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The Role of Digital Transformation and Its Impact on Project Management: An Applied Study in the Saudi Financial Sector

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دور التحول الرقمي وأثره في إدارة المشاريع: دراسة تطبيقية في القطاع المالي السعودي

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Abstract : المستخلص

English Abstract

This research investigates the adoption of digital tools and technologies in project management within Saudi financial institutions. A survey was conducted among employees to assess the extent of adoption, its impact on project management efficiency and effectiveness, and demographic factors influencing adoption. Findings reveal widespread adoption of digital tools, positively correlating with improved project management outcomes. The study confirms the reliability of survey instruments and highlights the need for continued investment in training and technology updates to sustain these benefits. Recommendations include fostering a supportive culture of innovation and regular evaluation of digital tools' impact on performance.

المستخلص

يقوم هذا البحث بدراسة اعتماد الأدوات والتقنيات الرقمية في إدارة المشاريع داخل المؤسسات المالية السعودية. تم إجراء استطلاع بين الموظفين لتقييم مدى الاعتماد، وتأثيره على كفاءة وفاعلية إدارة المشاريع، والعوامل الديموغرافية التي تؤثر على الاعتماد. تكشف النتائج عن اعتماد واسع للأدوات الرقمية، مما يترابط بشكل إيجابي مع تحسين نتائج إدارة المشاريع. يؤكد البحث على موثوقية أدوات الاستبيان ويبرز ضرورة الاستثمار المستمر في التدريب وتحديث التقنيات للحفاظ على هذه الفوائد. تتضمن التوصيات تعزيز ثقافة داعمة للابتكار والتقييم المنتظم لتأثير الأدوات الرقمية على الأداء.

Chapter One

Introduction

Introduction

Digital transformation is fundamentally altering industries worldwide. In the financial sector, this transformation goes beyond mere adoption of new technologies; it's reshaping how businesses operate and deliver value. This study delves into how digital transformation impacts project management within Saudi financial institutions, highlighting benefits, challenges, and future implications. (Mavlutova et al., 2022).

Globally, financial institutions are leveraging digital technologies to enhance customer experiences, streamline operations, and ensure regulatory compliance. Innovations such as mobile banking, blockchain, artificial intelligence, and big data analytics enable banks to offer more personalized services, detect and prevent fraud, and make data-driven decisions. These technologies also enhance organizational agility, allowing institutions to respond swiftly to market changes and evolving customer needs. (Chauhan et al., 2022).

In Saudi Arabia, digital transformation is a key pillar of Vision 2030, the national strategic framework aimed at diversifying the economy and reducing dependence on oil. The government is actively promoting digital innovation and investing heavily in infrastructure to support a digital economy. This has led to rapid adoption of digital technologies across various sectors, including finance. The Saudi financial sector is undergoing a significant transformation, driven by rising customer expectations for digital services, the need for greater operational efficiency, and stringent regulatory requirements. Additionally, the entry of companies is pushing traditional financial institutions to innovate and adopt technology-driven solutions. (Rogozhin, 2021).

Digital transformation is not only changing business models in the Saudi financial sector but also redefining project management practices. Traditional project management methods, which often involve manual processes and teams, are being replaced by more agile, collaborative, and data-driven approaches. The integration of digital tools and technologies enables project managers to improve efficiency, enhance decision-making, and achieve better project outcomes. Digital tools such as project management software, collaboration platforms, and automation technologies streamline workflows, reducing the time and effort required for administrative tasks. This shift allows project teams to focus more on strategic activities and value-added tasks. (Mavlutova et al., 2022).

Access to real-time data and advanced analytics enables project managers to make more informed decisions. Predictive analytics and artificial intelligence help identify potential risks and opportunities, allowing project teams to address issues proactively and optimize project outcomes. Digital transformation is also fostering a culture of collaboration and transparency. Cloud-based collaboration platforms and virtual meeting solutions enable project teams to work together seamlessly, regardless of their physical location. This enhanced collaboration breaks down silos and promotes more effective teamwork. (Pan & Zhang, 2021).

Despite the numerous benefits, digital transformation presents several challenges for project management in the Saudi financial sector. Resistance to change is a common issue, as significant changes to existing processes and organizational structures can lead to push back from employees accustomed to traditional ways of working. The successful implementation of digital technologies also requires a workforce with the right skills and expertise, and financial institutions may struggle to find and retain talent with the necessary digital skills. (Alojail et al., 2023).

Looking ahead, the continued evolution of digital technologies is likely to further transform project management practices in the Saudi financial sector. Financial institutions that successfully navigate the challenges of digital transformation will be well-positioned to achieve greater efficiency, innovation, and customer satisfaction. This study aims to provide a comprehensive analysis of how digital transformation is influencing project management in Saudi financial institutions, offering valuable insights for practitioners, policymakers, and researchers in the field. (Mavlutova et al., 2022).

Research Problem

The financial sector in Saudi Arabia is experiencing profound changes because of Vision 2030, a national initiative focused on economic diversification and reducing reliance on oil. This ambitious plan places a strong emphasis on technological advancement and innovation, prompting financial institutions to adopt new digital tools and processes. Despite this rapid adoption of digital technologies, there is a notable lack of research on how these changes specifically impact project management practices within the sector. (Rahman & Al-Borie, 2020).

Project management is critical in overseeing the planning, execution, and completion of initiatives within financial institutions. Traditionally, financial institutions have relied on manual processes and established methodologies for project management. The integration of digital tools holds promise in streamlining these processes, enhancing decision-making capabilities, and improving overall project outcomes. Despite this potential, there is a lack of research exploring the actual effects of these digital transformations on project management practices. (Prebanić & Vukomanović, 2021).

This study aims to fill this gap by examining the integration of digital tools and processes into project management within Saudi financial institutions. Specifically, the study will investigate whether these technologies enhance project management efficiency, contribute to better decision-making processes, and lead to more successful project completions. Understanding these impacts is crucial for financial institutions to fully harness the benefits of digital transformation and effectively navigate associated challenges.

A primary focus of the study will be on assessing the efficiency of project management practices facilitated by digital tools such as project management software and automated reporting systems. These tools have the potential to reduce time and effort spent on various tasks, thereby enhancing overall efficiency. The study will empirically explore the current usage of these tools and their effectiveness in achieving improved efficiency in project management.

Also, the study will examine how digital transformation impacts decision-making effectiveness processes in project management. By providing project managers with access to real-time data and advanced analytics, digital tools can significantly enhance the quality and timeliness of decisions. The study will quantify these impacts and assess whether enhanced decision-making leads to better project outcomes, such as meeting project timelines and objectives.

Research Importance

The study aims to thoroughly investigate how digital transformation affects project management within Saudi Arabia's financial sector, specifically focusing on efficiency and effectiveness. The integration of digital tools into project management practices is transforming how projects are planned, executed, and completed. By understanding these impacts, we can determine whether these changes are leading to improvements in project management performance.

To start, the study will examine the types of digital tools and technologies being adopted for project management. These tools include project management software, which helps in planning and tracking progress, collaboration platforms that facilitate team communication, and automation technologies that streamline repetitive tasks. By identifying the specific tools in use, the study can map out the digital landscape of project management in the Saudi financial sector.

Assessing the impact of these digital tools on project management efficiency involves looking at how they affect various aspects of project execution. Efficiency in project management means completing tasks within set timeframes and budgets while making optimal use of resources. The study will explore whether digital tools help project managers reduce the time spent on administrative tasks, enhance resource allocation, and improve overall workflow. For instance, digital project management software can automate scheduling, track progress in real-time, and alert managers to potential delays, thus helping projects stay on track.

Effectiveness, in this context, pertains to the ability to achieve project goals and deliver high-quality results. The study will evaluate whether digital transformation enhances the ability of project teams to meet their objectives. This includes examining how access to real-time data and analytics improves decision-making and problem-solving. For example, data analytics can provide insights into project performance, enabling managers to make informed adjustments and avoid pitfalls. Additionally, digital collaboration tools can improve team coordination and communication, leading to better project outcomes.

1. Understanding Adoption Rates:

- **Current State Analysis:** By identifying the extent of digital transformation adoption, the research will offer a detailed view of how far Saudi financial institutions have progressed in integrating digital tools into their project management processes.
- **Benchmarking:** This information allows for comparison with global standards and trends, highlighting areas where Saudi institutions are leading or lagging.

2. Impact on Efficiency:

- **Operational Improvements:** The research aims to quantify how digital tools improve time management, resource allocation, and workflow efficiency. This can reveal specific areas where technology is making a significant difference, such as reducing administrative overhead or enhancing real-time project tracking.
- **Strategic Insights:** Understanding these efficiency gains can inform strategic decisions within financial institutions, guiding future investments in digital tools and training.

3. Quantifying Effectiveness and Outcomes:

- **Empirical Evidence:** The study will provide empirical data on the tangible benefits of digital transformation, such as improved adherence to timelines, better achievement of project objectives, and enhanced stakeholder satisfaction.
- **Guidance for Best Practices:** By highlighting successful digital transformation strategies, the research can offer best practice guidelines for other institutions looking to enhance their project management effectiveness.

Broader Implications

- **Policy Formulation:** Insights from the study can assist policymakers in developing frameworks and regulations that support digital transformation in the financial sector.
- **Organizational Strategy:** Financial institutions can leverage the findings to refine their digital transformation strategies, ensuring they are aligned with best practices and are effectively enhancing project management.
- **Skill Development:** Identifying the specific digital tools and technologies that improve efficiency and effectiveness can guide educational and training programs to better prepare project managers and teams for a digital future.

Research Objectives

The study aims to thoroughly investigate how digital transformation affects project management within Saudi Arabia's financial sector, specifically focusing on efficiency and effectiveness. The integration of digital tools into project management practices is transforming how projects are planned, executed, and completed. By understanding these impacts, we can determine whether these changes are leading to improvements in project management performance.

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adjustments and avoid pitfalls. Additionally, digital collaboration tools can improve team coordination and communication, leading to better project outcomes.

Research Questions

1. What is the extent of digital transformation adoption in project management within Saudi financial institutions?

This question aims to assess the penetration of digital tools and technologies in project management practices across different financial institutions in Saudi Arabia. It seeks to quantify the adoption rates of various digital tools, such as project management software, collaboration platforms, and automation technologies, and understand their integration into existing project management processes.

2. How do digital transformation initiatives influence the efficiency of project management in Saudi financial institutions?

This question focuses on measuring the impact of digital tools on project management efficiency. It seeks to quantify improvements in time management, resource allocation, and overall workflow efficiency facilitated by the adoption of digital technologies. By analyzing quantitative data, the study aims to provide empirical evidence of the efficiency gains resulting from digital transformation.

3. What is the quantitative impact of digital transformation on project management effectiveness and outcomes in Saudi financial institutions?

This question aims to evaluate how digital transformation initiatives contribute to project management effectiveness. It focuses on quantifying improvements in project outcomes such as adherence to timelines, achievement of project objectives, and stakeholder satisfaction. Through statistical analysis of survey data, the study seeks to measure the tangible benefits of digital tools in enhancing project success rates.

