2.42 and a standard deviation of 1.280. Therefore, the direction of the sample members' responses is “Strongly Agree.”
- Statement “**Ethical considerations and patient data privacy are strongly integrated into artificial intelligence governance practices**” came in second place with a mean of 2.36 and a standard deviation of 1.195. Therefore, the direction of the sample members' responses is “Agree.”

- Statement “**Our organization regularly monitors and evaluates the performance and risks of artificial intelligence systems**” came in third place with a mean of 2.19 and a standard deviation of 1.221. Therefore, the direction of the sample members' responses is “Strongly Agree.”
- Statement “**We have a clear and established line of accountability for strategic failures or medical errors resulting from AI system decisions**” came in fourth place with a mean of 2.14 and a standard deviation of 1.221. Therefore, the direction of the sample members' responses is “Strongly Agree.”
- Statement “**Our organization has a formal, documented process for conducting ethical and risk reviews before deploying new AI applications**” came in fifth place with a mean of 2.06 and a standard deviation of 1.187. Therefore, the direction of the sample members' responses is “Strongly Agree.”

The overall mean for all items related to **AI Governance Maturity** is **2.2330**, with a standard deviation of **0.77211**. Therefore, the direction of the sample members' responses is “**Strongly Agree**” according to the five-point Likert scale.

4.4. Executive Strategic Planning

Table 10: Descriptive Statistics of Executive Strategic Planning

Descriptive Statistics				
	Mean	Std. Deviation	Arrangement	Direction
Our organization’s strategic plans can be quickly adjusted in response to technological and environmental changes in the healthcare sector.	2.00	1.085	5	Strongly Agree
Strategic decisions in our organization are			4	Strongly Agree

made efficiently due to the availability of timely data and analytical tools.	2.22	1.179		
Executive strategic plans incorporate data-driven insights to ensure comprehensive analysis of healthcare challenges and opportunities.	2.31	1.180	1	Agree
Artificial intelligence governance policies in our organization support the use of reliable AI insights in executive strategic planning.	2.26	1.260	3	Strongly Agree
AI allows our team to systematically evaluate a significantly greater number of strategic options during the planning phase.	2.30	1.327	2	Agree
Executive Strategic Planning	2.2194	.82439	Strongly Agree	

- Statement “**Executive strategic plans incorporate data-driven insights to ensure comprehensive analysis of healthcare challenges and opportunities**” came in first place with a mean of 2.31 and a standard deviation of 1.180. Therefore, the direction of the sample members' responses is “Agree.”

- Statement “**AI allows our team to systematically evaluate a significantly greater number of strategic options during the planning phase**” came in second place with a mean of 2.30 and a standard deviation of 1.327. Therefore, the direction of the sample members' responses is “Agree.”
- Statement “**Artificial intelligence governance policies in our organization support the use of reliable AI insights in executive strategic planning**” came in third place with a mean of 2.26 and a standard deviation of 1.260. Therefore, the direction of the sample members' responses is “Strongly Agree.”
- Statement “**Strategic decisions in our organization are made efficiently due to the availability of timely data and analytical tools**” came in fourth place with a mean of 2.22 and a standard deviation of 1.179. Therefore, the direction of the sample members' responses is “Strongly Agree.”
- Statement “**Our organization’s strategic plans can be quickly adjusted in response to technological and environmental changes in the healthcare sector**” came in fifth place with a mean of 2.00 and a standard deviation of 1.085. Therefore, the direction of the sample members' responses is “Strongly Agree.”

The overall mean for all items related to **Executive Strategic Planning** is **2.2194**, with a standard deviation of **0.82439**. Therefore, the direction of the sample members' responses is “**Strongly Agree**” according to the five-point Likert scale.

