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The Impact of Digital Transformation on organizational performance:
A Field Study of Primary Health Care Units in Zawia, Libya

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Abstract

This study aimed to identify the impact of digital transformation dimensions on organizational performance in the Primary Health Care Units in Zawia, Libya. To achieve the study objectives, the descriptive analytical method was adopted. A questionnaire was used to collect data, distributed to 170 employees, including medical doctors, nurses, clinical officers, laboratory technicians, and administrative staff. The number of valid questionnaires for statistical analysis was 148, representing a response rate of 87.1%. Data analysis was performed using SPSS, employing percentages, arithmetic means, standard deviations, and linear regression analysis. The results showed that the level of digital transformation dimensions namely the Internet of Things (IoT), Artificial Intelligence (AI), Big Data and Analytics, social media, and Cloud Storage and Computing was average, whereas the level of organizational performance was high. The results also revealed a statistically significant effect at ($\alpha \leq 0.05$) of all digital transformation dimensions on organizational performance. Based on these findings, the study presents a set of recommendations to improve the adoption and utilization of digital technologies in the healthcare sector.

Keywords: Digital Transformation, Organizational Performance, Primary Health Care Units.

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تأثير التحول الرقمي على الأداء التنظيمي

دراسة ميدانية لوحدات الرعاية الصحية الأولية في الزاوية، ليبيا

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ملخص

هدفت هذه الدراســـة إلى التعرف على تأثير أبعاد التحول الرقمي في الأداء التنظيمي لوحدات الرعاية الصـــحية الأولية في الزاوية، ليبيا. ولتحقيق أهداف الدراســـة، تم اتباع المنهج الوصـــفي التحليلي. وتم اســـتخدام الاســـتبانة لجمع البيانات، حيث تم توزيع الاســتبانات على (170) موظفًا شــملوا أطباء، وممرضــين، ومســاعدي أطباء، وفنيي مختبرات، وموظفين إداريين. بلغ عدد الاستبانات الصـالحة للتحليل الإحصـائي (148) استبانة، بنسبة استجابة بلغت (87.1%). تم تحليل البيانات باستخدام برنامجSPSS ، وذلك باستخدام النسب المئوية، والمتوسطات الحسابية، والانحرافات المعيارية، وتحليل الانحدار الخطي، وغيرها من الأســاليب الإحصــائية. أظهرت النتائج أن مســتوى أبعاد التحول الرقمي المتمثلة في إنترنت الأشياء (IoT)، والذكاء الاصطناعي(AI) ، والبيانات الضـخمة وتحليلها، ووسائل التواصل الاجتماعي، والتخزين والحوسبة السحابية في وحدة الرعاية الصحية الأولية بمدينة الزاوية كان متوسطًا، في حين أن مستوى الأداء التنظيمي في وحدة الرعاية الصـــحية الأولية بمدينة الزاوية كان مرتفعًا. كما أظهرت النتائج وجود تأثير ذي دلالة إحصـــائية عند مســـتوى ($\alpha \leq 0.05$) لجميع أبعاد التحول الرقمي (إنترنت الأشياء، والذكاء الاصـطناعي، والبيانات الضـخمة وتحليلها، ووسـائل التواصـل الاجتماعي، والتخزين والحوسبة السحابية) في الأداء التنظيمي. وفي ضوء هذه النتائج، قدمت الدراسة عددًا من التوصيات.

الكلمات المفتاحية: التحول الرقمي، الأداء التنظيمي، وحدات الرعاية الصحية الأولية.

Introduction

Digital transformation has emerged as a defining force in reshaping industries globally, and its significance within the healthcare sector is increasingly critical. Healthcare organisations worldwide face mounting pressure to improve patient outcomes, enhance operational efficiency, reduce costs, and elevate both employee and patient satisfaction (Marques & Ferreira, 2020; Kraus et al., 2021; Massaro, 2021). Historically, the integration of digital technologies

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in healthcare dates to the 1990s with the advent of 'e-health' (Aceto et al., 2018), yet the pace of transformation has accelerated dramatically over the past two decades (Marques & Ferreira, 2020). In the contemporary healthcare environment, digital transformation is broadly understood as the strategic adoption of technologies including the internet of things (IoT), artificial intelligence (AI), big data and analytics, social media platforms, and cloud storage and computing to automate processes, enhance communication, support clinical and managerial decision-making, and ultimately deliver safer, higher-quality care (Secundo et al., 2018; Saifudin et al., 2021; Secundo et al., 2021).

A substantial body of research has demonstrated that effective digital transformation yields advantages for patients, healthcare professionals, and organisations alike. For patients, DTs enable more personalised, accessible, and specialized services (Alloghani et al., 2018; Tortorella et al., 2020); for clinicians and managers, digital tools support the automation of data-intensive processes, reshapes decision-making, and improves the collection, processing, and analysis of diverse information sources ranging from electronic patient records and clinical findings to diagnostic images and prescription data (El Morr & Ali Hassan, 2019; Ilangakoon et al., 2022; Spano et al., 2021). In developed nations, the integration of technologies such as electronic health records (EHRs), telemedicine, and AI has led to significant improvements in diagnostic accuracy, administrative efficiency, and remote patient monitoring, translating into measurable gains in organisational performance (Massaro, 2021).

However, the existing evidence base is derived almost exclusively from hospitals and advanced healthcare systems in developed countries, leaving primary healthcare Units in developing and post-conflict nations severely under-researched (Kraus et al., 2021). This gap is particularly problematic because primary healthcare settings especially those operating under fragile conditions face fundamentally different constraints that may alter the relationship between digital transformation dimensions and organisational performance. The Primary Health Care Units in Zawia, Libya, exemplifies such a context. Libya has experienced over a decade of political instability, fragmentation of public infrastructure, and recurring resource shortages. Recent assessments have formally documented the weakness of Libya's health information architecture: a 2025 analytical study confirmed that developing

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modern digital technologies and enhancing information systems remain essential yet unmet requirements for health system reform (Ben Saleh, 2025). The World Health Organization has been actively working with Libyan authorities to strengthen health information systems as a strategic national priority (Libyan News Agency, 2025), while joint discussions between the Libyan Ministry of Health and the World Bank in late 2025 explicitly identified persistent "gaps in infrastructure" and the urgent need for "digital transformation technologies including the integration of health information systems" (EpiNews, 2025; LibyaReview, 2025a). High-level policy dialogues have further affirmed that digital transformation is a "key pillar of health system reform" (LibyaReview, 2025b). Despite this policy recognition, the actual presence and impact of specific digital transformation dimensions namely IoT, AI, big data and analytics, social media, and cloud computing remain entirely undocumented in frontline primary healthcare Units such as Zawia.

Consequently, a critical knowledge gap persists. No empirical study has investigated which dimensions of digital transformation are currently present at the Primary Health Care Units in Zawia, how these dimensions relate to organisational performance, or which dimensions exert the strongest influence on performance from the perspective of frontline staff. This gap renders decision-makers incapable of making informed investment choices, thereby perpetuating inefficiencies, missed opportUnits ies for performance improvement, and continued reliance on fragmented, non-digital workflows. To address this gap, the present study seeks to achieve aim by examining the impact of digital transformation dimensions on organizational performance, as perceived by staff in the primary health care Units in Zawia city.

