

Digital Transformation Adoption in Saudi Companies: Assessing Its Impact on Business Growth, Profitability, and Operational Efficiency

Table of Contents

1	Chapter 1: introduction	10
1.1	Introduction	10
1.2	Background of Study	12
1.2.1	Background of the Focus Area (Digital Transformation)	12
1.2.2	Background of the Industry (Banking in Saudi Arabia)	13
1.3	Current Situation of the Study	15
1.3.1	Current Situation of Digital Transformation in Saudi Banking	15
1.3.2	Current Status of Banking Performance in Saudi Arabia	17
1.4	Problem Statement	17
1.5	Research Objectives	19
1.6	Research Questions	21
1.7	Significance of the Study	22
1.8	Scope of the Study	23
1.9	Organization of the Thesis	24
1.10	Definition of Terms.....	25
1.11	Chapter Summary	26
2	Chapter 2: Literature Review	29
2.1	Introduction	29
2.2	Scope of the Chapter	30
2.2.1	History of Digital Transformation	31
2.2.2	Recent Changes in Digital Transformation.....	35
2.2.3	History of the Banking Sector	42
2.2.4	The Formation of Saudi Arabia's Banking Sector (1930s – 1960s).....	44
i.	Visual Suggestions:.....	Error! Bookmark not defined.

2.2.5	Latest Changes to the Saudi Banking Sector.....	46
2.3	Gaps in Literature	51
2.4	Definitions and Literature Review of Variables	55
2.4.1	Rationalization of relationships	60
2.4.2	Empirical Literature Matrix and Meta-Analysis	64
2.5	Meta-Analysis of Findings	69
2.5.1	Digital Capabilities of Organization and Digital Adoption	69
2.5.2	Digital performance: Adoption and Prosperity (Profitability, Growth, and Efficiency)	69
2.5.3	Readiness in terms of environment and adoption of digital arena.....	70
2.6	Theoretical Review	71
2.6.1	Theories Used (TOE, RBV)	71
2.6.2	Justification for the Framework.....	75
2.6.3	The Resource-Based View (RBV).....	77
3	Chapter3: Methodology	81
3.1	Introduction	81
3.1.1	Research Philosophy and Approach	82
3.1.2	Research Design	82
3.1.3	Data Collection Methods.....	83
3.1.4	Data Analysis Techniques	84
3.1.5	Alignment with Research Objectives.....	84
3.2	Variables.....	85
3.2.1	Conceptual Framework	85
3.2.2	Research Hypothesis	88
3.3	Research Design Process.....	90

3.3.1	Research Approach	91
3.3.2	Research Paradigm.....	92
3.3.3	Research Method	93
3.4	Sampling Design Process	96
3.4.1	Study Population.....	97
3.4.2	Unit of Analysis.....	98
3.4.3	Sampling Design.....	98
3.4.4	Sampling Technique	99
3.5	Instrument Development Process	101
3.5.1	Instrument Development	102
3.6	Data Analysis Process	104
3.6.1	Data Collection	104
3.6.2	Data Coding	104
3.6.3	Statistical Technique of Data Analysis	105
3.7	Findings from the Pilot Study.....	106
3.8	Chapter Summary	106
4	Chapter 4: Results and findings	107
4.1	Introduction	107
4.2	Data Screening and Preparation.....	109
4.2.1	Missing Data.....	109
4.3	Sample Characteristics	113
4.3.1	Demographic Information	113
4.3.2	Company Profile	115
4.4	Descriptive Statistics.....	121
4.4.1	Summary of Key Variables	122

4.4.2	Digital Adoption	125
4.4.3	Business Growth.....	127
4.4.4	Profitability.....	130
4.4.5	Operational Efficiency	133
4.4.6	Variable Correlation Snapshot (Optional Preview)	134
4.5	Factor Analysis and Reliability	136
4.5.1	Exploratory Factor Analysis (EFA)	137
4.5.2	Reliability Analysis.....	140
4.6	Structural Equation Modelling (SEM)	141
4.6.1	Confirmatory Factor Analysis (CFA): Measurement Models	141
4.6.2	Overall Model Fit.....	144
4.6.3	Structural Model and Hypothesis Testing	145
4.6.4	Mediating and Moderating Effects (Optional Exploratory Analysis).....	146
4.7	Interpretation of Results and Discussion.....	147
4.7.1	Impact of Digital Transformation on Business Growth.....	147
4.7.2	Impact of Digital Transformation on Profitability.....	148
4.7.3	Impact on Operational Efficiency	149
4.7.4	Influence of Organizational and Environmental Factors	149
4.7.5	Holistic Performance and Digital Maturity Mapping	150
4.8	Summary of the Chapter	151
4.8.1	Data Screening and Preparation.....	151
4.8.2	Sample Characteristics	152
4.8.3	Descriptive Statistics.....	152
4.8.4	Factor Analysis and Reliability	153
4.8.5	Structural Equation Modelling (SEM)	153

4.8.6	Interpretation and Discussion of Results.....	154
5	Chapter 5: Conclusions and Implications	156
5.1	Introduction.....	156
5.1	Preview of the Entire Study.....	157
5.2	Summary of the Findings	160
5.2.1	First Research Objective: Business Growth.....	160
5.2.2	Second Research Objective: Profitability	161
5.2.3	Third Research Objective: Operational Efficiency.....	162
5.2.4	Fourth Research Objective: Organizational and Environmental Factors.....	162
5.2.5	Fifth Research Objective: Holistic Performance Mapping	163
5.3	Implications of the Study	165
5.3.1	Implications for Academia	165
5.3.2	Implications for Banking Managers and Executives	166
5.3.3	Implications for Technology Strategists and Fintech Partners.....	166
5.3.4	Implications for Policymakers and Regulatory Authorities	167
5.4	Recommendations.....	169
5.4.1	Enhancing Digital Infrastructure and Investment.....	169
5.4.2	Strengthening Customer-Facing Innovations	170
5.4.3	Optimizing Operational Processes.....	170
5.4.4	Developing Digital Talent and Change Management.....	171
5.4.5	Fostering Strategic Partnerships and Fintech Collaboration	171
5.4.6	Enhancing Regulatory Engagement and Policy Frameworks	172
5.4.7	Promoting Financial Inclusion.....	172
5.4.8	Monitoring and Continuous Improvement	173
5.5	Limitations and Suggestions for Future Research	173

5.5.1	Limitations.....	173
5.5.2	Suggestions for Future Research	174
5.6	Chapter Summary	176

LIST OF FIGURES

Figure 2.1: Fraud detection process	37
Figure 2.2: Identifying Customer Needs	38
Figure 2.3: AI in Banking.....	38
Figure 2.4: Traditional Vs Blockchainbased cross borders payments	39
Figure 2.5: Blockchain	40
Figure 2.6: Fintech Product Development Process.....	48
Figure 2.7: Traditional Banking Vs Open Banking	49
Figure 2.8: Comparing the Regulatory Frameworks, Consumer Behavior, and Market Dynamics	58
Figure 2.9: Benefits of digital transformation in banking	59
Figure 3.1: Conceptual Framework Diagram	87
Figure 3.2: Research Design Flowchart	96
Figure 3.3: Sampling Design Flowchart:	101
Figure 4.1: Data Preparation Flowchart	112
Figure 4.2: Gender Distribution of Respondents	113
Figure 4.3: Age Distribution Bar Graph.....	114
Figure 4.4: Education Level of Respondents.....	115
Figure 4.5: Bank Type Representation.....	116
Figure 4.6: Organization Size by Employee Count	118
Figure 4.7: Line Graph – Digital Maturity by Company Size	119
Figure 4.8: Histogram – Digital Adoption Score Distribution	126
Figure 4.9: Boxplot – Business Growth Scores.....	129
Figure 4.10: Histogram – Profitability Scores.....	132
Figure 4.11:Boxplot – Operational Efficiency Score Distribution	134
Figure 4.12: Scree Plot of Extracted Factors	139
Figure 4.13: Bar Chart – Cronbach's Alpha by Construct.....	141
Figure 4.14: SEM path diagram.....	146
Figure 4.15: Correlation Plot – Digital Adoption vs Profitability	148
Figure 4.16: Digital Maturity vs Company Size	150
Figure 5.1:Performance Scores by Digital Maturity Tier	164

List of Tables

Table 2.1: Comparison of AML and CTF regulations before and after the reforms	49
Table 2.2: Empirical Literature Matrix	65
Table 3.1: Hypothesis Table	90
Table 3.2: Survey Question Table	94
Table 3.3: Sampling Criteria	101
Table 4.1: Frequency of Missing Data per Variable (Before Imputation)	109
Table 4.2: Boxplot of Key Variables Before and After Outlier Removal.....	110
Table 4.3: Skewness and Kurtosis Statistics of Major Constructs	111
Table 4.4: Age Distribution of Respondents	114
Table 4.5: Respondents by Designation.....	115
Table 4.6: Age of Bank Operations	116
Table 4.7: Company Size vs Digital Maturity	119
Table 4.8: Descriptive Statistics of Key Constructs	124
Table 4.9: Business Growth – Item-Level Summary.....	129
Table 4.10: Profitability Indicators	131
Table 4.11: Operational Efficiency – Descriptive Statistics	134
Table 4.12: Correlation Matrix (Excerpt).....	136
Table 4.13: Rotated Component Matrix (Varimax Rotation)	139
Table 4.14: Reliability Analysis – Cronbach’s Alpha by Construct.....	140
Table 4.15: Standardized Factor Loadings (CFA)	142
Table 4.16: CFA Model Fit Indices	143
Table 4.17: Full Structural Model Fit Summary.....	144
Table 4.18: AVE and CR Values	144
Table 4.19: Hypothesis Testing Results	145
Table 4.20: Summary of Construct Correlations	149
Table 4.21: Performance Scores by Digital Maturity Tier	150
Table 5.1: Implications by Stakeholder Group.....	168

1 Chapter 1: introduction

1.1 Introduction

The high rate of technological development has revolutionized the operational mechanisms, customer relations, and value delivery of organization in the contemporary market environment in every aspect (Abulibdeh et al., 2024). Digital transformation means implementing digital technologies in all aspects of the work of a company to cause fundamental changes in the nature of business, its work and business-to-business models. The transition does not concern the use of new technology only; it is more about remodeling the ways businesses produce and distribute value to their customers, improve their operations, and experience long-term expansion (Afonso and Jalles, 2013).