Research Hypotheses

- H1: Higher adoption rates of digital tools and technologies in project management positively correlate with the extent of digital transformation in Saudi financial institutions
- H1/0: There is no significant correlation between the adoption rates of digital tools and the extent of digital transformation in project management within Saudi financial institutions.
- H2: Increased use of digital tools in project management significantly improves efficiency metrics such as time management and resource allocation in Saudi financial institutions.
- H2/0: Increased use of digital tools in project management does not lead to significant improvements in efficiency metrics such as time management and resource allocation in Saudi financial institutions.

- H3: Enhanced adoption of digital tools in project management correlates with improved project effectiveness and outcomes in Saudi financial institutions.
- H3/0: Enhanced adoption of digital tools in project management does not correlate with improved project effectiveness and outcomes in Saudi financial institutions.

Research Variables

Independent Variables

Adoption Rates of Digital Tools and Technologies

The primary independent variable in this research is the adoption rates of digital tools and technologies. This variable represents the degree to which financial institutions in Saudi Arabia implement various digital tools within their project management practices. These tools include project management software, collaboration platforms, and automation technologies, each offering unique capabilities to streamline and enhance project operations. The adoption rate is measured by quantifying the level of integration and usage of these digital tools across different projects and teams within financial institutions. Understanding this variable is crucial as it directly impacts how extensively digital transformation is embraced within the project management frameworks of these institutions.

The adoption rates of digital tools are influenced by several factors, including organizational readiness, technological infrastructure, and the perceived benefits of these tools. By examining the adoption rates, the study seeks to investigate how the integration of digital technologies influences the overall extent of digital transformation in project management. This variable serves as the foundation for analyzing how digital tools are reshaping traditional project management practices and contributing to more streamlined and efficient operations.

Dependent Variables

Extent of Digital Transformation Adoption in Project Management

The first dependent variable is the extent of digital transformation adoption in project management. This variable measures the degree to which digital tools and technologies are incorporated into project management practices within Saudi financial institutions. It quantifies the adoption rates of specific digital tools and examines their integration into existing project management processes. By assessing this variable, the study aims to understand how extensively these tools are used and how they contribute to the overall digital transformation of project management within the financial sector.

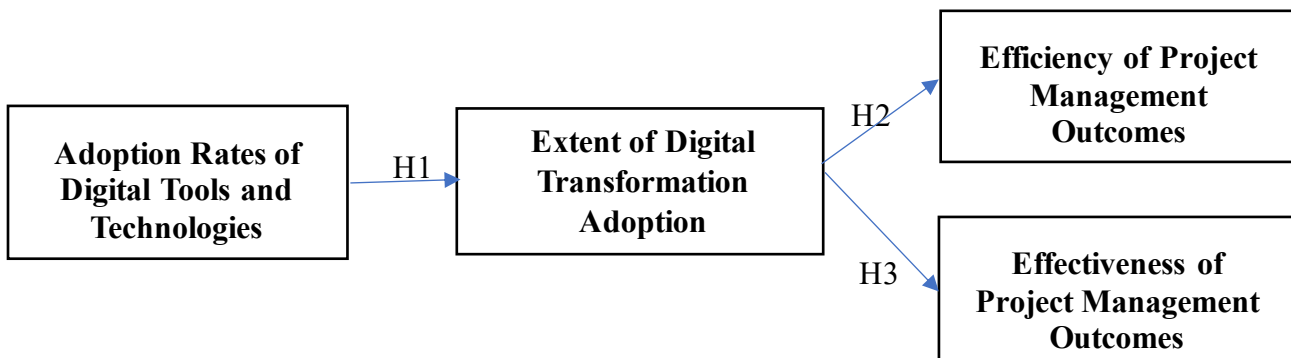
Efficiency of Project Management Outcomes

The second dependent variable is the efficiency of project management. This variable assesses the impact of digital tools on various aspects of project management efficiency, including time management, resource allocation, and overall workflow optimization. By quantifying improvements in these efficiency metrics, the study aims to determine whether the adoption of digital technologies leads to more efficient project management operations. The focus is on how digital tools reduce administrative overhead, streamline workflows, and improve resource utilization, ultimately contributing to enhanced project efficiency.

Effectiveness of Project Management Outcomes

The third dependent variable is the effectiveness of project management outcomes. This variable evaluates the success of project management in achieving desired outcomes such as adherence to timelines, meeting project objectives, and ensuring stakeholder satisfaction. By measuring improvements in these project outcomes, the study seeks to determine how digital transformation initiatives enhance project effectiveness. The effectiveness of project management is crucial for ensuring that projects are completed on time, within budget, and to the satisfaction of stakeholders. The study examines how digital tools contribute to achieving these goals by providing real-time data, facilitating better decision-making, and enhancing overall project performance.

Hypotheses Diagram



The relationship between these variables is explored through a set of hypotheses. The first hypothesis (H1) posits that higher adoption rates of digital tools positively correlate with the extent of digital transformation in project management within Saudi financial institutions. This hypothesis aims to establish a direct link between the adoption of digital tools and the overall digital transformation efforts within project management practices.

The second hypothesis (H2) suggests that increased use of digital tools in project management significantly improves efficiency metrics such as time management and resource allocation. This hypothesis seeks to quantify the impact of digital tools on project management efficiency, examining how these tools contribute to more streamlined and efficient project operations.

The third hypothesis (H3) posits that enhanced adoption of digital tools in project management correlates with improved project effectiveness and outcomes. This hypothesis focuses on evaluating how digital transformation initiatives contribute to achieving better project outcomes, including adherence to timelines, meeting project objectives, and ensuring stakeholder satisfaction.

Research Based Scientific Theory

The scientific theory underpinning this research is the Diffusion of Innovations (DOI) theory developed by Everett Rogers. This theory provides a framework for understanding how, why, and at what rate new ideas and technology spread through cultures. Applying DOI to the study of digital transformation in project management within Saudi financial institutions can offer valuable insights into the adoption and integration of digital tools.

DOI theory centers around several core concepts: innovation, communication channels, time, and social system. An innovation is an idea, practice, or object perceived as new by an

individual or other unit of adoption. In this research, the innovations are digital tools and technologies used in project management, such as project management software, collaboration platforms, and automation technologies. Communication channels are how information about innovation is transmitted to the members of the social system. In the context of this research, these channels include professional networks, industry conferences, training programs, internal corporate communication, and digital media. The time dimension in the DOI theory includes the innovation-decision process, the relative time with which an innovation is adopted by an individual or group, and the innovation's rate of adoption within the social system. This research will look at how quickly and extensively digital tools have been adopted by financial institutions in Saudi Arabia. A social system is a set of interrelated units engaged in joint problem-solving to accomplish a common goal. Here, the social system is the financial sector in Saudi Arabia, including banks, insurance companies, and investment firms.

DOI theory outlines five stages of adoption: knowledge, persuasion, decision, implementation, and confirmation. At the knowledge stage, individuals become aware of the innovation and gain some understanding of how it functions. In Saudi financial institutions, this could involve learning about digital tools through training sessions, workshops, or industry publications. During the persuasion stage, individuals form a favorable or unfavorable attitude towards the innovation. Decision-makers in financial institutions evaluate the benefits and drawbacks of adopting digital tools in their project management practices. The decision stage involves activities that lead to a choice to adopt or reject the innovation. Financial institutions may pilot digital tools in specific departments or projects before deciding on broader implementation. During the implementation stage, the innovation is put to use. This involves integrating digital tools into daily project management practices, training staff, and adapting processes to incorporate the new technology. At the confirmation stage, individuals seek reinforcement for the decision made. Financial institutions assess the impact of digital tools on project management efficiency and effectiveness, leading to continued use or discontinuation.

Several factors influence the adoption of innovations: relative advantage, compatibility, complexity, trialability, and observability. Relative advantage is the degree to which an innovation is perceived as better than the idea it supersedes. Digital tools in project management must demonstrate clear benefits over traditional methods in terms of efficiency, effectiveness, and overall project outcomes. Compatibility is the degree to which an innovation is perceived as consistent with existing values, past experiences, and needs of potential adopters. Digital tools need to fit well with the existing project management practices and corporate culture of Saudi financial institutions. Complexity is the degree to which an innovation is perceived as difficult to understand and use. Digital tools should be user-friendly and supported by adequate training and resources to facilitate adoption. Trialability is the degree to which an innovation can be experimented with on a limited basis. Financial institutions may conduct pilot projects to test the effectiveness of digital tools before full-scale adoption. Observability is the degree to which the results of an innovation are visible to others. Successful implementation and positive outcomes of digital tools should be communicated within the institution and the broader financial sector to encourage wider adoption.

By applying the DOI theory, the research will map the adoption landscape, identify which digital tools are being adopted and at what rate, providing a comprehensive overview of the digital transformation landscape in Saudi financial institutions. It will analyze the adoption process, examining how financial institutions learn about, evaluate, and decide to implement digital tools, shedding light on the decision-making processes. The study will evaluate influencing factors, assessing the relative advantage, compatibility, complexity, trialability, and observability of digital tools to understand what drives or hinders their adoption. Finally,

it will measure the impact, quantifying the impact of digital tools on project management efficiency and effectiveness, linking these outcomes to stages and factors in the DOI theory.

Chapter Two

Literature Review

Introduction

The rapid advancement of digital technologies has ushered in a transformative era for various sectors, fundamentally altering traditional business practices and operational frameworks. This chapter aims to review the existing literature on digital transformation, with a particular focus on its implications for project management within the financial sector of Saudi Arabia. The review encompasses an exploration of the broader context of digital transformation initiatives in Saudi Arabia, the specific advancements within the financial services sector, and the integration of digital tools in project management practices.

Saudi Arabia's commitment to digital transformation is a cornerstone of its Vision 2030, an ambitious plan designed to diversify the economy and reduce reliance on oil revenues. The national strategy emphasizes the adoption of advanced technologies to foster innovation, improve efficiency, and enhance service quality across various sectors, including finance, healthcare, education, and government services. The Kingdom's leadership has prioritized the development of a robust digital infrastructure and the establishment of regulatory frameworks to support this transformation, thereby catalyzing significant changes in business operations and citizen engagement with technology.

Within the financial sector, the integration of digital technologies has been particularly pronounced. Financial institutions are leveraging tools such as blockchain, artificial intelligence, big data analytics, and cloud computing to streamline operations, enhance customer experiences, and maintain competitiveness in a rapidly evolving global market. These technologies are being explored for their potential to increase transparency, security, and efficiency in financial transactions, revolutionize customer service and risk management, and provide critical insights through data analytics.

The literature also highlights the profound impact of digital transformation on project management practices. Traditional project management methodologies are being augmented by digital tools that offer new capabilities for planning, execution, monitoring, and completion of projects. Project management software, collaboration platforms, automation technologies, and data analytics tools are reshaping how projects are managed, promoting efficiency, collaboration, and data-driven decision-making. These advancements enable organizations to accelerate project delivery, reduce costs, and improve stakeholder satisfaction, ultimately supporting strategic objectives such as innovation and growth.