Study Problem

Digital transformation has become a driving force in reshaping industries globally, and its significance in the healthcare sector cannot be overstated, as healthcare organizations worldwide face increasing pressure to improve service delivery, enhance employee satisfaction, and ensure operational efficiency (Kumi et al., 2025). While digital transformation has been widely acknowledged as a driver of organizational performance in healthcare settings, existing evidence is derived almost exclusively from hospitals in developed

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nations, leaving primary healthcare Units in developing and post-conflict countries severely under-researched.

The Primary Health Care Units in Zawia, Libya, operates under unique constraints including fragmented digital infrastructure, limited financial resources, political instability, and a lack of standardized data management systems that may fundamentally alter the relationship between digital transformation dimensions and organizational performance. The severity of this situation is supported by recent official assessments: an analytical study of the Libyan health system published in 2025 confirmed that developing modern digital technology and enhancing information systems remain essential requirements for achieving health system reform (Ben Saleh, 2025), while the World Health Organization has been actively working with Libyan health authorities to strengthen health information systems as a strategic national priority (Libyan News Agency, 2025). Furthermore, documented discussions between the Libyan Ministry of Health and the World Bank in late 2025 explicitly identified "gaps in infrastructure" and the need for "digital transformation technologies including the integration of health information systems" as ongoing challenges requiring urgent attention (EpiNews, 2025), with the World Bank reaffirming its commitment to supporting Libya's health sector reforms by addressing these infrastructure gaps (LibyaReview, 2025a).

Additionally, high-level policy discussions between Libya and the WHO have confirmed that digital transformation is a "key pillar of health system reform" (LibyaReview, 2025b). Despite these systemic challenges and the recognition by policymakers that digital transformation is essential for health system reform, no empirical study has investigated which dimensions of digital transformation are currently present at primary healthcare Units like Zawia, how these dimensions relate to organizational performance, or which dimensions have the strongest impact on performance from the staff's perspective, leaving decision-makers unable to make informed choices about digital transformation investments and thereby perpetuating inefficiencies and missed opportunities for performance improvement. Therefore, this study addresses the following central research question: To what extent do digital transformation dimensions namely internet of things, artificial intelligence, big data and analytics, social media, and cloud storage and computing impact organizational performance from the

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perspective of employees in the Primary Health Care Units in Zawia, Libya?. To answer the research question, the study attempts to answer the following sub-research questions:

Q1. To what extent do healthcare employees perceive each digital transformation dimension namely, the Internet of Things (IoT), artificial intelligence (AI), big data and analytics, social media, and cloud storage and computing as currently present in the Primary Health Care Units in Zawia, Libya?
Q2. What is the level of organizational performance in the Primary Health Care Units in Zawia, Libya, as perceived by healthcare employees?
Q3. What is the impact of the digital transformation dimensions namely Internet of Things, artificial intelligence, big data and analytics, social media, and cloud storage and computing on the organizational performance from the perspective of employees in the public hospitals in the city of Zawia under study?

Study Significance
The significance of this study is reflected in the following contributions:

1. The study examines the relationship and impact of digital transformation dimensions on organizational performance, as perceived by staff in the primary health care Units in Zawia city an underexplored context.
2. the findings of this study provide actionable insights for decision-makers in this Units seeking to enhance organizational performance through a focus on digital transformation dimensions.
3. The study identifies critical gaps and shortcomings concerning digital transformation dimensions within this primary health care Units.
4. The study lays the groundwork for future research by encouraging further empirical investigations into organizational performance within healthcare settings.
5. This research contributes to the scholarly literature by addressing the timely and increasingly relevant intersection of digital transformation and organizational performance in primary healthcare.

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Study Aim and Objectives

The main aim of this study is to investigate the impact of digital transformation dimensions namely the Internet of Things (IoT), artificial intelligence (AI), big data and analytics, social media, and cloud storage and computing on organizational performance in the Primary Health Care Units in Zawia. To achieve this aim, the following objectives have been set:

O1. To evaluate the degree of digital transformation currently present at the Primary Health Care Units in Zawia, Libya from the perspective of employees**.**

O2. To assess the level of the organizational performance at the Primary Health Care Units in Zawia, Libya from the perspective of employees.

O3. To examine the impact of digital transformation dimensions namely internet of things, AI & machine learning, big data & analytics, social media, and cloud storage & computing on organizational performance in the Primary Health Care Units in Zawia, Libya from the perspective of employees**.**

Conceptual Framework of the Study

The conceptual framework for this study is illustrated in Figure 1

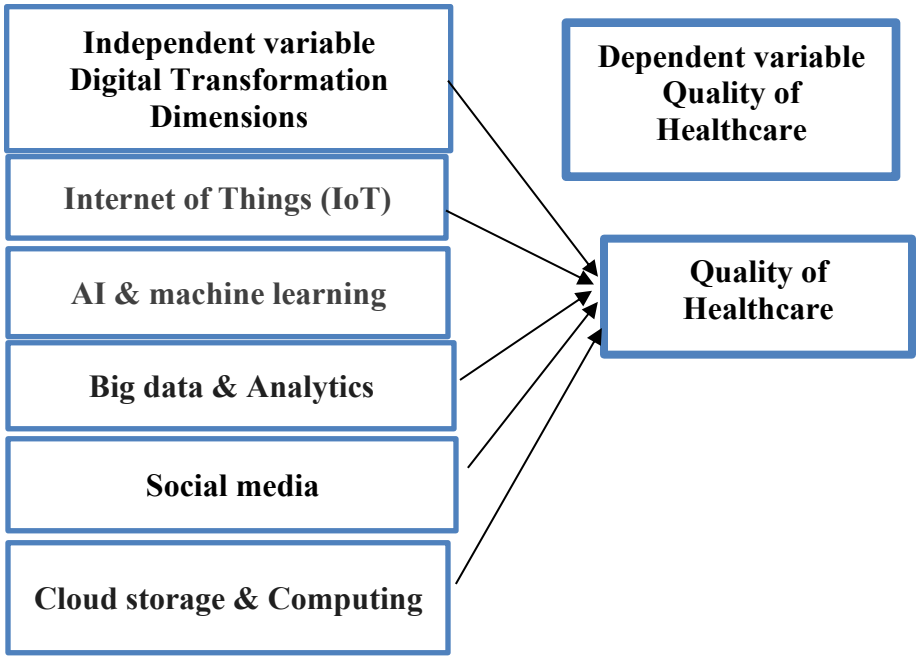

Figure 1. Study Model

Source: Developed by researcher based on literature review

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It includes one independent variable digital transformation dimensions (i.e., Internet of Things, AI & machine learning, big data & analytics, social media, and cloud storage & computing), and one dependent variable (organizational performance). The framework posits that digital transformation dimensions enhance organizational performance. This model aligns with the study's objectives and theoretical foundations, ensuring clarity and ease of understanding.

