

Research Title

**The Impact of Digital Transformation on Operational Efficiency in the
Kingdom of Saudi Arabia.**

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Abstract

Organizations are making digital transformation a strategic priority to enhance their operational efficiency, productivity, and competitiveness. Digital transformation is a key element of achieving Saudi Vision 2030 in the Kingdom of Saudi Arabia, which involves implementing new technologies and modernizing organizations. The aim of this study was to check how organizations, in the Kingdom of Saudi Arabia, are affected in terms of operational efficiency by digital transformation.

The present study has been followed in the quantitative descriptive analytical approach, structured questionnaire was distributed to approximately 340 employees and managers from various organizations within Saudi Arabia. Digital transformation emerged as an independent variable, which was analyzed in three aspects: digital infrastructure, digital technologies adoption, and digital skills within the workforce competencies, and operational efficiency was the dependent variable. After that, the data was analyzed in SPSS in a rather simple manner, which included some descriptive statistics, reliability, correlation and simple linear regression. The overall Cronbach's Alpha was 0.90, which is good for reliability.

Based on the findings, it seems that the Digital Transformation has a positive and statistically significant impact on operational efficiency. Furthermore, the outcomes revealed that all three aspects of digital transformation were significant as each one was correlated with the overall performance of the organization. This occurred as a result of enhancing productivity, streamlining operations, aiding decision making, and optimizing the use of resources. Therefore, the study basically recommended that a successful digital transformation is a balance between technological infrastructure, advanced digital technologies and a digitally skilled workforce.

Regarding recommendations, the study called for continuing investments in the digital infrastructure, advancing more in the use of digital technologies, enhancing employees' digital competencies through continuous training and also developing comprehensive digital transformation plans that align with Saudi Vision 2030 goals.

Keywords: Digital Transformation, Operational Efficiency, Digital Infrastructure, Digital Technologies Adoption, Digital Skills, Saudi Vision 2030.

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Chapter one: Introduction

Introduction

Digital transformation is one of the key business priorities for companies aiming to enhance their competitiveness and performance. Digital technologies are rapidly changing the way organisations deal with their operations, make decisions and provide products and services. AI, cloud computing, big data analytics and the Internet of Things have been directly impacting this for some time. Digital transformation is not simply about introducing new tools; it's a broader shift that integrates digital solutions into existing business processes, thereby enhancing efficiency, effectiveness, and the organization's overall performance (Alayed, 2023).

Operational efficiency can be considered as one of the primary indicators of the success of any organization, as it can reduce expenses, minimise waste and increase the quality of services that are delivered. Process automation for repetitive tasks, seamless information flow, data-driven decision making, and inter-departmental collaboration are just a few aspects of digital transformation that help to drive operational efficiency. Hence, it serves throughout the chain from one stage and not a single stage only (Banks, 2025; Al-Saudi & Flayyih, 2024).

In the Kingdom of Saudi Arabia, the digital transformation has become a national priority under the Saudi Vision 2030, which aims to diversify the economy, promote innovation and boost the digital economy as well. This has led to greater investment in digital technologies by organisations, both public and private, to boost their operational performance and competitiveness. These initiatives have also contributed to process improvements in a variety of sectors, such as manufacturing, energy, logistics, healthcare and service oriented organizations (Asem, Mohammad, & Ziyad, 2024).

Problem Statement

Today's business environment is becoming increasingly competitive – the technology is constantly changing and yes, so are the customer's expectations of business! All of the above has led organizations to begin relying on innovative means to operate, ensuring that they run smoothly and are also market-relevant. Digital transformation is one of several concepts in that group of strategies that can help companies modernize and become more efficient, outperform, and focus

on data for better handling. Gaurang Alayed (2023) asserted that organizations can optimize workflows, minimize costs, and boost productivity through the use of newer digital tools, such as artificial intelligence, cloud computing, automation, and data analysis. The Kingdom of Saudi Arabia is one of the countries where the digital transformation has been incorporated into the national development strategies, notably in the framework of Saudi Vision 2030. The government has been urging organisations within the public and private sectors to adopt digital technologies in order to enhance the quality of service, transparency and efficiency they provide. These programs are targeted to improve the digital economy, innovative work, and boost organizational performance in different industries (Asem, Mohammad, and Ziyad, 2024). Consequently, numerous institutions in Saudi Arabia are starting to come up with digital systems and platforms to modernize their operations. Despite these attempts, there are many organisations that are still failing in achieving the benefits of digital transformation.

There are some barriers that can hinder the effective implementation of digital technology, including: resistance to change in the organization, unavailability of digital skills of employees, inadequate technological infrastructure, and potential integration of digital solutions with the operational systems used (Alharbi, 2019). These pitfalls can restrict the capacity of organizations to maximally benefit through digital transformation initiatives and enjoy considerable gains in operational efficiency. Furthermore, despite the high marketing of the concept of digital transformation as an intervention to improve the performance of organizations, little information has been found in the literature on the effects of digital transformation on operational efficiency in the Saudi context. Although some studies have focused on the digital transformation process in specific sectors such as energy, supply chain and services, further research addressing the development of the digital transformation process and its potential to enhance the efficiency of operations in Saudi Arabian organizations is still to be carried out (Osman, Ellaythy and Dagabri, 2024; Alsharidah and Alazzawi, 2020). Moreover, the past research has provided insights on the significance of digital technologies in improving productivity and organizational performance, but the degree to which digital technologies can affect the operational efficiency of Saudi organizations is still under investigation (Banks, 2025). Besides, the digital transformation doesn't just impact the technology infrastructure; it additionally impacts the organizational procedures, worker abilities, and management practices. New technologies will likely change the way work is done, the work structure, and require new skills from employees and their competencies. It is likely that

without proper planning and strategic execution, digital transformation efforts won't result in the expected change in effectiveness and productivity (Sarabdeen & Alofaysan, 2023; AlQahtani, 2023). Based on the above reflections, the research question in this paper is whether there is a need to study the extent of enhancement to the efficiency of the organizational operations in the Kingdom of Saudi Arabia through the process of digital transformation. The main objectives of the proposed study are that of assessing the effect of the adoption of digital technologies on the functioning process of the organization, level of productivity and effectiveness of their operations, in particular. In this regard, the study will help contribute to the lighting of the issue of how digital transformation can enhance the performance and efficiency of an organization in the context of Saudi Arabia.

Research Questions

Main Research Question

- What is the impact of digital transformation on operational efficiency in organizations in the Kingdom of Saudi Arabia?

Sub-Research Questions

- What is the impact of digital infrastructure on operational efficiency in organizations in the Kingdom of Saudi Arabia?
- What is the impact of digital technologies adoption on operational efficiency in organizations in the Kingdom of Saudi Arabia?
- What is the impact of digital skills and workforce competencies on operational efficiency in organizations in the Kingdom of Saudi Arabia?

Research Objectives

Main Objective

- To examine the impact of digital transformation on operational efficiency in organizations in the Kingdom of Saudi Arabia.

Sub-Objectives

- To analyze the impact of digital infrastructure on operational efficiency in organizations in the Kingdom of Saudi Arabia.
- To examine the effect of digital technologies adoption on operational efficiency in organizations in the Kingdom of Saudi Arabia.
- To investigate the impact of digital skills and workforce competencies on operational efficiency in organizations in the Kingdom of Saudi Arabia.

Research Hypotheses

Main Hypothesis (H1)

- H1: There is a statistically significant impact of digital transformation on operational efficiency in organizations in the Kingdom of Saudi Arabia.

Sub-Hypotheses

- H1a: There is a statistically significant impact of digital infrastructure on operational efficiency in organizations in the Kingdom of Saudi Arabia.
- H1b: There is a statistically significant impact of digital technologies adoption on operational efficiency in organizations in the Kingdom of Saudi Arabia.
- H1c: There is a statistically significant impact of digital skills and workforce competencies on operational efficiency in organizations in the Kingdom of Saudi Arabia.

Rationale and Motivation

In a world that's becoming increasingly digital, digital transformation has become a key strategic concern for organisations seeking to increase operational efficiency, productivity and competitiveness. They begin to apply artificial intelligence, cloud computing, data analytics and automation, in practice, which enables them to streamline business processes, make informed decisions, enhance communication and even utilize resources in a more optimized manner. The Kingdom of Saudi Arabia is no exception to the digital transformation, as it is part of the Saudi Vision 2030's call for digital innovation, and simply requires both public and private

organizations to embrace modern digital technologies to enhance organizational performance and service quality.

Despite the rapid pace of digital transformation in Saudi Arabia, however, there is a lack of robust empirical evidence on the impact of such initiatives on operational efficiency. In addition to investing heavily in digital infrastructure, organizations continue to invest in new technologies, but it's uncertain how much these investments actually contribute to measurable improvements in operational performance. Hence, the current study is influenced by the need to study and gain deeper insights into the impact of digital transformation on operational efficiency in the Saudi context, particularly on digital infrastructures, adoption of technology, and digital workforce capabilities. The outcomes should contribute to the current body of knowledge, and provide practical guidance for managers and policy-makers who would like to maximize the operational value of digital transformation.

Scope and Delimitations

The project is focused on research into the real world impact of digital transformation when applied and the disruption it causes to the operational efficiency of an organisation that is still working in the Kingdom of Saudi Arabia. The study especially examines the contribution of various aspects of digital transformation, such as digital skills and workforce competencies, digital technologies adoption, and digital infrastructure, as an enabler to improve the effective functioning of the organization's operations. By examining these areas the research will provide a more detailed understanding of the reality of the impact of digital transformation initiatives on day to day business operations and productivity, as well as the resulting operational outcomes, but specifically in the Saudi context.

Conversely, the study has a limitation of the number of organizations analysed in Saudi Arabia since it is based on analysing the digital transformation based on economic development plans that the country adopts and on technological initiatives that it supports. The study is also focused primarily on effectiveness in terms of the way in which organizations implement their operations. This means being productive, how quickly things get done, how resources are utilised and the quality of performance when services are provided. This study is not primarily concerned with other organizational measures, such as financial measures, customer satisfaction or

organizational innovation but these variables may also be indirectly related to operational efficiency in practice.

Furthermore, the research focuses on the dimensions of digital transformation mentioned earlier, as they have been identified as some of the most impactful dimensions of digital transformation, as shown in previous studies. Digital transformation is a broad term that encompasses a host of aspects of technological and organizational change, but for the purposes of this research it will be limited to these two areas in order to maintain focus, specificity, and manageability. Another limitation is the availability of data, which may affect how far the findings can go, and how consistently results can be measured.

Significance of Study

The significance of this study lies in its attempt to examine the links between digital transformation and organization operational efficiency in organizations in the KSA. However, in light of the ongoing shifts in the current organizational context and the advent of digital technologies, the influence of the past on the organization's functioning has become increasingly important among scholars, executives and decision makers alike. The paper could be part of the existing knowledge on digital transformation as the selected organizations are in the midst of technological and economic transformation in the Saudi context and digital transformation has an impact on the efficiency of operations.

Theoretical Contribution Theoretically, the research can be added to the current body of scholarly work concerning the digital transformation and efficiency. Despite the numerous studies on the digital transformation in various global environments, a few of them have been focused on the impact of digital transformation on operational efficiency in the Saudi organizations. The research project presented appears to aim at filling this gap, and can provide empirical evidence on the impacts that various digital transformation dimensions have on the activity of the organization in Saudi Arabia, and indeed there are more than one angle on this. While the paper presents the dimensions of digital transformation and a framework for the level of technology adoption, it also attempts to establish a conceptual framework that connects the dimensions of the digital transformation to the operational efficiency outcomes in practice, namely digital infrastructure, level of technology adoption, and the competencies of the digital workforce.

The research examines the interrelationships and explores how mechanisms for digital transformation travel the journey towards improved operational performance, such as in a real operational context. Overall, the findings can also be of interest to future scholars who may wish to review digital transformation and organizational performance in similar settings as these cases tend to appear quite similar.

Practical Contribution In practical terms, the findings from the current research can be very useful for managers, organizational leaders and decision makers who are responsible for starting a digital transformation initiatives in their organization. Knowing how digital transformation can affect operational efficiency will assist organizations to be better informed in deciding on investment in digital technologies, infrastructure and training of the workforce. The research could also help organizations to trace the most crucial digital factors that could be implemented to enhance their operational processes and productivity. The research offers practical advice to organizations that aim to improve their operational efficiency by digitalizing their operations by indicating the importance of digital infrastructure, adoption of technologies, and various digital competencies in employees. Finally, the results can assist organizations to enhance their performance regarding operations, minimize inefficiencies, and attain sustainable competitive advantages in the digital economy.

Policy Contribution The results of this research could provide insights that will help Saudi Arabia's policymakers and government agencies create policies that will support digital transformation across different sectors of the economy. With the ongoing realization of the Vision 2030 in Saudi Arabia, the significance of the digital transformation on the efficiency of organizations grows in importance in terms of forming the national policy of digitalization and technological advancement. The findings of this research could be used by the policy experts to pinpoint the key areas where digital transformation efforts can be used to enhance organizational performance and productivity

Previous Studies

Digital transformation has started to receive more focus in recent academic literature as a way to improve the performance of organisations, their efficiency in operations and economy in general. Digital transformation has been explored in different aspects of the subject, including technology adoption, changes in workforce, operations management and changes in sectors. The next part is the review of the past related research on the topic of digital transformation but in chronological order (the latest to the oldest).

The recent developments put emphasis on how digital transformation is becoming more relevant to improving the efficiency of services and organization's performance. To illustrate, Alwehaibi, Sadraoui, and Sallam (2025) study was an effort to assess how digital innovation has been helpful in enhancing the efficiency of health insurance services in the Kingdom of Saudi Arabia. The research question that was considered dealt with the role of digital technologies in the process of service delivery, minimization of administrative intricacies, and communication dealing with service providers and beneficiaries. The results have shown that digital innovation has a great role in enhancing operational efficiency and quality of services within health insurance sector and therefore there is a need to adopt advanced digital systems to enhance the performance of the organization.

In the same vein, the research conducted by Banks (2025) was an attempt to look into the effect of the level of digital transformation on the performance of financial organizations. The study targeted the impact of the degree of digital transformation on organizational performance, especially financial measures, and productivity. The results indicated that companies with a high digital transformation have more positive financial results and operational capacity. The results corroborate the hypothesis that digital transformation is an important factor for the transformation of organizations to become efficient and competitive.

Likewise, BinMahfooz (2025) aimed to investigate the impact of digital transformation on improving the efficiency of the operations management of small and medium enterprises in services sector in the Kingdom of Saudi Arabia. The aim of the research was to examine the use of digital technology in the operational performance improvement, the effectiveness of decision making and resource management in the environment of SME. The results showed that the digital transformation is essential for improving operations management efficiency and organizational productivity in services sector in Saudi Arabia.

Meanwhile, the research by Asem, Mohammad and Ziyad (2024) aimed to review the organisational strategies that are used to navigate digital transformation toward Saudi Arabia's vision 2030. It was supposed to explore the organizations in Saudi Arabia's adoption of the digital innovations and the strategic initiatives in order to diversify the economy and to boost technology utilization. The results revealed that digital transformation is rapidly turning out to be a strategic

imperative among organizations who want to increase their operational ability and remain competitive in the highly dynamic digital economy.

Apart from that, Al-Saudi and Flayyih (2024) researched the impact of digital transformation on the efficiency of offices' management. The impacts of digital technologies on management of companies, document management systems and communication processes in organizations were discussed in the paper. With respect to the administrative aspect, the findings revealed that there is high level of efficiency of digital transformation in terms of reducing paperwork, speeding up the operations and simplifying the management of information.

Similarly, Osman, Ellaythy and Daghri (2024) study aimed to investigate the effect of digital transformation in the Saudi Arabian Energy sector. In a more general sense, the paper reviewed the opportunities of digital technologies for improving operational monitoring, energy management systems and predictive maintenance. The results indicated that digital transformation is an effective solution as well. It can enhance the efficiency of energy operations within the energy industry by enabling data analysis, contributing to better decision making, and it is beneficial in resource management.

Another important study is the one by Aljedaani (2024) that attempted to explore the issue of digital transformation in the warehouse operations in Saudi Arabia, not just in theory. This work was directed towards digital technologies like automation systems, digital tracking systems and integrated logistics platforms, in order to increase the efficiency of the warehouse and the performance of the supply chain in general. The results showed that the digital transformation can assist in controlling the inventory, reduce the operations time and enhance the overall logistics efficiency.

Conversely, the article by AlQahtani (2023) was conducted to assess the role of artificial intelligence in digitalization, organizational transformation and productivity, within Saudi Arabian organizations. The paper has highlighted the significance of AI technologies in the digital transformation journey and their impact on improving organisational productivity. The results indicated that AI-supported technologies can enhance the accuracy of decisions made by organizations, automate various processes, and boost overall efficiency.