Digital transformation in the modern global economy cannot be overestimated. Because of the internet, mobile devices and other high technology practices mingling the world together, there is an ever-growing pressure on businesses to find new ways of doing things and to keep up with the changes (Agrafiotis et al., 2018). Those companies that manage to address the issues of digital transformation in a successful way will appear to be in a better position to improve their operational efficiency, stimulate business growth, and raise profitability. Conversely, some organizations that have been reluctant or slow in embracing the digital technology face the risk of becoming obsolete in the market, failure to retain consumers and eventually, they lose their sustainability (Ajayi-Nifise et al., 2024).

Digital transformation has assumed a specific significance in case of Saudi Arabia as the Saudi Arabia has a prestigious vision known as vision 2030. The government of Saudi Arabia has embarked on a national development strategy known as Vision 2030 that aims at diversifying the economy and limiting its dependence on oil, which has triggered many industries to consider reforming their operations and implement new technologies (Akaddaf, 2001). Digitalization has dramatically changed especially in the financial sector, where the Saudi banks are in the fore front to adopt digital technology including artificial intelligence (AI), blockchain, cloud computing, mobile banking and apps. These technological advancements will not only transform customer experience but also help trigger better business growth, profitability and efficiencies (Akour et al., 2022).

Digitalization (AI and big data) empowers banks and financial firms to process enormous data, foresee customer activity, and offer personalized services to banking clients. Scalability of infrastructure has been given by cloud computing and this has allowed organization to grow their services more agile than before at cheaper costs (Al-Fuqaha et al., 2015). Digital wallets and mobile banking apps are now needed to enhance customer conveniences and engagement, making them use it more and more, as well as experience satisfaction. Besides, such technologies as blockchain have increased security that minimizes the possibility of fraud, thus improving the level of trustworthiness of the operations (Al-Hanawi, Khan and Al-Borie, 2019).

In the Saudi Arabian business landscapes, digital transformation is a critical issue that individuals can use to achieve competitive advantages in an ever-changing market environment. Besides making the operations more efficient by automating repetitive procedures and minimizing operational interventions, it also allows making decisions simpler by ensuring that they are made based on real-time information through refined data analytics. Moreover, embracing digital technologies helps the companies to generate new sources of revenues, target unexplored markets and satisfy their customers in a more understandable and customized manner (Alalwan et al., 2018).

Digital transformation is especially critical in the banking sector because it leads to innovation and the development of customer loyalty in the financial industry. In a highly competitive industry, banks which deploy latest brands of technologies in their operations and offer better services are capable of generating and maintaining customers. Also, implementation of the digital solutions into the banking infrastructure enables to make cost savings and provide more effective management of resources. Rather than being an opportunity, the digital transformation to Saudi banks is the only measure that they can take to continue their growth and profitability, as specified in Vision 2030 (Albino, Berardi and Dangelico, 2015).

To conclude, digital transformation is one of the drivers of business success in the 21st century. In the case of Saudi Arabia, this paradigm shift has been important in ensuring that the objectives of Vision 2030 are met and a more diversified and innovation driven economy is achieved. With the adoption of digital technologies, companies, especially in the banking industry, will have a chance to boost their productivity, profitability, and general competitiveness and remain successful in the future (Albliwi et al., 2017).

1.2 Background of Study

1.2.1 Background of the Focus Area (Digital Transformation)

Digital transformation (DT) is a process of incorporating the digital technologies in every aspect of the business and changing the nature of operations and processes and how businesses bring value to the customers (Alemu, 2011). It does not merely consist of adopting new tools or software, but a more profound change of organization that includes a business model innovation, reorganization of an organizational culture and customer experiences redesign. Ultimately, the transformation of digital is the ability to use the emerging technologies to enhance efficiency, customer communications, and making businesses able to respond promptly to new market needs and the pressure of competition (Alexakis et al., 2019).

The components of digital transformation can be broadly categorized into four key areas:

Technology Adoption: The most basic block of digital transformation is the funding of technologies that includes the use of cloud computing, big data analytics, artificial intelligence (AI), machine learning, Internet of Things (IoT), blockchain and mobile technologies. Those technologies make processes more automated, analyze big data in real-time, and offer insights to make a decision. As an example, in the banking industry, predictive analytics that facilitates predicting customer behavior can be achieved with the assistance of AI and big data and the high scalable infrastructure of the cloud (Alharbi, 2015).

Operational Efficiency: Operation efficiency is one of the main advantages of digital transformation. Automated tasks, easier access to data, and time saving processes will help businesses cut the cost and utilize resources more wisely. This especially in the case of industries such as banking where with efficiency in operations, the process of service delivery becomes faster with fewer cases of error and fewer operational costs are incurred (Ali, 2014).

Customer-Centric Business Models: Digital transformation has very drastically changed the way companies interact with the customers. Businesses may reach their customers in a personalized way, offer enhanced customer assistance, and facilitate easier communication through such mediums as mobile applications, websites, and social media. Mobile banking apps, chatbots, and digital wallets allow customers to get seamless, secure, and convenient services and improve the customer experience in the banking industry (Alowais et al., 2023).

Cultural and Organizational Change: Digital transformation would also include a change of organizational culture. Business should be ready to be flexible, friendly, agile, and have the mind set of pursuing innovation, and get different departments in the business to collaborate, and make decisions fast. As an example, culture of risk-taking and experimenting increases the necessity to keep up with the development of technologies and constantly enhance the work of business (Alromaih, Ismail and Elmedany, 2022).

Digital transformation has had significant influence in different sectors and especially in the banking sector. In the case of banks, it is not merely a change on how they should use new technologies but it is also about how they could reform their business model to stay competitive in a progressively digital environment (AmericasBarometer, n.d.). The introduction of digital banking tools and solutions, such as mobile banking applications, mobile payment systems, artificial intelligence-based customer service, and the employment of blockchain in conducting safe transactions is becoming essential to generating business growth, increasing their profitability, and the satisfaction of customers. Also, regulators have been critical in helping to facilitate digital transformation by offering regulatory policies that encourage innovation and at the same time promote security and compliance. As an example, the Saudi Central Bank (SAMA) has launched the fintech regulatory sandbox which enables banks and fintech start-ups to innovate on new digital offerings, in a controlled environment (Amin et al., 2025).

1.2.2 Background of the Industry (Banking in Saudi Arabia)

Saudi Arabia banking sector has transformed tremendously in the recent decades with the change imposed by both, internal forces and the general economic and political environment of the Kingdom. So far, the banking sector of Saudi Arabia has been featured by the combination of traditional and Sharia-compliant (Islamic) banks which are regulated by the Saudi Arabian Monetary Authority (SAMA). Banking system in the country so far has been stable in the sense that they have good capital base, regulation, and the general growth of the economy of the country which has closely been associated with oil revenues (Anagnostopoulos, 2018).

Traditional products and services provided by Saudi banks include savings accounts, loans, investment products etc. Nonetheless, in the last ten years, the industry has grown to be more innovative in light of the digitalization of financial services and the emergence of fintech (Anam

and Sopiah, 2024). The shift towards digital banking can be considered a direct effect of consumer demands of more convenient, efficient and easier to use banking experience as consumers are now more tech-savvy and used to introducing conveniences of digital offerings. In reaction, Saudi banks have spent wide amounts to enhance their technology framework, computerize their activities, and enlarge their digital services (Arbouna, 2007).

Digital banking in Saudi Arabia started with the entry of online banking into Saudi Arabia in early 2000s where customers have a facility of doing basic banking transactions like balances, funds transfer, and bill payments on the internet (Asni, 2019). As the time went on, mobile-banking and digital wallets gained popularity and offered customers more flexibility and in-the-motion access to terms of service. The Saudi banks today, including the Al Rajhi Bank, National Commercial Bank (NCB), and the Riyad Bank are also using advanced technologies like artificial intelligence (AI), machine learning, and blockchain to serve its customers better, automate activities, and to provide better security (Azma et al., 2018).

In the banking industry in Saudi Arabia, by far the greatest influencer of the process of digital transformation has been the Vision 2030 program of the country. The Vision 2030 is a detailed strategy to make Saudi Arabia less oil dependent, diversify the economy, and create more knowledge-based and technologically sophisticated economy (Bahroun et al., 2023). In this vision, financial sector has been termed as an important area requiring reform and innovation. SAMA has deployed several initiatives through the Saudi Arabian government to promote the digitalization of financial services and improve the rise of fintech. These consist of regulatory reforms such as the fintech regulatory sandbox where the financial institutions and startups can test their innovative solutions in a controlled environment before presenting them to the market (Bai, Quayson and Sarkis, 2021).