Study Hypotheses

Based on this review of the literature, the current study proposed the following main hypothesis:

Main Hypothesis (Ho1): There is no statistically significant effect at ($\alpha \leq 0.05$) for digital transformation dimensions (IoT, AI, big data and analytics, social media, and cloud storage and computing) on organizational performance in the Primary Health Care Units in Zawia, Libya, as perceived by employees.

From the previous hypotheses. the following sub- hypotheses were developed.

Ho1.1: There is no statistically significant effect at ($\alpha \leq 0.05$) for internet of things on organizational performance in the Primary Health Care Units in Zawia city, Libya.

Ho1.2: There is no statistically significant effect at ($\alpha \leq 0.05$) for AI & machine learning on organizational performance in the Primary Health Care Units in Zawia city, Libya**.**

Ho1.3: There is no statistically significant effect at ($\alpha \leq 0.05$) for big data & analytics on organizational performance in the Primary Health Care Units in Zawia city, Libya**.**

Ho1.4: There is no statistically significant effect at ($\alpha \leq 0.05$) for social media on organizational performance in the Primary Health Care Units in Zawia city, Libya.

Ho1.5: There is no statistically significant effect at ($\alpha \leq 0.05$) for cloud storage & computing on organizational performance in the Primary Health Care Units in Zawia city, Libya.

Study Concepts and Terminology

Under this topic conceptual definition of terms used in this study are presented**:**

Digital Transformation: The extent to which the Primary Health Care Units achieves its strategic and operational goals efficiently and effectively as a direct result of applying digital transformation dimensions namely internet of things, AI & machine learning, big data & analytics, social media, and cloud storage & computing.

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Organizational Performance: defined as the ability of Primary Health Care Units in Zawia city to achieve their health and administrative objectives efficiently and effectively through the optimal use of human and technological resources, thereby improving the quality of healthcare services provided to patients.

Theoretical Review and Conceptual Background

Digital transformation Definition

Digital transformation Definition is a broad field and has been defined in many ways (Anisic et al., 2020, Qvarfordt and Lagrosen, 2023). One definition is the use of technology to radically improve the performance or reach of an organization. In a digitally transformed business, digital technologies enable improved processes, engaged talent, and new business models (Verina and Titko, 2019). Digital transformation is viewed as a drastic change that enhances performance by impacting an organization's services, products, and processes (Spyridon, 2023). Karawya (2024) referred digital transformation as the strategic and complete adoption of digital technology and technical processes to completely change how organizations work, communicate with consumers, and achieve their business goals. Other researchers (e.g. Secundo et al., 2018; Saifudin et al., 2021) defined digital transformation is the use of technology to automate processes, enhance communication, and improve the delivery of healthcare services. The term is used to describe the adoption of new technologies that enable the shift towards secure and high-quality care. According to (Zhai et al., 2022) digital transformation is the use of technology to improve the way businesses and services operate to be more effective. Meanwhile according to Berman & Bell, (2018). Digital transformation is the process by which organizations adopt digital technologies to create new value for customers, change internal ways of working, and build the capabilities needed to compete in the digital age.

Moreover, digital transformation referred to a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies (Vial, 2019, Kraus et al., 2021). Other researchers argue that the digital transformation of work can be defined as a phenomenon in which new technologies cause significant changes in many aspects: how employees perform tasks and processes, their social relationships within and outside the

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organization, and subsequently their overall work experience (Meske & Junglas, 2020).

A recent literature review about digital transformation in healthcare (Sarbina and Saleh, 2025) indicates that digital transformation in the health sector is the process of digitizing health services through electronic platforms and information systems, aimed at bringing healthcare facilities closer to citizens and improving the quality of services provided. Digital transformation in healthcare also involves adopting digital technologies such as artificial intelligence and big data to improve the performance of healthcare institutions, enhance the patient experience, and reduce operational costs. (Husseini & Djemaa, 2025). It has also been defined as the integration of modern communication technologies into the healthcare system to accelerate and increase the efficiency of care, and to provide health services that transcend temporal and spatial limitations. (Bouchour, 2024). Westerman et al. (2011) described digital transformation as the use of technology to radically improve the performance or reach of organizations, while Hinings et al. (2018) view digital transformation as the combined effects of numerous digital innovations that create new actors, structures, practices, values, and beliefs that change, threaten, replace, or complement the current rules of the game within organizations, ecosystems, industries, or domains.

Based on the above discussion, digital transformation represents a significant organizational change requiring deep and multidimensional reorganization. An important aspect of digital transformation is DI, which referred to the number of areas that are managed using digital solutions, transformation techniques, or strategies. By prioritizing digital transformation and leveraging emerging technologies, primary healthcare entities can increase their DI and ultimately improve patient care and health outcomes. DI in primary healthcare entities refers to the level of integration and use of digital technologies and tools within an organization to improve patient care health outcomes and streamline healthcare processes. This concept encompasses the use of digital solutions, such as electronic health records, telemedicine, and other digital healthcare technologies to provide efficient and effective care (Aziz & Alsharabasi, 2015; Kludacz-Alessandri et al. 2025). Improving DI is essential for primary healthcare entities to improve service delivery and patient outcomes and remain relevant in an increasingly digital world.

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Although numerous definitions of digital transformation exist in the literature, this study adopts a definition tailored to the public hospital context. Digital transformation in healthcare involves the integration of digital technologies into all areas of hospital operations, fundamentally changing how healthcare is delivered, managed, and evaluated, with the aim of improving efficiency, quality, and patient outcomes". This definition aligns with (Kraus et al., 2021). This study adopts a focused definition where digital transformation encompasses five critical dimensions, namely: (1) the Internet of Things (IoT) for real-time patient monitoring, asset tracking, and environmental sensing; (2) artificial intelligence (AI) for diagnostic support, clinical decision-making, and administrative automation; (3) big data and analytics for deriving actionable insights from structured and unstructured health data to improve population health management and operational forecasting; (4) social media for patient engagement, health communication, public health surveillance, and commUnits y building; and (5) cloud storage and computing for scalable, cost-effective, and interoperable data management, remote access to electronic health records, and collaborative care delivery. Together, these five dimensions directly influence organizational performance in public hospitals by enhancing operational efficiency, care quality, patient experience, and data-driven decision-making capacity

Digital transformation Dimensions

Recent reviews of studies on digital transformation (Vial, 2019; Hausberg et al., 2019) suggested that major technological areas enabling digital transformation are diverse and traditionally called 'general purpose technologies'. The most common technologies include social networks (Li et al., 2017), mobile devices (Pousttchi et al., 2015), big data and analytics (Günther et al., 2017), cloud computing (Clohessy et al., 2017), IoT (Harbert, 2017), AI (Duan et al., 2019), and platforms (De Reuver et al., 2018). Other technologies such as the internet (Lyytinen and Rose, 2003), software (Setia et al., 2013), and blockchain (Glaser, 2017) are less frequently involved in digital transformation research. These digital tools are considered inherently disruptive (Karimi and Walter, 2015) because they act as 'game changers' that cause disruption in consumer behavior, competitive landscape, and data availability (Vial, 2019).