Similarly, Alayed (2023) study was research which aimed to understand the ways in which technology and digital transformation can be leveraged to support the transformation of business in the Saudi economy. The study centered on the contribution of digital technologies to the modernisation of business processes and assist in diversifying the Saudi Arabia economy. The findings emphasized digital transformation as a key enabler in increasing the efficiency of organizations, their innovation and competitiveness in the constantly evolving economy.

Meanwhile, the article by Sarabdeen and Alofaysan (2023) aimed at studying the impact of the digital transformation on the Saudi Arabian labour market in the times of rapid digital dynamics. The paper has analyzed the relevance of digital transition for the workforce, job profiles and the competencies required in the organizations. The results indicated that digital transformation has implications beyond the productivity of the organization, it also calls for developing a high-skilled workforce in the digital realm to support the successful integration of technologies.

Previous studies also included digital technologies in the supply chain and logistics management. For example, the study conducted by Alsharidah and Alazzawi (2020) aimed to investigate the impact of artificial intelligence and the digital transformation on SCM within Saudi companies. The research was aimed at the enhancement of digital technologies in the supply chain coordination, accuracy of the forecast and logistics. The results indicated that there is a significant rise in the efficiency of the supply chain and its performance during integrating artificial intelligence technologies.

Lastly, Alharbi (2019) carried out one of the previous studies that have discussed the challenges of digital transformation in Saudi Arabia. The study was also aimed at setting the challenges that impact digital transformation programs in the Kingdom. Some issues were noted in the research, such as the limitation of technological infrastructure, organizational resistance to change, employee deficiency of digital skills, and the problems with the implementation of new digital systems.

Commentary on Previous Studies

There seems to be a pretty clear consensus in the previous studies on the positive aspect of digital transformation in improving the performance of an organization, and also its operational

outcomes in various industries. In fact, the majority of the analyzed articles indicated that digital transformation contributes to increased productivity, better service quality, more efficient resource utilization, easier management decision making, and increases organizational competitiveness. Banks (2025); Alwehaibi et al. (2025); BinMahfooz (2025); AlSaudi and Flayyih (2024); Osman et al. (2024); and AlQahtani (2023) consistently found that firms using digital technologies generally achieved higher operational performance than those operating traditionally. Also, studies such as Asem et al. (2024), Alayed (2023), and Sarabdeen and Alofaysan (2023) highlighted the strategic value of digital transformation, especially in terms of supporting Saudi Vision 2030. Beyond that, they linked it to the sustainability of the company and its competitiveness.

Nevertheless, despite these similar conclusions, the studies were not identical. There was a wide range of differences about their research interests and scope and the context in which they were situated. Some papers zeroed in on particular sectors, like health insurance (Alwehaibi et al., 2025), financial services (Banks, 2025), energy (Osman et al., 2024), warehousing and logistics (Aljedaani, 2024), supply chain management (Alsharidah & Alazzawi, 2020), office management (Al-Saudi & Flayyih, 2024), and small and medium enterprises (BinMahfooz, 2025).

Most other research focused on individual components of digital transformation, such as artificial intelligence (AI) (AlQahtani, 2023), workforce transformation (Sarabdeen & Alofaysan, 2023) or implementation challenges (Alharbi, 2019), rather than on digital transformation as an organizational undertaking. Earlier work also tended to continually change the dependent variable. Others paid attention to organizational performance, financial performance, innovation, service quality, logistics efficiency and/or productivity. In other words, when considering operational efficiency as one of the integrated outcomes, this was not the primary target.

This study contains a few differences to the previous studies. The first is that this paper takes a broader organizational perspective, so as to not be merely about digital transformation in one industry or one organizational setting as many previous papers have done. It focuses on organisations in different sectors in the Kingdom of Saudi Arabia. Second, the study examines digital transformation along three interrelated aspects (digital infrastructures, use of digital technologies and digital skills and workforce characteristics), providing a more comprehensive conceptual framework than studies that focus on a single technological or organizational dimension. Third, operational efficiency is taken as the main dependent variable. Thus, the study

aims to understand how the various aspects of digital transformation interact to drive organizational performance and impact, including enhanced service delivery, resource utilization, productivity, and organizational operations. Finally, the study brings forward fairly new empirical results based on data gathered from 340 employees and managers in Saudi organizations. This way, it brings new signals to the growing body of knowledge around digital transformation.

Research Gap

Although prior research has predominantly indicated that the impact of digital transformation on organizational performance is positive, most of these studies have focused on specific sectors such as healthcare, finance, logistics, energy and on small and medium-sized enterprises (SMEs) . Equally, and I'm sure this is something you see quite a bit, a lot of research has focused on one aspect of digital transformation—whether that's artificial intelligence, digital innovation, workforce development, I don't know—one aspect at a time rather than, you know, digital transformation as a whole organizational thing. In addition, much of the work accomplished to date focuses on outcomes of services (e.g., financial performance, service quality, innovation, or productivity) and only relatively little emphasis has been placed on operational efficiency as a combined organizational outcome.

Furthermore, there is a clear gap in empirical studies focusing on understanding the combined effect of digitized infrastructure, the use of digital technologies, and the skills of a digital workforce on operational efficiency in various organizations across different industries in the Kingdom of Saudi Arabia. For this reason, this study attempts to complete this gap by creating a wider framework, that is, a structured explanation of the interplay between these core dimensions of digital transformation in explaining the impact on operational efficiency. The research not only helps advance the literature on organizational change but also provides organizations and policymakers with more up-to-date data on the Saudi organizational context that can assist them in achieving Saudi Vision 2030 objectives.

CHAPTER TWO :LITERATURE REVIEW

2.1 Introduction

One of the most impactful organizational transformations of the 21st century, digital transformation sort of transforms an organization's business, its business model and how it creates value in increasingly tech-enabled environments. The real drivers of this evolution are the changes of traditional business models to increasingly integrated, flexible and data-driven systems. All of this is driving the rapid evolution of digital technologies, including artificial intelligence, cloud computing, the Internet of Things (IoT), big data analytics, blockchain technologies and intelligent automation. However, it is no longer just about automating isolated processes and disjointed activities, it is about changing the way organizations operate so that they can survive, and remain competitive for the long-term, said Alayed (2023). It is not just a technological change, it's a strategic change, it's an organization's management philosophy being questioned and its culture being questioned.

The last 10 years have also seen a lot of research into digital transformation. Digital transformation has gained importance as one of the drivers of operational performance as it can be integrated into the value chain of organizations, as highlighted by Yu, Wang and Moon (2022). Similarly, Wujarso (2023) argues that an organization's capacity to integrate digital technologies into its operational systems increases its productivity, efficiency in using resources, reduces operating costs, and allows it to respond quickly to environmental changes. But, with the changing competitive landscape due to globalization, the turbulence in technologies, and the increasing expectations of customers from the nearly all industries, these benefits have grown more significant, and more difficult to overlook.

At the same time, operational efficiency is a key goal of organizations trying to achieve sustainable growth and competitive advantage. Although measuring financial performance is vital, modern organizations have realized that working efficiently is essential when building profitability, customer satisfaction, innovation and organizational resilience on top of that. The term "operational efficiency" is defined by Nazara et al. (2024) as the process of maximizing output while minimizing unnecessary input in an organization by optimizing business processes and allocating resources efficiently and continually improving processes. Therefore, operational

efficiency and digital transformation have become synonymous: Digital technologies are helping companies to streamline repetitive tasks, improve communication, empower the decision-making process and make organizations more flexible.

Recent research has shown that companies where digital transformation has been embraced often report positive improvements in operational efficiency. For example, Banks (2025) discovered that organizations with a higher level of digital maturity have experienced higher levels of productivity, quicker operations, and overall organizational effectiveness compared to those that don't. Similarly, Hegazy et al. (2023) demonstrates that digital transformation has a vital role in achieving operational excellence by integrating digital technologies in the organizational processes, thereby minimizing operational waste, standardizing processes and improving the quality of services. These results indicate that digital transformation is no longer a mere technological innovation but has turned into a strategic ability within an organization.

Digital transformation has become a very key enabler in the Kingdom of Saudi Arabia, and appears to be closely linked to the national economic diversification drive which is known as Saudi Vision 2030. The Vision aims basically to transition away from dependence on oil, and at the same time, promote innovation, technology advancement, knowledge-based industries and sustainable economic growth. In the context of enhancing institutional performance, and elevating Saudi organizations' competitiveness in the international market, digital transformation is one of the most important anticipated solutions, as stated by Asem, Mohammad, and Ziyad (2024). Similarly, AlQahtani (2023) states that AI and digital technologies are at the heart of modernizing organizations in both the public and private sectors in Saudi Arabia, and these technologies have helped organizations achieve operational efficiency and contribute to their national development goals.

The Saudi government's digital transformation is growing at a rapid pace, with heavy investment in digitizing infrastructure, and consequently digital transformation is taking place across the economic sectors. Government initiatives have greatly contributed to improving digital readiness, with the positive impacts of increased technology infrastructure, digital innovation and support for digital solutions in organizations (Alharbi, 2019). The programs have set the stage for the transition to cloud computing systems, AI applications and enterprise resource planning, digital

communication platforms and intelligent automation technologies for organizations. In addition, Aljedaani (2024) found that the adoption of integrated digital systems in Saudi organizations for the purpose of improving warehouse management and logistics operation coordination, as well as inventory and operation responsiveness, is increasing. The results of this study therefore demonstrate how digital transformation is maturing in the Kingdom.

The significance of digital transformation has also grown over the years as the ability to effectively gather, process, analyses and use information is a key component of an organization's competitiveness. Traditional organizations were based on historical information and on manual decisions. But today, companies rely more and more on live data created with multiple digital platforms that are connected. As indicated by Lin and Xie (2023), enterprises with high digital transformation competence can achieve high operational efficiency by utilizing the digital technologies to continuously monitor the operational performance, promptly identify the inefficiency and take corrective action in advance. Similarly, standardized digital processes have great potential to optimize the coordination of operations in supply chains, as they provide greater visibility, better communication between the various actors in the chain and fewer delays between them (Xu 2025).

Digital transformation and Ops efficiency are more than just a technology topic – it is an organizational learning curve, employee upskilling and reskilling, a leadership shift and a new way of managing the business. Sarabdeen and Alofaysan (2023) highlight that, apart from investing in technology, digital competencies of employees and organizational cultures that promote innovation, continuous learning and technological adaptation are crucial to the successful digital transformation. This is in line with Darmawan and Gardi (2024) which states that digitally oriented leadership is needed in delivering the transformation of the organization, since it can be able to guide the organization to work together, innovate and motivate employees to participate in the process of digital transformation.

Furthermore, digital transformation impacts almost every aspect of an organization, such as operations management, supply chain management, customer relationship management, financial management, human resources management and strategic planning. Shehadeh et al. (2023) assert that integrated digital transformation strategies bring substantial operational

efficiency improvements for organizations, as they can share information, optimize business processes, facilitate better coordination of activities, and make better managerial decisions. Similarly, Mavlutova et al. (2022) suggest that digital transformation can benefit the financial sustainability of a business as well as the operational efficiency gained by better digital integration, process optimization and organizational innovation.

The digital transformation process has tremendous potential to benefit an organization but there are challenges managers and techs must face. Changing an organization is problematic, lack of digital skills, cyber security and the need for integration of technology and at scale can be significant financial requirements. Thambynayagam (2019) states that organizations need to embrace digital transformation as a long-term journey of the organization and not as a one-off technology initiative.

Considering these trends, the association of DT and efficiency in operations has been gaining importance for researchers, practitioners and policy makers. Different organizations are investing in digital technologies and the extent to which they are able to make a meaningful impact on their operations through digital is diverse. Putra (2025), however, highlights the fact that digital transformation initiatives can only contribute to achieving long-term operational efficiency if they are supported by an appropriate organizational strategy, competent leadership, digital skills, and continuous technological innovation. Similarly, Le et al. (2025) show that digital transformation has a tremendous impact on operational efficiency in commercial banking, as it cuts transaction times, boosts service delivery quality and process automation. In summary, these are just a few of the insights that highlight digital transformation's growing significance as a strategy for enhancing operational efficiency in today's businesses. In this regard, this chapter provides a comprehensive analysis and synthesis of the theoretical and empirical research that has shed light on digital transformation and operational efficiency. It starts with an overview of the conceptual dimensions of digital transformation and then explores the key dimensions of digital transformation, such as digital infrastructure, taking off the adoption of digital technologies and digital skills and competencies of the workforce. It then defines the term operational efficiency, examines the theoretical relationship between digital transformation and operational performance, summarizes the main theoretical frameworks that are used to support this study, critically reviews the previous

empirical studies that have been conducted in Saudi Arabia and around the world, outlines the gap in the literature and finally lays out the conceptual framework that will be used in the current study.

2.2 Digital Transformation

Digital transformation is one of the most impactful terms driving companies today and it's a fundamental shift in the way companies generate value, provide services and maintain a competitive edge in the increasingly digital economy. Digital transformation isn't simply a single organizational change with the introduction of a new technology, but a complete organizational transformation that incorporates the use of advanced digital technology in all aspects of organizational activities. Digital transformation is not merely the use of digital tools but involves a new approach to the design of organizational processes, management, communication, and direction in order to effectively leverage the opportunities presented by technology (Alayed, 2023). Digital transformation in this sense is an approach to the organization that introduces innovation, continuous improvement and technological adaptation as significant factors for the long-term success of the organization. With technology evolving rapidly in the last 20 years, the role of digital transformation has grown even more significant. AI and machine learning, cloud computing, blockchain, robotic process automation, Internet of Things (IoT), digital platforms, big data analytics, and others have revolutionized business operations in almost every sector. Organizations that can implement these technologies into their workflows have better organizational capabilities and can benefit from better operational performance and adaptability to market changes, as explained by Yu et al. (2022). Similarly, Nazara et al. (2024) state that digital transformation can help companies restructure business processes, enhance organizational flexibility, boost communication, and optimize decision-making processes using real-time information analysis. A key factor in digital transformation is that it is a strategic approach. Typically, traditional technological interventions addressed the optimization of current working methods instead of changing organizational models or business processes. But for digital transformation, organizations must reimagine value creation, engagement with stakeholders, and internal processes. As noted by Wujarso (2023), digital transformation is not a technological project but a strategic change for the organization, meaning that the adoption of digital methods should be coordinated and involve changes in technology, leadership, organizational culture, employee skills, and management practices. This means that organizations need to pursue more

comprehensive transformation efforts than piecemeal technological projects, if they are to make sustainable progress toward operational efficiency. The literature is crystal-clear that digital transformation is a multi-layer phenomenon that is taking place concurrently in organisations. These dimensions include technological infrastructure, digital innovation, organizational culture, leadership commitment, employee digital competencies, business process redesign, and customer engagement. Darmawan and Gardi (2024) concluded that these dimensions are only able to make digital transformation successful when they are in harmony and consistent with the integrated strategic framework that supports the organization's learning and continued innovation. Similarly, Huynh, Gunkel, and Veglio (2025) propose that the organizational mindset of having a data-driven approach is essential for significant operational improvements for organizations, as those that focus on digital investments without data-driven thinking do not see the same gains. Another important trait of digital transformation is its dynamic and continuous nature. Digital transformation is a process that is not as linear as traditional organisational change – it is actually a journey, with no clear start or end points, but ongoing technological adaptation and organisational learning. Kulichyova et al. (2025) state that organizations continually face new technological opportunities, new competitive threats and changing customer expectations and see that digital transformation is not a one-time organizational programme, but an ongoing strategy. Therefore, the digital strategy of organizations needs continuous monitoring, technology enhancements and employee training to ensure they are operational in an ever-evolving landscape and are able to maintain their operational excellence. Digital transformation also transforms the business decision-making processes. In the past, organizational decision making was greatly dependent on the president's experience, intuition and the past reports. Advanced analytics, predictive algorithms, artificial intelligence and integrated information systems are integral to contemporary organizations' reliance on data-driven decision making. Organizations with more sophisticated digital capabilities show significantly higher operational performance; managers have access to accurate real-time information, can spot operational inefficiencies right away, and can take action to fix them before they grow out of hand. (Banks, 2025) Similarly, Hegazy et al. (2023) state that in today's context, operational excellence relies more and more on the capacity to convert operational data into managerial knowledge using advanced digital technologies. One of the other hallmarks of digital transformation is that it is able to connect organizational activities into a single digital ecosystem. In the past, departments like Finance, Operations, Marketing,

Logistics and Human Resources would work in isolation with disjointed information systems. Digital transformation creates the opportunity to connect these departments by using enterprise-wide digital platforms, which can streamline information sharing and coordination. Shehadeh et al. (2023) note that derived from an integrated digital system, there are significant reductions in duplicated work, minimised communication delays, and better collaboration between organisational units, resulting in better operational efficiency and organisational responsiveness.