4.5. Organizational Performance

Table 11: Descriptive Statistics of Organizational Performance

Descriptive Statistics				
	Mean	Std. Deviation	Arrangement	Direction
Strong artificial intelligence governance practices contribute to improving the overall performance and	2.18	1.297	3	Strongly Agree

efficiency of our organization.				
Artificial intelligence adoption has contributed to better healthcare service quality and patient outcomes.	2.34	1.201	1	Agree
Our organization effectively leverages artificial intelligence to support sustainability and operational efficiency goals aligned with Saudi Vision 2030.	2.16	1.227	4	Strongly Agree
The use of artificial intelligence has helped reduce operational and administrative costs across key organizational functions.	2.22	1.228	2	Agree
Artificial intelligence technologies have enhanced the financial performance of our organization through improved resource utilization and revenue management.	2.12	1.051	5	Agree
Organizational Performance	2.2039	.90488	Agree	

- Statement “**Artificial intelligence adoption has contributed to better healthcare service quality and patient outcomes**” came in first place with a mean of 2.34 and a standard deviation of 1.201. Therefore, the direction of the sample members' responses is “Agree.”
- Statement “**The use of artificial intelligence has helped reduce operational and administrative costs across key organizational functions**” came in second place with a mean of 2.22 and a standard deviation of 1.228. Therefore, the direction of the sample members' responses is “Agree.”
- Statement “**Strong artificial intelligence governance practices contribute to improving the overall performance and efficiency of our organization**” came in third place with a mean of 2.18 and a standard deviation of 1.297. Therefore, the direction of the sample members' responses is “Strongly Agree.”
- Statement “**Our organization effectively leverages artificial intelligence to support sustainability and operational efficiency goals aligned with Saudi Vision 2030**” came in fourth place with a mean of 2.16 and a standard deviation of 1.227. Therefore, the direction of the sample members' responses is “Strongly Agree.”
- Statement “**Artificial intelligence technologies have enhanced the financial performance of our organization through improved resource utilization and revenue management**” came in fifth place with a mean of 2.12 and a standard deviation of 1.051. Therefore, the direction of the sample members' responses is “Agree.”

The overall mean for all items related to **Organizational Performance** is **2.2039**, with a standard deviation of **0.90488**. Therefore, the direction of the sample members' responses is “**Agree**” according to the five-point Likert scale.

4.6. Hypothesis Testing

H1: There is a statistically significant relationship between the adoption of AI technologies and the comprehensiveness, adaptability, and speed of strategic planning processes among KSA healthcare C-suite executives.

The hypothesis testing results for H1 validate the statistically significant relationship between the adoption of AI technologies and the comprehensiveness, adaptability, and speed of strategic planning processes among KSA healthcare C-suite executives. The regression analysis reveals an R-square value of 0.438, indicating that approximately 43.8% of the variance in executive strategic planning is explained by AI adoption. The ANOVA results show a significant F-value of 78.769 ($p = 0.000$), confirming that the model is statistically significant. The coefficient for AI adoption is 0.735, with a t-value of 8.875 and a significance level of 0.000, indicating a strong and statistically significant positive effect. These findings support the hypothesis, demonstrating that AI adoption significantly enhances the strategic planning capabilities of healthcare executives in Saudi Arabia.

Table 12: First Hypothesis

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.662 ^a	.438	.433	.62098
Predictors: (Constant), Artificial Intelligence Adoption				

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.374	1	30.374	78.769	.000 ^b
	Residual	38.947	101	.386		
	Total	69.321	102			
a. Dependent Variable: Executive Strategic Planning						
b. Predictors: (Constant), Artificial Intelligence Adoption						

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.601	.192		3.122	.002
	Artificial Intelligence Adoption	.735	.083	.662	8.875	.000
a. Dependent Variable: Executive Strategic Planning						

H2: There is a statistically significant relationship between AI adoption, governance maturity and executive strategic planning effectiveness in the Saudi Arabian healthcare sector.

The hypothesis testing results for H2 validate the statistically significant relationship between AI adoption, AI governance maturity, and executive strategic planning effectiveness in the Saudi Arabian healthcare sector. The regression analysis shows an R-square value of 0.531, indicating that approximately 53.1% of the variance in executive strategic planning effectiveness is explained by AI adoption and governance maturity. The ANOVA results reveal a significant F-value of 56.691 ($p = 0.000$), confirming that the model is statistically significant. The coefficient for AI adoption is 0.436 with a t-value of 4.301 ($p = 0.000$), and the coefficient for AI governance maturity is 0.435 with a t-value of 4.459 ($p = 0.000$), both indicating strong and statistically significant positive effects. These findings support the hypothesis, demonstrating that both AI adoption and governance maturity significantly enhance executive strategic planning effectiveness in Saudi healthcare organizations.