Looking specifically at the healthcare sector, the main digital tools include big data, IoT, biomedical/digital sensors, cloud computing,

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remote control and monitoring, collaborative robots, augmented reality, 3D printing, and AI with machine learning (Tortorella et al., 2020). Among these, biomedical/digital sensors and cloud computing are the most widely used (Eze et al., 2020; Garai et al., 2017), followed by IoT and big data (Spano and Ginesti, 2022; Tortorella et al., 2020; Wehrens et al., 2020).

Given the broad range of technologies identified in the literature, and to ensure the feasibility and focus of this study, five specific dimensions were selected as the core pillars of digital transformation. These five dimensions namely the Internet of Things (IoT), Artificial Intelligence (AI), Big Data and Analytics, social media, and Cloud Storage and Computing were chosen for three main reasons. First, they are the most frequently cited and empirically tested technologies in recent healthcare digital transformation studies (Tortorella et al., 2020; Spano and Ginesti, 2022). Second, they collectively cover the key functional areas of digital healthcare, including data collection (IoT and sensors), data processing and decision-making (AI and Big Data), data storage and accessibility (Cloud Computing), and patient/staff engagement (social media). Third, these five dimensions are practically applicable and measurable within the context of primary health care units, unlike other emerging technologies such as blockchain or 3D printing, which remain less adopted in this specific setting. Accordingly, the following five components represent the essential dimensions of digital transformation adopted in this study.

Internet of Things: The networking of physical objects using embedded sensors and other devices that collect and transmit information about real-time activity within the network (Harbert, 2017)**.**

AI & Machine Learning The ability of a machine to learn from experience, adjust to new inputs and perform human-like tasks. AI systems can be used either to support/assist human decision-makers or to replace them (Duan et al., 2019). Within the AI field, machine learning produces predictions that AI technologies can use to take actions.

Big data & Analytics The processing of huge amounts of data coming from different sources in different formats to acquire intelligence. It can be viewed as a sub-process in the overall process of insight extraction from big data (Gandomi and Haider, 2015).

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Social media: An umbrella term and a revolutionary trend of online blogs, micro-blogs, social networking, forums, collaborative projects and the sharing of photos and videos (Xu et al., 2019)

Cloud storage & Computing: An approach to information sharing or services on both Internet and Intranet. Clients can decide what information or services they are going to use, depending on their demands (Gai and Li, 2012). Cloud storage is a service model in which data is transmitted and stored on remote storage systems, where it is maintained, managed, backed up and made available to users over a network.

Organizational Performance Definition

Several researchers have provided different definitions for organizational performance, since organizational performance is a fairly broad concept (Obeidat, 2016), and its meaning changes in accordance with the user's perspective and needs (Avci, 2011; Masa'deh, 2015). organizational performance is understood as the efficiency of a healthcare system's transformation process, comprising inputs, processes, outputs, and outcomes, where digital transformation enhances performance by improving the integration and efficiency of all these components (Donabedian, 1988). Cameron's (1978) organizational performance is the judgment a healthcare institution makes about itself relative to peer organizations in the same sector, measured using comparative indicators such as patient satisfaction scores, average surgical costs, or infection rates compared to best-practice hospitals. organizational performance is defined as the speed and effectiveness with which a healthcare institution integrates smart technologies such as electronic health records, telemedicine platforms, and artificial intelligence to improve diagnostic accuracy, reduce medical errors, enhance administrative transparency, and increase operational agility (Vial, 2019). Organizational performance reflects the way an organization takes advantage of tangible and intangible resources to achieve its goals (Wheelen and Hunger, 2015), and the culmination of an organization's working process and activities (Robbins & Coulter, 2007). While, Cho & Dansereau, (2010) defined organizational performance in relation to the organization's goals and objectives. Tomal & Jones (2015) and Iriye, (2019) referred to organizational performance as the actual output or results of an organization as measured against its intended outputs, goals, and objective. Since organizational performance is a multidimensional concept, it seeks to measure companies' achievement of the

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objectives proposed for different stakeholders in a given period (Richard et al. 2009). Hermas et al. (2021) defined organizational performance as the success of an organization in achieving its objectives in terms of financial, customer, internal process, learning and growth. Similarly, Roca-Puig, (2007) and Osintsev and Khalilian (2023) refers organizational performance as the outcomes that organizations achieve according to predetermined goals and includes three main factors: financial results, employee satisfaction and productivity, and customer satisfaction with the services and products provided. Takriti et al., (2023) defines organizational performance is the ability of an organization to boost output through cross departmental collaboration to achieve specific goals. Evaluating this performance is essential for transforming project management data into valuable insights.

In this study, organizational performance is defined from the researcher's perspective as the degree to which the Primary Health Care Units in Zawia, Libya, achieves outcomes through the integration of digital transformation dimensions namely, the Internet of Things (IoT), artificial intelligence (AI) and machine learning, big data and analytics, social media, and cloud storage and computing. This is measured across three key dimensions such as quality of patient outcomes, operational efficiency, and organizational adaptability including speed of adopting new technologies, continuous institutional learning.

Organizational Performance Measurement

Organizational performance is a multidimensional concept that has evolved from traditional financial-centric measures (profit, costs, market share) to broader frameworks incorporating non-financial indicators (Venkatraman & Ramanujam, 1986; Kaplan & Norton, 1996). In the public sector context, performance encompasses outputs, efficiency, service outcomes, responsiveness, and stakeholder satisfaction (Boyne, 2002; Swindell & Kelly, 2005). One of the most influential frameworks is the Balanced Scorecard (BSC), which integrates four perspectives: financial, customer satisfaction, internal processes, and learning and growth (Kaplan & Norton, 1992, 1996). Contemporary research emphasizes that financial measures alone capture only one part of organizational performance, while non-financial measures focus on long-term success and sustainability (Falshaw et al., 2009; Avci et al., 2011). Accordingly, this study adopts non-financial performance to represent organizational performance, drawing on subjective

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perspectives including internal management, employee perspective, learning and growth, and internal operations. These dimensions are particularly appropriate for examining organizational performance in Libyan government organizations, specifically the Primary Health Care Units in Zawia, Libya, as perceived by healthcare employees.

Previous studies

Understanding the nature of the relationship between digital transformation and organizational performance, and based on the previously defined conceptual framework, this section analytically reviews the most prominent findings of previous studies relevant to these dimensions. For exmple, Tortorella et al. (2019) conducted a cross-sectional study involving 181 hospital leaders from various countries that had already begun implementing Healthcare 4.0 (H4.0). The study aimed to identify bundles of H4.0 technologies and associated implementation barriers, and to test their impact on hospital performance improvement using multivariate statistical techniques. The results revealed that H4.0 technologies can be organized into two distinct bundles based on their role within the hospital, while barriers were grouped into two categories following sociotechnical systems theory. The findings indicated that H4.0 technology bundles have a positive and significant effect on hospital performance. Moreover, the interaction between H4.0 technologies and barriers displayed a significant effect on performance improvement. These results help hospital managers anticipate potential implementation issues, enabling more assertive efforts to improve performance and deliver high-quality, low-cost care in the era of the Fourth Industrial Revolution.