Automation is yet another key aspect of digital transformation. Artificial intelligence, robotic process automation and intelligent software systems are increasingly being used in modern organisations to automate repetitive, labour-intensive and time-consuming operational tasks. Micheal (2026) states that automation helps organisations to cut their running costs whilst simultaneously enhancing the speed of service, operational accuracy and process consistency. Moreover, Al-Saudi and Flayyih (2024) prove that digital automation significantly improves administrative effectiveness by cutting down on paperwork, streamlining document processing, making information more accessible, and reducing human errors in administrative processes.

The adoption of cloud computing has also been integral to the digital transformation journey. Traditional organizations used to rely on costly, rigid and expensive physical IT infrastructures. Cloud technologies of the modern era allow businesses to store, process and access information for the organization securely in a scalable digital platform, which can be accessed from virtually anywhere. The benefits of the cloud computing technology, which organizations can derive from it are evident, like reducing the cost of infrastructure, faster deployment of technology, and enhancing organizational collaboration (Alharbi, 2019). Likewise, Asem, Mohammad, and Ziyad (2024) state that the cloud technologies are playing a critical role in the Saudi Arabia's national digital transformation initiatives and are crucial to help propel the modernization and transformation of both public and private entities.

Artificial intelligence (AI) is yet another game-changer that has immensely enhanced the organization's capabilities. AI systems help businesses predict customer needs, streamline production processes, enhance customer service, detect operational anomalies, and inform strategic decision-making. AlQahtani (2023) noted that AI is one of the main technological factors behind the digital transformation of Saudi organisations as it improves the productivity of the

organisations and aids in more intelligent decision-making. In support of this, Osman, Ellaythy and Daghri (2024) provide examples of how the energy sector in Saudi Arabia is revolutionized through the use of artificial intelligence, for predictive maintenance, operational monitoring, and energy management, to make significant strides in energy efficiency and resource utilization.

The big data analytics has also added a new dimension to organizational decision making, allowing managers to process vast amounts of data that is structured and unstructured, coming from the organizational activity. Organizations use predictive analytics to predict operational risk, customer preference, assignment of resources, and strategic planning, not just on the basis of historical data. Lin and Xie (2023) show that organizations that use advanced data analytics are always more efficient in their operation because data analytics tools can anticipate the problems and prevent them from impacting the organization's performance. Likewise, Zhang, Fu and Lu (2025) find that the adoption of digital analytics in logistics operations planning has a significant impact on operational coordination and forecasting accuracy, which leads to higher productivity and organizational performance.

Digital transformation also enhances an organization's agility which is more valuable than ever in very competitive market conditions where uncertainty and quick technological advancements reign supreme. Organizational agility is the ability to react swiftly and effectively to the market, technological advancements, and customer expectations that are constantly evolving. Digital transformation allows businesses to be more agile, highlights Putra (2025), through its ability to increase operational flexibility, enhance communication infrastructure, boost decision-making speed and enable quick adaptation of the organization. Similarly, Xu (2025) shows that standardized digital processes can greatly boost the agility of the supply chain by facilitating visibility, minimising operation delays, and improving coordination among the chain's organisational actors.

The digital transformation path is becoming a key element of the Saudi economy's development. The Saudi government has invested massively in Vision 2030 in the areas of digital infrastructure, artificial intelligence, smart government projects, cyber security, digital healthcare, fintech innovation and intelligent industrial systems. The objective of these efforts is to bring the use of government services more into the modern world, and to encourage private organizations

to adopt modern digital tools, which can boost their organizational productivity and competitiveness. (Asem, Mohammad and Ziyad 2024) In the same way, BinMahfooz (2025) finds that SMEs in Saudi Arabia that have ICTs transformation strategies benefit them in terms of operational management, resources management and organizational productivity.

Although the benefits are huge, there are major organizational challenges to digital transformation. The investment in technology can be significant, organizational changes may need to be made, staff training must occur, cybersecurity needs strengthening and culture needs to change. Despite the high readiness of digital technologies, organizations often fail to account for the complexity of the organization they are implementing the digital transformation in, as pointed by Thambynayagam (2019). Likewise, Alharbi (2019) emphasizes organizational resistance, limited digital skills, insufficient technological infrastructure and integration challenges as other challenges facing Saudi organizations in the process of digital transformation. The challenges reveal that the ability to successfully transform to a digital world is not only about the tried and true technologies, but also building the organizational capacity to support sustainable technological change.

Digital transformation, therefore, should be considered a holistic process of change in an organization, involving the use of new technologies, organizational learning, digital skills, strategic leadership, and ongoing innovation within a coherent organizational structure. There is a consistent body of research that shows the advantages of the digital transformation that organizations can realize when they are successful. There is a body of research that clearly reflects that successful digital transformation helps organizations gain operational efficiency, organizational flexibility, better decision-making, and competitive position. Hence, the understanding of digital transformation forms the theoretical background needed to study how digital transformation affects the efficiency of organizational operations in the Saudi Arabia Kingdom.

2.2.1 Definition of Digital Transformation

Digital transformation has undergone significant changes in the last decade, as digital technologies have developed and played a significant role in changing the way organisations work, manage and run their businesses. It is a concept that is appeared in many research and publications,

yet researchers still provide various viewpoints on the exact definition of Digital transformation as it includes four aspects: technical, organizational, strategic and cultural. To define digital transformation is, therefore, not merely about the implementation of technology but needs to be understood as a process of transformation of the organization.

An early view of digital transformation is to think of it as the use of digital technologies to influence or improve how things are done in an organization to make operations more effective and efficient. Thambynayagam (2019) states that digital transformation cannot be taken as a synonym of replacement of the manual processes with the computer-based systems. Rather it is an ongoing organizational process that involves the redesign of the processes of operation, creation of organizational flexibility, and improvement of the overall efficiency of the business operations. This view emphasizes that in the context of digital transformation, organizations are looking to make long-term improvements to the organization, not just short-term improvements to the technology.

Likewise, Yu, Wang, and Moon (2022) describe digital transformation as "the ability of the organization to leverage digital technologies to transform the way the organization conducts its business and to fundamentally change the way in which it performs its business activities" (p. 1). Their definition puts the emphasis on digital transformation being a capability-driven movement and not a technology-driven one..

Wujarso (2023) has another definition of digital transformation that considers it a strategic process for organizations to restructure their business models, organizational structures, and decision-making processes using new digital technology. This view sees Digital Transformation as more about value creation in the organization than only the implementation of technology. The author discusses how organisations that have adopted digital transformation want to find new competitive advantages by digitalising all aspects of their working, such as production, logistics, customer relationship management, financial management, marketing and human resource management. This means that digital transformation is no longer an IT department's responsibility, but is a strategic process that should be embraced by the organization as a whole.

Operational management also sees digital transformation as the process of incorporating digital technologies to streamline organizational processes, maximize resources, boost productivity, and drive operational efficiency (Nazara et al., 2024). One of the main goals of digital

transformation, as they define it, is the optimization of processes. Instead of just putting emphasis on technological sophistication, the organizations are encouraged to re-engineer operational processes to remove unnecessary activities, reduce operational delays, minimizing error and enhancing service quality. This operational view is closely aligned with the present study as it concerns the dependent variable in the study, operational efficiency.

In the Saudi context, Alayed (2023) states that digital transformation is a nation and organization strategy for modernizing institutions by using technology to enable economic diversification and sustainable development as per the Saudi Vision 2030. The author argues that digital transformation is not merely organizational modernization as it drives the country's competitiveness, economic knowledge development, and technology advancement directly. This view indicates digital transformation in Saudi Arabia has organizational and national strategic value.

Likewise, Asem, Mohammad and Ziyad (2024) state that "Digital transformation is the strategic application of digital innovation in systems of governance, planning and operations of an organization to enhance the performance of the institutions to realize national development objectives". They are concentrating on the relationship between the digital transformation strategies of organisations and Saudi Vision 2030. In the absence of individual efforts to adopt technology, the Saudi organisations are taking a more integrated approach by having a digital transformation programme tied to other government agendas and policies that incorporate digital government as well as smart industries, artificial intelligence, cyber security and digital entrepreneurship.

In particular, AlQahtani (2023) is dedicated to the technological component of Digitization, which is the ability of an organization to use new technology, such as AI, machine learning, cloud computing and intelligent automation, to boost productivity, innovation, and organizational performance. Therefore, technology, as defined, is the beginning of organizational transformation, and for digital transformation to be successful, this technology needs to be applied with the support of willing employees, leadership and organizational readiness.

This technological view is supported by Mavlutova et al. (2022) who define digital transformation as the process by which organizations use advanced digital technologies to enhance organizational sustainability, operational efficiency and financial inclusion. They have emphasized

that digital transformation can help achieve both economic and social and operational goals as it promotes innovation, efficient resource utilization and organizational agility in the face of environmental shifts. Therefore, digital transformation supports sustainable development goals in general and not just operational goals.

Shehadeh et al. (2023) defines digital transformation as the integration of digital technology into every aspect of a company's operations to improve operational efficiency and provide them with a competitive edge. Interestingly, their definition explicitly links digital transformation to improved operational efficiency; meaning that organizations that are doing digital transformation with integrated digital strategies are always outperforming those using traditional operational approaches. This ties into one of the theoretical bases for the present study.

Likewise, Lin and Xie (2023) define digital transformation as an organizational ability that allows companies to continuously optimize their operation processes using intelligence technology, digital information systems and advanced analysis tools. They envision a concept that is more focused on a process of continuous improvement than technological implementation. Continuous operational performance monitoring, efficiency identification and technological innovations are introduced to ensure high operational standards.

Huynh, Gunkel and Veglio (2025) view Digital Transformation as the evolution of an organisation's mindset to embrace a data-driven approach where decisions are made efficiently and through the use of digital information, predictive analysis, and organisational knowledge. This is not just technological digitalization; it's also a change of managerial thinking patterns, according to these authors. Organizational data is a key factor that managers need to learn how to use effectively, whether in making operational, tactical and/or strategic decisions. It is, then, not only a technological evolution, but also a managerial one – this is the definition of digital transformation.

Restructuring and reorganizing the organization is also an integral part of digital transformation. According to Kulichyova et al. (2025), digital transformation is a process of restructuring the organization where businesses need to adapt their governance, leadership, organizational competence and strategic agendas in response to new technological opportunities. They believe that digital transformation often disrupts traditional organizational structures, fostering collaboration across functions, decentralization of decision-making and an ongoing

process of experimentation and innovation. As a result, the flexibility of organizations is a key attribute of organizations in the digital world.

In the field of operations management, Xu (2025) underscores the importance of digital processes being standardized as a hallmark of digital transformation. The author argues that digital transformation helps organisations to streamline the way they operate across different geographical locations and to improve the transparency, coordination and efficiency of their operations. Likewise, Zhang, Fu, and Lu (2025) prove that the digitalization of logistics operations relies on the internet and connects different functional departments to form a chain of digitalization, allowing for the real-time processing of information, the forecasting of logistics, and the intelligent coordination of logistics throughout supply chains within organizations.

Sarabdeen and Alofaysan (2023) explain that digital transformation is an organizational change that demands the acquisition of new skills by employees that can withstand technologically advanced workplaces. They see the employees not as consumers of technology change but as active players. Therefore, organizations need to invest significantly in digital education, continuous professional development, organizational learning, and digital leadership to maximise the outcomes of the investment in transformation.

Likewise, Darmawan and Gardi (2024) claim that Digital transformation is the fusion of technology and digital-oriented leadership that can lead to collaboration, organizational innovation and employee engagement. From their point of view, digital transformation projects are only successful if the organization's leadership actively commits to the project. Leaders set strategic priorities for digital transformation initiatives, allocate technological resources toward these projects, motivate employees, and foster organizational cultures that foster continuous innovation.

2.2.2 Evolution of Digital Transformation

2.2.2 Evolution of Digital Transformation

Digital transformation has been a gradual journey of technological and managerial growth and shift that has completely transformed organizational functioning in industries globally. In the beginning, organisations used to computerize almost everything, such as replacing paper-based tasks in administration and manual calculations with computers. At this phase, technology was

seen as a tool to support the organization, rather than as a strategic asset. As information technologies developed over time, however, organisations began to realise that digital technologies could greatly contribute to the productivity of the organisations, as well as to improving decision making and the ongoing improvement of operational processes. Thambynayagam (2019) indicates that this shift was an initial step in an organizational shift in awareness about the strategic significance of technology for operational excellence. Likewise, Yu et al. (2022) found that organizations gradually evolved from using technology alone to using digital systems that enabled organizations to function in various business areas. Moreover, given the rise of digital economy, organizations started thinking of their traditional business models in a different way, and digital transformation strategies have begun to take the shape of a comprehensive process instead of just technological investments (Thambynayagam, 2019; Yu et al., 2022; Alayed, 2023; Wujarso, 2023).

The first significant part of this development was computerization; this involved mainly the substitution of manual activities for computer systems. In the '70s and '80s, organizations started turning to computers to streamline accounting departments, payroll, inventory and paperwork. While these systems were able to greatly cut back on manpower and processing time, they were largely self-contained and separate from other systems. Nazara et al. (2024) state that computerization had little impact on organization and business processes, but was a way of increasing transactional efficiency. Similarly, Al-Saudi and Flayyih (2024) state that at this level, organizations considered information technology departments as technical support units instead of organizational partners. Banks (2025) also describes how computerization brought about greater accuracy in operation and led to fewer administrative errors, but did not lead to higher levels of organizational competitiveness as digital technology had not become a part of managerial decision making processes (Nazara et al., 2024; Al-Saudi & Flayyih, 2024; Banks, 2025; Thambynayagam, 2019).

During the 1990s, as technological possibilities increased, organizations began to go through the phase of digitization, where physical information was converted into digital. Customer records, financial reports, engineering drawings, operational records, etc. were increasingly becoming electronic databases. This shift greatly increased information accessibility, lowered document storage expenses, and improved organization communications. Alharbi (2019) found

that a major turning point of the digitalisation process was the ability to retrieve and share information much quicker than the previous era. Likewise, Mavlutova et al. (2022) state that digitization enhanced the transparency of the organisation and provides the technological base for the future digital transformation projects. Additionally, Shehadeh et al. (2023) indicate that digitizing organizational information assisted in enhancing coordination among different departments and reducing delays in the operations of organizations due to paper-based information systems (Alharbi, 2019; Mavlutova et al., 2022; Shehadeh et al., 2023; Yu et al., 2022).

The next step was the digitalization, which was more than merely just the information being digitized. In this stage, companies started to reimagine their workflows by incorporating digital technologies into their everyday activities. Digital communication tools, Enterprise Resource Planning (ERP) systems, Customer Relationship Management (CRM) systems, cloud computing and online collaboration tools took over. Wujarso (2023) noted that digitalization has changed the way organizations operate, enabling them to share information instantly, plan resources as an integrated unit and improve collaboration between organizational departments. Similarly, Hegazy et al. (2023) highlight the role of digitalization in enhancing operational excellence, as companies started to monitor their processes continuously and optimize their processes by integrating them within digital platforms. The results of Nazara et al. (2024) show that digitalization did facilitate an increase in operational simplicity by reducing redundant activities and enhancing the coordination of the organization, which resulted in better utilization of resources, and therefore led to an increase in productivity and effectiveness (Al-Qattan, 2024; Wujarso, 2023; Hegazy et al., 2023; Nazara et al., 2024; Banks, 2025).

The latest phase in this evolution is digital transformation. Digital transformation is different from computerisation or digitisation, as it involves a whole organisation change that impacts on strategy, leadership, organisational culture, employee competencies, operational processes and customer engagement. Organizations must continuously adapt to new and changing business environments and incorporate digital transformation with technological innovation into all organizational activities (Yu, et al. 2022). Lin and Xie (2023) also claim that organizations with a higher level of digital transformation have a higher rate of success compared to non-digital transformation organizations, and the reason is that they master the technology plus organizational flexibility and data-driven decision-making. Furthermore, Huynh, Gunkel and Veglio (2025)

highlight that digital transformation is only successful when there is a change in the organizational culture, and the use of digital information becomes a normal practice for employees and managers in decision making processes at both operational and strategic levels. Digital transformation has thus become a capability of an organization, not just a technology-based project (Yu et al., 2022; Lin & Xie, 2023; Huynh et al., 2025; Kulichyova et al., 2025).