Table 13: Second Hypothesis

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.729 ^a	.531	.522	.56997
Predictors: (Constant), Artificial Intelligence Adoption, AI Governance Maturity				

ANOVA^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.834	2	18.417	56.691	.000 ^b
	Residual	32.487	100	.325		
	Total	69.321	102			
a. Dependent Variable: Executive Strategic Planning						
b. Predictors: (Constant), Artificial Intelligence Adoption, AI Governance Maturity						

Coefficients^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.289	.190		1.520	.132
	Artificial Intelligence Adoption	.436	.101	.393	4.301	.000
	AI Governance Maturity	.435	.097	.407	4.459	.000
a. Dependent Variable: Executive Strategic Planning						

H3: There is a statistically significant relationship between AI adoption, governance maturity and organizational performance in the Saudi Arabian healthcare sector.

The hypothesis testing results for H3 validate the statistically significant relationship between AI adoption, AI governance maturity, and organizational performance in the Saudi Arabian healthcare sector. The regression analysis shows an R-square value of 0.630, indicating that approximately 63.0% of the variance in organizational performance is explained by AI adoption and governance maturity. The ANOVA results reveal a significant F-value of 85.060 ($p = 0.000$), confirming that the regression model is statistically significant. The coefficient for AI adoption is 0.512 with a t-value of 5.178 ($p = 0.000$), and the coefficient for AI governance maturity is 0.528 with a t-value of 5.551 ($p = 0.000$), both indicating strong and statistically significant positive effects. These findings support the hypothesis, demonstrating that both AI adoption and governance maturity contribute significantly to enhancing organizational performance in Saudi healthcare organizations.

Table 14: Third Hypothesis

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.794 ^a	.630	.622	.55605
Predictors: (Constant), Artificial Intelligence Adoption, AI Governance Maturity				

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	52.599	2	26.300	85.060	.000 ^b
	Residual	30.919	100	.309		
	Total	83.518	102			
a. Dependent Variable: Organizational Performance						
b. Predictors: (Constant), Artificial Intelligence Adoption, AI Governance Maturity						

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.103	.185		-.554	.581
	Artificial Intelligence Adoption	.512	.099	.420	5.178	.000
	AI Governance Maturity	.528	.095	.450	5.551	.000
a. Dependent Variable: Organizational Performance						

Chapter Five

Discussion, Conclusion and Recommendations

This chapter presents the discussion, conclusions, and recommendations of the study based on the findings obtained from the empirical analysis.

4.1. Discussion

The results of this paper are good indicators of the beneficial effect of AI implementation and the maturity of governance on strategic planning and organizational performance in the Saudi Arabian healthcare system. The demographic results suggest that the sample comprised of high educated and experienced executives, with the proportion of those with a Master degree (almost 50 percent) and those having PhDs or MD degrees being high. The majority of the participants belonged to the age category of 30-49 years and held top positions in the company such as CMOs, COOs, CFOs, and CEOs. This profile guarantees that the information obtained through the study is based on the experience of individuals with rich managerial experience and the ability to evaluate the process of strategic decision-making and the use of AI and the effectiveness of governance. The combination of both the state and commercial healthcare representation can also be taken as a broad perspective of the industry because of the diverse organizational settings where AI can be applied.

The descriptive findings also point to the importance of executives in viewing the utilization of AI as an essential facilitator of strategic decisions. Sentences about the possibility to understand AI insights and assimilation of AI in the process of medical care were well received and it showed that AI is not only there but is also forming the decision making processes. Equally, the degree of governance maturity was rated high, and the participants affirmed that their governance was in line with the principles of ethics, data privacy measures, and accountability systems. These results indicate that Saudi healthcare institutions are now beyond the phase of AI adoption to the incorporation of structured governance in line with the world best practices with regard to using AI ethically.