Park and Lee (2020) conducted research on a meta-analysis of digital transformation initiatives within healthcare organizations, synthesizing findings on the impacts of digital health technologies on patient care and operational efficiencies. Integrating data from multiple empirical studies, their meta-analysis demonstrated that healthcare organizations adopting digital technologies experienced significant improvements in patient outcomes, reduced medical errors, and enhanced operational efficiencies. The study highlighted the critical role of personalized patient care models and streamlined operational processes enabled by digital health technologies in enhancing healthcare service delivery and organizational performance.

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Jassim and Al-Ghazali, (2024), conducted research to determine the impact of digital transformation on achieving high performance for public sector organizations in Iraq. The study aimed to examine the impact of digital transformation and its impact on achieving high performance for public sector organizations. The study adopted the descriptive-analytical method. To obtain the necessary data and information, the researcher relied on a questionnaire as the data collection tool. The Karbala Health Department served as the study population, with a sample of 137 employees from various departments. The research utilized the SMART PLS and SPSS V26 statistical software programs to test its hypotheses. The research concluded with several key findings, most notably the significant impact of digital transformation on organizational performance.
Mauro et al. (2024) Conducted research to investigate the role of digital technologies for managerial support processes. This study used Porter's value chain model within healthcare organizations and the technology, organization, environment framework to explore the impact of digital technologies on managerial and administrative support processes and identify the determinants of their adoption. The study adopted the Delphi methodology to examine six categories of digital technologies (Internet of Things, artificial intelligence & machine learning, big data & business analytics, cloud storage & computing, social media, and blockchain). The study used an inductive qualitative approach involving 11 experts to gather opinions on the most impactful digital technologies and the factors that hinder or limit digital transformation. The study found that the Internet of Things and artificial intelligence & machine learning have the most significant impact on administrative support processes in healthcare organizations. Blockchain was least relevant. The experts identified the skills and competencies of employees as the most crucial determinants for ensuring successful digital transformation.

Purnawan et al. (2025) conducted research to discover the relationship between digital entrepreneurial orientation and organizational performance, the mediating role of digital innovation competence and the moderating effect of digital technology preparedness. This study examines the relationship between digital entrepreneurial orientation and organizational performance in Indonesian healthcare organizations, investigating the mediating role of digital innovation competence and the moderating effect of digital technology preparedness. The study employed a cross-

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sectional survey design to examine the proposed moderated mediation model among organizational performance in Batam City, Indonesia. Healthcare organizations, Using PLS-SEM with 250 healthcare organizations in Batam City. The results of this study demonstrate that digital entrepreneurial orientation significantly influences organizational performance both directly and indirectly through digital innovation competence as a partial mediator. Digital technology preparedness serves as a critical moderator, substantially amplifying the relationship between entrepreneurial orientation and innovation competence at higher preparedness levels. The model explains substantial variance in digital innovation competence and moderate variance in organizational performance, demonstrating strong predictive relevance.

It is worth noting that despite the growing body of research on digital transformation in healthcare, several important gaps remain. First, existing studies have predominantly focused on hospital settings in developed countries, while primary healthcare Units especially in developing nations remain largely underexplored (Tortorella et al., 2020; Ciasullo et al., 2022). Second, the majority of research has examined digital transformation from a technological or clinical perspective, with limited attention paid to organizational performance outcomes as perceived by frontline staff (Kraus et al., 2021). Third, there is a scarcity of empirical evidence on how different dimensions of digital transformation (e.g., internet of things, AI & machine learning, big data & analytics, social media, and cloud storage & computing) individually and collectively affect organizational performance in resource-constrained healthcare environments (Marques and Ferreira, 2020; Ilangakoon et al., 2022). Fourth, the Libyan healthcare context, characterized by infrastructural challenges, recent political instability, and ongoing reconstruction efforts, has received no scholarly attention regarding digital transformation and organizational performance.

Empirical review the effect of digital transformation on organizational performance

Empirical studies have explored the relationship between digital transformation and employee quality service delivery, emphasizing the role of digital transformation in improving organizational performance. For instance, The study by Laurenza al.et (2018) examined the experience of MSD Italy, the Italian branch of Co. &

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Merck, in implementing digital tools within the healthcare sector. Based on a literature review and a case study, the study concluded that the use of digital tools contributes to improving efficiency and quality in service delivery, while reducing response times and enhancing the overall performance of the organization. It recommended adopting technology and directing it towards developing key processes in the healthcare sector. Other researchers such as (Kaihlanen et al. 2023) confirmed that digitalization and its effects on care professionals is important, as it play a key role in enhancing the performance, such as improving productivity, efficiency, information flow and quality of care. Digital transformation is essential to provide high-quality healthcare services, improve patient outcomes, and solve existing challenges and enhancing performance (Abuhammad, 2022; Santos, 2024).

Furthermore, emerging technologies such as artificial intelligence contribute to greater precision in medical treatment (Topol, 2019). Scholars (e.g. Laker et al., 2018; Wang et al., 2019; Sun et al., 2020) have investigated how digital transformation (DT) influences the performance of healthcare organizations. The authors indicate that DT plays a pivotal role in improving operational efficiency, clinical decision-making, and quality of care. Specifically, telemedicine reduces congestion in emergency rooms (Sun et al., 2020), AI-enabled clinical decision-making allows faster and more precise decisions by clinicians (Laker et al., 2018), and big data analytics are linked with better health outcomes, such as reduced readmission rates and increased patient satisfaction (Wang et al., 2019). Do et al. (2022), the results indicated that digital transformation positively affects the performance. Similarly, Takriti et.al (2023), found that digital transformation can significantly impact organizational performance. The transformation offers significant opportUnits ies to reduce expenses, save time and effort, It also aims to establish a digital economy, enhancing productivity. Digitization can enhance organizational performance by improving operational excellence and quality (Bharadwaj, 2013) increasing customer satisfaction and loyalty (Westerman, 2014) and fostering networks of digital platforms, partners, and customers that share data and resources. This collective intelligence and capability within a digital ecosystem can enhance resilience, adaptability, and co-creation, ultimately improving organizational performance (Yoo, 2012). The digital healthcare transformation helps healthcare organizations to improve efficiency and achieve cost reductions (Akinola & Telukdarie,

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2023; Bachuk, 2024). When properly implemented, digital technologies have the potential to enhance patient care by providing clinicians with more accurate, timely, and comprehensive information about their patients' health (Tehrani, 2015; Kuwabara, 2020). For example, the use of artificial intelligence and machine learning in predictive analytics can help identify at-risk patients, enabling early interventions that prevent hospitalizations and reduce adverse health outcomes (Gajra et al. 2023; Ramírez, 2024). digital platforms facilitate better communication between healthcare providers, ensuring that patients receive consistent and coordinated care throughout their journey across different stages of treatment (Kagan, 2019; Aslam et al., 2023). As a result, the integration of digital technologies into healthcare systems has the potential to create a more patient-centered, efficient, and effective healthcare system. The integration of digital technologies within care systems holds significant promise for transforming healthcare delivery by improving efficiency, coordination, and patient outcomes (Schofield et al., 2019; Araja et al., 2023).