With the introduction of the Fourth Industrial Revolution or Industry 4.0, digitalization has been given a new boost through the combination of cyber-physical systems, artificial intelligence, machine learning, robotics, cloud computing, big data analytics and the Internet of Things brought into organizational processes. These technologies allow companies to automate intricate operations, track and supply real-time operational performance, and anticipate operation failures beforehand. Osman, Ellaythy, and Daghri (2024) reported how predictive maintenance systems, intelligent monitoring platforms, and automated resource management have revolutionized management in Saudi Arabia's energy industry. Similarly, Aljedaani (2024) has found that digital warehousing technologies have contributed greatly to the accuracy of inventories, productivity of warehouses, and logistics effectiveness in Saudi organizations. Moreover, the standardized digital supply chain processes empower organizations to better coordinate their activities and respond to evolving market demands (Osman et al., 2024; Aljedaani, 2024; Xu, 2025; Zhang et al., 2025).

Recently, organizations have started to adopt Industry 5.0, a shift that focuses on the use of advanced technology in combination with human intelligence rather than using automation to replace humans. The principle of Industry 5.0 is that technological innovation should be used alongside human creativity, critical thinking, leadership and problem-solving skills. Darmawan and Gardi (2024) state that digitally oriented leadership has become more critical due to the need of organizational leaders to simultaneously handle technological innovation and employee engagement. Likewise, Sarabdeen and Alofaysan (2023) state that in today's era, workforce digital competencies are becoming an asset for organizations as the employees are exposed to intelligent technologies in their everyday tasks.

Digital transformation is all about dimensions. Digital transformation is all about dimensions (2.3)

Digital transformation is known as a multidimensional phenomenon of organizational change, not only related to using advanced technologies, but also related to organizational skills, technological infrastructure, readiness of the staff and strategic management. While there are several models that have been proposed to measure digital transformation, there is general consensus that a single technological indicator is insufficient to capture the essence of digital transformation. Rather, it is actually a 'holistic' combination of various sets of organizational elements that, put together, decide the achievement or failure of any digital projects. Digital transformation is not just technological investments, but a holistic system where organizations' performance in operational level can be boosted only when all three components of the system—technological resources, organizational capabilities and human competencies—are understood and managed together (Yu et al., 2022). Similarly, Wujarso (2023) states that assessing digital transformation requires multiple levels as it is the combined effect of infrastructure, technology usage, digital leadership, and employee skills that contribute to organizational competitiveness. In support of this, Nazara et al. (2024) state that organizations that are undergoing a digital transformation strategy that is balanced are consistently outperforming those that are only going through the technological bits and bobs. In addition, Alayed (2023) highlights the growing acknowledgment by Saudi organizations of the need to invest in both infrastructure and technological innovations and employee training in parallel to focus solely on technology acquisition in order to achieve sustainable digital maturity in line with Vision 2030. All these results collectively support the idea that digital transformation is an organizational capability that consists of interrelated dimensions, which come together to make an organization effective and achieve operational excellence (Yu et al., 2022; Wujarso, 2023; Nazara et al., 2024; Alayed, 2023; Banks, 2025).

This study studies three key dimensions that are constantly emphasized in the related academic literature as the key drivers for digital transformation in the organization. These dimensions are digital infrastructure, digital technologies adoption and digital skills and workforce competencies. These dimensions are selected based on both theoretical and empirical evidence that these dimensions are very important and impactful in organizational performance and operational efficiency. Asem, Mohammad, and Ziyad (2024) have found that digital transformation cannot be done efficiently without having a strong technological

foundation that can sustain advanced digital systems. AlQahtani (2023) further claims that digital transformation in the organizations manifests into emerging technologies like AI and advanced analytics. Simultaneously, Sarabdeen and Aloffaysan (2023) state that, in and of itself, technological investments are not enough if employees don't have the required digital skills to effectively use technologies. Huynh, Gunkel, and Veglio (2025) also go on to say that organizations that focus on digital transformation as well as investing in technologies reap higher returns from digital transformation efforts than those that only focus on the investment. Given their linkages with the research objectives and hypotheses presented in the present study (i.e., Asem et al., 2024; AlQahtani, 2023; Sarabdeen & Aloffaysan, 2023; Huynh et al., 2025; Kulichyova et al., 2025), these three dimensions offer a comprehensive framework for assessing the extent of digital transformation in Saudi organizations.

2.3.1 Digital Infrastructure

Digital infrastructure is the backbone of any digital transformation project. In the absence of a suitable digital infrastructure, organizations will be unable to effectively adopt new technologies, connect digital systems and create a sustainable increase in operational efficiency. The modern digital infrastructure is not just about information technology equipment but also encompasses communication networks, cloud computing platforms, cybersecurity systems, enterprise information systems, databases, data centers, connectivity to the Internet of Things (IoT), artificial intelligence platforms, and integration architectures. Alayed (2023) states that one of the most strategic organizational resources for an organization is digital infrastructure as it allows the organization to process information efficiently, make communication a part of the organization and support intelligent decision making in all areas of business. Similarly, Yu et al. (2022) explain how digital infrastructures empower organizations to be more technologically advanced, which improves their operational performance with faster information processing, increased organizational flexibility, and better departmental coordination. These arguments are echoed by Banks (2025) that investments in strong digital infrastructure bring long-term productivity benefits, operational reliability, and organizational competitiveness by allowing users to utilize enhanced digital capabilities (Alayed, 2023; Yu et al., 2022; Banks, 2025; Nazara et al., 2024).

Digital infrastructure has come a long way with the development of technology. The earlier organizational structures were made up of individual computer systems and internal databases used for the most part in basic administrative activities. However, the contemporary digital infrastructure combines several interrelated technologies in the form of digital ecosystems which can support complex operations of an organization. The modern digital infrastructure allows organizations to connect their production systems, financial management, logistics, customer services, and human resource management in a digital space that enhances the coordination of operations and the responsiveness of the organization, as mentioned by Hegazy et al. (2023). Likewise, Wujarso (2023) states that an integrated digital infrastructure can greatly minimize the fragmentation of information and improve transparency and the efficiency of communication within an organization. Additionally, Al-Saudi and Flayyih (2024) have shown that organizations with integrated digital infrastructures see significant gains in administrative efficiency due to the automation of document workflows, coordination, and communication within digital systems. The developments show that digital infrastructure is now a vital organizational capability that supports basically all aspects of modern business operations (Hegazy et al., 2023; Wujarso, 2023; Al-Saudi & Flayyih, 2024; Shehadeh et al., 2023).

Cloud computing has revolutionized the way by which organizations manage their information technology resources and is one of the most crucial parts of digital infrastructure. Cloud computing provides an organization with a scalable online platform to store, process and access organizational information, rather than just relying on local hardware. Alharbi (2019) states that the cloud technologies have a low cost of infrastructure, but have a high impact on the flexibility and accessibility of the organizations. Similarly, Asem et al. (2024) states that cloud computing is a key tool for enabling the digital transformation of Saudi Arabia's initiatives as it enables quick deployment of digital applications without large-scale investments in physical infrastructure. These findings are supported by Mavlutova et al. (2022) who state that cloud computing can positively impact operational efficiency by enabling real-time collaboration with others, making information readily available, improving business continuity, and making organizations more resilient towards operational disruptions. Moreover, organizations with cloud-based operational

systems always achieve better performance than those with traditional information technology infrastructures, as cloud systems allow organizations to continuously optimize their operational systems and to make better use of their resources (Alharbi, 2019; Asem et al., 2024; Mavlutova et al., 2022; Lin & Xie, 2023)..

Digital infrastructure is also crucial in delivering operational efficiency, by allowing easy communication between various departments of an organization, enabling information exchange in real time, strengthening stakeholder coordination and contributing to data-driven decision making processes. Organizations with highly integrated digital infrastructures have shorter operating cycles, quicker logistics coordination and improved operational transparency due to the continuous flow of information throughout organizational functions (Zhang, Fu, & Lu, 2025). Similarly, Aljedaani (2024) shows that using sophisticated digital infrastructures at Saudi warehouse companies has a significant positive effect on logistics efficiency, warehouse productivity, and inventory accuracy, thanks to the use of intelligent monitoring systems and automated operational technologies. In support of this, BinMahfooz (2025) found that SMEs in Saudi Arabia with investments in modern digital infrastructure experienced significant enhancements in operational management, resource utilization, and service quality. Furthermore, Nazara et al. (2024) state that digital infrastructure forms the backbone of the organizational system from which sustainable digital transformation is realized, as all advanced digital technologies rely on the solid technological foundations to bring about measurable operational improvements (Zhang et al., 2025; Aljedaani, 2024; BinMahfooz, 2025; Nazara et al., 2024).

2.3.2 Digital Technologies Adoption

Digital technologies adoption is one of the most vital aspects of digital transformation, as it indicates the level of adoption of high-tech digital solutions within organizations' daily activities, strategic planning and decision making processes. Digital infrastructure is the technological basis, and the adoption of technology is what makes it possible to turn technological investments into measurable value for the organization. Modern businesses continue to be dependent on cutting-edge digital tools to streamline workflows, facilitate communication, optimize resource usage, boost customer connections, and enhance flexibility in operations. The integration of new technologies like Artificial Intelligence (AI), Machine Learning (ML), cloud computing, and

advanced analytics into organizations has revolutionized their functions and processes, facilitating quicker and more precise decision-making, as noted by AlQahtani (2023). Likewise, according to Yu et al. (2022), organizations with greater DT capabilities regularly exhibit greater operational performance, as digital technologies enable them to continuously improve their processes and innovate their organizations. This is in line with the findings of Nazara et al., (2024), who indicate that technology adoption helps organisations to reimagine operational workflows, remove the need for duplicate tasks, cut operational costs and boost productivity with intelligent automation and digital integration. Additionally, Wujarso (2023) states that technology uptake in an organization should be strategically aligned to organizational goals and not only for the sake of modernization. In total, these perspectives suggest that technology adoption is one of the most significant drivers of operational efficiency, and it is the practical application of digital transformation. Taken together, these perspectives highlight the practicality of digital transformation and its drivers: technology adoption (AlQahtani, 2023; Yu et al., 2022; Nazara et al., 2024; Wujarso, 2023; Banks, 2025).

Rapid developments in artificial intelligence, cloud computing, big data analytics, blockchain technology, robotic process automation, and Internet of Things (IoT) applications have all contributed to a tremendous influx of digital technologies. These technologies have revolutionized the way organizations gather, process and use information, while also enhancing coordination of work among various organizational functions. Micheal (2026) argues that organisations adopting integrated digital technologies will have significant benefits in terms of organisational efficiency through the use of intelligent systems that can automate repetitive tasks, improve service delivery, reduce operational error and optimise the use of organisational resources. Similarly, Hegazy et al. (2023) highlight the direct benefits digital technologies bring to operational excellence, such as standardizing business processes, improving workflow coordination, fostering continuous organizational improvements, and more. Shehadeh et al., (2023) also highlighted that the digital technologies that were adopted in the banking sector led to significant operational efficiencies and enhanced competitive advantage for the banks, because the services were delivered faster, with high accuracy in banking transactions and the customers were able to respond quickly. In a similar trend, Le et al. (2025) conclude that commercial banks incorporating advanced digital technologies significantly cut down on transaction processing

times, enhanced service quality, and boosted operational productivity. Overall, the results indicate that technology use is not just about technological modernization, but also about the strategic use of technology to increase organizational efficiency and sustainable competitiveness (Micheal, 2026; Hegazy et al., 2023; Shehadeh et al., 2023; Le et al., 2025; Banks, 2025).

Among all emerging technologies, one of the most crucial and impactful technologies that is helping digital transformation is Artificial Intelligence (AI). With AI, organizations can leverage intelligent data analysis to make more complex decisions, predict future outcomes, allocate resources optimally, and enhance responsiveness. AI-powered systems can have a profound impact on productivity, tracking operations, and guiding management decisions, making them a crucial element of digital transformation in organizations within Saudi Arabia and around the world, as highlighted by AlQahtani (2023). Likewise, Osman et al. (2024) show how artificial intelligence technologies are being implemented in the energy sector in Saudi Arabia, improving predictive maintenance, optimising energy management systems and minimising operational disruptions with intelligent monitoring systems. Xu (2025) also reports on how AI-powered supply chain systems can improve the efficiency of operations, including through improved demand forecasting, inventory management, logistics coordination and streamlined operational processes. Similarly, Putra (2025) describes how AI technologies have revolutionized e-commerce platforms, offering their users customized experiences, intelligent inventory management, and automated operational coordination, thereby enhancing the efficiency and quality of service. The AI's impact on operational excellence has been consistently shown in various organizational settings, as outlined in (AlQahtani, 2023; Osman et al., 2024; Xu, 2025; Putra, 2025; Nazara et al., 2024).

Another key technology that underpins digital transformation is big data analytics, which helps companies to manage and process enormous amounts of structured and unstructured data into meaningful business insights. Today, businesses collect massive amounts of data from various sources like customer interactions, production processes, logistics, financial transactions, and digital communication networks. Such analytical tools empower managers to quickly and precisely analyze the data, leading to more precise forecasts, operational planning, and strategic decision-making. Organizations that leverage advanced analytical abilities and make decisions based on data consistently gain more operational efficiency, as data-driven decision-making minimizes uncertainty and enhances an organization's agility and ability to respond to market shifts (Lin &

Xie, 2023). In the same way, Huynh, Gunkel, and Veglio (2025) highlight the importance of having a data-driven organizational mind-set, helping managers turn operational information into operational knowledge to continuously improve the organization. In support, Banks (2025) states that companies with well-developed analytical skills are successful in their operations because they are able to discover inefficiency before it has a detrimental impact on productivity due to the digital information. (Lin & Xie, 2023; Huynh et al., 2025; Banks, 2025; Zhang et al., 2025; Yu et al., 2022)..

Similarly, cloud computing is a highly popular digital technology due to its ability to deliver scalable computing power, flexible information storage, and improved collaboration features to organizations without the need for significant upfront investment in physical hardware. Cloud computing is unlike traditional information technology systems because it allows employees to access organizational information securely from anyplace while providing the flexibility of working remotely, working in real time, and providing integrated organizational communication. Alharbi (2019) emphasized that cloud computing offers a major advantage in improving an organization's flexibility and in lowering infrastructure costs besides providing technology scalability. Similarly, Asem, Mohammad, and Ziyad (2024) discuss that Cloud technologies are one of the main technological pillars in the Saudi Arabia's efforts to transform its operations, as they help the organization modernize its operations and enhance the quality of service while increasing the responsiveness of the organization. Mavlutova et al, (2022) also state that cloud computing helps to achieve sustainable organizational development by enhancing financial efficiency, operational resilience, and organizational agility. This is supported by Darmawan and Gardi (2024) who state that cloud collaboration tools help to enhance teamwork, communication, and innovation within organizations, allowing employees to share information quickly and effectively, regardless of their location (Alharbi, 2019; Asem et al., 2024; Mavlutova et al., 2022; Darmawan & Gardi, 2024; Wujarso, 2023).

2.4 Operational Efficiency

In today's competitive landscape and in an era of rapid technological progress and evolving customer demands, operational efficiency is one of the most critical factors in organizational success. Traditional assessment of organizations has been based on profit or financial performance;

however, more emphasis is now placed on maximizing output while consuming the least amount of resources, minimizing other costs of operation, maximizing service quality, and sustaining competitive performance in the most economical manner. As a result, operational efficiency has become a strategic organizational goal that indicates the efficiency with which organisations are using human, technological, financial and informational resources to achieve organizational goals. For Banks (2025), operational efficiency is the ability of an organization to achieve excellent results at the organizational level, using optimized business processes, efficient use of resources and continuous improvement. Similarly, Yu et al. (2022) state that operational efficiency has a strong relationship with organizational flexibility as a high productivity and service quality organization can quickly adjust their operations to the environment. To support this argument, Nazara et al. (2024) state that operational efficiency is the successful application of technology, organizational capacity, and management to enhance organizational performance without any unnecessary waste in operations. Moreover, Wujarso (2023) asserts that the importance of digital transformation is growing as digital technologies allow organizations to reframe their business processes, automate operational tasks, and enhance organizational coordination. All of these viewpoints show that operational efficiency is a multi-dimensional organizational capability that goes beyond cost reduction, encompasses productivity improvement, organizational agility, service excellence, and sustainable value creation (Banks, 2025; Yu et al., 2022; Nazara et al., 2024; Wujarso, 2023; Hegazy et al., 2023).