This chapter delves into the extent of digital transformation adoption in project management within Saudi financial institutions, exploring the types of digital tools being utilized and their integration into project management processes. It examines the influence of these tools on project management efficiency, looking at improvements in time management, resource allocation, and workflow optimization. Furthermore, the chapter evaluates the impact of digital transformation on project management effectiveness, focusing on enhancements in project delivery, stakeholder engagement, and overall project outcomes.

By synthesizing the current state of research and identifying gaps in the existing literature, this review sets the stage for a deeper understanding of the transformative effects of digital technologies on project management within the Saudi financial sector. It provides a foundation for subsequent empirical analysis and offers insights into the broader implications of digital transformation for organizational performance and competitive advantage.

Previous Studies

Previous studies provide a valuable context for understanding the current research on digital transformation and its impact on project management within the Saudi financial sector. While numerous investigations have explored digital transformation in various industries, a specific focus on project management in financial institutions, particularly within Saudi Arabia

Digital Transformation in Saudi Arabia:

Saudi Arabia is undergoing a significant digital transformation initiative, which aims to diversify the economy and reduce dependence on oil revenues. This national strategy emphasizes the adoption of advanced technologies to foster innovation, improve efficiency, and enhance the quality of services across various sectors, including finance, healthcare, education, and government services. (Hassan, 2020).

The Kingdom of Saudi Arabia has embarked on an ambitious journey to revolutionize its technological landscape, driven by a vision to diversify its economy and position itself as a regional powerhouse in the digital realm. This strategic shift, spearheaded by the country's leadership, has catalysed a profound shift in the way businesses, government entities, and citizens engage with technology. (Hassan, 2020).

At the heart of this transformation lies a concerted effort to harness the power of emerging technologies, from cloud computing and big data analytics to artificial intelligence and the internet of things. Organizations across various sectors, ranging from finance and healthcare to energy and logistics, have embraced these tools, enabling them to streamline operations, enhance decision-making, and deliver superior customer experiences. (Hoang, 2024).

Notably, the Saudi government has taken a proactive stance in fostering this digital revolution. Through the establishment of specialized entities, such as the Ministry of Communications and Information Technology and the National Information Center, the kingdom has implemented robust policies and regulatory frameworks to guide the integration of digital solutions across the public and private domains. These initiatives have paved the way for a surge in technological investments, attracting global tech giants and nurturing a vibrant startup ecosystem. (Ministry of Communications and Information Technology, 2024).

the Saudi Vision 2030 – the nation's comprehensive plan for economic and social transformation – has played a pivotal role in driving the digital agenda. This far-reaching strategy has identified technology as a key enabler, with a focus on developing a digitally empowered workforce, enhancing digital infrastructure, and fostering a culture of innovation and entrepreneurship.

Consequently, the digital transformation in Saudi Arabia has yielded tangible outcomes, ranging from the digitization of government services and the automation of administrative processes to the launch of smart city initiatives and the expansion of e-commerce platforms. These advancements have not only enhanced efficiency and productivity but have also fostered greater connectivity, transparency, and access to information for the Saudi populace. (Saudi Data and Artificial Intelligence Authority, 2024) .

As the kingdom continues to navigate this digital journey, it faces both opportunities and challenges. The continued investment in technologies, the upskilling of the workforce, and the fostering of a collaborative ecosystem among stakeholders will be crucial in ensuring the sustained success of this transformative endeavour. By embracing the digital revolution, Saudi Arabia aims to cement its position as a regional leader, driving economic diversification,

social progress, and a future-ready society. (Saudi Data and Artificial Intelligence Authority, 2024).

Digital Transformation in Financial Services:

The financial sector has been at the forefront of this digital shift. Banks and financial institutions are increasingly leveraging digital tools and technologies to streamline operations, enhance customer experience, and maintain competitiveness in a rapidly evolving global market. Key technologies driving this transformation include blockchain, artificial intelligence, big data analytics, and cloud computing. (Hariri, 2023).

Blockchain technology is being explored for its potential to increase transparency, security, and efficiency in financial transactions. By decentralizing transaction records, blockchain can reduce fraud, lower costs, and speed up processes such as cross-border payments and settlement of trades. Several Saudi banks are piloting blockchain projects to understand its benefits and integration challenges. (Guo & Liang, 2016).

Artificial intelligence (AI) and machine learning (ML) are revolutionizing customer service and risk management in the financial sector. AI-powered chatbots and virtual assistants are now common in customer service, providing quick and accurate responses to inquiries and issues. Moreover, AI is being used to analyse vast amounts of data to detect fraudulent activities, assess credit risk, and tailor financial products to individual customer needs. (Buchanan & Wright, 2021).

Big data analytics is another critical component of the digital transformation in Saudi Arabia. Financial institutions are collecting and analysing data from various sources to gain insights into customer behaviour, market trends, and operational efficiency. These insights enable banks for examples to make data-driven decisions, personalize services, and identify new business opportunities. by analysing transaction data, banks can offer personalized financial advice and products that meet specific customer needs. (Sun et al., 2019).

Cloud computing is transforming the IT infrastructure of Saudi financial institutions by providing scalable and cost-effective solutions. Cloud-based services allow banks to store and process large amounts of data, deploy new applications quickly, and improve collaboration among employees. This shift to cloud computing also enhances cybersecurity measures, ensuring that sensitive financial data is protected against cyber threats. (Alruwaili & Gulliver, 2018).

The Saudi government has played a crucial role in facilitating digital transformation through supportive policies and regulatory frameworks. The establishment of the Saudi Arabian Monetary Authority (SAMA) Regulatory Sandbox allows fintech companies to test innovative products and services in a controlled environment before full-scale deployment. This initiative encourages experimentation and innovation while ensuring that new technologies comply with regulatory standards. (Chen et al., 2021).

In addition to regulatory support, significant investments are being made in digital infrastructure and education. The government is investing in high-speed internet, 5G networks, and data centres to support the growing demand for digital services. Educational initiatives aimed at developing digital skills among the workforce are also underway, ensuring that Saudi professionals are equipped to thrive in a digital economy. (Alshareef, 2022).

Despite these advancements, challenges remain in the digital transformation journey. Cybersecurity threats are a constant concern, requiring continuous investment in security measures and training. Additionally, the rapid pace of technological change necessitates ongoing adaptation and learning by both organizations and employees. (Favoretto et al., 2021).

Project Management and Digital Tools:

Project management in the context of digital transformation involves the integration of advanced digital tools and technologies to enhance planning, execution, monitoring, and completion of projects within organizations. Traditionally, project management relied on manual processes and standardized methodologies. However, the advent of digital tools has revolutionized this field by offering new capabilities that improve efficiency, collaboration, and decision-making. (Gonçalves et al., 2023).

One of the key digital tools transforming project management is project management software. These tools provide centralized platforms for planning and scheduling tasks, managing resources, tracking progress, and communicating with stakeholders. Features such as Gantt charts, task dependencies, and real-time updates enable project managers to streamline workflows, allocate resources effectively, and maintain visibility over project timelines and milestones. (Barghoth et al., 2020).

Collaboration platforms have also become essential in modern project management practices. These platforms facilitate real-time communication and collaboration among team members, regardless of their geographical locations. Features such as file sharing, instant messaging, video conferencing, and document management enhance teamwork, foster innovation, and reduce delays in project delivery. By enabling seamless communication and information sharing, collaboration platforms promote agility and responsiveness in project management processes. (Leipämaa-Leskinen et al., 2022).

Automation technologies are increasingly being integrated into project management to streamline repetitive tasks and enhance operational efficiency. Automated reporting systems, for instance, generate and distribute project status reports, key performance indicators (KPIs), and financial summaries automatically. This reduces manual effort, minimizes errors, and ensures that stakeholders have access to up-to-date information for informed decision-making. (Savio & Dewan, 2023).

Data analytics tools play a critical role in project management by providing insights into project performance, resource utilization, and risk factors. These tools analyse historical data and real-time metrics to identify trends, predict outcomes, and optimize project strategies. By leveraging data analytics, project managers can make data-driven decisions, allocate resources strategically, and mitigate potential risks proactively, thereby improving project outcomes and enhancing organizational competitiveness. (Buse & Zimmermann, 2010).

The adoption of digital tools in project management not only enhances operational efficiency but also supports strategic objectives such as innovation and growth. By automating routine tasks, facilitating collaboration, and providing actionable insights, these tools enable organizations to accelerate project delivery, reduce costs, and improve stakeholder satisfaction. Moreover, digital tools empower project managers to adapt to changing market dynamics and complex project requirements, enabling them to drive successful project outcomes in a dynamic business environment. (Vaio et al., 2021).

The integration of digital tools into project management requires careful planning, investment in technology infrastructure, and continuous training of personnel. Challenges such as cybersecurity risks, data privacy concerns, and resistance to change may hinder adoption and implementation efforts. Overcoming these challenges necessitates a holistic approach that combines technology deployment with organizational change management and stakeholder engagement to ensure successful digital transformation in project management practices. (Swart et al., 2022).

Extent of Digital Transformation Adoption in Project Management:

The financial sector has witnessed a profound shift in the way project management operations are executed, driven by the embrace of digital technologies. Financial institutions have recognized the transformative potential of these advancements and have actively sought to integrate them into their project management frameworks. (Warner & Wäger, 2019).

One of the most prominent areas of digital transformation adoption has been the incorporation of cloud-based project management platforms and tools. These innovative solutions have enabled seamless collaboration, real-time data sharing, and enhanced visibility across project teams, regardless of their physical location. By leveraging the power of the cloud, financial organizations have been able to streamline their project initiation, planning, and control processes, promoting greater efficiency and agility. (Warner & Wäger, 2019).

Furthermore, the integration of data analytics and visualization capabilities has revolutionized the way project managers monitor and report on their initiatives. Financial institutions have harnessed the power of advanced analytics to glean deeper insights into project performance, identify potential risks and bottlenecks, and make more informed decisions. The ability to transform raw data into meaningful visual representations has empowered project teams to quickly identify patterns, trends, and areas for improvement, ultimately enhancing project outcomes. (Mariani & Mancini, 2023).

Alongside these advancements, financial organizations have also embraced the potential of automated task assignment, workflow management, and collaboration tools. These digital solutions have helped to reduce manual overhead, ensure the timely execution of project activities, and foster cross-functional teamwork, leading to improved productivity and coordination among project stakeholders. (Mariani & Mancini, 2023).

The adoption of artificial intelligence and machine learning technologies has also emerged as a transformative force in project management within the Saudi financial sector. These capabilities have enabled project managers to generate predictive insights, optimize resource allocation, and enhance risk mitigation strategies, ultimately contributing to the overall effectiveness and efficiency of their initiatives. (Vial, 2019).