To further support the conceptual framework linking digital transformation dimensions (IoT, AI, big data, cloud computing) to organizational performance (patient outcomes, operational efficiency, and adaptability), several articles have explored the potential to use DTs in addressing clinical needs (Corny et al., 2020; Rolls et al., 2020). Scholars have suggested that DTs are mainly used for patient diagnosis, treatment, and follow-up (Tortorella et al., 2022). In particular, the IoT, big data, and cloud computing are often used to gather and control information about patients' daily life processes and vital parameters, such as blood pressure, heart rate, and body fat (Tortorella et al., 2020). AI and machine learning are often used to predict patients' conditions, allow early detection, and prevent adverse events (Robert, 2019; Leone et al., 2021; Schiavone et al., 2021). On the other hand, studies have shown that introducing digitalization to the administrative core is vitally important, and an essential component of H4.0 (De Sousa Jabbour et al., 2018; Laubengaier et al., 2022; Xu et al., 2018). These emerging DTs can contribute to the improvement of healthcare decision-making by allowing the collection, management and analysis of new and large sets of data (Kamble et al., 2019; Hasselgren et al., 2020; Secundo et al., 2021; Marrone and Hazelton, 2019). However, it is also important to empirically analyze how the introduction of DTs might improve administrative support processes and the related decision-

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making (Behkami and Daim, 2012). All activities along the care delivery path, including support processes, can generate value for patients (Kaplan and Porter, 2011). Collectively, these findings align with the organizational performance dimensions adopted in this study such as patient outcomes (e.g., diagnosis and treatment), operational efficiency (e.g., information gathering and administrative digitalization), and organizational adaptability (e.g., improved decision-making and learning), reinforcing the relevance of examining their integration within the Primary Health Care Units in Zawia, Libya.

Research Methodology

This study adopted a descriptive analytical approach to explore the phenomena under investigation (Creswell, 2012)**,** as this approach is widely recognized as suitable for social and humanistic studies. The descriptive approach relies on studying phenomena as they exist in reality, describing them accurately, and expressing them both qualitatively and quantitatively. This approach was employed to collect, analyze, and test the study's hypotheses through the responses of the sample to the questionnaire items, with the aim of identifying the effect of digital transformation dimensions on organizational performance in the Primary Health Care Units in Zawia, Libya.

Population and Sampling

A sample of 170 healthcare employees, including medical doctors, nurses, clinical officers, laboratory technicians, and administrative staff, was drawn from a population of 600 obtained from the Health Services Administration portal using Krejcie and Morgan's formula (1970). A stratified random sampling technique was employed to ensure adequate representation of different professional categories within the target population. The sample was proportionally stratified according to the size of each professional category in the total population. After data cleaning, 22 questionnaires were excluded due to incomplete responses or invalidity, and 148 valid questionnaires were retained for statistical analysis, yielding a response rate of 87.1%. This response rate is considered acceptable for survey-based research in organizational settings (Baruch & Holtom, 2008).

Data Collection Sources and Instrument

A structured, self-administered questionnaire was used to collect primary data during year 2025. The questionnaire utilized a 5-point Likert-type scale. The development of the questionnaire was based

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on a comprehensive review of previous literature, relevant field studies, and the specific objectives of this study. The instrument was organized into two main sections. Section one involving demographic and background information. This section collected data on participants' characteristics, including age, gender, educational level, years of experience, job position and department affiliation. Section two connecting digital transformation practices. This section included (25) items measuring the key dimensions of digital transformation. Drawing on established frameworks in healthcare management literature, the items assessed (e.g., internet of things (IoT), artificial intelligence (AI), big data and analytics, social media, and cloud storage and computing) (Al-Tit, 2022; Mosadeghrad, 2014). Section three connecting organizational performance. This section included (10) items measuring organizational performance. The items captured multiple performance dimensions, including (e.g., operational efficiency, service quality, and patient satisfaction), consistent with previous validated studies (Al-Tit, 2022; Quinlan et al., 2019). All items in Sections 2 and 3 were rated using a five-point Likert scale, which is widely employed in descriptive-analytical survey research to measure attitudes, perceptions, and self-reported behaviors (Taherdoost, 2022; Boateng et al., 2023). The scale ranged from 1 (strongly disagree) to 5 (strongly agree), with a neutral midpoint of 3 (neither agree nor disagree). All respondents were requested to provide annotated descriptions of their perceptions and factual information based on digital transformation and organizational performance. This response format produces quantitative data suitable for parametric statistical analysis, including correlation and regression techniques (Hair et al., 2019). The data were analyzed using SPSS (Version 25).

Instrument Validation

To ensure content validity, the questionnaire was reviewed by three academic experts in human resource management and public health, together with two mangers of Primary Health Care Units, to assess the relevance, clarity, and comprehensiveness of the items. Additionally, a pilot test was conducted with 40 healthcare employees Primary Health Care Units in Zawia city to assess face validity and reliability. Feedback from the pilot was used to refine wording and eliminate ambiguity.

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Reliability Test

The degree to which a measurement of a phenomenon produces a stable and consistent result is referred to as its reliability (Alavi & Leidner. 2001). Reliability is also concerned with the ability to reproduce results. A scale or test is said to be reliable if it consistently produces the same result when repeated measurements are taken under the same conditions (Albino et al. 2001). Testing for reliability is necessary because it refers to the consistency of a measuring instrument's performance across its various components (Van & Wubben,2005). When using Likert scales, it is generally considered to be the most appropriate measure of reliability to use (O'Sullivan & Dooley, 2008). In this research work, the researcher applied a reliability test to measure the internal consistency of the digital transformation and organizational performance constructs, shown in Table (1).

Table (1). Cronbach's Alpha coefficient values for the reliability of the study tool

Dimension	Items	No. of Items	Cronbach's Alpha
Internet of Things (IoT)	5	1-5	0.73
AI & machine learning	5	6-10	0.86
Big data & Analytics	5	11-15	0.77
Social media	5	16-20	0.87
Cloud storage & Computing	5	20-25	0.71
Digital Transformation (Total)	25	-	0.87
Organizational Performance	10	-	0.90

Results Descriptive Statistics

To analyze the respondents' perceptions and attitudes toward each survey item, descriptive statistics including the mean and standard deviation were computed. The mean serves as a measure of central tendency, indicating the average response, while the standard deviation reflects the dispersion or variability within the responses (Pallant, 2005; Sekaran & Bougie, 2013). A low standard deviation suggests that responses are concentrated around the mean, whereas a high standard deviation indicates greater variability. To interpret the level of each item, a five-point Likert scale was categorized using the following formula: $(5 - 1) / 5 = 0.80$. Accordingly, the following ranges were established: 1.00–1.80 as 'very low', 1.81–2.60 as 'low', 2.61–3.40 as 'moderate', 3.41–4.20 as 'high', and 4.21–

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5.00 as 'very high'. The items were subsequently ranked based on their mean values.

The Descriptive Statistics

Table (2) shows the results of the descriptive analysis for digital transformation & its dimensions, and organizational performance by using the mean and the standard deviation. The results in table (2) also indicate that digital transformation was practiced in the at the Primary Health Care Units in Zawia at moderate level, where the mean is calculated (3.37) and standard deviation (0.86). It illustrated also that there are moderate levels for all dimensions of digital transformation except big data and analytics, It came in high level. It also explored the highest for big data and analytics with a mean (3.61) and a standard deviation (0.65), and the lowest cloud storage & computing with a mean (3.19) and a standard deviation (0.97). Finally, the organizational performance at Primary Health Care Units in Zawia was found at a high level, where the mean is calculated (3.56) and the standard deviation (0.76). Table (2) presents the results of the descriptive statistics for the study variables.