As one of the key areas of the financial sector development program (FSDP) under the Vision 2030, digital banking has been a central topic. The introduction of open banking, digital-only banking licenses, and integration of fintech solutions into mainstream banking services have always been a topic of the discussion. The appearance of such digital-only banks as STC Pay and D360 Bank that do not have traditional branches but are rooted in the digital platform demonstrates the movement of the industry towards becoming fully digital regarding the services of banking. Moreover, the growing popularity of mobile banking applications, online payment wallets (such

as Apple Pay and STC Pay), and more complex payment systems are making the competitive environment change (Bakos, 1991).

Nevertheless, along with these developments, the banking sector in the Kingdom of Saudi Arabia continues to encounter various issues concerning digitalization. It is apparent that there is a digital divide in size and established banks, which have invested much in digital infrastructure and small, regional banks who are falling back in the race. Also, although mobile banking and online services have undergone substantial advances, issues of cybersecurity, privacy of information and data compliance appear to be major issues that are urgently needed to guarantee success of digital projects (Ballot, Montreuil and Zacharia, 2021).

To sum everything up, the banking sector in Saudi Arabia is on the edge of a big shift towards digitalization, not only due to the governmental direction in the context of Narodny-paideyskiy plan but remarkably because of the growing interest in more effective and client-oriented services (Baloch et al., 2019). Although a lot has been accomplished, there is still a way to productively negotiate the digital divide between large and smaller banks, security and data privacy concerns. The current banking sector evolution is ready to go further to contribute to the economy through diversification, improve the competitiveness of Saudi banks, and offer novel opportunities to businesses as well as customers within the Kingdom (Barrett et al., 2015).

1.3 Current Situation of the Study

1.3.1 Current Situation of Digital Transformation in Saudi Banking

The Saudi banking industry has experienced major digitalization over the last few years, which is fueled by the enhanced level of technology and development of the vision 2030 of the government. This transformation is characterized by a number of digital technologies that are embraced to improve the efficiency of operations, the experiences of customers, and competitiveness, in general (Beck et al., 2018).

Adoption of Digital Technologies

Major Saudi banks have embraced a range of digital tools and platforms to modernize their operations. These include:

- 1. Mobile and Internet Banking:** Banks have come up with efficient mobile banking and internet banking where a customer can carry out transactions, access services, and manage his account remotely. This transformation has made access and convenience easy to customers (Beck, Lin and Ma, 2014).
- 2. Artificial Intelligence (AI) and Machine Learning:** Such tasks as credit scoring, fraud detection, and personalized customer service are carried out with the help of AI technologies. The usage of machine learning algorithms examines the data of customers in order to provide them with customized financial goods and services.
- 3. Cloud Computing:** With the transition to cloud infrastructure, banks have managed to streamline their operations, cut expenses, and use data storage opportunities to improve their processing (Bhatiasevi and Naglis, 2018).
- 4. Blockchain Technology:** Some banks are investigating the possibility of using blockchain to process transactions with a high level of security and transparency, especially in such directions as cross-border payments and smart contracts.

Impact on Operational Efficiency

Use of digital technologies has contributed to significant gains in terms of operation efficiency in Saudi banks. Routine work processes have been automated, and services digitized, which has been saving Internal institutions plenty of money by making physical branches and manual operations unnecessary. The use of digital tools has made the process easy to operate, improved the rate of processing, and the minimization of the human error factor which leads to increased overall effectiveness (Bini et al., 2008). The use of advanced data analytics and cloud computing has enhanced data storage, retrieval and analysis so that it can be used in the effective decision making and plans. Chatbots and virtual assistants built on AI help 24/7 to answer and resolve questions and problems in the shortest possible time. Nevertheless, despite the observations, the digital transformation process has some challenges (Binsaeed et al., 2023). The more digital platforms are utilized, the more likely it is that there will be an occurrence of cyber threats, which require solid security strategies to guard the critical data about customers. Although urban regions have high rates of digital adoption, there is a significance of improving digital literacy in the countryside so that they are not disregarded on any aspect of receiving banking services. The need to adjust to

fast changing digital regulations, and meet international standards continues to be a challenge among banks (Broby, 2021).

1.3.2 Current Status of Banking Performance in Saudi Arabia

Saudi banks have demonstrated their resilience and growth in performance, which is due to the adoption of digital transformation and positive economic circumstances. There is a positive Return on Assets (ROA) amount maintained by banks showing good use of assets. The Return on Equity (ROE) has been very strong meaning the shareholder equity has been done well. The average total net income (+13.5 year-on-year) of Saudi banks stood at SR79.6 billion 2024. This increase is credited to an optimized digital transformation, automation and cost control strategy. Digital initiatives have led to the enhancement of operational efficiency (Brown and Wyatt, 2018). The cost/income ratio went down and fell to 31.3 percent in 2024 as compared to the previous year of 31.9 percent showing improved costs incurred along with income earned. They were able to show effective expense control measures as operating expenses also increased at a relatively gradual rate (7.1%) compared to the operating income (9.3%). Although performance indicators are satisfactory, some weak points should be improved. The small banks could be left behind when embracing digital banking and this could interfere with their competitiveness and customer satisfaction (Brynjolfsson and Hitt, 2021). Digital tools have improved the delivery of services; however, there is the need to keep improving so as to keep up with the changing customer expectations. Banks have to develop an innovative and nimble culture to react quickly to the market fluctuations and improvements in technologies. Overall, Saudi banks have achieved vast progress in the digital transformation, which has resulted in the improvement of operation efficiency and profitability. Nevertheless, in order to ensure the sustainability of growth and competitiveness in the changing field of the financial environment, it is important to eliminate the existing problems and gaps (Budhwar et al., 2019).

1.4 Problem Statement

In the current world, online transformation has emerged as one of the major key factors contributing to business success in many of the sectors in the world and the banking sector is not an exception. Cloud computing, artificial intelligence (AI), blockchain, and mobile applications are some of the technologies integrated into the functioning of banks so that the way of banking,

customer interactions, and internal operations changed. In Saudi Arabia, the banking sector as well has embarked in a transformational journey being much dependent on the Vision 2030 initiative also known to focus on the idea of digital innovation as one key pillar of economies diversification and growth (Buehn and Schneider, 2007).

Although there is an ongoing digital trend that manifests in Saudi banks in adopting digital and dealing with it, empirical evidence of the real impact that digital transformation has made in core banking performance measures (i.e., business growth, profitability, and operation efficiency) is lacking. Current literature in Saudi Arabia is more inclined to the adoption of digital banking services by customers, user satisfaction, and technological preparedness (Bughin, Kretschmer and Van Zeebroeck, 2021). But no profound study has been performed which critically examines the effect of adopting digital technologies on the total performance of banks in terms of its profitability, its efficiency and growth in the market.

Although most pieces of international literature on the digital transformation of banks look at how digital tools can enhance customer experience and simplify operations, not much has been documented on how digital adoption has direct comparisons with the physical output of the business in the Saudi banking environment. Most research is either based on single technologies, customer focused theory or narrow views that organisations are complete units of organisational performance and the inter-relationship between various technologies in order to achieve operational efficiencies and business prosperity (Buhalis and Law, 2008).

Furthermore, there is a considerable body of literature that does not draw the line between various phases of digital transformation (i.e., digitization to the full-scale digitalization) or does not take into consideration the specifics of Saudi banking environment, including the composition of conventional and Sharia-compliant banks, regulation drivers, and the fast-growing fintech sector (Cahyadi and Magda, 2021). These literature gaps pose a problem as banks, policymakers and researchers will not be in a position to comprehend fully the key aspects which determine the effectiveness of going digital and its direct impact on the performance of banks.

Most of the related studies are based on technology preparedness of banks, customer attitude, but the internal assets needed to successfully embrace digital perspectives such as IT infrastructure, organizational culture, and administration support has not been given much consideration.

Moreover, the absence of an inclusive model that links the multiple factors of the digital transformation (including digital capabilities, environmental factors, and digital adoption) to the key performance outcomes can be identified (Campagna and Bhada, 2024).

Therefore, this study identifies the gap in the research by stating that no research work has shed light on the impact of digital transformation of Saudi banks on key performance indicators of the banks such as profitability, operational efficiency and business growth in the unique context of Saudi Arabia in terms of socio-economic characteristics, and regulatory environment (Cao and Iansiti, 2022). The presence of such a gap restrains the possibility of banks to undertake strategic investment in suitable digital tools and distribute the resources in the context of maximum results.

The proposed study would address this gap by exploring the correlation between digital transformation and the banking performance based on such key performance indicators that would indicate the direct effects of digitalization adoption on the profitability, effectiveness, and over bearing growth of the Saudi banks (Carlo, 2016a).

1.5 Research Objectives

To examine the effects of the digital transformation on the performance of the Saudi banks is the main focus of the study. The research aims to define the impact of the introduction of digital technologies on such metrics of the performance of the bank as its business growth, profitability, and efficiency of its operations. With the purpose of reaching this goal, the following specific objectives are given:

1. To Assess the Level of Digital Adoption in Saudi Banks

Such an aim can be pursued to determine the degree to which Saudi banks have implemented different digital technologies, including mobile banking, AI, blockchain, cloud computing, and digital wallets. It will concentrate on determining the most popular technologies used within the industry, which obstacles are there to using them and examining the digital maturity level of Saudi banks (Carlo, 2016b).

2. To Examine the Impact of Digital Transformation on Business Growth

This is an objective that will seek to find out the effects of digital transformation in Saudi banks on their capacity to expand in terms of the market share, number of customers, and

products/services offered (Cella et al., 2007). This paper will evaluate how the digital tools and approaches have made banks enter new markets and perform their business on a larger scale, generating more customers.