As financial institutions continue to navigate this digital transformation journey, the integration of these innovative technologies into project management practices has become a strategic imperative, enabling them to stay ahead of the curve, enhance operational excellence, and deliver superior customer experiences in an increasingly competitive landscape. (Vial, 2019).

Influence of Digital Transformation on Project Management Efficiency:

The digital technologies relation into the project management has had a profound impact on enhancing operational efficiency. These transformative initiatives have enabled a fundamental shift in the way project teams plan, execute, and monitor their initiatives, leading to tangible improvements across various aspects of project management. (Papadonikolaki et al., 2022).

One of the primary benefits of digital transformation has been the reduction of administrative overhead and manual tasks through the implementation of automated systems and workflows. Financial organizations have leveraged digital tools to streamline project initiation, planning, and control processes, eliminating time-consuming manual interventions and freeing up project managers to focus on higher-value activities. This automation has not

only improved productivity but has also contributed to the minimization of human errors, ensuring greater consistency and reliability in project execution. (You & Zhao, 2023).

The utilization of digital collaboration platforms and communication tools has also been a game-changer in enhancing project management efficiency. These solutions have facilitated seamless information sharing, improved coordination among team members, and enabled immediate access to project-related data, regardless of geographic location. This enhanced collaboration and transparency have contributed to the reduction of communication breakdowns, improved decision-making, and more effective problem-solving within project teams. (Hajj & Hammoud, 2023).

The adoption of artificial intelligence and machine learning algorithms has further amplified the efficiency gains within project management. These sophisticated technologies have enabled financial institutions to generate predictive insights, automate repetitive tasks, and optimize resource allocation, ultimately leading to increased productivity, reduced costs, and improved project outcomes. (Hajj & Hammoud, 2023).

Impact of Digital Transformation on Project Management Effectiveness:

One of the primary areas where digital transformation has bolstered project management effectiveness is in the realm of project delivery. By leveraging automated task assignment, real-time project tracking, and data-driven insights, financial institutions have been able to enhance their ability to complete projects on time and within budget. The increased visibility and transparency afforded by digital tools have enabled project managers to anticipate and mitigate risks more effectively, ensuring smoother project execution and minimizing costly delays or scope creep. (Teng et al., 2022).

The digital collaboration platforms and communication channels has fostered enhanced stakeholder engagement and alignment. Project teams can now seamlessly coordinate with internal and external stakeholders, facilitating the timely exchange of information, addressing concerns, and aligning expectations. This improved collaboration has led to increased stakeholder satisfaction, better-informed decision-making, and ultimately, more successful project outcomes. (Butt et al., 2016).

The application of data analytics and visualization capabilities has also been instrumental in enhancing project management effectiveness. Financial institutions have harnessed the power of these digital tools to generate actionable insights, identify trends, and optimize project processes. By transforming raw data into meaningful visual representations, project managers can quickly identify areas for improvement, make data-driven decisions, and enhance the overall quality and performance of their initiatives. (Flood et al., 2016).

The adoption of artificial intelligence and machine learning technologies has further amplified the effectiveness of project management. These advanced capabilities have enabled financial institutions to automate repetitive tasks, generate predictive insights, and optimize resource allocation, leading to increased productivity, reduced risks, and improved project outcomes. (Buchanan & Wright, 2021).

Theoretical Principles of the Study

Resource-Based View (RBV):

The Resource-Based View theory provides a foundational perspective for understanding how digital transformation influences project management within the Saudi financial sector. It posits that adopting digital tools, such as project management software and automation

systems enhances organizational capabilities and efficiency. By leveraging these technological resources, financial institutions aim to achieve competitive advantage through improved decision-making and project outcomes. (Davis & DeWitt, 2021).

Technology Acceptance Model (TAM):

The Technology Acceptance Model informs this study by examining stakeholders' perceptions and acceptance of digital tools in project management. TAM suggests that the perceived usefulness and ease of use of these tools influence their adoption and effectiveness in enhancing project management efficiency and effectiveness. Understanding stakeholders' attitudes and beliefs about these technologies is crucial for assessing their impact on project outcomes and organizational performance. (Hernández et al., 2008).

Innovation Diffusion Theory:

The Innovation Diffusion Theory helps contextualize the adoption and diffusion of digital tools across different financial institutions in Saudi Arabia. It categorizes adopters into various stages, from early adopters to laggards, based on their readiness to embrace technological innovations. This framework assists in predicting patterns of digital tool adoption and identifying factors that influence adoption rates within the sector. (Al-Gahtani, 2003).

Organizational Learning Theory:

Organizational Learning Theory underscores the importance of continuous adaptation and learning within organizations undergoing digital transformation. Financial institutions in Saudi Arabia are encouraged to cultivate a learning-oriented culture that embraces new technologies in project management. This theory guides the study in exploring how organizations learn from digital transformation experiences, address challenges and optimize project management practices over time. (Almulhim, 2020).

Systems Theory:

Systems Theory provides a holistic perspective on how digital tools integrate into existing project management systems within financial institutions. It emphasizes the interconnectedness and interdependencies within organizational systems, highlighting the need to consider the broader organizational context when studying the impact of digital transformation on project management practices. This framework supports the study in analyzing how digital tools influence organizational processes, structures, and interactions to enhance project management efficiency and effectiveness. (Batova et al., 2021).

Chapter Three

Methodology

Introduction

The purpose of this chapter is to detail the research methodology employed to investigate the impact of digital tools on project management practices within Saudi Arabia's financial sector. Given the study's objectives, a quantitative approach has been selected to facilitate the collection and analysis of empirical data. This chapter provides a comprehensive overview of the rationale behind adopting a quantitative method, outlines the design and structure of the survey, discusses the sampling strategy, and describes the data collection and analysis techniques.

The quantitative approach is deemed appropriate for this study due to its ability to objectively measure variables and statistically analyze the relationships between them. By employing structured surveys, the research aims to gather consistent and reliable data from a broad sample of employees across various financial institutions. This method allows for an extensive examination of the extent of digital tool adoption and its impact on project management efficiency and effectiveness.

The design of the survey is a critical aspect of the research methodology. The survey is meticulously crafted to address the core research questions and hypotheses. It incorporates a range of question types, including Likert scale questions, multiple-choice items, and demographic queries, to capture a comprehensive dataset. This structure ensures that the survey can effectively measure key variables related to digital transformation and project management.

A robust sampling strategy is essential to ensure that the survey reaches a representative sample of employees within the financial sector. The strategy may utilize random sampling to provide equal chances of selection or stratified sampling to achieve proportional representation across various organizational sizes, geographical locations, and types of financial services. This approach minimizes sampling bias and enhances the generalizability of the study's findings.

The data collection process is meticulously planned to ensure consistency and reliability. Surveys are distributed electronically, providing easy access and encouraging a high response rate. Respondents are given clear instructions to guide them through the survey, ensuring accurate and thoughtful responses. Confidentiality and anonymity are maintained to promote honest feedback from participants.

The analysis of the collected data is conducted using statistical software such as SPSS. The analysis includes descriptive statistics to summarize the data, correlation analysis to explore relationships between variables, regression analysis to identify predictors of project management success, and hypothesis testing to evaluate the research hypotheses. These statistical techniques enable a thorough examination of the data and provide insights into the impact of digital tools on project management practices within the Saudi financial sector.

Methodology and Research Methods

The study will adopt a quantitative method approach. A survey will be distributed to a broader sample of employees within these institutions to collect data on the impact of digital tools on project management practices.

a quantitative approach is employed to examine the impact of digital tools on project management practices within the Saudi financial sector. This section details the rationale behind selecting quantitative methods, the survey design, the sampling strategy, and the data analysis techniques used to achieve the research objectives and test the hypotheses.

Quantitative Method (Surveys):

The primary data collection method for this study involves distributing structured surveys to a broad sample of employees across various financial institutions in Saudi Arabia. The surveys are designed to gather quantitative data on the adoption and impact of digital tools on project management practices. This method is chosen for several reasons:

1. **Objective Measurement:** Quantitative methods allow for objective measurement of variables related to digital transformation and project management. By using structured surveys with predefined questions, the study can collect consistent data that can be statistically analysed to identify patterns and relationships.
2. **Broad Reach:** Surveys can be distributed to many respondents across different institutions, departments, and roles. This broad reach ensures that the data collected is representative of the diverse experiences and perspectives within the financial sector, providing a comprehensive understanding of the impact of digital tools.
3. **Statistical Analysis:** The structured nature of survey data facilitates the application of various statistical techniques to analyse the data. This includes descriptive statistics to summarize the data, correlation analysis to explore relationships between variables, and regression analysis to identify predictors of project management efficiency and effectiveness.
4. **Replicability:** Quantitative methods are highly replicable, meaning that the study can be repeated in the future or in different contexts to verify the findings. This adds to the reliability and validity of the research results.

Survey Design:

The surveys are carefully designed to address the research questions and test the hypotheses. The questions are structured to measure key variables such as the extent of digital tool adoption, the efficiency and effectiveness of project management practices, and the challenges faced during digital transformation. The survey includes a mix of Likert scale questions, multiple-choice items, and demographic questions to gather comprehensive data from respondents.

Sampling Strategy:

A robust sampling strategy is employed to ensure that the survey reaches a representative sample of employees within the financial sector. The strategy may involve random sampling techniques to ensure that every employee has an equal chance of being selected, or stratified sampling to ensure proportional representation across different organizational sizes, geographical locations, and types of financial services. This approach helps to minimize sampling bias and enhance the generalizability of the study findings.

Data Collection:

The data collection process follows a structured protocol to ensure consistency and reliability. Surveys are distributed electronically to facilitate easy access and completion by respondents. Clear instructions are provided to guide respondents through the survey, ensuring that they understand the questions and provide accurate responses. Measures are

taken to ensure confidentiality and anonymity of the respondents to encourage honest and candid responses.

Data Analysis:

The quantitative data collected from the surveys are analysed using statistical software such as SPSS. The analysis involves:

- **Descriptive Statistics:** Summarizing the data to provide an overview of the respondents' demographics and key variables related to digital transformation and project management.
- **Correlation Analysis:** Exploring the relationships between different variables to understand how digital tool adoption correlates with project management efficiency and effectiveness.
- **Regression Analysis:** Identifying predictors of project management success and quantifying the impact of digital tools on project outcomes.
- **Hypothesis Testing:** Using statistical tests to evaluate the research hypotheses and determine whether there are significant effects or relationships between the studied variables.

Study Tools

Quantitative Questionnaire:

The primary study tool is a structured quantitative questionnaire designed to gather data from project managers and stakeholders within Saudi financial institutions. The questionnaire includes Likert scale questions, multiple-choice items, and structured questions tailored to measure specific variables related to digital transformation adoption, project management efficiency, and project outcomes. This instrument ensures consistency in data collection across respondents, facilitating rigorous analysis of quantitative data.

Sampling Framework:

A robust sampling framework is employed to ensure the questionnaire reaches a representative sample of project managers and stakeholders from various financial institutions in Saudi Arabia. The sampling strategy may involve random sampling techniques or stratified sampling to ensure diversity and inclusivity across different organizational sizes, geographical locations, and types of financial services provided.