Table (2) The descriptive statistics results for the study variables

No.	Dimension	Mean	Std. Deviation	Ranking	Relative importance
1	Internet of Things (IoT)	3.39	0.74	2	Moderate
2	AI & machine learning	3.37	0.78	3	Moderate
3	Big data & Analytics	3.61	0.65	1	High
4	Social media	3.30	0.68	4	Moderate
5	Cloud storage & Computing	3.19	0.97	5	Moderate
	Digital Transformation (Total)	3.37	0.86		Moderate
	Organizational Performance	3.56	0.76		High

Testing Study's Hypothesis

(Ho1): There is no statistically significance impact at ($\alpha \leq 0.05$) for digital transformation with its dimensions (internet of things (IoT), artificial intelligence (AI), big data and analytics, social media, and cloud storage and computing) on organizational performance at

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Primary Health Care Units in Zawia. To test this hypothesis, the study used a multiple regression analysis, and the results are summarized in Table (3).

Table (3) Multiple Regression Analysis Results for (Ho1).

"Model Summary"					"ANOVA"	"Coefficients"			
R	R 2	Adj. R^2	Df (Reg)	F	Sig	Sub-Independent Variables	Beta	t	Sig
0.574	0.330	0.306	5	22.701	0.001	Internet of Things (IoT)	0.351	5.361	0.001
						AI & machine learning	0.210	3.600	0.001
						Big data & Analytics	0.331	5.543	0.001
						Social media	0.189	3.015	0.002
						Cloud storage & Computing	0.150	2.850	0.005

Table (4) illustrates (R = 0.574), whereas (R 2 = 0.330); which indicates that digital transformation emphasizes (33%) of the variance in organizational performance . (F = 22.701) with (Sig = 0.001) , which indicates a significant regression. It is noticed from the table of coefficients: (Beta = 0.351), (t = 5.361), at (Sig. = 0.001) for Internet of Things (IoT) which refers that the impact of this dimension is significant, and from AI & machine learning (Beta = 0.210), (t = 3.600), at (Sig. = 0.001) which refers that the impact of this dimension is significant, and from Big data & Analytics (Beta = 0.331), (t = 5.543), at (Sig. = 0.001) which refers that the impact of this dimension is significant, and from Social media (Beta = 0.189), (t = 3.015), at (Sig. = 0.002) which refers that the impact of this dimension is significant, and finally from Cloud storage & Computing (Beta = 0.150), (t = 2.850), at (Sig. = 0.005) which refers that the impact of this dimension is significant. This further rejected the zero (null) hypothesis and supported the study's first alternate hypothesis: There is a statistically significant impact at level ($\alpha \leq 0.05$) for digital transformation (Internet of Things (IoT), artificial intelligence (AI), big data and analytics, social media, and cloud storage and computing) on organizational performance at Primary Health Care Units in Zawia.

In order to test the impact of every dimension of digital transformation on organizational performance at Primary Health Care Units in Zawia; the first main hypothesis branches off into five sub-hypotheses, as follows: (Ho1.1): There is no statistically

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significance impact at ($\alpha \leq 0.05$) for internet of things (IoT) on organizational performance in Primary Health Care Units in Zawia. To test this hypothesis, the study used a simple regression analysis, and the results are summarized in Table (4).

Table (4) Simple regression analysis results for (Ho1.1).

"Model Summary"			"ANOVA"				"Coefficient"	
R	R 2	Adj. R^2	df	F	Sig*	Beta	t	Sig*
0.351	0.123	0.117	1	28.74	0.001	0.351	5.361	0.001

Table (4) shows (R = 0.351), whereas (R 2 = 0.123); which indicates that internet of things (IoT) explained (12.3%) of the variance in organizational performance. (F = 28.74), with (Sig = 0.001) on (df = 1), (Beta = 0.351), (t = 5.361), at (Sig. = 0.001), and it is significant at level ($\alpha \leq 0.05$). Therefore, the study rejects a zero (null) hypothesis and support the study's first alternate hypothesis: There is a statistically significance impact at ($\alpha \leq 0.05$) internet of things (IoT) on the organizational performance in Primary Health Care Units in Zawia.

(Ho1.2): There is no statistically significance impact at ($\alpha \leq 0.05$) for AI & machine learning on organizational performance in Primary Health Care Units in Zawia. To test this hypothesis, the study used a simple regression analysis, and the results are summarized in Table (5).

Table (5) Simple regression analysis results for (Ho1.2).

"Model Summary"			"ANOVA"				"Coefficient"	
R	R 2	Adj. R^2	df	F	Sig*	Beta	t	Sig*
0.210	0.044	0.038	1	12.96	0.001	0.210	3.600	0.001

Table (5) shows (R = 0.210), whereas (R 2 = 0.044); which indicates that AI & machine learning explained (4.4%) of the variance in organizational performance. (F = 12.96), with (Sig = 0.001) on (df = 1), (Beta = 0.210), (t = 3.600), at (Sig. = 0.001), and it is significant at level ($\alpha \leq 0.05$). Therefore, the study reject a zero (null) hypothesis and support the study's first alternate hypothesis.

(Ho1.3): There is no statistically significance impact at ($\alpha \leq 0.05$) for Big data & Analytics on organizational performance in Primary Health Care Units in Zawia. To test this hypothesis, the study used a simple regression analysis, and the results are summarized in Table (6).

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Table (6) Simple regression analysis results for (Ho1.3).

"Model Summary"			"ANOVA"				"Coefficient"	
R	R 2	Adj. R^2	df	F	Sig*	Beta	t	Sig*
0.331	0.110	0.104	1	30.73	0.001	0.331	5.543	0.001

Table (6) shows (R = 0.331), whereas (R 2 = 0.110); which indicates that big data & Analytics explained (11%) of the variance in organizational performance. (F = 30.73), with (Sig = 0.001) on (df = 1), (Beta = 0.331), (t = 5.543), at (Sig. = 0.001), and it is significant at level ($\alpha \leq 0.05$). Therefore, we reject a zero (null) hypothesis and support the study's first alternate hypothesis: There is a statistically significance impact at ($\alpha \leq 0.05$) for big data & Analytics on the organizational performance in Primary Health Care Units in Zawia.
(Ho1.4): There is no statistically significance impact at ($\alpha \leq 0.05$) for social media on organizational performance in Primary Health Care Units in Zawia. To test this hypothesis, the study used a simple regression analysis, and the results are summarized in Table (7).

Table (7) Simple regression analysis results for (Ho1.4).