3. To Analyze the Impact of Digital Adoption on Profitability

Any bank depends on profitability as an important performance measure. The purpose of this objective is to review the implications of the use of digital technologies on the issue of profitability of Saudi banks (Chang and Octoyuda, 2024). There will be inquiry of the connection between digital transformation and profitability indicators - return on assets (ROA), return on equity (ROE), and net profit margins will be the focus points. It will also engage the role of digital initiatives in the reduction of costs and revenue (Chataut, Nankya and Akl, 2024).

4. To Evaluate the Effect of Digital Transformation on Operational Efficiency

The research will encompass the discussion of the advantage of digital transformation in making operational processes of Saudi banks more efficient. This is done by reviewing automation of banking operations, de-manualization and optimization of resources. It is to be expected to evaluate how digital tools can influence the cost of operations, the time of a transaction, and its whole delivery (Chittipaka et al., 2022).

5. To Develop a Comprehensive Model Linking Digital Adoption and Performance Metrics

This goal will entail building a conceptual model that connects different conditions which form part of the digital adoption process (including internal capabilities, the technology utilization, and external conditions (e.g., government support)) with the main performance outcomes (business development, profitability, and efficiency). The aim of the model will be to develop a strategic platform through which the relationship between digital transformation and banking performances in Saudi Arabia will be seen (Chong et al., 2015).

6. To Identify the Organizational and Environmental Factors Influencing Digital Transformation

The aim of the goal is to determine and examine the internal (e.g., leadership support, IT infrastructure) and external (e.g., government policies, market competition) variables which impact successfulness of digital adoption within Saudi banks (Chonsawat and Sopadang, 2021). It will investigate the relationship between the factors and the mediation that they play in the connection between digital transformation and the performance of banking. Having accomplished the above goals, this study will be able to offer useful details about the advantages and difficulties of digital transformation among Saudi banks. It will enable banks to gain more insight into the role of digital technologies in performance enhancement and enable policymakers to design the strategies that would promote digital innovation in the sphere of banking (Cosentino, 2022).

1.6 Research Questions

The research questions inform the study and they are based on the essence of digital transformation and its effect on the performance of Saudi banks. Key questions to consider will be as follows:

1. How digitally advanced are the Saudi banks?

This question is supposed to measure the extent of adoption of different digital technologies into the banking activities and services in Saudi Arabia.

2. What are the impacts of digital transformation to the growth of businesses in Saudi banks?

The question aims at determining what the connection between the digital adoption and the expansion of the Saudi banks entails (with regards to customer acquisition, market expansion and new services).

3. How does digital transformation affect profitability of Saudi banks?

This question aims at addressing how digital adoption affected key performance metrics of profitability, including return on assets (ROA), return on equity (ROE), and financial performance in general.

4. What is the impact of digital adoption towards operational efficiency within banks of Saudi Arabia?

This question focuses on the connection between digital transformation and organizational efficiency focusing on the aspects of cost reduction, automation of processes, and service delivery.

5. What are its internal and external factors that can determine the level of success of digital transformation of Saudi banks?

This question answers the organizational and environmental motivations of digital adoption i.e., leadership support, the boundaries of regulation and market forces.

6. Which are the main performance metrics they generate in digital transformation of Saudi banks, and which are connected to process improvement, organizational growth, financial gain as well as the growth and profitability of a business?

The last question seeks to capture the overall perspective of how digital transformation influences performance with connection to the major banking growth, profitability and effectiveness analytics.

In its exploration of the topic of how digital transformation affects the banking performance in Saudi Arabia, these research questions will assist in charting the path in both the positive and negative aspects of the digital transformation as well as the challenges, which banks experience in going digital.

1.7 Significance of the Study

This research is of great academic and practical importance besides its policy value especially in the light of the banking environment in Saudi Arabia that has been rapidly changing. The thesis will provide a contribution to the literature on digital transformation paying special attention to case of the banking sector in Saudi Arabia. Although the amount of research on digital transformation in banking across the globe is high, gaps have been observed in the form of empirical studies looking into the effects of digital adoption on key performance indicators in business growth, profitability, and efficiencies in an operation within Saudi. This gap will be filled by the study and hence providing insightful information on impacts of digital changes on the operational and financial performance of Saudi banks that have never been explored in the already existing scholarly literature (Cvetkova, 2018). Moreover, the combination of several theoretical approaches, including the Technology-Organization-Environment (TOE) framework and the

Resource-Based View (RBV), helps make the current research more detailed and complex in the description of the processes of digital adoption and the associated results. To the practitioners in the banking sector, the research results are of practical value in terms of the guidance on how banks can strategically invest in digital technologies to improve their business. The research piece reveals that matching digital transformation efforts with organizational aims is critical to performance to deliver quantitative gains in profitability and operational efficiency. It will also give feasible suggestions to bank managers and decision-makers about important digital abilities, technologies, and management practices contributing to successful transformation. Investigating the impact that the digital transformation of the business has on its further development is particularly crucial for Saudi banks that have to remain competitive in the context of the growing digital and customer-centered financial environment.

Policy-wise, the researcher can provide gold information to regulatory agencies like the Saudi Arabian Monetary Authority (SAMA) which still is formulating the regulatory framework of digital banking. The results of the research will support policymakers to familiarize themselves with the effects of the digital transformation introduced to the performance of banking and guide further rules in the area of digital adoption, cybersecurity, data privacy, and fintech integration. Moreover, the analysis will be helpful in achieving the objectives of Vision 2030 that are aimed at diversifying as well as innovation within various sectors of the Saudi economy, including the financial one. Through the presentation of such benefits and shortcomings of the digital transformation, the study gathered facts that can be used to formulate a policy action in order to create a more mature and comprehensive digital banking system in Saudi Arabia (Dalfovo et al., 2017).

1.8 Scope of the Study

The aim of this study is confined to the banking industry of Saudi Arabia, in particular to the effect that digital transformation is having on the growth of businesses, perception of and business profitability as well as efficiency of operation. The study will involve the analysis of how Saudi major banks have implemented digital technologies like mobile banking, artificial intelligence, blockchain and cloud computing and how these technologies have helped in their overall performance (Dashkevich, Counsell and Destefanis, 2020). Only commercial and Islamic banks

operating in Saudi Arabia shall be taken into consideration in the study since they are the main financial institutions of that country.

This research will be methodological in both a qualitative and quantitative way. A mixture of methods of primary data collection e.g. survey and interviews and secondary data analysis, e.g. financial reports and industry publication will be adopted. It will do a study of the organizational and environmental influences in the digital adoption within the Saudi Arabian banks regardless of the internal abilities such as the IT infrastructure, the support of the leadership and external forces including regulatory environment and market forces. The collected data to be analyzed will include determining the degree of digital adoption and its direct outcome on the performance measure of Saudi banks.

This thesis will not consider the behavior of customers or their satisfaction levels and it will rule out using the banks which are not located in Saudi Arabia since the major purpose of this paper is to evaluate the effects of digital transformation at an organizational level (Demirguc-Kunt and Klapper, 2012). Moreover, the paper will not discuss all technological tools applied in the banking industry but will concentrate ones that contributed to the performance the most, including AI, cloud computing, and blockchain.

1.9 Organization of the Thesis

This thesis is organized into five main chapters:

Chapter 1: Introduction

The chapter defines the research topic, states the background of the research, the research problem, the research objectives as well as the research significance. It also provides the research questions as well as the scope of the study, which forms the basis of the rest of the thesis.

Chapter 2: Review of Literature

The chapter will provide a critical analysis of the current body of literature on digital transformation with a reference to the banking industry. It addresses the historic development of digital transformation, major theories and models involved in the research of digital adoption work and empirical studies involved in the investigation of the effect of digital technologies on business

performance. The chapter also shows that not much has been done and the research should help to fill the gaps in other research studies.

Chapter 3: The research methodology

The chapter provides the description of the research design, methodology, and data collection method of the study. It talks about the qualitative and quantitative aspects, the sampling method and method used in data analysis to answer the research questions.

Chapter 4; Results and Discussion

This chapter illustrates the results of data analysis and discusses them. It looks at how digitalization has affected the overall performance of Saudi bank according to their core performance indicators including business growth, profitability and operational efficiency. The relative concept between digital adoption and organizational performance also fell within the gaps of the chapter as they, theoretically, found their fundamentals in the previous chapters.

Chapter 5: Conclusions and Implication

The concluding chapter is a summary of all the findings and implications of the study to the banking sector and the policymakers. It gives advice to banks and regulatory authorities to maximize the advantages of digital transformation, it covers the shortcomings of study and also gives new areas of research.

1.10 Definition of Terms

Digital Transformation:

Digital transformation This can be described as a transformation of how organizations conduct their business towards combining all platforms of the business with the digital technologies, which transforms the entire organization and its operations, customer interaction, and delivery of value. It is associated with the application of cloud computing, artificial intelligence, big data analytics, and blockchain to optimize the processes and improve businesses.

Digital Adoption:

Digital adoption refers to the process through which organizations are integrating digital technologies in their operations, products and services. It entails the switch between conventional ways of doing business and alternatives that are more mainstream and technologically oriented, using the digital tools to their maximum effectiveness and innovativeness.

Profitability:

Profitability is an index of how much a company earns in comparison with other revenues, assets, or stock. Some of the most common metrics that are applied in determining profitability are Return on Assets (ROA), Return on Equity (ROE), and net profit margin. Profitability in relation to the case of banks is the level at which a bank multi-tasks its assets to earn an income.

Operational Efficiency:

Operational efficiency means the capacity of a bank to produce its services on minimum cost basis and also in an optimal way. It entails the minimization of waste, reduction in the use of resources, and enhancement of speed as well as precision of the processes. Useful performance measuring metrics of operational efficiency entail the cost to income ratio and times of transactions processing.