Data Collection Protocol:

To maintain data integrity and reliability, a structured data collection protocol is followed. This protocol includes clear instructions for administering the questionnaire, ensuring standardization in data collection procedures. Training may be provided to personnel involved in distributing and collecting responses to minimize bias and ensure adherence to ethical guidelines throughout the data collection process.

Statistical Analysis Software:

Quantitative data collected through the questionnaire are analyzed using statistical analysis software SPSS (Statistical Package for the Social Sciences). These tools enable the application of advanced statistical techniques, including descriptive statistics, correlation analysis, regression analysis, and hypothesis testing. By employing robust statistical methods, the study aims to uncover patterns, relationships, and significant findings.

Validity and Reliability Measures:

Validity and reliability measures are implemented to ensure the accuracy and consistency of the study's findings. Validity checks may include content validity, ensuring that questionnaire items accurately measure intended constructs related to digital transformation and project management. Reliability measures, such as Cronbach's alpha for internal consistency, assess the reliability of survey items and ensure that responses are consistent over time and across respondents.

Ethical Considerations:

Ethical considerations are paramount in the use of study tools, ensuring participant confidentiality, informed consent, and adherence to data protection regulations. Measures are taken to anonymize responses, secure data storage, and obtain ethical approval from relevant institutional review boards or ethics committees. These ethical practices safeguard participant rights and uphold the integrity of the research process.

The Limits of the Study

The study aims to provide valuable insights into the impact of digital transformation on project management within the Saudi financial sector, several limitations must be acknowledged. These limitations affect the generalizability and applicability of the findings beyond the specific context of this research.

Geographical and Sectoral Focus:

The study is confined to financial institutions operating within Saudi Arabia. As a result, the findings are highly context-specific and may not be directly applicable to financial institutions in other countries or regions. Cultural, economic, and regulatory differences can significantly influence the adoption and effectiveness of digital tools in project management. Therefore, the insights gained from this study should be cautiously applied when considering other geographical or sectoral contexts.

Time Limitations:

The rapidly evolving nature of digital technologies presents another limitation. The study captures data at a specific point in time, reflecting the state of digital transformation and its impact on project management practices as they are observed during the research period. Given the fast-paced advancements in technology, new tools and practices may emerge shortly after the study is completed, potentially altering the dynamics of digital transformation in project management.

Survey-Based Data Collection:

The study relies on self-reported data collected through structured surveys. While surveys are effective for gathering broad data from a large sample, they also have inherent limitations. Respondents may interpret survey questions differently, leading to variability in responses. Additionally, self-reported data can be subject to biases such as social desirability bias, where respondents may provide answers, they believe are expected rather than their true experiences. Efforts to design clear and unbiased survey questions are essential, but these limitations can still affect the accuracy of the data.

Focus on Quantitative Methods:

The exclusive use of quantitative methods means that the study primarily captures numerical data and statistical relationships. While this approach provides a robust analysis of patterns and correlations, it may overlook nuanced, qualitative insights that can be obtained through interviews, focus groups, or case studies. Qualitative data could offer deeper understanding of the contextual factors and individual experiences that influence the adoption and impact of digital tools in project management.

Organizational Diversity:

Financial institutions in Saudi Arabia vary widely in terms of size, structure, and technological maturity. This diversity can lead to significant variations in how digital tools are adopted and utilized in project management. While the study aims to capture a representative sample, the variability among institutions means that findings may not fully encapsulate the experiences of all types of financial organizations within the country.

Practical Implications:

Despite these limitations, the study seeks to provide actionable insights for practitioners and policymakers in the Saudi financial sector. By highlighting the current state of digital transformation and its impact on project management, the study offers a foundation for informed decision-making and strategic planning. However, readers should consider the study's limitations when interpreting the results and applying them to their specific contexts.

Chapter Four

Practical Study

Introduction

In the rapidly evolving landscape of project management within Saudi financial institutions, the integration of digital tools has become a critical factor. Our practical study delves into the quantitative analysis of the adoption and impact of these digital technologies on project management practices. Through a carefully designed survey, we gathered data from a diverse group of employees to uncover the extent of digital transformation and its effects on efficiency and effectiveness within their project management processes.

This section provides a comprehensive overview of the methodology and tools employed to analyze the collected data. The insights gained from this analysis are crucial for understanding the current state of digital adoption in the financial sector and identifying areas where digital tools are driving significant improvements. By examining the survey responses, we aim to present a clear picture of how digital transformation is reshaping project management practices and influencing outcomes.

Our survey, distributed to 54 respondents across various financial institutions, captured detailed information on several key variables related to digital transformation. These variables include the adoption rates of digital tools and technologies, the extent of digital transformation in project management, the efficiency of project management practices, and the effectiveness of these practices in achieving project goals.

The survey responses were analyzed to identify trends, correlations, and significant impacts of digital tools on project management. Descriptive statistics, correlation analysis, and regression analysis were employed to draw meaningful insights from the data.

Descriptive statistics provide an initial understanding of the survey data. This includes the distribution of respondents across different demographic categories, such as gender, age, job position, and years of experience. Additionally, we analyzed the overall adoption rates of digital tools, the extent of digital transformation, and the perceived improvements in efficiency and effectiveness due to digital tools.

Correlation analysis was conducted to explore the relationships between different variables. This helped in identifying how the adoption of digital tools correlates with the extent of digital transformation, efficiency improvements, and effectiveness in project management. By understanding these relationships, we can pinpoint which aspects of digital adoption are most beneficial and which areas may require further attention.

By applying these statistical techniques to present a detailed and insightful analysis of the survey data, shedding light on the transformative effects of digital tools in the project management landscape of Saudi financial institutions. The findings from this analysis will not only validate our hypotheses but also offer actionable insights for organizations seeking to enhance their project management practices through digital transformation.

Analysis

This section presents an in-depth analysis of the collected data on the adoption, extent, efficiency, and effectiveness of digital tools in project management within the Saudi financial sector. The analysis is structured to provide a comprehensive understanding of the demographics of the respondents, followed by their perceptions and experiences regarding digital transformation in their project management practices. Each aspect is examined through descriptive statistics and distribution plots to illustrate the overall trends and insights. By examining the responses from various demographic groups, this analysis aims to identify patterns and derive meaningful conclusions about the current state and impact of digital tools on project management in the financial sector.

Binomial Test

Binomial Test						95% Confidence Interval	
	Level	Counts	Total	Proportion	p	Lower	Upper
Gender	Female	27	54	0.500	1.000	0.361	0.639
	Male	27	54	0.500	1.000	0.361	0.639

Binomial Test1 Table

The binomial test results for gender show an equal proportion of male and female respondents, each accounting for 50% of the total sample. The confidence interval for both genders is between 36.1% and 63.9%, indicating no significant difference in the gender distribution among the respondents. This balance ensures that our analysis is not biased by gender and can be considered representative of both male and female perspectives within the Saudi financial sector.

Binomial Test

						95% Confidence Interval	
	Level	Counts	Total	Proportion	p	Lower	Upper
Age	25-34	10	54	0.185	< .001	0.093	0.314
	35-44	18	54	0.333	0.020	0.211	0.475
	45-54	9	54	0.167	< .001	0.079	0.293
	55-64	9	54	0.167	< .001	0.079	0.293
	Under 25	8	54	0.148	< .001	0.066	0.271

The age distribution shows a diverse range of respondents, with the highest proportion in the 35-44 age group (33.3%). This is followed by the 25-34 age group (18.5%), and both the 45-54 and 55-64 age groups each representing 16.7%. The under 25 age group accounts for 14.8% of the respondents. The p-values indicate that all age groups are significantly represented, ensuring that the analysis captures a broad spectrum of experiences and perspectives from different age demographics within the financial sector.

Binomial Test

						95% Confidence Interval	
	Level	Counts	Total	Proportion	p	Lower	Upper
Job Position	Analyst	9	54	0.167	< .001	0.079	0.293
	Consultant	9	54	0.167	< .001	0.079	0.293
	Developer	9	54	0.167	< .001	0.079	0.293

Binomial Test

Level	Counts	Total	Proportion	p	95% Confidence Interval	
					Lower	Upper
Other	8	54	0.148	< .001	0.066	0.271
Project Manager	1	54	0.019	< .001	4.687e -4	0.099
Senior Manager	9	54	0.167	< .001	0.079	0.293
Team Leader	9	54	0.167	< .001	0.079	0.293

The job position data reveals an even distribution among Analysts, Consultants, Developers, Senior Managers, and Team Leaders, each making up 16.7% of the respondents. 'Other' positions account for 14.8%, while Project Managers are underrepresented at only 1.9%. The significant p-values for all categories indicate a robust representation of various roles, except for Project Managers. This distribution highlights the broad range of job functions involved in the study, providing a comprehensive view of digital tool adoption and its impact across different job roles within the financial sector.

Binomial Test

	Level	Counts	Total	Proportion	p	95% Confidence Interval	
						Lower	Upper
Years of Experience	1-3 years	9	54	0.167	< .001	0.079	0.293
	4-6 years	10	54	0.185	< .001	0.093	0.314
	7-10 years	9	54	0.167	< .001	0.079	0.293
	Less than 1 year	8	54	0.148	< .001	0.066	0.271
	More than 10 years	18	54	0.333	0.020	0.211	0.475

The years of experience data indicates a diverse range of respondents, with the highest proportion having more than 10 years of experience (33.3%). This is followed by respondents with 4-6 years of experience (18.5%), and those with 1-3 years and 7-10 years of experience, each representing 16.

7%. Respondents with less than 1 year of experience account for 14.8%. The significant p-values for all experience levels indicate that the sample adequately captures perspectives

across different levels of professional experience. This distribution ensures that the analysis considers insights from both seasoned professionals and relatively new entrants to the financial sector, providing a well-rounded view of digital tool adoption and its impact on project management practices.

Descriptives Variable (Adoption)

Descriptive Statistics					
	Adoption Q1	Adoption Q2	Adoption Q3	Adoption Q4	Adoption Q5
Valid	54	54	54	54	54
Missing	0	0	0	0	0
Mean	3.167	3.167	3.185	3.019	3.019
Std. Error of Mean	0.1846	0.1728	0.1715	0.1682	0.1703
Median	3.500	3.500	3.000	3.000	3.000
Mode	4.000	4.000	3.000	3.000	3.000
Std. Deviation	1.356	1.270	1.260	1.236	1.251
Variance	1.840	1.613	1.588	1.528	1.566
Minimum	1.000	1.000	1.000	1.000	1.000
Maximum	5.000	5.000	5.000	5.000	5.000
Sum	171.0	171.0	172.0	163.0	163.0

Descriptives Variable (Adoption) 2 Table

The descriptive statistics for the adoption of digital tools and technologies indicate that the mean responses across all five questions hover around the neutral to agree range (mean values approximately 3.0 to 3.2). The standard deviations are relatively consistent, suggesting a moderate level of agreement among respondents about the adoption of digital tools. The median and mode values support the mean, showing that most responses are centered around the 'Agree' option. This indicates a generally positive perception of digital tool adoption in project management practices among the respondents.