"Model Summary"			"ANOVA"				"Coefficient"	
R	R 2	Adj. R^2	df	F	Sig*	Beta	t	Sig*
0.189	0.036	0.030	1	9.09	0.003	0.189	3.015	0.003

Table (7) shows (R = 0.189), whereas (R 2 = 0.036); which indicates that social media explained (3.6%) of the variance in organizational performance. (F = 9.09), with (Sig = 0.003) on (df = 1), (Beta = 0.189), (t = 3.015), at (Sig. = 0.003), and it is significant at level ($\alpha \leq 0.05$). Therefore, we reject a zero (null) hypothesis and support the study's first alternate hypothesis: There is a statistically significance impact at ($\alpha \leq 0.05$) for social media on organizational performance at Primary Health Care Units in Zawia.
(Ho1.5): There is no statistically significance impact at ($\alpha \leq 0.05$) for cloud storage & computing on organizational performance in Primary Health Care Units in Zawia. To test this hypothesis, the study used a simple regression analysis, and the results are summarized in Table (8).

Table (8) Simple regression analysis results for (Ho1.5).

"Model Summary"			"ANOVA"				"Coefficient"	
R	R 2	Adj. R^2	df	F	Sig*	Beta	t	Sig*
0.150	0.023	0.017	1	8.12	0.005	0.150	2.850	0.005

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Table (8) shows (R = 0.150), whereas (R 2 = 0.023); which indicates that cloud storage & computing explained (2.3%) of the variance in organizational performance. (F = 8.12), with (Sig = 0.005) on (df = 1), (Beta = 0.150), (t = 2.850), at (Sig. = 0.005), and it is significant at level ($\alpha \leq 0.05$). Therefore, we reject a zero (null) hypothesis and support the study's first alternate hypothesis: There is a statistically significance impact at ($\alpha \leq 0.05$) for cloud storage & computing on organizational performance at Primary Health Care Units in Zawia.

Results of the Study

The descriptive analysis revealed that the overall level of digital transformation in the Primary Health Care Units in Zawia was moderate, with a mean of 3.37 and a standard deviation of 0.86. Regarding the dimensions of digital transformation, the results showed that Big Data & Analytics ranked first with a mean of 3.61 (SD = 0.65), classified as a high level. Internet of Things (IoT) ranked second with a mean of 3.39 (SD = 0.74), classified as a moderate level. AI & Machine Learning ranked third with a mean of 3.37 (SD = 0.78), classified as a moderate level. Social media ranked fourth with a mean of 3.30 (SD = 0.68), classified as a moderate level. Finally, Cloud Storage & Computing ranked fifth with a mean of 3.19 (SD = 0.97), classified as a moderate level. As for organizational performance, the results indicated a high level, with a mean of 3.56 and a standard deviation of 0.76.

A multiple regression analysis was conducted to test the main hypothesis stating that there is no statistically significant the impact of digital transformation dimensions on organizational performance. The results showed that the coefficient of determination (R^2) was 0.330, indicating that digital transformation dimensions explain 33.0% of the variance in organizational performance. The calculated F-value was 22.701 with a significance level of $p < 0.001$, indicating that the overall regression model is statistically significant. Regarding the regression coefficients, all five dimensions of digital transformation demonstrated a positive and statistically significant impact on organizational performance. Further, the result showed that Internet of Things (IoT) was the most influential dimension, followed by Big Data & Analytics, AI & Machine Learning, social media, and finally Cloud Storage & Computing. This result aligns with the study of Tortorella et al. (2019) and Park and Lee (2020).

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A simple regression analysis was conducted to test the impact of IoT on organizational performance. The results showed $R = 0.351$, $R^2 = 0.123$, indicating that IoT explains 12.3% of the variance in organizational performance. The calculated F-value was 28.74 ($p < 0.001$), with Beta = 0.351 ($t = 5.361$, $p < 0.001$), which is significant at $\alpha \leq 0.05$. Therefore, Ho1.1 was rejected, confirming that IoT has a statistically significant impact on organizational performance. The results of the simple regression analysis also showed $R = 0.210$, $R^2 = 0.044$, indicating that AI & Machine Learning explains 4.4% of the variance in organizational performance. The calculated F-value was 12.96 ($p < 0.001$), with Beta = 0.210 ($t = 3.600$, $p < 0.001$), which is significant at $\alpha \leq 0.05$. Therefore, Ho1.2 was rejected, confirming that AI & Machine Learning has a statistically significant impact on organizational performance. Furthermore, The results showed $R = 0.331$, $R^2 = 0.110$, indicating that Big Data & Analytics explains 11.0% of the variance in organizational performance. The calculated F-value was 30.73 ($p < 0.001$), with Beta = 0.331 ($t = 5.543$, $p < 0.001$), which is significant at $\alpha \leq 0.05$. Therefore, Ho1.3 was rejected, confirming that Big Data & Analytics has a statistically significant impact on organizational performance.

Moreover, the results showed $R = 0.189$, $R^2 = 0.036$, indicating that social media explains 3.6% of the variance in organizational performance. The calculated F-value was 9.09 ($p = 0.003$), with Beta = 0.189 ($t = 3.015$, $p = 0.003$), which is significant at $\alpha \leq 0.05$. Therefore, Ho1.4 was rejected, confirming that social media has a statistically significant impact on organizational performance. Additionally. The results showed $R = 0.150$, $R^2 = 0.023$, indicating that Cloud Storage & Computing explains 2.3% of the variance in organizational performance. The calculated F-value was 8.12 ($p = 0.005$), with Beta = 0.150 ($t = 2.850$, $p = 0.005$), which is significant at $\alpha \leq 0.05$. Therefore, Ho1.5 was rejected, confirming that Cloud Storage & Computing has a statistically significant impact on organizational performance. This result consistent with study of Tortorella et al. (2019) and Park and Lee (2020).

Recommendations

Based on the findings of this study, the following recommendations are proposed:

The Primary Health Care Units in Zawia should expand the use of smart sensors for patient monitoring, connect medical devices to IoT

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networks for real-time data collection, and provide training for healthcare staff on IoT applications.

Based on the study findings it recommended to establish a centralized platform for health data analysis, employ specialized data analysts, and utilize analytical results to support clinical and administrative decision-making.

The Primary Health Care Units should deploy AI systems for disease diagnosis, use machine learning algorithms to predict patient needs, and automate routine tasks using AI technologies. Additionally, the Units should create official pages for health awareness, use social platforms to communicate with patients and their families, and measure patient satisfaction through social media channels.

The Primary Health Care Units should transition to secure cloud storage systems for health records, provide specialized training for staff on cloud computing systems, and ensure the security and confidentiality of data stored in the cloud. Additionally, the Units should formulate a comprehensive strategic plan for digital transformation that includes all five dimensions, with clear performance indicators and timelines for implementation.

Based on the empirical analysis, which confirmed that all digital transformation dimensions have a statistically significant impact on organizational performance, more focus should be placed on designing and implementing ongoing training programs for healthcare staff to enhance their digital competencies across all dimensions of digital transformation. Furthermore, it is recommended to allocate adequate financial resources to support digital transformation projects and upgrade the technical infrastructure of the healthcare Units.

The Primary Health Care Units in Zawia should establish a dedicated monitoring and evaluation Units that utilizes evidence-based metrics to periodically assess the impact of digital transformation on organizational performance, while also ensuring the integration of all digital transformation systems to maximize collective benefits and prevent data silos that may hinder decision-making processes.

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