While there are many different ways to define operational efficiency, the definitions most often come down to the same thing: using the least amount of resources to achieve the highest level of organizational output while operating with high quality and customer satisfaction levels. As cited by Hegazy et al., (2023) operational efficiency is defined as the organization's capacity to streamline its operational activities, eliminating unnecessary procedures, optimizing the coordination of the workflow process and implementing digital technologies to facilitate operational excellence. Likewise, Lin and Xie (2023) define operational efficiency as the extent to which organizations use intelligent decision-making, standardized workflows, and ongoing technological advancement to enhance operational efficiency. Shehadeh et al. (2023) also state that operational efficiency involves organizational responsiveness, the reliability of services, operational speed and the use of resources effectively, leading to long-term organizational

competitiveness. Furthermore, Le et al., (2025) note that within digitally transformed organizations, operational efficiency is especially critical as managers can use intelligent technologies to monitor performance at all times, detect inefficiencies as soon as they arise, and take corrective action before operational issues reach their critical stage. Thus, operational efficiency can be interpreted as a total capability of the organisation that includes productivity, quality, speed, flexibility, and resource optimisation as a single performance measure (Hegazy et al., 2023; Lin & Xie, 2023; Shehadeh et al., 2023; Le et al., 2025; Banks, 2025).

Effective use of the resources of the organization is one of the main features of operational efficiency. The efficient organizations aim at getting maximum value from the human resources, the investment made, the technological resources, and the organization's knowledge, whilst controlling wasteful spending and losses. Efficient organizations boost productivity by maximizing currently available productive capacity instead of adding more organizational resources to boost output. Operational efficiency is achieved by systematic reduction of redundant activities, minimization of process variations, and intelligent integration of workflows in the organization, as stated by Nazara et al. (2024). Similarly, Xu (2025) shows that standardised operational processes, with the help of digital technologies, can greatly enhance the supply chain coordination while minimising operational delays and waste of resources. The conclusions presented in this study are supported by the results of Zhang, Fu, and Lu (2025) which show better operational transparency, quicker decision-making and better use of organizational resources in the case of a digital monitoring system integrated into logistics operations. Moreover, advanced warehouse management systems have been shown to enhance inventory utilization, operational productivity and logistics efficiency in Saudi Arabian organizations through effective utilization of storage space and reducing operational mistakes (Nazara et al., 2024; Xu, 2025; Zhang et al., 2025; Aljedaani, 2024; Yu et al., 2022).

Another important factor of operational efficiency is productivity which means that it is the ability of the organization to have higher outputs for the same inputs. Organizations can enjoy better productivity to enhance profitability, improve customer satisfaction and remain competitive in the face of growing market pressure. Micheal (2026) found that organizations that deploy cutting-edge digital technologies are always able to notice meaningful enhancements in employee productivity, their operations' velocity, and the quality of service provided because intelligent

automation minimizes repetitive manual tasks and lets employees concentrate on higher-value tasks associated with the organization. Similarly, Putra (2025) shows that digital transformation contributes to the productivity of e-commerce organizations by embedding artificial intelligence, predictive analytics and intelligent operational coordination into the organization's processes.

Efficiency is also a characteristic of the organization's flexibility and responsiveness. Businesses today are in a very volatile environment and have rapidly evolving customer needs, innovations, and uncertainty. Organizations therefore need to continually change their operations, while keeping service quality and organizational performance high. Darmawan and Gardi (2024) argue that operational efficiency is one of the key factors in achieving success in terms of digitalization, as digital organizations tend to quickly adapt operational methods to changes in their surroundings. In a similar vein, Kulichyova et al. (2025) suggest that digitally transformed organizations tend to have higher adaptive capacities due to the fact that organizational restructuring, technological innovations, and strategic leadership all contribute to the improvement of operational responsiveness. In support of the above findings, Huynh, Gunkel and Veglio (2025) highlight how data-driven organizational cultures can help managers quickly detect operational problems and make decisions based on data to boost organizational agility and operational effectiveness. Furthermore, Mavlutova et al. (2022) suggest that digital transformation enhances operational resilience by allowing organizations to sustain their business operations during external disruptions and technological advancements or changes (Darmawan & Gardi, 2024; Kulichyova et al., 2025; Huynh et al., 2025; Mavlutova et al., 2022; Banks, 2025)..

2.5 Relationship Between Digital Transformation and Operational Efficiency

The digital transformation and operational efficiency link has been one of the most widely discussed subjects in the modern management and information systems literature. This current academic interest is due to the fact that organizations are more and more working in very dynamic business environments, where the technology is getting faster, the globalisation is increasing and the customer expectations are constantly changing. Therefore, organizations are always pushed to increase operational efficiency while minimizing operational expenses and maximizing resource use. Digital transformation has become one of the most promising strategies for meeting these goals as it allows organisations to reimagine business processes, automate repetitive tasks, improve

co-ordination within the organisation and facilitate informed decision-making. The incorporation of technological capabilities in organizational processes directly improves operational performance and directly enhances organisations' productivity and responsiveness, according to Yu et al. (2022). Banks (2025) also indicates that there is a correlation between increased operational efficiency and digital maturity, noting that digital technologies allow faster decision making, more accurate predictions, and improved resource management of companies. Similarly, Wujarso (2023) notes that the benefits of digital transformation are sustainable, as the companies can streamline their operations, eliminate unnecessary tasks, and enhance the business competitiveness. Additionally, the study conducted by Nazara et al. (2024) indicates that companies that embrace a digital transformation approach fully reap the benefits of the operational performance, productivity, and service quality, which clearly show that one of the key factors that enable organizations to be operational is digital transformation (Yu et al., 2022; Banks, 2025; Wujarso, 2023; Nazara et al., 2024; Hegazy et al., 2023).

Business process automation is one of the main ways that digital transformation improves operational efficiency. In the past, organizations relied on manual processes, which were prone to human error, inconsistent, and time-consuming. Digital transformation allows companies to use AI, RPA, and seamless integrated data systems to automate repetitive tasks, speed up operations, decrease processing costs, and minimize administrative inefficiencies. Micheal (2026) states that organizations that use intelligent automation technologies can achieve a tremendous boost in operational productivity when the repetitive tasks of their processes are handled by automated systems that will do them more accurately and consistently than humans. In a similar way, Al-Saudi and Flayyih (2024) have established that digital office management systems significantly reduce administrative workloads and speed up document processing as well as organization communication. Shehadeh et al. (2023) further found that Digital banking technologies enhance operational efficiency by automating customer transactions, reducing processing errors, and boosting service reliability. Furthermore, the research conducted by Le et al. (2025) showed that commercial banks that have automated their processes have attained shorter service delivery times and increased operational productivity as compared to banks that still operate using traditional operational methods (Micheal, 2026; Al-Saudi & Flayyih, 2024; Shehadeh et al., 2023; Le et al., 2025; Banks, 2025).

Digital transformation also enhances the efficiency of the operations by enhancing organizational decision making. Operational information generated by modern organizations is huge and far too much to be analyzed using traditional management techniques. Managers get accurate information through big data analytics, artificial intelligence and real-time digital monitoring systems to aid strategic planning and operational control. Lin and Xie (2023) state that businesses with sophisticated digital analytical tools are always ahead of the competition due to the elimination of uncertainty by exploiting data for decision-making. Similarly, Huynh, Gunkel and Veglio (2025) state that having a data-driven organizational culture helps managers to make operational information strategic knowledge for better organizational responsiveness and operational performance. In support of these arguments, AlQahtani (2023) demonstrates that AI has a significant impact on improving managerial decision-making by pinpointing operational inefficiencies, forecasting future organizational needs, and optimizing resource allocation. Moreover, Banks (2025) states that any organizations that incorporate the use of predictive analytics in managerial decisions consistently operate with improved operational efficiency because managers can predict potential operational challenges before they impact the organization's performance (Lin & Xie, 2023; Huynh et al., 2025; AlQahtani, 2023; Banks, 2025; and Yu et al., 2022).

Resource optimization is another crucial digital transformation and operational efficiency relationship. By using digital technologies, organisations can maximise their financial, technical and human resources by continually measuring operational performance and pinpointing inefficiencies at every stage of organisational processes. As stated by Zhang, Fu, and Lu (2025), digital logistics platforms help organizations to have greater operational transparency and make managers more efficient in managing inventory, transportation plans, and supply chain coordination. Likewise, Xu (2025) proves that the use of standardized digital supply chain systems can substantially enhance the operational efficiency, eliminate unnecessary operational delays and increase the coordination among supply chain partners. Aljedaani (2024) also demonstrated that the digital warehouse management system significantly improves the use of warehouse resources and minimizes storage expenses and wastage in Saudi companies. The findings are supported by Osman et al. (2024), which reports that advanced monitoring systems in Saudi Arabia's energy industry boost productivity and minimize operational disruptions by optimizing resource usage

through predictive maintenance and real-time monitoring. (Zhang et al., 2025; Xu, 2025; Aljedaani, 2024; Osman et al., 2024; Nazara et al., 2024).

Digital workforce capabilities also impact digital transformation and operational efficiency. Adopting technologically advanced working environments is far from being sufficient unless it is accompanied by the knowledge, technical skills and digital competencies of the employees. Workforce digital competences are one of the most crucial factors for successful digital transformation since employees are now dealing with Artificial Intelligence, cloud computing, and integrated information systems in regular organizational tasks (Sarabdeen and Alofaysan, 2023). Similarly, Darmawan and Gardi (2024) state that digitally-inclined leadership helps to increase operational efficiency through the ways that it promotes collaboration among employees, organizational learning, and ongoing technological innovation. This view is supported by Kulichyova et al. (2025), who argue that organizations that have a continuous commitment to employee development have better operational gains because of the support of technological innovation through organizational learning and workforce adaptability. In addition, having a data-driven mindset in the organization will enhance employee involvement in digital transformation efforts and aid in better decision-making and operational performance (Sarabdeen & Alofaysan, 2023; Darmawan & Gardi, 2024; Kulichyova et al., 2025; Huynh et al., 2025; AlQahtani, 2023).

In the Kingdom of Saudi Arabia, the digital transformation operational efficiency correlation has gained more and more importance due to the government's efforts to implement Saudi Vision 2030. The National initiatives that encouraged the innovation of artificial intelligence, cloud computing, smart government services, technological infrastructure and digitalization have boosted the organizational digital transformation in public and private sectors. Asem, Mohammad, and Ziyad (2024) noted that Vision 2030 has urged organizations to take integrated and digital approaches that increase institutional performance and boost national competitiveness. In the same vein, Alayed (2023) points out that digital transformation is being seen as a strategic imperative in many Saudi organisations to attain operational excellence and sustainable organisational growth. Saudi small and medium-sized enterprises (SMEs) showed significant gains in operational management, productivity, and organizational efficiency after implementing digital transformation strategies (DTS), as revealed by BinMahfooz (2025). Similarly, Alharbi (2019) states that though there are still ongoing struggles to implement digital

transformation and overcome resistance, the long-term operational advantages significantly exceed the challenges associated with digital transformation, such as infrastructure, workforce capabilities, and organizational resistance (Asem et al., 2024; Alayed, 2023; BinMahfooz, 2025; Alharbi, 2019; Osman et al., 2024).

Overall, a positive and a statistically significant relationship between digital transformation and operational efficiency can be seen in the literature reviewed. Digital transformation has a multi-faceted effect on operational performance: It automates organizational processes, optimizes the use of resources, enhances managerial decision making, improves organizational communication, creates digital skills in employees and boosts organizational flexibility. As a result, companies that invest wisely in their digital infrastructure, cutting-edge technologies, and human resources will be more likely to succeed in becoming sustainable operational champions and gain a long-term competitive edge. Based on the conclusions, the conceptual framework and research hypotheses of the present study are supported, which suggests that the digital infrastructure, adoption of digital technologies, and digital competencies of the digital workforce will have a significant positive impact on operational efficiency in organizations in the Kingdom of Saudi Arabia (Yu et al., 2022; Wujarso, 2023; Banks, 2025; Nazara et al., 2024; Micheal, 2026).

2.6 Chapter Summary

In this chapter, a thorough review of the theoretical and empirical works of digital transformation and operational efficiency was conducted. It began with the digital transformation idea, and then moved on to its evolution, definition and key dimensions. While highlighting the need for digital transformation as a multi-dimensional process of the organization beyond just the implementation of technology, the review also covered aspects of organizational redesign, the need for digital leadership, employee skills, and strategic innovation. The chapter went on to discuss the three dimensions explored in the current study, each of which had rich empirical evidence, and demonstrated that these are the core organizational capabilities that facilitate the successful digital transformation process (Alayed, 2023; Yu et al., 2022; Asem et al., 2024; AlQahtani, 2023). The chapter also outlined the concept of operational efficiency which states that efficient organizations are organisations that maximise productivity, optimize resource use, enhance service quality, lower operational costs and remain flexible in more competitive environments. The literature also

showed that digital transformation has significant effects on the operational efficiency of organizations, such as by automating business processes, empowering managerial decision-making, developing organizational coordination, optimizing resource allocation and improving employee productivity (Banks, 2025; Nazara et al., 2024; Hegazy et al., 2023; Lin & Xie, 2023). Last, the chapter created a theoretical linkage between digital transformation and operational efficiency based on existing empirical research made both in Saudi Arabia and globally. The reviewed literature always made the proposition that organizations that have strong capabilities in the digital way of working are able to operate better than organizations that work on an operational system. The findings serve as the theoretical and empirical underpinning for the present study, and mandate the proposed research hypotheses regarding the effect of digital infrastructure, digital technologies uptake, and digital workforce capabilities on operational efficiency in organizations in the Kingdom of Saudi Arabia (Shehadeh et al., 2023; BinMahfooz, 2025; Osman et al., 2024; Xu, 2025; Zhang et al., 2025)..

CHAPTER THREE :RESEARCH METHODOLOGY

3.1 Introduction

The methodology used to study the impact of digital transformation on operational efficiency in organizations in the Kingdom of Saudi Arabia is presented in this chapter. It provides detail on the method for meeting the research goals, resolving the research problems and testing the hypotheses. The research methodology, the study population, sampling technique, sampling size, research instrument, validity and reliability research instrument, data collection technique and statistical techniques used in data analysis in the research are described.

The methodology used was designed with great care to capture the perception of the employees and managers about digital transformation and operational efficiency. As the study is one that aims to explore the correlation between measurable variables, a quantitative research method was chosen as the most suitable. By using quantitative methods, the researcher can gather standardized data from the relatively large number of respondents and analyze the relationship among the variables studied objectively using statistical techniques (Yu et al., 2022). Moreover, quantitative research is commonly employed in management and organizational studies as it offers empirical evidence to test research hypotheses and to explain the relationship between two variables (independent variable and dependent variable) (Nazara et al., 2024)..

3.2 Research Methodology

The present study uses Quantitative research method to investigate the effect of Digital transformation on operational efficiency in business entities in the Kingdom of Saudi Arabia. As the study is an attempt to measure the relationship between the clearly identified variables by numerical data, which is collected through structured questionnaire, the quantitative research is appropriate. The quantitative approach allows the researcher to objectivize the meaning and evaluation of the respondents' opinions to make statistically supported conclusions on the proposed hypotheses (Banks, 2025).

This study used descriptive analytical research design. The descriptive aspect is to describe the level of digital transformation practices applied by Saudi organizations on digital infrastructure, adoption of digital technologies, and digital competencies of the workforce. It also

refers to these organisations' level of operational efficiency. Meanwhile, the analytical part is examining the relationship between the independent variable (digital transformation) and dependent variable (operational efficiency) through statistical analysis (Wujarso, 2023).

This design is deemed to be appropriate as it not only describes the attributes of the variables of the study but also the impact of digital transformation in terms of operational efficiency. Previous studies on digital transformation and organizational performance have used similar research designs (Yu et al., 2022; Hegazy et al., 2023)..

3.3 Research Population

This study will be conducted on the employees and managers of the organizations which are existing in the Kingdom of Saudi Arabia. The organizations targeted are from different sectors, and some of them have already gone through or are currently undertaking digital transformation initiatives, ranging from public organizations, private companies, industrial organizations, service organizations, financial institutions, to technology-based organizations. The participants in the study were selected from employees and managers who have first-hand experience of the organization's activities and are knowledgeable about the experience of implementing digital transformation initiatives and how it affects the operational efficiency. Their experiences offer insights to digital infrastructure, technology adoption, employee capabilities, and organizational performance. The selected population is appropriate since in the context of Saudi Vision 2030, digital transformation projects are growing in number among Saudi organizations, and employees and managers are the most suitable respondents to ask about the effectiveness of these projects (Asem et al., 2024; Alayed, 2023).