Distribution Plots

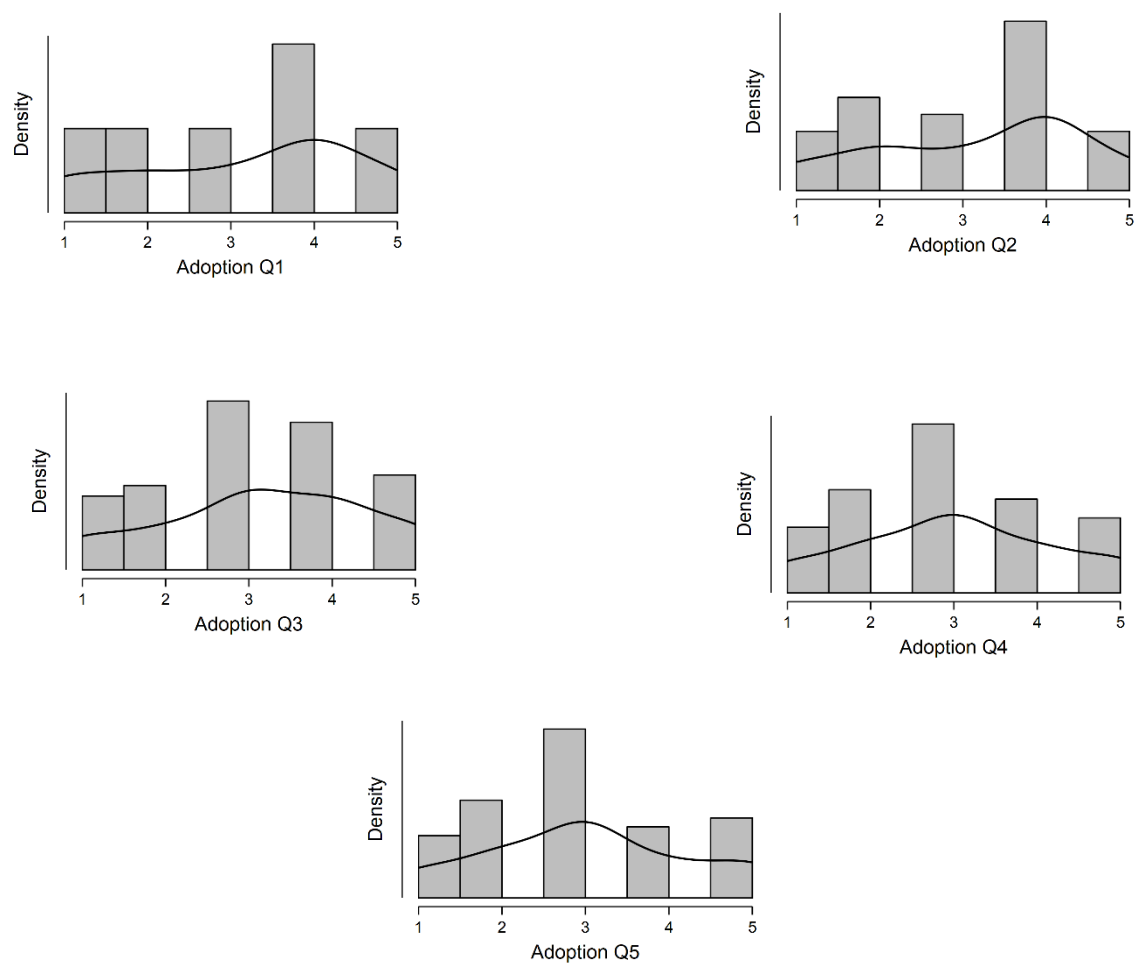


Figure 1

Descriptives Variable (Extent)

Descriptive Statistics					
	Extent Q1	Extent Q2	Extent Q3	Extent Q4	Extent Q5
Valid	54	54	54	54	54
Missing	0	0	0	0	0
Mean	3.167	3.111	3.093	3.056	3.056
Std. Error of Mean	0.1846	0.1706	0.1657	0.1701	0.1801
Median	3.500	3.000	3.000	3.000	3.000
Mode	4.000	4.000	3.000	3.000	3.000
Std. Deviation	1.356	1.254	1.217	1.250	1.323
Variance	1.840	1.572	1.482	1.563	1.752
Minimum	1.000	1.000	1.000	1.000	1.000
Maximum	5.000	5.000	5.000	5.000	5.000
Sum	171.0	168.0	167.0	165.0	165.0

Descriptives Variable (Extent) 3 Table

The extent of digital transformation adoption in project management shows mean values between 3.056 and 3.167, indicating a slightly positive perception of digital transformation adoption. The median and mode values are mostly centered around 3.000, signifying a tendency towards agreement on the extent of adoption. The standard deviations and variances indicate some variability in responses, but overall, there is a consensus that digital transformation is moderately adopted in project management practices within the financial sector.

Distribution Plots

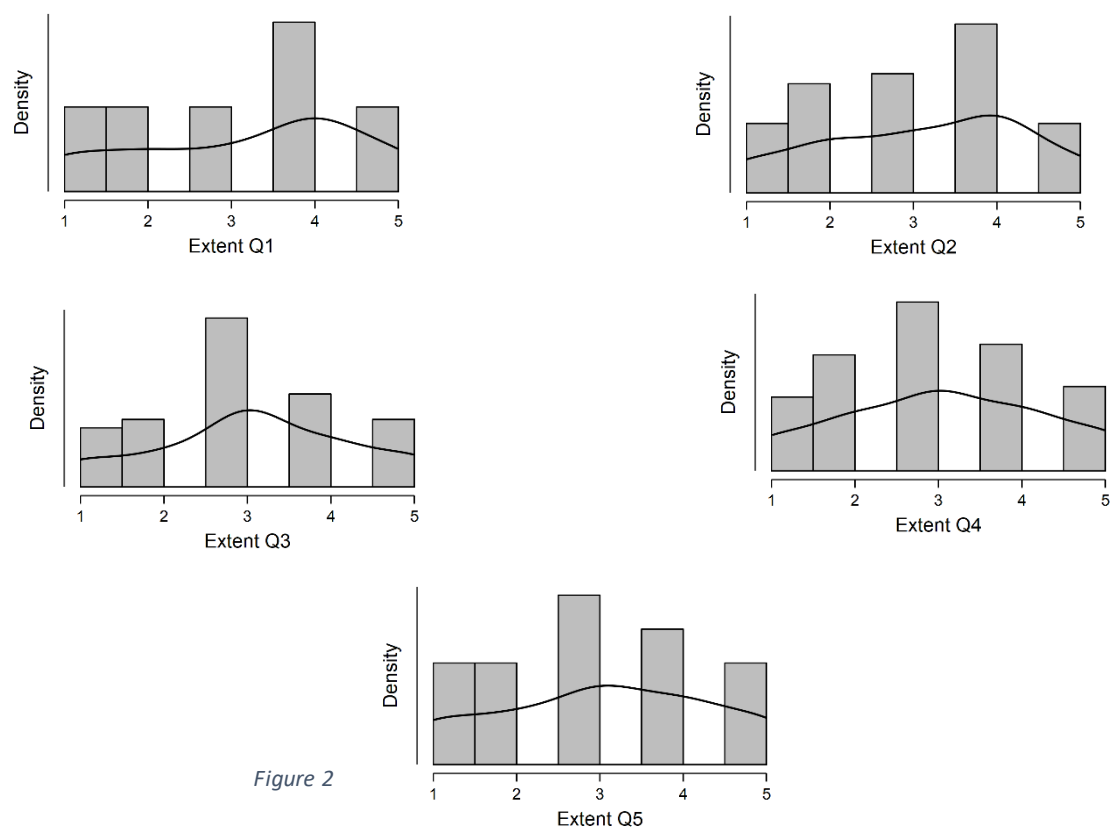


Figure 2

Descriptives Variable (Efficiency)

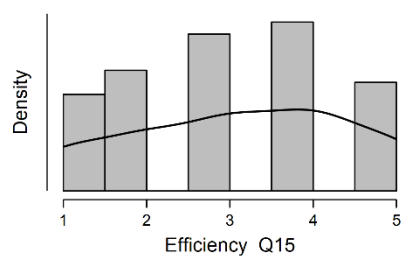
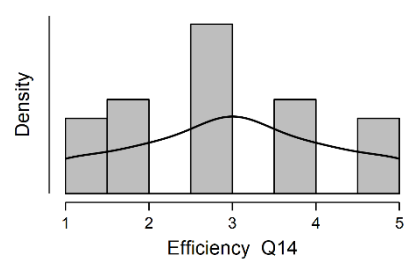
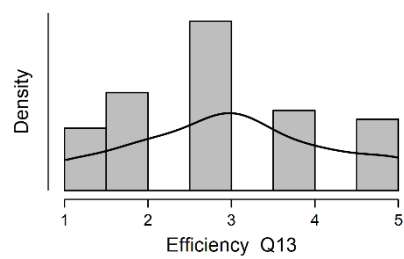
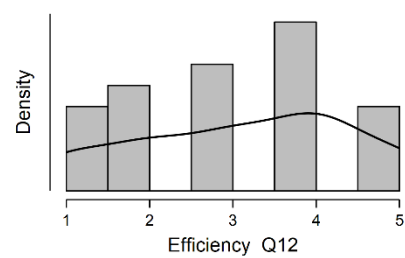
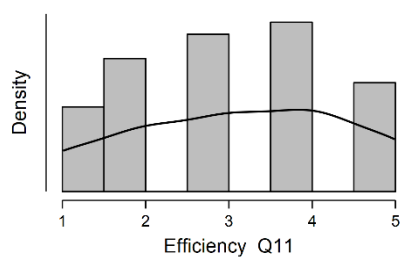
Descriptive Statistics

	Efficiency Q11	Efficiency Q12	Efficiency Q13	Efficiency Q14	Efficiency Q15
Valid	54	54	54	54	54
Missing	0	0	0	0	0
Mean	3.130	3.111	3.000	3.000	3.111
Std. Error of Mean	0.1754	0.1767	0.1672	0.1713	0.1786
Median	3.000	3.000	3.000	3.000	3.000
Mode	4.000	4.000	3.000	3.000	4.000
Std. Deviation	1.289	1.298	1.229	1.259	1.313
Variance	1.662	1.686	1.509	1.585	1.723
Minimum	1.000	1.000	1.000	1.000	1.000
Maximum	5.000	5.000	5.000	5.000	5.000
Sum	169.0	168.0	162.0	162.0	168.0

Descriptives Variable (Efficiency) 4 Table

The efficiency of digital tools in project management shows mean values around 3.0 to 3.1, suggesting a neutral to slightly positive perception of the efficiency of these tools. The median and mode values indicate a central tendency around 3.0, which corresponds to a 'Neutral' response. The standard deviations are relatively consistent, indicating moderate variability in perceptions of efficiency. Overall, the data suggests that respondents perceive digital tools as being moderately efficient in enhancing project management practices.