Business Growth:

Business growth Business growth is an overall rise in the size, revenue, market share, or the number of customers of a given company with the course of time. Business growth in banking is normally quantified by increase in the number of customer accounts, market share and launching of new financial product or services that entices and maintains customers.

1.11 Chapter Summary

The structure of this chapter acts as the introductory background to the thesis in preparing the groundwork to the thesis content that follows. It starts with the introduction of the study background that deals with the transformation of digital banking in Saudi Arabia. The recent years have been characterized by major technological changes within the banking sector of the Kingdom, both as the result of the market conditions and the governmental effort especially through Vision 2030 (Demirguc-Kunt, Pedraza and Ruiz-Ortega, 2021). The study is particularly useful in knowing how the economy is to go with the development of the industry in future due to this

initiative to diversify the economy and improve the digital capacity of different sectors, including the banking sector.

The chapter then presents the problem statement, which illuminates the research gap in the already existing literature related to the direct effects of digital transformation on the banking performance indicators, such as profitability, business growth, and operational efficiency in the concrete environment of Saudi Arabia. Although most of the research on digital transformation in the banking sector has been conducted worldwide, a limited number of studies have been done domestically, namely, in Saudi Arabia and related to the ways the digital transformation of banks (through the implementation of digital technologies notably artificial intelligence (AI), blockchain, mobile banking) affects key performance indicators of banks. The relevance of such research gap is that it reduces the capacity of the banks, regulatory organizations and policymakers to make informed decisions in respect of investments into digital technologies and their likely affects on the banking performance (Digital Transformation Adoption, 2023).

After exposing the problem, the chapter proposes the research objectives. The overall aim of the research is to determine the degree of digitalization of Saudi banks and its direct effect on major performance. The project aims at identifying the impact of digital adoption on profitability, efficiency and business development. Such particular research questions, on which the investigation is conducted, are also stated in the chapter: "What is the effect of digital transformation on Saudi bank profitability?" and What are the drivers of effective digital adoption amongst Saudi banks? The following questions are meant to answer the crucial gaps in the currently implemented research and allow to fill them in with practical information.

In this chapter, the meaning of the study is clearly defined. Academically, the study would be bringing new light in the literature of the digital transformation in the banking sector and especially in Saudi Arabia. In the study, the researcher provides a scrutiny perspective of the impact of digital adoption on performance which had not been comprehensively researched in this part of the world. In practical terms, the study would assist the industry practitioners in better understanding how to adopt the approaches to digital transformation to enhance profitability, operational efficiency, and the satisfaction levels of customers, especially the managers and decision-makers in the banking sector (Din et al., 2018). Moreover, it is also of utmost relevance to policymakers and the regulations departments, like the Saudi Arabian Monetary Authority (SAMA) because the research

can direct policymaking that promotes sustainable and safe digital transformation in the banking sector.

The area of my research is well outlined as it will only cover the banking industry in Saudi Arabia. It looks at some of the largest commercial and Islamic banks, operating in the Kingdom and determines the extent to which they have embraced the digital technologies. The research methodology that is a mixture of both qualitative and quantitative approach is also noted. To achieve this, the research will focus on both primary and secondary data in terms of surveys and interviews and secondary data (industry publications and financial reports) to ensure that it has as much understanding as possible regarding the effect of digital transformation.

Lastly, the chapter gives a description of the structure of the thesis. In the following chapters, the literature review will be expanded upon further, including the discussion of applicable theories and prior research on the topic of digital transformation in banking. The research methodology will be represented in detail in Chapter 3, along with the description of ways data would be gathered, analyzed, and interpreted. The data analysis will be demonstrated in Chapter 4 and the findings will be discussed in the same chapter, whereas Chapter 5 will include the conclusions, the policy recommendations, and recommendations on further research. The thesis structure is patterned to bring a logical and systematic discussion of the topic with every chapter adding on the next in order to end up with practical ideas that can be used by the banking industry in Saudi Arabia.

The chapter has prepared an overall framework of examining the current findings about digital transformation in Saudi banks, which points out the objectives, relevance, and methodology path of the study and gives an outline of how the thesis shall be treated to answer the research questions (Doyle, 2002).

2 Chapter 2: Literature Review

2.1 Introduction

The chapter of Literature Review presents a comprehensive basis of examining digital transformation in Saudi banking sector and how it affects the performance measure of the Saudi banks. This chapter aims at critical analysis of the existing body of literature on digital transformation with references to the global and local perspectives of digital transformation taking a special focus on the banking industry (Drath and Horch, 2014). The review will also enable placing the research in the bigger theoretical and empirical context with specific trends, challenges, and gaps in the literature that the research will fill. Considering the main task of this chapter to construct a solid theoretical framework and provide the current context of the research, it is necessary to address central insights in available academic and industry sources on digital transformation in banking.

In this part of the chapter, one can trace the development of digital transformation in the banking industry: the changes, which took place since digitization arrived to digitalisation and, finally, into the process of digital transformation. It will review the historical evolution of important digital technologies including the emergence of mobile banking, AI, blockchain, and big data, and they are starting to permeate the work of a bank (Dwivedi, Alabdooli and Dwivedi, 2021).

A critical appraisal of theoretical frameworks that have undergone application in the bid to comprehend the digital transformation in the banking sector will be provided. The Technology-Organization-Environment (TOE) framework, the Resource-Based View (RBV), and Dynamic Capabilities Theory (DCT) will be identified as the key ones that will be discussed in detail. These models will give the lens in which the study will determine the organizational, technological and environmental factors that contribute to the adoption of digital in Saudi banks (Dwivedi, 2022).

The chapter will evaluate and summarize the empirical research based on the digital transformation and its effects on bank performance. It shall be dealing with the way the different technologies impact the business growth, profit and efficiency of operation both in the developed market and emerging markets situations and comparing where differences are and citing the issues that the Saudi banks are facing (Dwivedi, 2023).

The literature review will determine the literature gaps in the banking sector of Saudi Arabia in terms of digital transformation. Despite the abundance of studies that examined the issue of digital adoption in the banking industry all over the world, there is no dedicated research studying the effects of such adoption in Saudi banks in particular and their corresponding performance results. This paper intends to fill these research gaps by giving an in-depth explanation of the dynamics between digital transformation and the main banking performance measures (Dwivedi et al., 2021).

In availing these purposes, this chapter will precondition the conceptual framework and hypotheses that shall be generated later in the chapter. The given literature review is not only aimed at discussing what has already been learned about digital transformation, but also at identifying which knowledge gaps still need to be filled, especially when it comes to the banking industry in Saudi Arabia that is rapidly developing (Effect of Gender and Regions, 2022).

2.2 Scope of the Chapter

This chapter is highly extensive, since it dwells upon not only the global tendencies but also situation in the banking sphere in Saudi Arabia. Although it helps realize the global character of digital transformation, it mainly targets the environment of Saudi banks and the peculiarities of how they have to deal with digital transformations (Engin and Treleaven, 2019). Both the theoretical and empirical dimensions of digital transformation are also included in the chapter and thus offer a profound insight into the topic at hand.

The literature review focuses on the different areas of digital transformation, including the technologies themselves, organizational preparedness and compliance. The literature review is also cross-sectional in terms of the varying theoretical perspectives of the topic; the earlier models of technology adoption to more current theories on dynamic capabilities, resource-based strategies (Financing Climate Futures, 2018). The chapter will therefore present an overview of the state of digital transformation in a coherent manner, intertwining theoretical aspects with reality in a manner that reveals the existing gaps in its coverage and which will be fulfilled by the study.

Finally, the chapter on Literature Review is the part and parcel of establishing the research background. The review of the main theoretical frameworks, assessment of empirical studies, gaps in the existing research, and the historical background will provide the solid foundation to the study. The chapter will not only inform the conceptual framework, hypotheses of the study but it

will also inform the methodology and data analysis in subsequent chapters. The information obtained during the current review will be critical to comprehend the issues and intricacies of digital transformation in Saudi banks, and how it affected the performance of these banks (Floridi, 2014).

2.2.1 History of Digital Transformation

Digital transformation is a term that has gone through a remarkable transformation in the last few decades whereby its perception has gone beyond mere digitization process to a wholesome turnaround in the way a business operates, interacts with customers and the value it creates. Digital transformation incorporates the usage of digital technologies in every aspect of business and essentially changes the ways of operation and value provision to customers in organizations. In order to comprehend the process of digital transformation, it would be interesting to trace its emergence in the worldwide setting, drawing specific attention to the way this concept is implemented into the banking industry (Frączkiewicz-Wronka and Szymaniec, 2013).

2.2.1.1 Early Stages: Digitization and Automation (1950s-1980s)

Digitization is what marked the inception of the digital transformation journey and it mainly entailed the conversion of analog data into digital data to achieve efficiency in the operations. The 1950s and 1960s were associated with the beginning of digitalization in the banking industry as computers also came to regulate simple operations like deposits and withdrawals. The mainframe computers played an important role in storage and processing of large quantities of information that enabled banks to phase out the traditional manual operation where ledgers were operated and maintained manually, a procedure that time consuming and error prone (Frenk, Chen and Bhutta, 2020). This era was the dawn of automation in the banking sector and some of the major innovations done in this period include the Electronic Funds Transfer (EFT) system which was introduced in 1970s to enable the transfer of secure and effective money transfer between the banks.

During the 1980s, the banking institutions had started investing in information technology systems that enabled them to have better transaction processing and data management (Gabor and Brooks, 2017). The creation of ATM machines (Automated Teller Machines) brought the concept of customer care to a different level ensuring service availability of core banking 365 days and 24

hours a day. But still the technology of this time was confined to individual systems and the majority of the processes at this time were manual in the banks and only some of the core banking functions were getting automation.