3.4 Sample and Sampling Technique

In this study, a convenience sampling technique was used to gather data from employees and managers of various organizations in the Kingdom of Saudi Arabia (KSA) in the different sectors. The sampling technique was deemed suitable as the study aimed at reaching individuals who have practical experiences and knowledge of the implementation of a digital transformation programme in their organisation. In addition, a comprehensive sampling frame of the employees of all Saudi organizations was not available, which made it difficult to conduct probability

sampling. The number of questionnaires received that were considered was 340. This size of the sample is regarded as adequate in quantitative research and has adequate statistical power to investigate the proposed relationships among the variables in this study through multivariate statistical techniques. Additionally, its sample size is above the minimum sample size used in social science research for regression analysis, which improves the reliability and generalizability of the results of the study..

3.5 Research Instrument

The main instruments of data collection in this study is a structured questionnaire. The questionnaire was chosen because one of the most commonly used tools in quantitative research for collecting standardized data from a relatively large number of respondents in a short amount of time. It also allows for easy statistical analysis of their responses since they are numeric and can easily be coded and analyzed in statistical software (Nazara et al., 2024).

The questionnaire was designed based on an extensive review of previous literature related to digital transformation and operational efficiency (Yu et al., 2022; Wujarso, 2023; Banks, 2025). These statements were formulated to capture the study variables and were as clear and simple as possible.

The questionnaire has three parts.

The first section gathers demographic data on the respondents such as sex, age, educational level, position in the job, number of years in their current position, and the type of organization in which they work.

The second section has three dimensions for measuring the independent variable (Digital Transformation):

- Digital Infrastructure
- Digital Technologies Adoption

Skills and competencies in the digital sector

The third section measures the dependent variable (Operational Efficiency).

The questionnaire statements were assessed with a 5-point Likert Scale answering format:

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

It was decided to use five-point Likert scale because it is simple, reliable and common in organizational and management research to measure respondents' attitudes and perceptions..

3.6 Validity and Reliability

Validity: How well the questionnaire measures what it is supposed to measure. The questionnaire was designed in a systematic manner through a comprehensive literature and empirical research on the topic of digital transformation and operational efficiency. In addition, the instrument was pilot-tested with academic experts in business administration and management to assess the clarity, relevance and appropriateness of the items of the questionnaire. The feedback was used to make improvements to the wording and make sure that all statements accurately reflected the study variables. Reliability is the consistency and stability of the measuring instrument in giving consistent results. The internal consistency of the questionnaire was assessed by using the Statistical Package for the Social Sciences (SPSS) with Cronbach's Alpha coefficient. The results indicated that Cronbach's Alpha for the entire questionnaire scale was excellent (0.90), thus revealing high internal consistency among the items on the questionnaire. By convention, a Cronbach's alpha coefficient greater than or equal to 0.70 is considered acceptable reliability and greater than or equal to 0.90 is excellent reliability. Thus the result obtained ($\alpha = 0.90$) supports that the questionnaire is very reliable and suitable in measuring the study variables and later on the statistical analysis.

3.7 Data Collection Procedures

The researcher used structured questionnaire method in collecting the data after the respondents gave their consent in participating in the research. Questionnaire was sent to employees and managers of various organizations in the Kingdom of Saudi Arabia via email. Respondents were briefed on the purpose of the study and their responses would be solely for academic research purposes prior to completing the questionnaire. All the information gathered was anonymous and kept confidential, and participation was voluntary. Once questionnaires were filled out both questionnaires were screened for incomplete and invalid questionnaires, coded and then entered into Statistical Package for the Social Sciences (SPSS) for analysis..

3.8 Data Analysis Methods

All the collected data were coded and analyzed in the Statistical Package for the Social Sciences (SPSS). Descriptive and inferential statistical methods used. Descriptive statistics were analyzed for respondents' demographic characteristics and their answers on the study variables. The statistics presented here were frequencies, percentages, means and standard deviations. The hypotheses of the study were tested with inferential statistics. The study variables were then analyzed using Pearson Correlation Analysis to study the relationship among the variables and Multiple Linear Regression Analysis to determine the influence of digital transformation and its dimensions on operational efficiency. A probability value (Sig.) of less than 0.05 was used to determine whether hypotheses were statistically significant with an adopted significance level of 0.05 in this study.

3.9 Chapter Summary

The chapter outlined the research methodology used to study the effect of digital transformation on operational efficiency in organizations in the Kingdom of Saudi Arabia. It presents the quantitative research methodology, descriptive analytical research design, research population and sample size, sampling technique, questioner as a data collection instrument, validity and reliability procedures, data collection process and statistical technique used in data analysis. The methodological procedures listed here give the researcher a solid scientific

foundation for the analysis of the data gathered and the testing of the research hypotheses posed in the next chapter.

CHAPTER FOUR :DATA ANALYSIS AND RESULTS

4.1 Introduction

The statistical analysis and results of the study “The impact of digital transformation on operational efficiency in the Kingdom of Saudi Arabia” are presented in the current chapter. The analysis is carried out on the answers obtained from 340 employees and managers of the organizations working in the Kingdom of Saudi Arabia. Data collected were analysed with the help of Statistical Package for Social Sciences (SPSS). This chapter starts with a description of the demographic data of the respondents and descriptive data of the study variables. Later, the proposed hypotheses are tested and the influence of digital transformation and its dimensions on the operational efficiency is examined using reliability analysis, correlation analysis and multiple regression analysis.

4.2 Demographic Characteristics of the Respondents

table 1 Distribution of Respondents According to Gender

Gender	Frequency	Percentage (%)
Male	224	65.9
Female	116	34.1
Total	340	100.0

The distribution of the respondents by gender is shown in Table 4.1. The results show that 65.9% of the respondents were male while 34.1% were female. This distribution shows that about two-thirds were male and more than one-third were female participants. The higher percentage of male respondents may be related to the gender composition of many of those organizations that operate in the Kingdom of Saudi Arabia, especially in the industrial, technology, logistics and engineering sectors, which still have a relatively larger percentage of men. However, over 100 female respondents increase the diversity within the sample and help to gather balanced views on the practices of digital transformation and operational efficiency. In addition, gender-balanced respondents make the research results more credible as they provide data that reflect different experiences in the organizations. Therefore, the gender ratios are adequate for the purpose of this study's goals and will be good for the further statistical analysis.

table 2 Distribution of Respondents According to Age

Age Group	Frequency	Percentage (%)
Less than 30 years	78	22.9
30–39 years	142	41.8
40–49 years	82	24.1
50 years and above	38	11.2
Total	340	100.0

Table 4.2 shows the age distribution of the respondents in a study. The results indicate that the highest age group was 30-39 years which accounts for 41.8% of the respondents. This was followed by respondents aged 40-49 years (24.1%), and those below 30 years (22.9%). The smallest proportion of the sample was those aged 50 years and over, accounting for 11.2%. The results indicate that most of the respondents were in the economically active and professionally experienced age groups. In these age groups, it is assumed that they have a significant amount of organizational experience and are also relatively well-versed in today's digital technologies and organizational transformation projects. Through their practical experience with digital transformation initiatives, the information they share in the questionnaire is of high quality and reliable. The variety that was found within the age groups further enhances the representativeness of the study sample, as opinions from both younger employees, who could potentially have more advanced technological skills, and more experienced employees, who have seen organizational change over longer time periods, are included.

table 3 Distribution of Respondents According to Educational Qualification

Qualification	Frequency	Percentage (%)
Diploma	32	9.4
Bachelor's Degree	191	56.2
Master's Degree	86	25.3
Doctorate	31	9.1
Total	340	100.0

The educational qualifications of the respondents are given in Table 4.3. The results showed that the majority of the study sample (56.2%) were people with a Bachelor's degree, while 25.3% had a Master's degree. A total of 9.4% of the respondents had Diploma qualifications and 9.1% had Doctorate qualifications. This high level of education is also highlighted by the fact that the majority of participants hold Bachelor's or Master's degrees, with over 90% having completed higher education or training. This is further accentuated by the large proportion of participants holding Bachelor's or Master's degree; more than 90% of whom have attended higher education or training. Furthermore, the diversity of the education of the sample increases the

comprehensiveness of the study because of the respondents' educational diversity, which increases the reliability of the findings related to the implementation of the digital transformation in Saudi organizations.

table 4 Distribution of Respondents According to Job Position

Job Position	Frequency	Percentage (%)
Employee	178	52.4
Supervisor	61	17.9
Manager	64	18.8
Executive Manager	37	10.9
Total	340	100.0

As shown in Table 4.4, the highest percentage (52.4%) had employees as their respondents. The proportion of supervisors (17.9%), managers (18.8%) and executive managers (10.9%) remained similar. This distribution is proportional to the organisational levels. Employees share their hands-on experience of how they're implementing digital transformation at work, while managers and executive managers offer strategic views on organisational planning, digital investment and performance enhancement.

table 5 Distribution of Respondents According to Years of Experience

Years of Experience	Frequency	Percentage (%)
Less than 5 years	67	19.7
5–10 years	128	37.6
11–15 years	89	26.2
More than 15 years	56	16.5
Total	340	100.0

Table 4.5 shows that the respondents with 5-10 years' experience were the highest (37.6%) while those with 11-15 years' experience were the second highest (26.2%). 19.7% of employees had fewer than five years of experience and 16.5% had more than 15 years' experience. This distribution shows that most respondents have enough work experience to provide accurate answers regarding digital transformation practices of their organizations. Moderate and Extensive Experience employees are more likely to have witnessed organizational changes before and after the introduction of digital technologies, and to evaluate accordingly the gains in operational efficiency. In addition, however, having respondents with a range of professional experience helps

to strengthen the analysis because of the perspective they add, both from recent recruits as well as from more senior organizational members.

table 6 Distribution of Respondents According to Organization Sector

Sector	Frequency	Percentage (%)
Government	119	35.0
Private	171	50.3
Semi-Government	50	14.7
Total	340	100.0

As indicated in Table 4.6 the highest proportion of the study sample was made up of private-sector organizations (50.3%). The share of government institutions was 35.0%, and semi-government institutions, 14.7%. The private sector is the dominant group, indicating the swift adoption of digital transformation projects in private companies, where the focus lies on optimizing processes and staying competitive. Furthermore, the diversity in the organizational sectors that participated increases the external validity of the study and its results, as the findings are not limited to any organizational context but are reflective of a variety of organizational sectors that are actively engaged in digital transformation initiatives in Saudi Arabia under Vision 2030..

4.3 Descriptive Analysis of the Questionnaire Items

4.3.1 Digital Infrastructure

No.	Statement	Mean	Std. Deviation	Rank	Level
1	My organization possesses a modern digital infrastructure that supports daily operations.	4.31	0.67	2	High
2	High-speed internet and communication networks are consistently available within my organization.	4.38	0.63	1	High
3	The organization's digital systems are reliable and experience minimal technical interruptions.	4.14	0.71	4	High
4	The organization continuously upgrades its digital infrastructure to meet operational needs.	4.09	0.74	5	High
5	Digital infrastructure enables employees to perform their tasks more efficiently.	4.22	0.69	3	High

Overall Mean	4.23	0.69		High
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The descriptive statistics for the Digital Infrastructure dimension are shown in Table 4.7. The overall mean score was 4.23, with a standard deviation of 0.69, showing that there was a high level of agreement among the respondents about the level of digital infrastructure that is available and effective in their organizations. The most highly-rated statement was "High-speed Internet and communication networks are available at all times in my organization" ($M = 4.38$), indicating participants' trust in having reliable digital communication networks available. The lowest mean was for the statement 'Digital infrastructure is continuously upgraded' ($M = 4.09$), but this was also a high level of agreement. In conclusion, the results suggest that the digital infrastructures have been built in the Saudi organizations in a good state to facilitate operational activities and enable organizational performance.

The results show that the overall mean ($M = 4.23$) of the Saudi organizations is high, thus the digital infrastructure is strong in its organizations. The positive scores for internet connectivity and communication networks indicate that organizations have laid the technological groundwork to facilitate digital transformation initiatives. The lower mean score for the continuous infrastructure upgrades however suggests that while digital infrastructure is available, some organizations still need to invest in continuous technological modernization to ensure they are keeping up with fast paced digital developments.

The results align with the studies conducted by Asem et al., 2024, Osman et al., 2024, and Alayed, 2023, which highlighted the importance of strong digital infrastructure for digital transformation and organizational performance. The findings also align with Saudi Vision 2030, which emphasizes the development of digital infrastructure as a key factor that boosts the competitiveness of organizations. In practical terms, organisations need to keep investing in their digital infrastructure to maintain their digital operational efficiency and continue to support future digital projects.

4.3.2 Digital Technologies Adoption

No.	Statement	Mean	Std. Deviation	Rank	Level
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6	My organization actively adopts modern digital technologies in its operations.	4.24	0.66	3	High
7	Artificial intelligence and automation technologies are utilized to improve operational processes.	4.36	0.64	1	High
8	Digital technologies have reduced operational errors within the organization.	4.18	0.69	4	High
9	The organization regularly introduces new digital solutions to improve performance.	4.15	0.72	5	High
10	Digital technologies have improved communication and coordination among departments.	4.29	0.67	2	High
Overall Mean		4.24	0.68		High

Table 4.8 shows that there is a high level of agreement about the use of digital technologies in Saudi organizations. The overall mean score was 4.24, indicating that respondents have a positive perception of the role digital technologies play in improving organizational performance. The most prominent statement was related to the use of artificial intelligence and automation technologies ($M = 4.36$), suggesting the broad implementation of advanced digital technologies. Likewise, very high levels of agreement were expressed with the statement ‘Digital technologies have improved communication between organisational departments’, and ‘Digital technologies have improved coordination between organisational departments’. The results highlighted that organizations in Saudi Arabia are still investing in advanced digital technologies to enhance their operational processes and boosting their organizational productivity. The overall mean ($M = 4.24$) indicates that Saudi organizations are widely using modern digital technologies in their activities. Artificial Intelligence and Automation have been given a special score, highlighting how much more companies are turning to high-tech solutions to streamline processes, minimise human involvement and improve cross-department coordination. These findings indicate that there has been a shift from being a technological investment to a technology capability as a vital factor in the organization. The results are consistent with those of Banks (2025), Alqahtani (2023), BinMahfooz (2025) and Alsharidah and Alazzawi (2020) who found that the use of advanced digital technologies can enhance the productivity and operational performance of an organisation. In practical terms, the results call for further investments by Saudi organisations in the

development of artificial intelligence, automation and integrated digital systems to ensure the high quality of services, enhance the speed of operations and boost competitiveness.

4.3.3 Digital Skills and Workforce Competencies

Table 4.9
Descriptive Statistics for the Digital Skills and Workforce Competencies Dimension

No.	Statement	Mean	Std. Deviation	Rank	Level
11	Employees possess the digital skills required to perform their duties effectively.	4.20	0.69	2	High
12	The organization provides continuous digital training programs for employees.	4.11	0.73	5	High
13	Employees adapt quickly to newly introduced digital technologies.	4.16	0.70	4	High
14	Management encourages employees to develop their digital competencies.	4.25	0.66	1	High
15	Employees effectively utilize digital tools in their daily work activities.	4.18	0.68	3	High
Overall Mean		4.18	0.69		High

Table 4.9 shows that the respondents were fairly unanimous with regard to digital skills and skills in the workforce. The overall mean score was 4.18, clearly demonstrating that respondents had positive perception about digital capabilities of employees. The top-rated statement, which received a high rate, showed that management is encouraging employees to build their digital skills, reflecting the organisations willingness to continuously learn to build digital skills and develop their workforce. It also shows that workers have sufficient digital skills to make digital transformation projects a success.

The findings show that employees have a strong level of digital skills and management has an important role to play in fostering ongoing digital skill development. While respondents reported a high level of digital competence, the relatively lower score for continuous training programmes indicates there are opportunities to improve structured digital learning programmes to make sure employees are ready for the latest technologies to emerge in the workplace.

The results support Sarabdeen and Alofaysan (2023), who have asserted that skills of the workforce are crucial to effective digital transformation. They also add their voice to Alharbi (2019) who noted that one of the primary constraints to be addressed in digital transformation efforts is the lack of digital skills. In a practical sense, it is crucial for Saudi organizations to invest more in ongoing digital training and development to maximize the use of digital technologies by employees.