Distribution Plots



3 Figure

Descriptives Variable (Effectiveness)

Descriptive Statistics					
	Effectiveness Q16	Effectiveness Q17	Effectiveness Q18	Effectiveness Q19	Effectiveness Q20
Valid	54	54	54	54	54
Missing	0	0	0	0	0
Mean	3.019	3.130	3.056	3.130	3.037
Std. Error of Mean	0.1723	0.1652	0.1701	0.1774	0.1712
Median	3.000	3.000	3.000	3.000	3.000
Mode	3.000	3.000	3.000	4.000	3.000
Std. Deviation	1.266	1.214	1.250	1.304	1.258
Variance	1.603	1.473	1.563	1.700	1.584
Minimum	1.000	1.000	1.000	1.000	1.000
Maximum	5.000	5.000	5.000	5.000	5.000
Sum	163.0	169.0	165.0	169.0	164.0

Table 5 Descriptives Variable (Effectiveness)

The effectiveness of digital tools in project management reveals mean values between 3.0 and 3.13, indicating a neutral to slightly positive perception of their effectiveness. The median values of 3.0 for most questions align with the 'Neutral' response, while the mode values fluctuate between 3.0 and 4.0, showing some variation in responses. The standard deviations and variances suggest a moderate level of agreement among respondents. Overall, the data indicates that while digital tools are perceived as somewhat effective, there is room for improvement in their perceived impact on project management effectiveness.

Distribution Plots

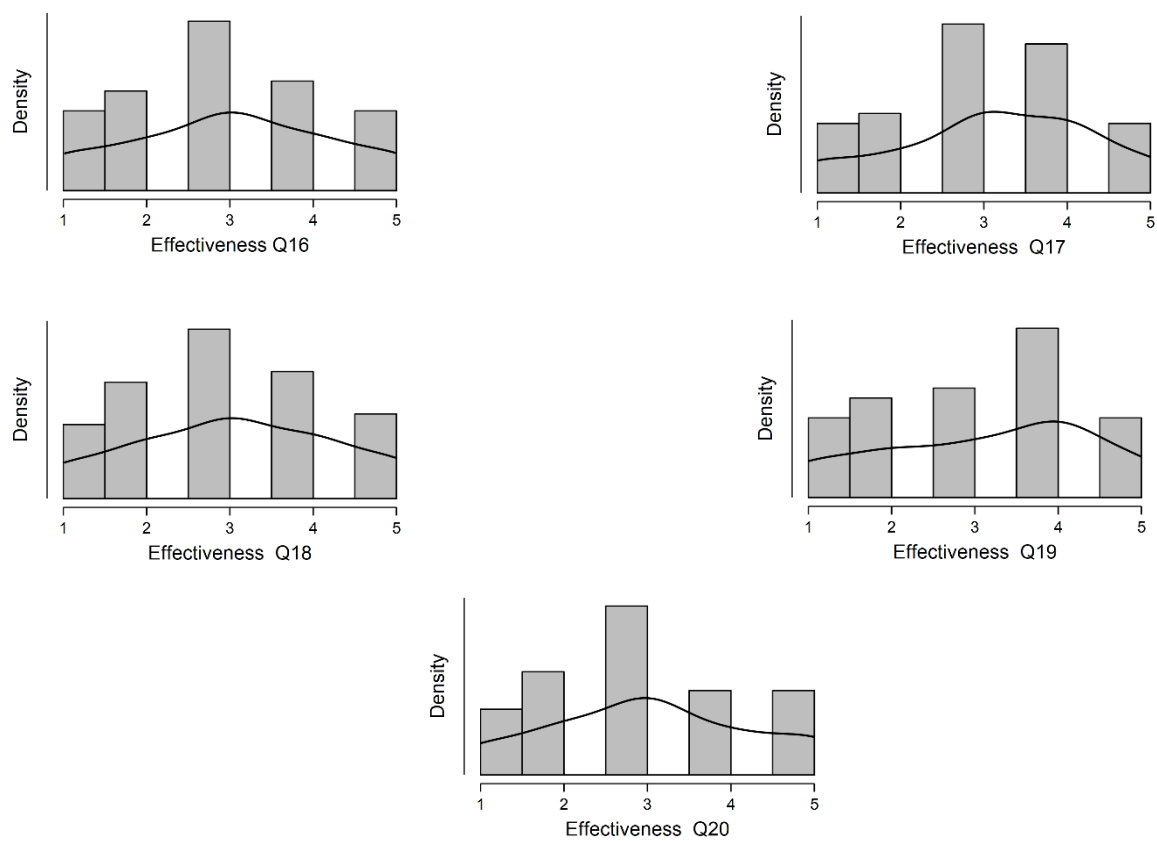


Figure 4

Bayesian Correlation Matrix

Bayesian Correlation Table

		Adoption Rates of Digital Tools and Technologies	Extent of Digital Transformatio n Adoption in Project Management	Efficiency of Project Management	Effectiveness of Project Management
Adoption Rates of Digital Tools and Technologies	Pearson' s r	—			
	BF ₊₀	—			
	Kendall' s tau	—			
	BF ₊₀	—			
Extent of Digital Transformatio n Adoption in Project Management	Pearson' s r	0.995	—		
	BF ₊₀	∞	—		
	Kendall' s tau	0.969	—		
	BF ₊₀	7.130e +21	—		
Efficiency of Project Management	Pearson' s r	0.996	0.988	—	
	BF ₊₀	∞	∞	—	
	Kendall' s tau	0.965	0.943	—	
	BF ₊₀	5.053e +21	5.160e +20	—	
Effectiveness of Project Management	Pearson' s r	0.997	0.996	0.994	—
	BF ₊₀	∞	∞	∞	—
	Kendall' s tau	0.985	0.985	0.959	—
	BF ₊₀	3.550e +22	3.543e +22	2.659e +21	—

Note. For all tests, the alternative hypothesis specifies that the correlation is positive.

Bayesian Correlation Matrix6 Table

The Bayesian correlation analysis confirms extremely strong positive relationships between the adoption rates of digital tools, the extent of digital transformation, and both the efficiency and effectiveness of project management. The infinite Bayes Factors (BF₊) indicate decisive evidence in favor of these positive correlations. Kendall's tau also supports these findings, reinforcing the robustness of the relationships observed.

These results emphasize the significant impact of digital tool adoption and digital transformation on improving project management outcomes within Saudi financial institutions.

Correlation Matrix

Pearson Correlations

		Adoption Rates of Digital Tools and Technologies	Extent of Digital Transformation Adoption in Project Management	Efficiency of Project Management	Effectiveness of Project Management
Adoption Rates of Digital Tools and Technologies	Pearson's r	—			
	p-value	—			
	Upper 95% CI	—			
	Lower 95% CI	—			
Extent of Digital Transformation Adoption in Project Management	Pearson's r	0.995	—		
	p-value	< .001	—		
	Upper 95% CI	1.000	—		
	Lower 95% CI	0.992	—		
Efficiency of Project Management	Pearson's r	0.996	0.988	—	
	p-value	< .001	< .001	—	
	Upper	1.000	1.000	—	

Pearson Correlations

		Adoption Rates of Digital Tools and Technologies	Extent of Digital Transformation Adoption in Project Management	Efficiency of Project Management	Effectiveness of Project Management
Effectiveness of Project Management	95% CI				
	Lower 95% CI	0.993	0.981	—	
	Pearson's r	0.997	0.996	0.994	—
	p-value	< .001	< .001	< .001	—
	Upper 95% CI	1.000	1.000	1.000	—
	Lower 95% CI	0.995	0.994	0.991	—

Note. all tests one-tailed, for positive correlation

Table 7 Correlation Matrix

Adoption Rates of Digital Tools and Technologies

Extent of Digital Transformation: Extremely strong positive correlation ($r = 0.995$, $p < 0.001$).

Efficiency of Project Management: Very strong positive correlation ($r = 0.996$, $p < 0.001$).

Effectiveness of Project Management: Extremely strong positive correlation ($r = 0.997$, $p < 0.001$).

Higher adoption rates of digital tools are closely linked with greater integration of digital transformation, improved efficiency, and better project outcomes.

Extent of Digital Transformation Adoption

Efficiency of Project Management: Very strong positive correlation ($r = 0.988$, $p < 0.001$).

Effectiveness of Project Management: Extremely strong positive correlation ($r = 0.996$, $p < 0.001$).

Comprehensive digital transformation efforts enhance both the efficiency and effectiveness of project management.

Efficiency and Effectiveness of Project Management

Correlation: Very strong positive relationship ($r = 0.994$, $p < 0.001$).

Improvements in project management efficiency are closely linked to enhanced project effectiveness.

Correlation Plot

Rates of Digital Tools and Transformation Adoption in Efficiency of Project Management

Effectiveness of Project Management Transformation Adoption in Rates of Digital Tools and