2.2.1.2 Digitalization: The Rise of the Internet and Online Banking (1990s-2000s)

The opening of Internet and the fast pace of personal computer evolution started to have a serious effect on the existing way of business in the 1990s, and this change concerned banks as well. Digitalization was no longer limited to the internal processes automation, but to the integration of digital technologies in services provided to customers (Gangwar, Date and Ramaswamy, 2015). The banks began relying on the use of online banking, and the clients could now be in their homes and check their account balances, transfer money, pay bills, and investigate their financial statements. This advance acted as one of the major milestones in the change of banking sector because the Internet had offered the infrastructure to link the customers to their banks in new and convenient methods.

Introductions of digitalization changes continued into the new millennium as the challenge was reformulating business models and relations with customers, rather than the sole approach to digitalization being records and transaction digitization. Banks started to provide more extensive online services and this strategy made them more available and efficient (Geldsetzer, 2020). To illustrate, the turn of the century and the emergence of e-banking and internet banks which gave users access to do more banking activities online. The innovations did not only help cut down the number of attendance at the bank but also brought in the concept of improved customized convenience and efficiency in delivering the services (George, Lakhani and Puranam, 2020).

Meanwhile, banks were also incorporating schemes of digital payments like online bill pay and electronic money transfer, popularized in the 2000s. During this time, credit card payment gateways and digital wallets also emerged where consumers can continue their transactions online and no longer require physical credit cards. These were initially digital tools that were predominantly transactional; they started to form the basis of more holistic, customer-oriented digital bank experiences in subsequent years (Gheeraert and Weill, 2015).

2.2.1.3 The Digital Revolution: The Integration of Advanced Technologies (2010s-Present)

The decade of the 2010s was marked by a paradigm shift associated with the outlook on digital transformation in the banking sphere, and the following emergence of more advanced digital technologies largely promoted this modus operandi. The era characterized the actual start of the digital banking revolution, whereby financial establishments started to embrace the use of some of the most advanced technologies, like cloud computing, artificial intelligence (AI), big data, blockchain, and mobile apps (Giawa and Saragih, 2020). Those technologies gave a new set of more potent tools to banks to augment individual encounters with customers, streamline practices, and generate innovation.

Cloud Computing emerged to be the game changer in the banking industry because the scalable infrastructure provided the banking firms with the opportunity to store and process massive data and lowered the financial expense they would have incurred to maintain the data centres on their own premises. Cloud-based systems enabled improved inter-departmental and intra-departmental collaboration, real-time data analysis and created more flexible, and agile banking solutions (Gielen et al., 2019).

The expansion of digital transformation in the banking sector was further enhanced by applications of mobile banking. In the mid-2010s, smartphones became omnipresent, and banks were in a hurry to adjust to this reality, so one can nowadays find full-service mobile banking apps, where customers can work with their accounts, pay with their credit card, take out loans, and even invest in various financial assets using their mobile devices. This mobile-first banking revolutionized the behavior of the customers, where a larger number of consumers chose to prefer mobile banking because of its convenience (Gisip and Harun, 2013).

At the same time, artificial intelligence (AI) and machine learning started making considerable progress in banking. Examples of AIs implemented included chatbots that would give customers support on 24/7 basis and predictive analytics where banks would analyze massive sets of data in predicting customer patterns and suggest options and make recommendations. Another use-case of AI is in the form of fraud detection systems that have the ability to detect out of ordinary patterns and behaviors to give an extra security to the customers and the financial institutions (Goswami, Sharma and Chouhan, 2022).

Blockchain technology has found a lot of significance in the banking sphere too. Blockchain started as a technology involved in cryptocurrencies; however, it has now been adopted by banks to enable delivery of safe and transparent payment through its technology. Blockchain capacity to offer immutable and decentralized account book has endeared it to be used as an effective mechanism to curb transaction costs, enhance transparency and amplify security (Hariguna et al., 2021).

Meanwhile, the key factor of fintech companies which use the benefits of innovative technologies in order to provide new kinds of financial services has destroyed the usual model of banking. Neobanks (or Digital-only banks) have also appeared as competitors of established banking institutions because they offer fully digital services that are frequently more customer-friendly (Harun et al., 2020). Such fintech startups have become popular due to offering low-cost user-friendly services, which appealed to a tech-savvy and younger generation. This boom of pure digital banks has also secondarily altered the strategies of traditional, and caused a blistering pace of digital integration and incorporation of new technologies by traditional banks.

2.2.1.4 The Future of Digital Transformation in Banking

The future of digitalization of the banking industry is determined to be influenced by the further integration of the novel technologies like 5G, quantum computing, augmented reality (AR) and internet of things (IoT) as we move forward. These advances will also continue to contribute to efficiency, safety and customer-experience. Especially, the 5G technology will ensure faster data transfer and more stable mobile connection, which will improve the performance of mobile banking applications and its functionality, especially involving the elements of real-time-payment and video-consultation (Hassani and Amin Babazadeh Sangar, 2024).

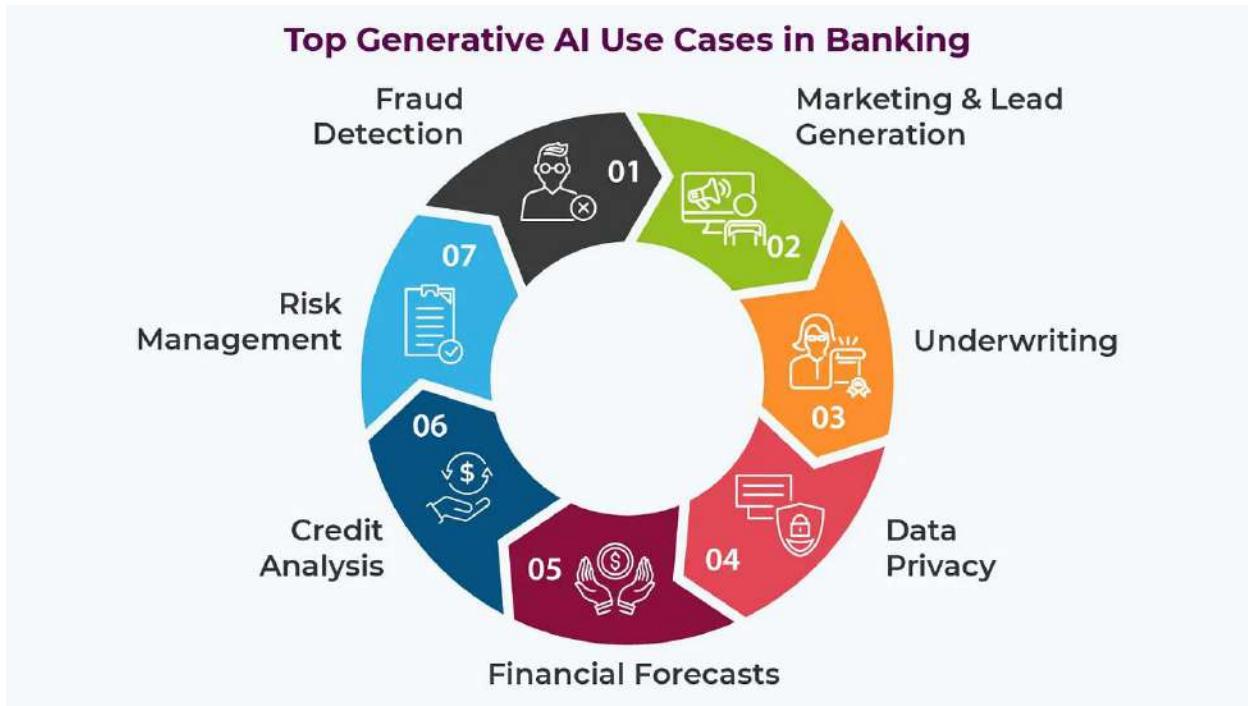
The transformation of banking industry with digital transformation is the same trend over the global economy; industries are finding technology to not only improve the operations but transform new business models, services, and value propositions. Both financial institutions and technology companies that are able to improve and adapt to the new technologies will be better off in a world that is fast becoming much more digitalized (Hassija et al., 2023).

To conclude, the digital transformation process in banking has been developing over the years since the first steps of digitizing and automating certain processes all the way to implementing

new technologies that transformed the back office and even the services offered to the customers. In the course of the years, the banking industry has advanced the range of online basic services to include full digital ecosystems based on the use of AI, cloud computing, and blockchain. The future of banking is bound to be affected greatly by further development of such technologies, which will provide even more disruption and innovation in the industry. The revolution of digital banking transformation is still shaping the operations of all financial institutions and the ways of serving its customers placing technology at the center-stage of modern banking (Heng and McDonagh, 2008).

2.2.2 Recent Changes in Digital Transformation

Over the past years, the banking sector has been experiencing a striking transition, and it is based on the technological developments transforming the way things are done in the banking sector, improved customer experience, and the nature of delivering financial services. Significant shifts in digital transformation in banking now cover an extensive range of emerging technologies including Artificial Intelligence (AI), Blockchain, and Fintech innovations, each of which represents a critical component of the banking of tomorrow. The technologies not only have been able to streamline operations but have also come by to provide new areas of growth and high efficiency and customer engagement (Hollands, 2015).



2.2.2.1 Artificial Intelligence (AI) in Banking

It is such new aspects of AI that have transformed the banking industry and made banks automate, improve the relationships with their clients and make informed data-based decisions. The application and use of AI technologies are widely exploited in the banking sphere, as there are several purposes that it serves:

1. Customer Service

Virtual assistants and AI-based chatbots have become a part of the customer service improvements (Horváth and Szabó, 2019). The technologies enable customers to address banks with automated responses, which solve their problems and respond to the queries within a short time. Using AI, banks would be able to offer 24-hour customer support through different digital platforms, such as websites, mobile applications, and social networks.