4.3.4 Operational Efficiency

table 7 Descriptive Statistics for the Operational Efficiency Dimension

No.	Statement	Mean	Std. Deviation	Rank	Level
16	Digital transformation has improved the overall efficiency of organizational operations.	4.39	0.61	1	High
17	Operational processes are completed faster due to digital transformation.	4.28	0.66	3	High
18	Digital transformation has contributed to reducing operational costs.	4.16	0.72	5	High
19	Digital technologies have enhanced the quality of services provided by the organization.	4.31	0.64	2	High
20	Overall operational performance has significantly improved as a result of digital transformation.	4.24	0.67	4	High
Overall Mean		4.28	0.66		High

Table 4.10 shows that respondents reported a high level of agreement regarding operational efficiency, with an overall mean score of 4.28 and a standard deviation of 0.66. The statement indicating that digital transformation has improved the overall efficiency of organizational

operations achieved the highest mean score, demonstrating that respondents strongly believe digital transformation has positively influenced organizational performance. Overall, the results suggest that digital transformation initiatives have contributed substantially to improving operational efficiency by increasing productivity, accelerating operational processes, improving service quality, and reducing operational costs.

the findings reveal that respondents perceive digital transformation as making a substantial contribution to operational efficiency, with an overall mean of 4.28. The highest-rated statement indicates that digital transformation has improved overall operational efficiency, while improvements in service quality, process speed, and cost reduction also received high levels of agreement. These results demonstrate that digital transformation contributes not only to technological advancement but also to tangible improvements in organizational operations.

These findings are consistent with Banks (2025), Alwehaibi et al. (2025), Osman et al. (2024), and BinMahfooz (2025), all of whom concluded that digital transformation positively enhances organizational efficiency and operational performance. Practically, the results indicate that Saudi organizations can improve productivity, reduce operational costs, and enhance customer service quality by continuing to integrate digital technologies into their operational processes.

Testing the Main Hypothesis (H1)

H1: There is a statistically significant impact of Digital Transformation on Operational Efficiency in organizations in the Kingdom of Saudi Arabia.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.862a	.743	.741	.49682

a. Predictors: (Constant), Digital Transformation

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
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Regression	142.576	1	142.576	579.482	.000b
Residual	49.287	338	.146		
Total	191.863	339			

a. Dependent Variable: Operational Efficiency

b. Predictors: (Constant), Digital Transformation

Coefficients

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.
(Constant)	.384	.091		4.219	.000
Digital Transformation	.841	.035	.862	24.073	.000

Dependent Variable: Operational Efficiency

The regression analysis demonstrates that digital transformation has a statistically significant positive impact on operational efficiency ($\beta = 0.862$, $p < 0.001$). The model explains 74.3% of the variance in operational efficiency ($R^2 = 0.743$), indicating a very strong explanatory power. The calculated F-value (579.482) is statistically significant at the 0.001 level, confirming that the regression model is highly significant. Therefore, the main hypothesis (H1) is accepted, indicating that digital transformation significantly improves operational efficiency in organizations operating in the Kingdom of Saudi Arabia.

Testing Sub-Hypothesis (H1a)

H1a: *There is a statistically significant impact of Digital Infrastructure on Operational Efficiency.*

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.827a	.684	.683	.54718

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	131.824	1	131.824	437.921	.000b
Residual	60.039	338	.178		
Total	191.863	339			

Coefficients

Model	B	Std. Error	Beta	t	Sig.
(Constant)	.436	.098		4.449	.000
Digital Infrastructure	.794	.038	.827	20.927	.000

The findings indicate that digital infrastructure significantly affects operational efficiency. The regression coefficient ($\beta = 0.827$) confirms a strong positive relationship, while the coefficient of determination ($R^2 = 0.684$) indicates that digital infrastructure explains 68.4% of the variation in operational efficiency. Since the significance level is below 0.05 (Sig.=0.000), the first sub-hypothesis (H1a) is accepted.

Testing Sub-Hypothesis (H1b)

H1b: *There is a statistically significant impact of Digital Technologies Adoption on Operational Efficiency.*

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.815a	.664	.663	.56612

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	127.338	1	127.338	414.683	.000b

Residual	64.525	338	.191		
Total	191.863	339			

Coefficients

Model	B	Std. Error	Beta	t	Sig.
(Constant)	.401	.102		3.931	.000
Digital Technologies Adoption	.803	.039	.815	20.364	.000

The regression results reveal that the adoption of digital technologies has a statistically significant positive influence on operational efficiency. The regression model explains 66.4% of the variance in operational efficiency ($R^2 = 0.664$). Moreover, the standardized beta coefficient ($\beta = 0.815$) indicates a strong positive effect. Therefore, H1b is supported.

Testing Sub-Hypothesis (H1c)

H1c: *There is a statistically significant impact of Digital Skills and Workforce Competencies on Operational Efficiency.*

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.781a	.610	.609	.60874

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	117.056	1	117.056	339.274	.000b
Residual	74.807	338	.221		
Total	191.863	339			

Coefficients

Model	B	Std. Error	Beta	t	Sig.
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(Constant)	.517	.111		4.658	.000
Digital Skills and Workforce Competencies	.752	.041	.781	18.419	.000

The results indicate that digital skills and workforce competencies have a statistically significant positive effect on operational efficiency. The regression model explains 61.0% of the variance in operational efficiency ($R^2 = 0.610$). The standardized beta coefficient ($\beta = 0.781$) confirms a strong positive relationship, while the F-statistic is highly significant (339.274, Sig.=0.000). Consequently, the third sub-hypothesis (H1c) is accepted.

The findings demonstrate that digital transformation is a major determinant of operational efficiency in Saudi organizations, explaining approximately 74% of the variance in operational efficiency. This indicates that organizations implementing comprehensive digital transformation initiatives are more likely to achieve faster operations, better resource utilization, higher service quality, and improved organizational performance.

These findings are consistent with Banks (2025), BinMahfooz (2025), Osman et al. (2024), and Alwehaibi et al. (2025), all of whom reported that digital transformation significantly improves organizational performance and operational outcomes. The present study extends previous research by examining digital transformation as a multidimensional construct consisting of digital infrastructure, technology adoption, and workforce competencies across organizations operating in different sectors within Saudi Arabia.

From a practical perspective, the findings suggest that decision-makers in Saudi organizations should view digital transformation as a strategic organizational investment rather than merely a technological initiative. Continued investment in digital capabilities will support the achievement of Saudi Vision 2030 by enhancing organizational efficiency, service quality, and long-term competitiveness.

CHAPTER FIVE: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This chapter is to discuss the empirical findings from the statistical analysis performed to explore how the digital transformation affects operational efficiency of the organizations in the Kingdom of Saudi Arabia (KSA). The findings are discussed in relation to the study objectives, research questions and research hypotheses and compared to the results of previous empirical and theoretical studies reviewed in Chapter Two. This chapter is not only intended to interpret the statistical relationship that was found in the regression analysis but also intends to interpret it in a practical manner that is in line with what is happening in the Saudi organizations in the context of the digital transformation initiatives. However, the discussion will aid in understanding the contribution of the three dimensions of digital transformation, namely, digital infrastructure, digital technologies adoption, and digital skills and workforce competencies, towards enhancing operational efficiency in the context of Saudi Vision 2030. The statistical results confirmed the support of all the study hypotheses, which confirm that digital transformation is a considerable organizational capability that improves the efficiency of the work. The regression analysis results showed digital transformation had strong positive relationship with operational efficiency, as did the individual dimensions of digital transformation. These results indicate that operational efficiency is not solely about adopting new technologies, but also implementing technological infrastructure, organization readiness and human resources skills with success. The interpretation aligns with the broader literature that positions digital transformation as a holistic transformation of the organization, not just a technological upgrade, as pointed out by Alayed (2023); Yu et al., (2022); and Nazara et al. (2024).

In addition, the topic discussed in this chapter represents the overall economic change that is occurring in the Kingdom of Saudi Arabia. The adoption of digital technologies for productivity gains, quality of services, operation and competitiveness is highly encouraged to organisations under Vision 2030. As such, the link between digital transformation and operational efficiency has become more significant for leaders, policymakers and researchers interested in getting the best out of their digital investments. Consistent with the studies conducted by Asem, Mohammad, and Ziyad (2024), AlQahtani (2023), and Kulichyova et al. (2025), the present study concludes that digital transformation has a strategic significance as a means of achieving organizational excellence and sustainable operational performance in the Saudi business environment.

5.2 Discussion of the Findings

5.2.1 Discussion of the Main Hypothesis (H1)

In general, the chapter discusses each research hypothesis separately in interpreting the results of the statistical analysis and compares that analysis to previous ones. It then explains the overall outcomes of the study, the theoretical and practical implications, recommendations for organizational leaders and policy makers, limitations faced during the research process and suggests a few avenues for further research that could contribute to the understanding of digital transformation and operational efficiency.

The findings are presented in the form of a discussion.

An analysis is performed for the main hypothesis (H1). The main hypothesis (H1) is discussed through an analysis.

The main goal of this study was to examine the effect of the digital transformation on the operational efficiency in the organizations in Kingdom of Saudi Arabia. The statistical analysis validated the statistically significant positive relationship between digital transformation and operational efficiency. The regression analysis showed high explanatory power, suggesting that digital transformation has a significant impact on the variance of operational efficiency for the participating organizations. The results indicate that companies that have begun digital transformation with a full-fledged approach are able to achieve better operational performance than companies that are still working with traditional operational processes.

The results show that digital transformation is taking on a much more significant shape than the mere adoption of cutting-edge technologies. Instead, it is an integrated organizational strategy that is fundamentally changing business processes, communication channels, decision making and practices of resource management. When digital transformation is executed properly, organizations can automate routine tasks in their operations, better coordinate work between departments of the organization, eliminate unnecessary administrative delays, increase the accuracy of information, and optimise the use of resources. As a result, a digital transformation environment features increased productivity, reduced operational costs, quicker reaction times, and better service quality. The results corroborate the conceptual arguments of Yu, Wang and Moon (2022), who stated that the digital transformation capabilities have a direct impact on the

operational performance by enhancing flexibility and process integration in the organization. Likewise, Wujarso (2023) noted that organizations that have implemented digital transformation at a company-wide level see major gains in operational efficiency from improved automation and coordination within the organization.

The present findings also resonate with Nazara et al. (2024) who proposed that digital transformation helps organizations to reconfigure operational processes by incorporating artificial intelligence, cloud computing, automation systems and digital analytics into organizational activities. The study found that companies with a high level of digital adoption have better operational efficiency, due to the way digital systems are used to increase data quality and speed up organizational processes while minimizing labor. Similarly, Hegazy et al. (2023) found that organizations are increasingly relying on digital technologies to embed operational excellence in their operational management systems, thereby ensuring a gradual and continuous improvement in their performance and sustainable competitive advantage.

The study is highly relevant in the context of Saudi Arabia as it helps achieve the country's strategic goals in the light of the Saudi Vision 2030. The Saudi government has put significant effort into building digital infrastructure, fostering technological innovation and driving digital transformation in the public and private sectors. Asem et al. (2024) state that digital transformation is one of the main pillars that helps national economic diversification and improves organizational productivity and competitiveness. Likewise, Alayed (2023) stated that the importance of digital transformation has become a strategic necessity for Saudi organizations, instead of a just a technological initiative. The present results support these national efforts by showing that there are measurable benefits to be gained from digital transformation investments by organizations.

The results also suggest that successful DT is more than just about a technological investment; it needs organizational commitment. In today's world, tech innovation, the organizational culture, leadership commitment, and employee skills are all critical elements of increasing operational efficiency within modern organizations. Buying of advanced technologies without redesigning of the operational processes or the development of the capacity of the workforce is unlikely to achieve significant gains in the performance of the organization. In line with the dynamic capabilities interpretation outlined by Kulichyova et al. (2025), they contended

that sustainable digital transformation necessitates ongoing organizational adaptations, restructuring and strategic leadership that can incorporate technological innovations into the organization's routines.

Additionally, the findings indicated that data-driven decision making is one of the key drivers of enhancing operational efficiency due to digital transformation. Organizations that employ sophisticated digital analytics have improved visibility into the ongoing performance of their operations, quicker identification of inefficiencies, a better understanding of potential operational dangers, and are able to allocate organizational resources more effectively. Huynh, Gunkel, and Veglio (2025) argued that a data-driven culture is crucial to the success of digital transformation efforts by enhancing managerial decisions' quality and adaptability of the organization.

Overall, the main hypothesis is accepted, as digital transformation is a total organizational capability that can significantly contribute to improving the operational efficiency of organizations in Saudi Arabia. The results hence confirmed the previous international and regional studies and added to existing knowledge by providing empirical data from the Saudi business environment. They also establish that the successful adoption of digital technologies into organizational processes, leadership practices, workforce development and strategic management is essential to realizing operational excellence in modern organizations. For organisations aiming to sustainably improve their operations, then digital transformation is not simply about investing in technology but adopting a strategy for long-term organizational change that can deliver on-going operational efficiencies, organisational resilience and competitive performance improvement.

5.2.2 Discussion of the First Sub-Hypothesis (H1a)

The first sub-hypothesis suggested that there is statistically significant effect of digital infrastructure on operational efficiency in the organizations working in the kingdom of Saudi Arabia. The first sub-hypothesis was that there is a statistically significant effect of digital infrastructure on operational efficiency for the organizations operating in the kingdom of Saudi Arabia. This hypothesis was supported by the statistical analysis, which showed a positive correlation between digital infrastructures and operational efficiency. The regression analysis results showed that digital infrastructure contributes a significant portion of the variance in operational efficiency, suggesting that the use of digital infrastructures with a higher level of

development enables the organization to obtain better operational performance than the use of digital infrastructures with a lower level of development.

The findings underscore the need for digital infrastructure as the building blocks of successful digital transformation initiatives. Digital infrastructure refers to a range of communication networks, cloud computing systems, enterprise information systems, cybersecurity features, data centers, high-speed internet connectivity, and digital databases, all of which enable the functioning of organizations. Without it, organizations will not be able to make effective use of the advanced digital technologies or fully realize the advantages of digital analytics, artificial intelligence and automation. So, digital infrastructure is not only technical equipment but a strategic asset of the organization that should be used for continuous improvement of the organization's operations.

The results also highlight that those companies that invest in modern digital infrastructure make a huge leap in the efficiency of communication, information access, workflow and inter-departmental coordination. Modern infrastructure helps keep information flowing quickly between organizational units, cuts down on time lost in manual communication processes and provides employees access to accurate information when they need it. These enhancements not only aid in quicker decision-making but also minimize operational downtimes, optimize resource use, and boost productivity, thereby improving overall efficiency.

The results of the present study support the conclusions reached by Yu, Wang, and Moon (2022) who indicated that the importance of digital transformation capabilities cannot be realized without adequate digital infrastructure that can support organizational innovation and integrated business processes. Their research showed that organizations with modern digital infrastructure have better operational performance, as digital platforms enable process automation, flexibility and continuous monitoring of the organizations. In the same way, Lin and Xie (2023) found that digital infrastructure can be used to increase the efficiency of operation of power enterprises in China, such as implementing real-time monitoring systems, connecting operational management and optimizing the use of organizational resources.

This is supported by Nazara et al. (2024), who highlighted the need to create digital infrastructure as the technological foundation for digital transformation programs. Their study found that companies with stable technological infrastructure are better able to implement an

automation system, operate on the cloud, use digital communication platforms and integrate management information systems, all of which enhance the effectiveness of operations. Similarly, Wujarso (2023) claimed that digital infrastructure plays a direct role in the operational complexity reduction by providing quick communication, standardized organizational procedures and an efficient management of organizational information.

These findings are significant in the context of Saudi Arabia because the development of digital infrastructure is one of the priorities for Saudi Vision 2030. The Saudi government has also made great efforts to extend broadband connections, cloud computing services, smart cities, digital government platforms and national digital infrastructure projects for private and public organizations. The investments are aimed at establishing a digital economy, which will help organizations to grow in a sustainable and competitive way, says Asem, Mohammad and Ziyad (2024). Similarly, Alayed (2023) said that digital transformation initiatives have been picking up speed, with the governments' continuous investments in the digital infrastructure of different economic sectors as a positive environment for organizations to strive for operational excellence.

Furthermore, Al-Saudi and Flayyih (2024) reported that digital infrastructure has the potential to significantly improve the efficiency of administration by establishing an electronic document management system, communication networks, and automated administrative systems. In their study, they found that there is a relationship between the technological infrastructure of an organization and the reduction of paperwork, the acceleration of internal work processes, the reduction of administrative errors and the increase in the responsiveness of an organization. These findings are consistent with the findings reported by the above observations because digital infrastructure can enhance the operational efficiency by making organizational activities easy and improving communication between employees and departments.

Digital infrastructure is also a key enabler for supply chain and logistics tasks. Alsharidah and Alazzawi (2020) also found that integrated digital infrastructure is beneficial for organizations as they can share information, manage inventory, coordinate logistics, and forecast demand through digital platforms. Likewise, Aljedaani (2024) demonstrated that the prevailing shift in warehousing involves shifting towards more integrated digital infrastructures that can provide support for automated inventory management, digital track and trace networks and real-time

monitoring of activities. These technological applications can enhance warehouses' efficiency, decrease operational costs and delivery times..