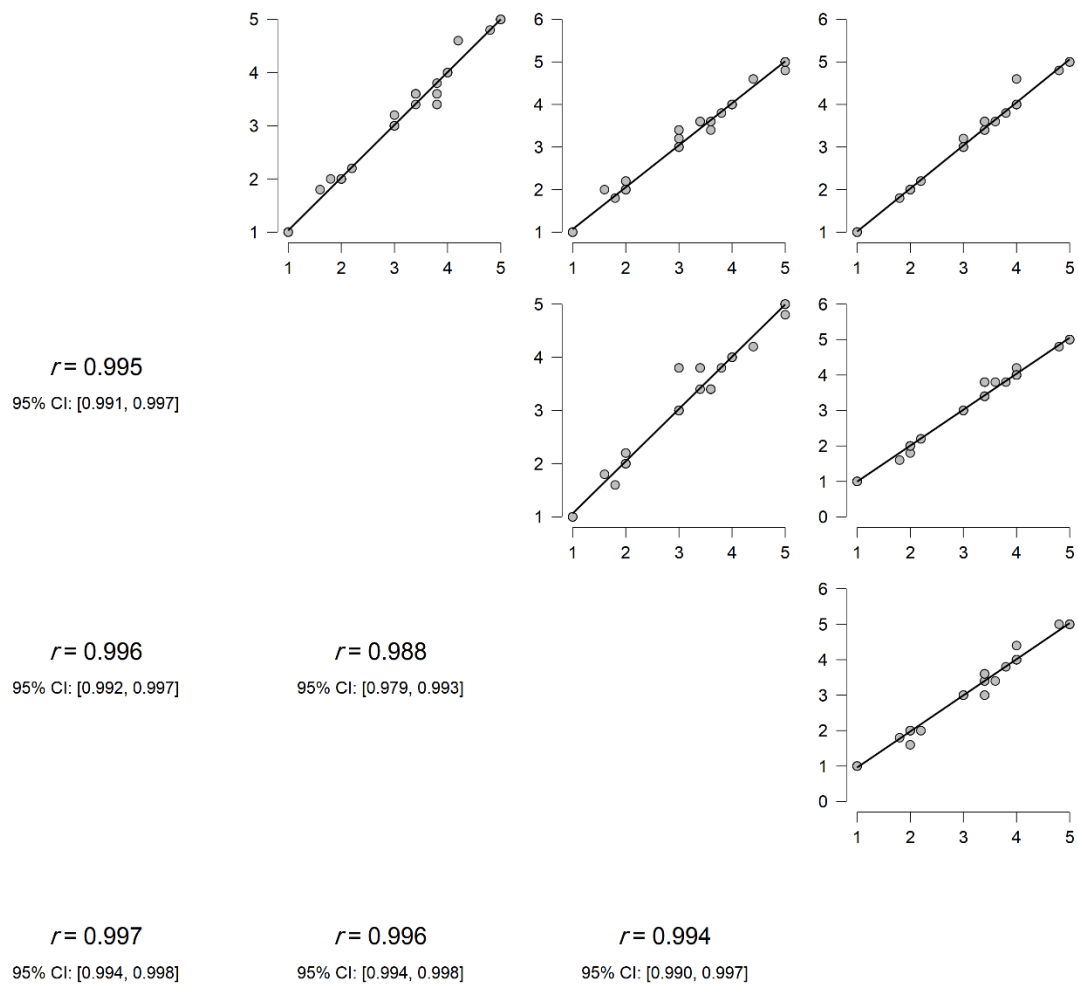


Figure 5

Exploratory Factor Analysis

Component Loadings

	PC 1	Uniqueness
Adoption Rates of Digital Tools and Technologies	0.998	0.003
Effectiveness of Project Management	0.998	0.003
Efficiency of Project Management	0.996	0.009
Extent of Digital Transformation Adoption in Project Management	0.996	0.007

Chi-squared Test

	Value	df	p
Model	29.870	2	< .001

Table 8 Exploratory Factor Analysis

The exploratory factor analysis (EFA) demonstrates that all four variables have high loadings on the principal component (PC 1), indicating they strongly correlate with this factor. The low uniqueness values suggest that most of the variance in each variable is explained by the underlying factor. The Chi-squared test result is significant ($p < .001$), indicating that the model fits the data well.

Principal Component Analysis

Component Loadings

	RC 1	Uniqueness
Adoption Rates of Digital Tools and Technologies	0.999	0.002
Effectiveness of Project Management	0.999	0.002
Efficiency of Project Management	0.997	0.007
Extent of Digital Transformation Adoption in Project Management	0.997	0.006

Component Loadings

				RC 1	Uniqueness
Chi-squared Test					
	Value	df	p		
Model	34.380	2	< .001		

Principal Component Analysis 9 Table

The principal component analysis (PCA) confirms the findings of the EFA, with all variables showing very high loadings on the principal component (RC 1). The extremely low uniqueness values indicate that the principal component accounts for nearly all the variance in these variables. The Chi-squared test result ($p < .001$) signifies a strong model fit.

Reliability Analysis

Scale Reliability Statistics

						95.0% Confidence Interval	
	mean	sd	McDonald's ω	Cronbach's α	Guttman's λ_6	Lower	Upper
scale	3.088	0.019	0.999	0.999	0.999	0.998	0.999

Note. Of the observations, 54 were used, 0 were excluded listwise, and 54 were provided.

Item Statistics

Item Reliability Statistics

	mean	sd	item-rest correlation	If item dropped		
				McDonald's ω	Cronbach's α	Gutmann's λ_6
Adoption Rates of Digital Tools and Technologies	3.111	1.248	0.998	0.998	0.998	0.998
Extent of Digital Transformation						
Adoption in Project Management	3.096	1.252	0.995	0.998	0.998	0.998
Efficiency of Project	3.070	1.259	0.994	0.998	0.999	0.998

Item Reliability Statistics

	mean	sd	item-rest correlation	If item dropped		
				McDonald's ω	Cronbach's α	Gutmann's λ_6
Management Effectiveness of Project Management	3.074	1.229	0.998	0.998	0.998	0.998

Table 10 Reliability Analysis

The reliability analysis indicates strong internal consistency among the survey items measuring adoption rates of digital tools, extent of digital transformation adoption, efficiency, and effectiveness of project management within Saudi financial institutions.

The scale shows high reliability with McDonald's ω of 0.999, Cronbach's α of 0.999, and Gutmann's λ_6 of 0.999, suggesting that the items collectively measure a consistent underlying construct.

Each item demonstrates strong reliability when considered individually, with McDonald's ω , Cronbach's α , and Gutmann's λ_6 coefficients all above 0.998. This indicates that each item correlates well with the overall scale, reinforcing the robustness of the measurement.

Conclusion

The analysis of the survey data on the adoption of digital tools and technologies in project management within Saudi financial institutions reveals several key insights. Firstly, there is a significant adoption of digital tools and technologies among the surveyed institutions, indicating a widespread recognition of their importance in enhancing project management practices. This high adoption rate reflects a proactive approach towards embracing digital transformation to improve operational efficiency and effectiveness.

The strong positive correlations between the adoption rates and both the efficiency and effectiveness of project management underscore the substantial benefits that digital transformation brings to these processes. Institutions that have integrated digital tools into their project management frameworks have reported marked improvements in both efficiency and effectiveness metrics. These findings suggest that the adoption of digital tools is not merely a trend but a critical component of successful project management in the modern financial sector.

Furthermore, the reliability analysis confirms that the survey instrument used in this study is robust, with high internal consistency across all items. This validation of the data collection method underscores the accuracy and reliability of the findings. It ensures that the insights drawn from this analysis are based on dependable and consistent data.

Additionally, the demographic analysis reveals that these trends are consistent across different age groups, job positions, and years of experience. This consistency indicates that the positive impact of digital transformation on project management is a broad phenomenon, not limited to specific subsets of the workforce. Regardless of age, job role, or experience level, employees within Saudi financial institutions are benefiting from the adoption of digital tools and technologies.

Suggestions

1. **Invest in Training and Development:** To maximize the benefits of digital tools, institutions should invest in comprehensive training programs that equip employees with the necessary skills to effectively utilize these technologies.
2. **Encourage Continuous Learning:** Promote a culture of continuous learning and professional development to ensure that employees stay updated with the latest digital tools and project management methodologies.
3. **Foster a Supportive Organizational Culture:** Develop a supportive organizational culture that encourages innovation and the adoption of new technologies. Leadership should actively promote and model the use of digital tools.
4. **Regularly Update Digital Tools:** Ensure that the digital tools and technologies being used are regularly updated and maintained to keep pace with technological advancements and changing project management needs.
5. **Measure and Monitor Impact:** Continuously measure and monitor the impact of digital tools on project management efficiency and effectiveness. Use this data to make informed decisions about future investments in digital technologies.
6. **Tailored Solutions for Different Roles:** Recognize that different job positions may have unique needs and challenges with digital tools. Provide tailored solutions and support to address these specific requirements.

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Appendix

Demographic Questions

1. Gender:
 - ☐ Male
 - ☐ Female
2. Age:
 - ☐ Under 25
 - ☐ 25-34
 - ☐ 35-44
 - ☐ 45-54
 - ☐ 55-64
 - ☐ 65 and above
3. Job Position:
 - ☐ Project Manager
 - ☐ Team Leader
 - ☐ Senior Manager
 - ☐ Analyst
 - ☐ Developer
 - ☐ Consultant
 - ☐ Other (please specify)
4. Years of Experience in the Financial Sector:
 - ☐ Less than 1 year
 - ☐ 1-3 years
 - ☐ 4-6 years
 - ☐ 7-10 years
 - ☐ More than 10 years

Questionnaire Questions

Adoption Rates of Digital Tools and Technologies

1. Our organization has widely adopted project management software for managing tasks and timelines.
 - ☐ Totally agree
 - ☐ Agree
 - ☐ Neutral
 - ☐ Disagree
 - ☐ Totally disagree
2. Collaboration platforms are extensively used in our project management practices.
 - ☐ Totally agree
 - ☐ Agree
 - ☐ Neutral
 - ☐ Disagree
 - ☐ Totally disagree
3. Automation technologies have significantly reduced manual tasks in our projects.
 - ☐ Totally agree
 - ☐ Agree
 - ☐ Neutral
 - ☐ Disagree
 - ☐ Totally disagree
4. Digital tools are integrated into our project management processes to a large extent.

- Totally agree
 - Agree
 - Neutral
 - Disagree
 - Totally disagree
5. The adoption of digital tools in our organization is continually increasing.
- Totally agree
 - Agree
 - Neutral
 - Disagree
 - Totally disagree

Extent of Digital Transformation Adoption in Project Management

1. Digital transformation initiatives have been fully integrated into our project management practices.
 - Totally agree
 - Agree
 - Neutral
 - Disagree
 - Totally disagree
2. Our project management processes have significantly changed due to digital transformation.
 - Totally agree
 - Agree
 - Neutral
 - Disagree
 - Totally disagree
3. Digital tools are crucial for the successful management of our projects.
 - Totally agree
 - Agree
 - Neutral
 - Disagree
 - Totally disagree
4. The extent of digital tool usage in our project management is high.
 - Totally agree
 - Agree
 - Neutral
 - Disagree
 - Totally disagree
5. Digital transformation has been a key focus in our organization's project management strategy.
 - Totally agree
 - Agree
 - Neutral
 - Disagree
 - Totally disagree

Efficiency of Project Management

1. Digital tools have significantly improved our project time management.
 - Totally agree

- Agree
 - Neutral
 - Disagree
 - Totally disagree
2. Resource allocation in our projects has become more efficient due to digital tools.
 - Totally agree
 - Agree
 - Neutral
 - Disagree
 - Totally disagree
 3. Our overall project workflows have been streamlined by using digital tools.
 - Totally agree
 - Agree
 - Neutral
 - Disagree
 - Totally disagree
 4. The use of digital tools has reduced administrative overhead in our projects.
 - Totally agree
 - Agree
 - Neutral
 - Disagree
 - Totally disagree
 5. Project management efficiency has improved with the adoption of digital technologies.
 - Totally agree
 - Agree
 - Neutral
 - Disagree
 - Totally disagree

Effectiveness of Project Management

1. Digital tools have helped us meet project deadlines more consistently.
 - Totally agree
 - Agree
 - Neutral
 - Disagree
 - Totally disagree
2. The achievement of project objectives has improved with the use of digital tools.
 - Totally agree
 - Agree
 - Neutral
 - Disagree
 - Totally disagree
3. Stakeholder satisfaction has increased due to the adoption of digital tools in project management.
 - Totally agree
 - Agree
 - Neutral
 - Disagree
 - Totally disagree
4. Digital tools have enhanced the overall quality of our project outcomes.

- Totally agree
 - Agree
 - Neutral
 - Disagree
 - Totally disagree
5. Our project success rates have improved with the use of digital technologies.
- Totally agree
 - Agree
 - Neutral
 - Disagree
 - Totally disagree