The adoption of AI and the maturity of AI governance impacted positively the execution strategy planning of the executive. According to the respondents, AI enables them to consider a larger, more strategic options, process data-driven insights, and make prompt decisions, making them more adaptive and responsive. The organizational performance also demonstrated these improvements in strategic planning since the respondents stated that AI and governance practices helped in enhancing the quality of healthcare services, lowering operational expenses, and utilizing

resources better. This is in line with existing studies by Jafari et al. (2025), who pointed out that AI can improve agility and intelligence in the process of making strategic decisions, and by Faiyazuddin et al. (2025), who underscored the role of AI in enhancing operational efficiency and patient outcomes with the use of predictive analytics and advanced monitoring tools.

H1 proved that adoption of AI by itself is enough to explain the variance of executive strategic planning of 43.8 percent, meaning that technological adoption has a great effect of improving comprehensiveness, speed and adaptability. H2 demonstrated that incorporation of AI governance maturity revealed that 53.1 percent of the difference in effectiveness of strategic planning is justified, since structured governance intensifies the advantages of AI. H3 showed that adoption of AI and the maturity of AI governance jointly explain 63 percent of the difference in organizational performance, which is very strong and significant in terms of operational effectiveness, financial performance, and meeting strategic goals like Saudi Vision 2030. These findings are in line with those of Osman and Anuar (2025), who established that governance structures have a positive impact on the organizational performance, employee engagement, and operational transparency.

Altogether, the study demonstrates a synergistic relationship between the adoption of AI and the maturity of governance where AI offers the analytic and predictive power required to optimize the decision-making process and operational efficiencies, and sound AI governance provides accountability, ethical, and sustainable adoption. These results also support Kumar et al. (2025) who propose that the effect of technology adoption would be the best in terms of its effects being supported by organizational readiness, resources, and leadership capabilities. In aggregate, the study findings affirm that the incorporation of AI into a robust governance framework is the remedy to promote the efficacy of strategic planning and organizational performance in the Saudi healthcare industry and give viable insights to policy-makers, healthcare administrators, and executives who want to use AI to enhance operational effectiveness.

4.2. Conclusion

This study highlights the value of the increasing significance of artificial intelligence (AI) and governance maturity in future healthcare management. With the world becoming more and more complex in healthcare systems, advanced technologies including AI are no longer a choice but a necessary tool that will keep the efficiency, quality, and innovation levels at the necessary level. In addition to direct operational benefits, AI can revolutionize the decision-making process, and healthcare organizations can foresee the issues, manage resources effectively, and work towards better patient outcomes in a systematic and ethical way.

In addition, the paper also notes the importance of governance in making sure that adoption of technology is in line with the organizational values, morals and strategic goals. Correct AI governance does not only reduce risks and improve accountability but also gradually creates a culture of trust and reliability, which is required to massively adopt AI. The technological preparedness and effective governance are a roadmap to healthcare organizations that want to bring operations to the modern level and meet the regulatory and ethical standards.

This study has implications on the policy-makers, leaders in healthcare and educational institutions. It needs policy frameworks and regulatory directives to develop a friendly atmosphere in which AI integration can take place, such as data privacy standards, risk management standards, and ethical standards. The leaders in healthcare need to pay attention to the creation of executive literacy and workforce preparedness to harness the full potential of AI, and academic and professional education programs need to include AI competencies and principles of governance to train the new generation of healthcare administrators.

Lastly, the research demonstrates the significance of investment in the technological capacity as well as governance systems in the healthcare sector. The adoption of AI will not be optimum without appropriate oversight, AI application policies, and executive literacy to AI uses. On the other hand, any form of governance that lacks the adoption of effective technology constrains the organizational potential. Combined with the latter, these two elements help healthcare organizations to balance, become ethically and high-performing, proving that AI and governance maturity are two critical factors that drive strategic and operational success in the Saudi healthcare industry.