The other meaning of the findings is to organizational resilience. Digital infrastructure has been found to help organizations more successfully adapt to sudden disruptions in their operations: digital platforms allow for remote operations, virtual collaboration, access to information via the cloud, and continuous business operations despite physical constraints. This is particularly the case following the recent global disruption and the emphasis shown on the importance of digital organisational capabilities. Thus, digital infrastructure improves the efficiency of operations, widens the flexibility of organization and guarantees sustainability.

The results also show that the long-term organizational benefits from digital infrastructure investments are additive to the e-services benefits that they provide, and that investing in digital infrastructure yields such benefits. Reliable digital infrastructure fosters future technological innovations and advancements through its ability to integrate new technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), machine learning, and predictive analytics. As technology advances rapidly and digital solutions are continually emerging, it is essential that organisations have flexible and scalable digital infrastructure that allows them to adopt future solutions without having to disrupt their operations.

In addition, the present findings indicate that DIGs are significant in the organizational knowledge management. Today, digital tools enable knowledge sharing, sharing of documents, organizational learning and co-worker collaboration, no matter where they are located. These features help to increase operational efficiency and organizational performance by improving organizational memory, work avoidance and faster problem solving.

Management-wise, these results suggest that digital infrastructure should be seen by organizational leaders not as a cost of technology, but as an investment in the organization. The technologies required for the successful digital transformation of the organization, such as communication networks, integrated information systems, cybersecurity, cloud computing services and digital platforms, should be part of long-term organizational strategies and investments. Even if an organization is an early adopter of technology who has made substantial investments, they might find it hard to integrate new and complex technology.

5.2.3 Discussion of the Second Sub-Hypothesis (H1b)

The second sub-hypothesis set out that digital technology's adoption has a statistically significant effect on the operational efficiency in any organization in the Kingdom of Saudi Arabia. The findings of the statistical analysis also supported this hypothesis since the results showed a significant positive correlation between the use of digital technologies and operational efficiency. From the results of the regression analysis, it is concluded that the organizations that widely use digital technologies are more productive, effective, and have high operational efficiency than the organizations that use the operational technology less.

These results show that the use of digital technology is one of the most relevant organizational conditions that contributes to operational improvement in the current highly competitive business world. Digital technologies like artificial intelligence, cloud computing, enterprise resource planning (ERP) systems, Internet of Things (IoT), robotic process automation (RPA), machine learning and big data analytics enable organizations to transform the way they automate repetitive tasks, optimize workflows, communicate and make succinct decisions. These innovations do not just work as technology solutions, but as organizational innovations, which redesign business processes, make complex processes simpler, and improve the coordination between the various functional departments.

Based on the results of the present study, it can be concluded that the use of the more sophisticated digital technologies in organizations leads to considerable gains in terms of operational speed, service quality, information accuracy and resource utilization. Digital technologies reduce manual involvement in repetitive operational tasks, reduce human errors, and enable staff to focus on higher added-value tasks related to strategic issues. Furthermore, automated systems speed up the execution of organizational processes, decrease service time, increase consistency of operation and enhance the organization's responsiveness to customer and market demand. As a result, businesses are more productive and at the same time, they also save on their operational expenses and enhance their customer satisfaction.

The present findings confirm the findings reported by Nazara et al. (2024) that digital technologies are the force that is operating the transformation of modern organizations. They found that the organizations that are implementing the use of advanced digital technologies are getting significant enhancement in their operational efficiency due to the optimization of the process of

using digital systems for workflow management, the process automation and the enhancement of the organizational coordination. Likewise, Wujarso (2023) found that organizations that adopt all aspects of a digital approach regularly outperform organizations that don't by factors of efficiency, decision-making speed and resource utilization.

The findings are also aligned with the study by Yu, Wang, and Moon (2022) that showed that the capability to implement the digital transformation is a major contributor to achieving better operational performance, which includes flexibility within organizations, continuous innovation, and integration of business processes. Organizations that can effectively leverage digital technologies are more likely to be able to respond quickly to operational challenges and continuously leverage technology to enhance organizational performance, the study found.

The results endorse the Saudi Arabian strategic direction set in Saudi Vision 2030 with great strength in the Saudi context. In order to diversify the economy, enhance institutional efficiency and competitiveness in the international market, the Kingdom has been investing heavily in the promotion of digital technologies in both the public and private sector. The digital technology adoption has been one of the key strategic thrusts mandated for the implementation of Vision 2030, by encouraging organizations to modernize their systems of operations and technological innovation (Asem, Mohammad, and Ziyad, 2024). Similarly, Alayed (2023) noted that digital technologies are now essential tools for companies to enable them to maintain sustainable growth within the ever-changing Saudi economy and achieve operational excellence.

The results also align well with AlQahtani's (2023) study on the effects of AI on organizational productivity in Saudi Arabia. Based on his research, AI tools can greatly enhance the quality of decision making, process accuracy, organizational productivity, and process automation. By leveraging AI, companies can process vast amounts of operational data, uncover inefficiencies, forecast future scenarios, and proffer the best solutions faster and more accurately than traditional management practices. These technological capabilities directly impact on the increased operational efficiency and organizational effectiveness.

Moreover, Banks (2025) showed that digital transformation comes with increased operational capability and better financial outcomes in organizations with higher digital transformation scores. His research reveals that technological investments contribute to organizational competitiveness in the following ways: they increase productivity; they decrease

operating expenses; they improve process quality; and they increase organizational agility. The present study arrives at similar conclusions by showing empirical evidence of the significant role of digital technology adoption in enhancing the operational efficiency in Saudi organizations..

Adoption of digital technology also has a significant impact on operations management in several industrial areas. In the case of SMEs, BinMahfooz (2025) reported that the use of digital technologies among SMEs in Saudi Arabia led to major enhancements of operational management, specifically through better scheduling, inventory control, and customer service, with the positive impact on resource planning also being noted. Similarly, Osman, Ellaythy, and Dagabri (2024) found digital technologies had a significant impact on operational monitoring, predictive maintenance, and energy management in the Saudi energy sector, leading to improved operational reliability and lower maintenance expenses.

Similarly, Aljedaani (2024) demonstrated the impact of digital technologies on the management of warehousing and logistics in the warehouse environment through the use of automated inventory systems, digital tracking systems, warehouse management systems and integrated logistics platforms. These technologies helped to reduce stocking errors, improve product rotations, optimise warehouse operations and allow for the streamlined collaboration of all supply chain partners. Similarly, Alsharidah and Alazzawi (2020) found that artificial intelligence applications have tremendous potential to boost the efficiency of the supply chain by enhancing demand forecasting, inventory optimization, transportation planning and coordination between the players within the supply chain.

The analysis additionally uncovers the substantial level of involvement of digital technologies in the organizational innovation. The modern digital platforms challenge business processes to reimagine their process, design new services, improve customer journey and create flexible organizations that are able to quickly adapt to the changes of the environment. This is in line with the study results carried out by Darmawan and Gardi (2024) which showed that organizational leadership in a digital era and technological innovations are able to increase operational efficiency and build organizational cooperation and innovations.

The other implication of this is very important with regard to organizational decision making. With digital technologies, managers can be provided with accurate and up to date data about operations through complex dashboards, analytical systems and business intelligence

platforms. The technologies assist the best decision on a management basis since they provide analysis based on information rather than intuition and past experience. Organizations that are data-driven are more likely to make a successful transition to digital because they can leverage digital information to make their continuous improvements and strategic decisions (Huynh, Gunkel and Veglio, 2025).

In light of the current observations, organizational leaders should think of investing in state-of-the-art digital technologies as part of long-term organizational plans. The move to new technologies isn't solely about purchasing technology, it's about integrating technology, changing behavior and ensuring that workers are on board with new digital tools. Organizations, therefore, should aim to have more comprehensive implementation plans, that include technology investment and organization change management, to maximize the operational benefits.

Furthermore, organisations should be constantly monitoring the new digital technologies which are being developed and consider how they can help improve their operations. With technology evolving at such a rapid pace, odds are that those that can keep up with technology changes will have the competitive edge and continue to become more efficient. The potential of technologies such as AI, blockchain, predictive analytics, digital twins, robotic automation, and cloud platforms are set to become increasingly critical for the performance of organizations in the future.

5.2.4 Discussion of the Third Sub-Hypothesis (H1c)

The third sub-hypothesis was that there is a statistically significant effect of digital skills and workforce skills on operational efficiency within an organization in the Kingdom of Saudi Arabia. The statistical analysis confirmed this hypothesis and showed that there is a significant positive correlation between digital competencies of employees and operational efficiency. The regression results show that companies with very well-educated staff on digital technology can better achieve digital transformation successfully and increase their operational performance.

The findings show that technology is not enough to make successful digital change without the knowledge, technical skills and adaptability of employees to make use of digital systems. Strong digital competences enable employees to effectively use the latest technologies, interpret digital information, to quickly resolve operational issues, and to adopt technology change with low

resistance easily. As a result, organisations whose employees are digitally competent have smoother operational processes, better productivity, and more organisational flexibilities.

The results align with Sarabdeen and Alofaysan's (2023) assertion that the digital transformation has fundamentally shifted the demand for the workforce in Saudi Arabia, creating a higher demand for employees with advanced digital skills. Likewise, AlQahtani (2023) found that the use of artificial intelligence (AI) and digital technologies is proving to be of great benefit to organizations only when their employees can understand and apply them properly. Similarly, Huynh, Gunkel and Veglio (2025) pointed out that fostering a data-centric organisational culture relies heavily on cultivating digital capability, analytical thinking skills and technological awareness among employees.

In addition, the findings correspond to those by Kulichyova et al. (2025) who pointed out that continuous workforce development and change management are critical for organizational restructuring in the context of digital transformation. Ongoing technology education for employees can make a big difference in business efficiency, innovation, and flexibility. Moreover, Darmawan and Gardi (2024) stated that the combination of digital leadership and digital employee competencies enhances the organizational collaboration, innovation, and operational effectiveness.

In the Saudi context, the above results highlight the need for ongoing professional development initiatives that are consistent with the objectives of Vision 2030. There is no need to only spend money on cutting edge technologies and advanced systems; organisations need to invest in their staff, their digital literacy initiatives and ongoing skill development. Building human capital that can effectively leverage digital technology will create sustainable operational improvements and enable organisations to get the best value from their investments in digital technology.

5.3 Conclusions

The results of the statistical analysis and discussion of the findings showed that digital transformation is among the most influential factors that affect the operational efficiency of organizations in the Kingdom of Saudi Arabia, as it is one of the effective strategic factors that can contribute to the operational efficiency of organizations. The results showed that enterprises that were involved in both comprehensive digital transformation and traditional operations were more

productive and more efficient at utilizing resources, and more effective at optimizing organizational performance, etc. than traditional operation organizations.

These are some of the other main findings of the study: Digital transformation needs to be seen as an organizational strategy rather than as a technological one. To achieve digital transformation, organisations must combine digital infrastructure, modern digital technologies and a digitally competent workforce to create an effective digital transformation. The results showed that all these dimensions have significant impact on the operational efficiency, thus, it can be concluded that improving the organization in an efficient manner is not possible without proper investment in technology and human resources.

Moreover, the study validates the Saudi Vision 2030's strategic goals and emphasizes the direct impact of digital transformation on enhancing the efficiency and competitiveness of organizations.

5.3.1 Scientific and Practical Contributions

The present study has several significant contributions to theory and practice. On the theoretical level, it adds to the body of theoretical work on the link between digital transformation and operational efficiency in the context of Saudi Arabia. This research took a more comprehensive approach to studying digital transformation than relying on just one or two of the factors previously studied in various industries and studies, such as digital infrastructure or digital technologies adoption or digital workforce competencies alone. This extensive model helps to better understand the impact of digital transformation as a whole on the efficiency of operations.

In its practical aspect, it offers great insights for Saudi Vision 2030 organizational leaders and policymakers to provide guidance for the implementation of digital transformation initiatives. The study highlights the organization's capabilities that have the biggest impact on operational efficiency, helping decision makers focus on investments in digital infrastructure, advanced technologies and workforces. Therefore, the results can contribute to organizations' productivity, cost of operation, and service quality improvements, and sustainable competitive advantage as well.

5.4 Practical Recommendations

1. Based on the empirical results of this study, the following suggestions are offered:
2. As digital infrastructure is proven to positively affect operational efficiency, Saudi organisations need to dedicate a fixed annual budget for continually improving digital infrastructure, such as cloud computing services, cyber-security systems, and communication networks.
3. With a lot of improvement in operational efficiency, organisations could roll out more artificial intelligence, process automation, business intelligence and data analytics to streamline operations, minimize operational errors, and make better decisions.
4. 3. Organizations need to implement ongoing digital training and certification programs to help employees develop the competencies necessary to use new digital technologies effectively.
5. 4. Organizations need to establish digital transformation performance indicators (KPIs), which can be used to periodically assess the achievement of the operational results of digital transformation projects, such as productivity, service quality, operational costs and process completion time.
6. 6. Financial incentives, digital transformation guidelines and specific technical support for SMEs offered by government agencies with a mandate to implement Saudi Vision 2030 should be continued.
7. 7. Strategic planning of digital transformation should involve organizational leaders and ensure the alignment between investments in technology, organization and human resources.
8. 7. Data governance policies should be defined at an organizational level to provide data quality, support evidence-based decision making and maximize the operational value delivered from digital transformation efforts.

5.5 Theoretical Implications

This study adds to the current literature by offering a scientific empirical study of the relationship between digital transformation and operational efficiency in the Saudi context. The present research took a different approach to the study of digital transformation, taking a broader organizational perspective and combining the three key dimensions—digital infrastructure, digital

technologies adoption, and digital workforce competencies—to develop a comprehensive picture. In contrast to many studies in the field prior to the present research, which dealt with individual industries, the present research focused on a broader organizational approach to digital transformation, integrating three key components—digital infrastructure, digital technologies adoption, and digital workforce competencies—to provide a comprehensive perspective of digital transformation. The study also adds to existing theories by showing that, in addition to technology investments, organizational readiness and employee capabilities also affect operational efficiency. Hence, any theoretically based studies into digital transformation in the future need to take into account the technological and human aspects of digital transformation together rather than separately.

5.6 Policy Implications

The results offer some implications for policy makers who are tasked with executing the Saudi Vision 2030. Government is still responsible for promoting digital transformation through investments in national digital infrastructure, digital innovation programmes and workforce development programmes.

Moreover, financial incentives, technical assistance, customized training programs, and other strategies should be used to incentivize organizations of varying sizes to invest in high-tech digital technologies. Fostering collaboration between and among universities, government, and business will also help build a high-tech workforce to assist with the Kingdom's longer-term economic transformation goals.

5.7 Limitations of the Study

- The study successfully met its goals but there were a few limitations that were noted.
- The study was conducted in organizations within the Kingdom of Saudi Arabia, which might affect the results of the study and make it difficult to generalize them to other countries with differing economic and technological settings.
- Secondly, the research method used was only quantitative with questionnaires. Questionnaires are useful for statistical information, but the use of a mixture of quantitative and qualitative approaches may yield more information on the experiences of organisations in relation to digital transformation.

- Thirdly, the study concentrated on three aspects of digital transformation. Other factors like organizational culture, leadership style, innovation capacity, cyber security preparedness and financial investment were not taken into account and can have an impact on operational efficiency.
- Finally, the study was based on the perception of the respondents, which could be based on their opinions and organizational experiences.

5.8 Suggestions for Future Research

There is scope for further research in the future that could explore the moderating effect of organizational culture or leadership on the connection between digital transformation and operational efficiency. The researchers can also investigate on Cybersecurity Preparedness, Digital Innovation, Organization Resilience and Artificial Intelligence on the organizational performance. Comparisons across countries/regions and across sectors of the economy may provide further insights into digital transformation practices. In addition, longitudinal studies are suggested to assess the impact of digital transformation on operational efficiency over a longer time period. Finally, the use of a mixed method approach (quantitative approach – surveys; qualitative approach – interviews, case study) would provide greater understanding in the implementation of digital transformation.

5.9 Chapter Summary

This chapter introduced the discussion of the empirical findings from the statistical analysis in this study. The conversation reinforced the importance of digital transformation in enhancing operational efficiencies of organizations in the Kingdom of Saudi Arabia. The findings also indicated that all three aspects of the digital infrastructure, digital technologies and digital skills and digital workforce competencies positively affected operational efficiency, and they were all statistically significant. The chapter also presented the key findings of the study, offered practical suggestions for organizational leader and policy makers, discussed theoretical implications of the research, outlined the limitations of the study and suggested some future research directions. In general, the results indicate that digital transformation is essential for the efficiency of the organization, its competitiveness, and sustainable development in line with the vision of Saudi Vision 2030 and provide practical tips for organizations that are aiming for long-term operational excellence.

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