2. Fraud Detection

AI is also important when it comes to preventing fraud, and it does that by constantly checking transactions in real-time and detecting patterns that may indicate fraudulent activity. The more historical data is available, the more machine learning algorithms can learn and they can become even more effective in their performance to predict and detect suspicious activities.

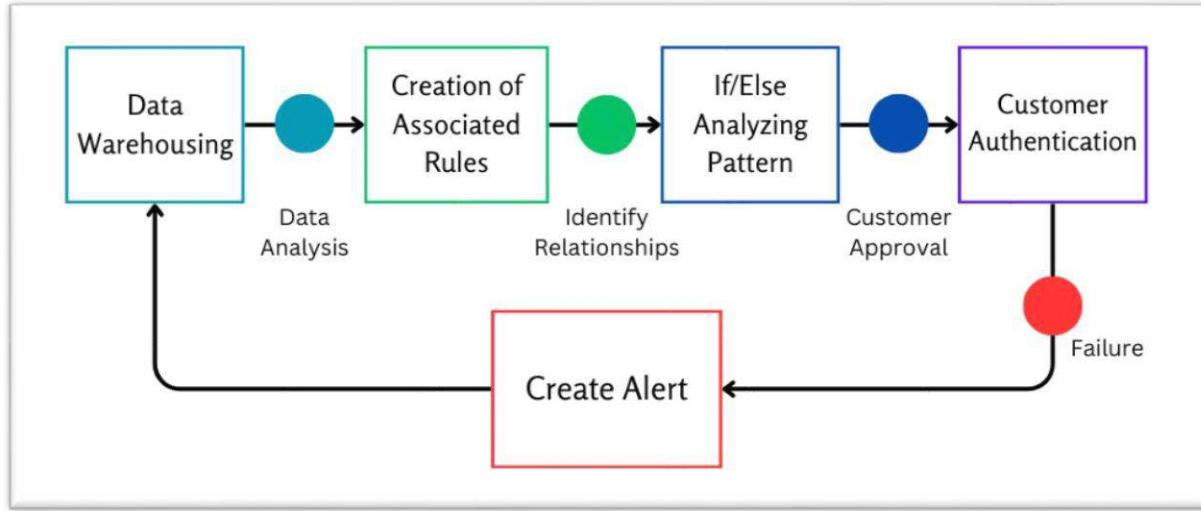


Figure 2.1: Fraud detection process

3. Consumer Banking Insight

AI will help banks to understand and recommend customized suggestions, items, and services based on the customer patterns and movement patterns that can only be analyzed through large quantities of information about the customer (Hrvoje Serdarušić, Mladen Pancić and Željka Zavišić, 2024). Predictive analytics through AI allow banks to foresee the needs of customers, such as making them personalized loans or even giving them specific financial guidance.



Figure 2.2: Identifying Customer Needs

4. Operational Efficiency:

AI can help banks to streamline their business by automating routine operations such as data entry, compliance check, credit assessment and hence reducing operational costs (Hsiao, 2024). The consequence is a quicker service recipient and utilization of human resources.



Figure 2.3: AI in Banking

2.2.2.2 Blockchain Technology in Banking

The initial popularity of blockchain brought by cryptocurrencies such as Bitcoin is currently being embraced by the banking sector to take advantage of blockchain in many uses such as security of transactions, transparency of data, and efficiency of operations.

1. Cross-Border Payments:

Blockchain technology will allow real-time cross-border payments, which are cost-effective and are faster. Conventional cross border payments are usually subjected to numerous intermediaries, thus delays and huge charges are incurred in this process (Hutchins and Rowe, 2012). Blockchain allows direct payments to be made between parties without involvement of intermediaries leading to safe and transparent transactions that are efficient.

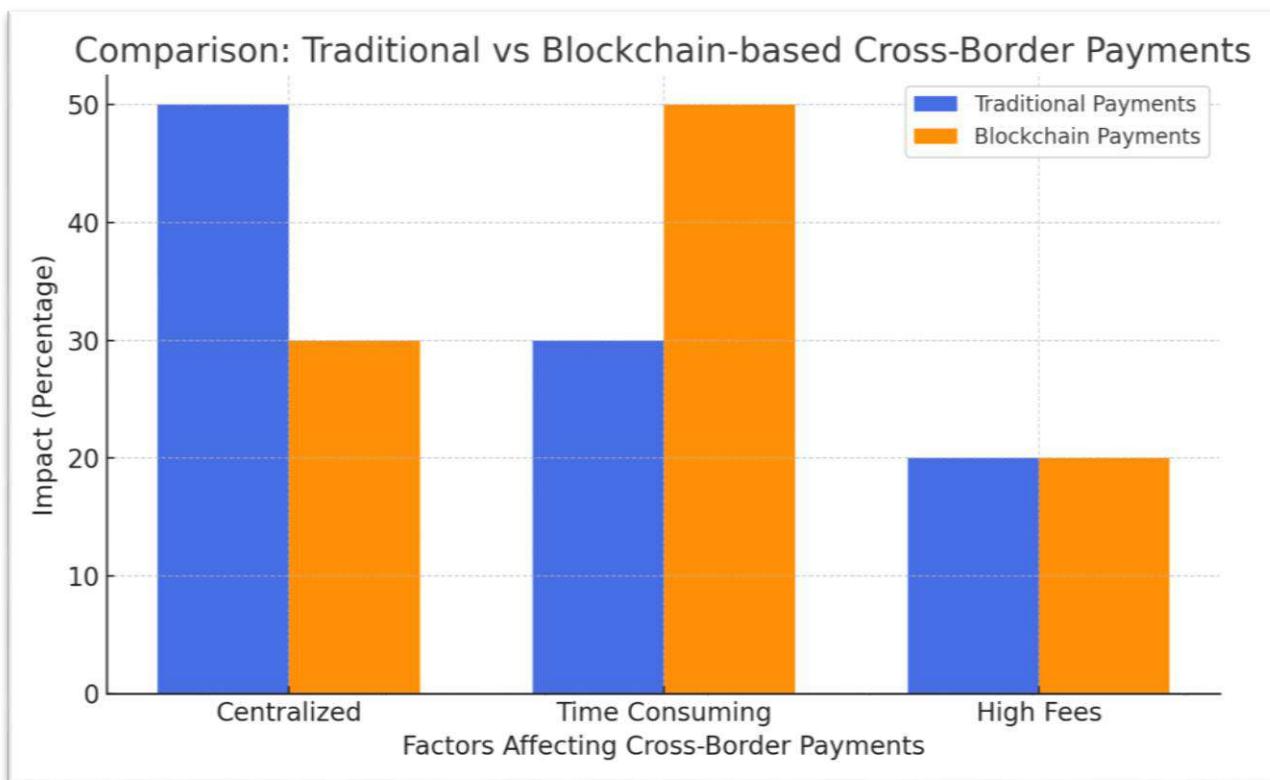


Figure 2.4: Traditional Vs Blockchainbased cross borders payments

2. Smart Contracts:

Smart contracts are programs that facilitate the performance of an agreement directly written in computer code (Ifinedo, 2011). In the financial sector, smart contracts are applied to store safe

loan agreements, insurance policies, and other financial services, eliminating the necessity to involve third parties and enhance the level of trust.

3. Regulatory Compliance:

A higher degree of transparency and traceability provided by blockchain use can also be positively impacted on compliance needs (Istvan Egesi and Belge, 2015). The blockchain technology allows all the transactions to be placed securely on the immutable record (ledger), which makes the tracing of transactions by the banks easier to implement and accommodate regulations, like Know Your Customer (KYC), and Anti-Money Laundering (AML) rules.

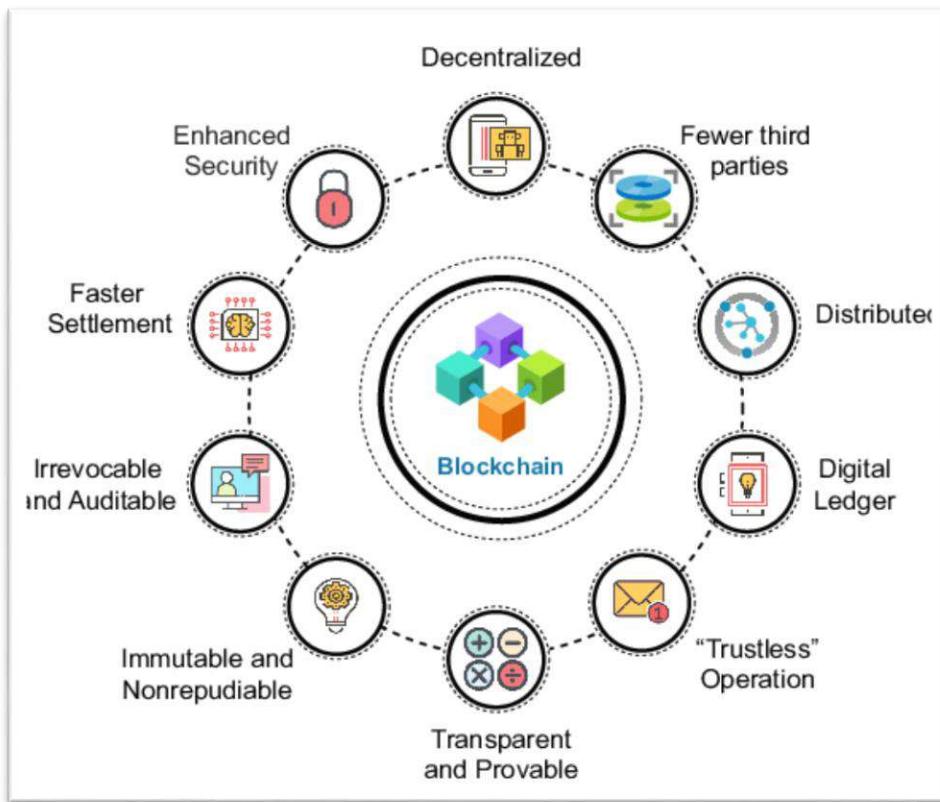


Figure 2.5: Blockchain

4. Security: Data integrity:

The decentralized nature of blockchain makes its data safe behind a wall, and hacking or fraudulent activities is less likely to occur (Jamison et al., 2013). In banking, data integrity is important in

particular. Blockchain can also limit the possibility of data breach in an extreme manner as it serves as the sturdy platform in carrying the financial transactions.