4.3. Recommendations

- The healthcare organizations must keep on incorporating AI technologies in their operations and strategic decisions to enhance efficiency, patient outcomes, and resource utilization.
- Institutions must have formal AI governance policies, such as ethical oversight, risk management, and an appropriate set of accountability functions to provide responsible and safe AI usage.
- C-suite level training programs ought to be introduced to enhance knowledge on AI capabilities, analysis of AI insights, and the ability to make proper decisions relying on their data-driven analyses.
- Support networking of the public and private healthcare organizations to exchange best practices, lessons learned, and technological advances in AI adoption and governance.
- Establish and implement policies that prefer patient data privacy, equity, and clarity in the use of AI to minimize possible ethical and legal dangers.

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Appendix

Questionnaire

Demographic Information

1. Gender

- ☐ Male
- ☐ Female

2. Age (Years)

- ☐ 30–39
- ☐ 40–49
- ☐ 50–59
- ☐ 60 years and above

3. Education Level

- ☐ Bachelor
- ☐ Master
- ☐ PhD
- ☐ MD
- ☐ Other

4. Current Executive Role

- ☐ Chief Executive Officer (CEO)
- ☐ Chief Operating Officer (COO)
- ☐ Chief Financial Officer (CFO)
- ☐ Chief Medical Officer (CMO)
- ☐ Chief Information Officer (CIO)
- ☐ Other

5. Years of Experience (Years)

- ☐ Less than 5
- ☐ 5-10
- ☐ 11-15
- ☐ More than 15

6. Type of Healthcare Facility

- ☐ Public
- ☐ Private

First Axis: Artificial Intelligence Adoption						
NO.	Items	(1) Strongly Agree	(2) Agree	(3) Neutral	(4) Disagree	(5) Strongly Disagree
1	Executive leaders in our organization demonstrate adequate literacy in artificial intelligence to guide AI-related initiatives.					
2	Artificial intelligence applications are widely utilized across different departments within our organization.					
3	The use of artificial intelligence technologies in our organization has increased significantly in recent years.					
4	I am able to interpret and use insights generated by artificial intelligence systems when making strategic decisions.					
5	Our organization actively integrates artificial intelligence technologies into healthcare operations and decision-making processes.					

Second Axis: AI Governance Maturity						
NO.	Items	(1) Strongly Agree	(2) Agree	(3) Neutral	(4) Disagree	(5) Strongly Disagree
1	Our organization has a formal, documented process for conducting ethical and risk reviews before deploying new AI applications.					
2	We have a clear and established line of accountability for strategic failures or medical errors resulting from AI system decisions.					
3	Our organization's AI governance practices are fully aligned with SDAIA's AI Ethics Principles.					
4	Ethical considerations and patient data privacy are strongly integrated into artificial intelligence governance practices.					
5	Our organization regularly monitors and evaluates the performance and risks of artificial intelligence systems.					

Third Axis: Executive Strategic Planning						
NO.	Items	(1) Strongly Agree	(2) Agree	(3) Neutral	(4) Disagree	(5) Strongly Disagree
1	Our organization's strategic plans can be quickly adjusted in response to technological and environmental changes in the healthcare sector.					
2	Strategic decisions in our organization are made efficiently due to the availability of timely data and analytical tools.					
3	Executive strategic plans incorporate data-driven insights to ensure comprehensive analysis of healthcare challenges and opportunities.					
4	Artificial intelligence governance policies in our organization support the use of reliable AI insights in executive strategic planning.					
5	AI allows our team to systematically evaluate a significantly greater number of strategic options during the planning phase.					

Fourth Axis: Organizational Performance						
NO.	Items	(1) Strongly Agree	(2) Agree	(3) Neutral	(4) Disagree	(5) Strongly Disagree
1	Strong artificial intelligence governance practices contribute to improving the overall performance and efficiency of our organization.					
2	Artificial intelligence adoption has contributed to better healthcare service quality and patient outcomes.					
3	Our organization effectively leverages artificial intelligence to support sustainability and operational efficiency goals aligned with Saudi Vision 2030.					
4	The use of artificial intelligence has helped reduce operational and administrative costs across key organizational functions.					
5	Artificial intelligence technologies have enhanced the financial performance of our organization through improved resource utilization and revenue management.					