2.2.2.3 Fintech Innovations Transforming Banking

The overlapping of finance and technology, fintech, has been one of the disruptive forces towards the banking industry. Emergence of fintech companies has brought along new ways of doing things which disrupt the model of traditional banking systems, offering consumers better options, mostly more efficient means of handling their money (Jiang and Murmann, 2022).

1. Digital Only Banks (Neobanks):

Neobanks is a new type of bank that establishes its presence in the digital world providing an extended number of financial services through mobile apps and websites instead of being represented by physical branches (Johnson and Chinazunwa Uwaoma, 2024). Some of the services of these banks include checking, savings accounts, loans, investment management, and payment solutions all of which are online based. The ease of user interface, low-cost architectures and the smooth experience of customers is making neobanks grow.

2. Embedded Finance:

The process of incorporating financial services into a non-financial platform that makes financial products, e.g. payments, lending, and insurance, available directly within an app or Web site. As an example, such online stores as Amazon or even ride-sharing services as Uber currently provide an opportunity to get payment and loan services within the same application (Johri and Kumar, 2023). This is opening up the environment to financial services to consumers who are not necessarily conventional users of banks.

3. Regulatory Technology (RegTech):

The term RegTech can be defined as the application of the technology to assist banks and financial institutions to ensure their regulatory compliance requirements are accomplished effectively. RegTech applications are helpful in handling anti-money laundering (AML), Know Your Customer (KYC) activities and handling other regulatory requirements. RegTech helps in automation of such processes thereby minimizing cases of human error, quickens compliance as well as minimizes costs incurred in operations (Julian Fernandez Mejia, 2024).

4. Other Lending platforms:

Alternative lending is another main innovation in fintech where platform companies provide peer-to-peer lending as well as other non-traditional lending services. Such hubs have established algorithms to evaluate creditworthiness, and this means that people and small companies can obtain loans that cannot be obtained in traditional banks. Due to the advent of peer-to-peer (P2P) lending and crowd platforms, it has become less difficult to find funds with more flexible terms, especially on the side of the borrowers.

All the changes that happened recently in terms of AI, blockchain, and other fintech innovations have changed the face of banking in radically new ways, allowing customer service quality to improve, operations to be done more efficiently, and compliance requirements to be met (Kammer et al., 2015). AI has brought automation and individual customer experience, and blockchain has increased the security, transparency, and speed in the field of financial transactions. In the meantime, the traditionalism of banking is being met by fintech organizations, and they present their new, innovative financial services to serve customers that are becoming more digitally aware. Such trends are not only transforming the way banks do business, but they are also determining the future of banking and offering more flexible, inclusive, and client-oriented financial system (Kapoor et al., 2017). These technologies are constantly developing, which means that they can cause additional disruption and can contribute to the improvement of the banking industry.

2.2.3 History of the Banking Sector

The history of the banking industry is very old and the industry started as simple money lending and money keeping mechanism but has now turned into complicated organizations supporting the global business, investment and bank related services. The factors that have influenced the development of the banking industry are economic demands, technological upgrades, and regulatory modifications (Kaur et al., 2021). This part will give an account of the history of the banking sector in the global context and then focus precisely on the growth of banking sector on the Saudi Arabian front. Ancient civilizations gave birth to the banking industry as we know it today because those civilizations employed primitive kinds of banking that could not have been used to finance trade and agriculture.

1. Early Banking systems and the Ancient Civilizations (3000 BCE- 500CE)

Mesopotamia traveling as far back as ancient Mesopotamia where the temples and palaces were some of the earliest centers of financial transactions setting up one of the earliest forms of banking (Khan et al., 2020). These are the institutions that took accounts and were custodians of wealth and safe-keeper as well as lenders to people and merchants. In Ancient Greece, the early bankers were called trapezitai, and in the Rome, the banker-like functions (taking in deposits, issuing loans and transfer of money) were carried out by argentarii (moneylenders).

2. The Middle Ages and the Rise of Modern Banking (500 – 1600 CE)

In the Middle Ages banking fell mostly to the domain of churches and monasteries, where wealth could be stored safely. Merchant banking originated in Italy as the renaissance was going in especially in the cities of Venice and Florence (Kinyanjui, 2013). This Medici family and their banking venture contributed a great share in the funding of art, culture and economy during this era.

3. The Birth of Central Banks and Global Banking (1600 – 1900)

As it is considered the first modern central bank, the Bank of England was established in 1694. It was created to control the finances of the government and essential in developing decision stability of the monetary system (Köhler et al., 2019). During the 19th and 20th centuries, banking continued to be organised being established in large economies central banks, commercial banks and savings banks. These banks came up with a system of controlling national money, conducting international trade as well as offering financial services to people.

4. The Digital Revolution and Modern Banking (2000 – Present)

In the late 20th century, the situation had changed when the internet and mobile technologies appeared and transformed banking. Banking migration followed, and in the early 2000s online banking became common with the subsequent emergence of mobile banking and digital-only banks in the 2010s. Other technologies like blockchain, AI, and big data have also transformed the industry allowing the banks to provide more secure and personalized services. The Banking Sector in Saudi Arabia The history of the banking sector in Saudi Arabia dates as far as the year 1926, when the first bank had been formed and established (Lamberton and Stephen, 2016). Saudi bank

has experienced a drastic change with the past 100 years. Since the inception of its first bank to the current day high technology innovations of digital banking business, the banking industry in Saudi Arabia has enabled the growth of the Saudi economy by performing a central role it plays in the country.

2.2.4 The Formation of Saudi Arabia's Banking Sector (1930s – 1960s)

The banking industry in Saudi Arabia developed in the course of the 1930s. Before this time, the banking activities in the area were offered by the foreign banks. In 1952, Saudi Arabian Monetary Agency (SAMA) was the first bank created in the Kingdom as a central institution to control the monetary policy, control currency reserves and financial system. The Saudi National Bank (SNB) came into being in 1953 as the initial commercial bank within the nation (Laquidara-Carr, 2025). With time, other banks operating within the area raised up and other foreign banks came to boost the economy of the country. The use of national currency was a major event in the history of the Kingdom of Saudi Arabia in 1963 when SAMA released Saudi riyals to replace the currency.



2.2.4.1 The Development of Islamic Banking (1970s – 1990s)

Saudi Arabia began experiencing Islamic banking in 1970s and 1980s which moves in line with the sharia law and does not allow transactions which are based on interest(riba). The span experienced the formation of banks like Al Rajhi Bank, which today is considered as one of the

biggest Islamic banks in the world (Lawrence, Richards and Lyons, 2013). The principles of the Islamic banking system took root in the Saudi financial market and this resulted in the establishment of the Sharia-compliant financial products like Murabaha (cost-plus financing) and Ijara (leasing). The banking industry in Saudi Arabia emerged as a significant centre of Islamic finance, and this paved the way to the Gulf Cooperation Council (GCC) countries and other predominantly Muslim countries to adopt practices of Islamic banking.

2.2.4.2 The Growth of the Banking Sector (2000s – 2010s)

The decade of the 2000s was one of the fastest expanding and modernizing decades in the Saudi bank industry. Oil abundance accompanied by high oil prices gave the country an opportunity to make its banks grow and invest in the development of their new technologies. The banks started working towards modernization through the use of core banking system, automation of services, and internet banking. The niche of credit cards, personal loans, and mortgages experienced a sharp increase in Saudi Arabia banking industry (Lee, Olson and Trimi, 2012). The increasing financial stability and external competitiveness of the sector were also provided by the implementation of the regulatory structures of SAMA. With the founding of the Saudi Stock Exchange (Tadawul) in 2007, the local dormant banks got an opportunity to increase their operations by raising capital.

2.2.4.3 Digital Banking Revolution and Vision 2030 (2010s – Present)

In the 2010s, Saudi Arabia banking industry ushered in a new age of the digital banking revolution. With the increasing number of technologically advanced customers and with the spread of smart phones, banks embarked on a more extensive field of mobile banking and online banking services. Financial innovation in Saudi Arabia has been hugely spurred by the Vision 2030 plan by the government that seeks to diversify the economy and lessen the reliance of the Kingdom on oil (Lemon and Verhoef, 2016). A growing interest in digital banking, fintech innovation, and a collaborative partnership with such technologies as blockchain, cloud computing, and artificial intelligence have been promoted by the government. The emergence of fintech firms, online-only banks, and open banking projects has changed the scene even further, ensuring more financial inclusion possibilities and easier access to traditional banking services. STC Pay along with digital wallet and mobile banking services of Riyad bank are an important part of contemporary banking (Levi, 2015). In 2018, SAMA launched the fintech regulatory sandbox, which is an environment that allows fintech startups to experiment with innovative solutions in financial sector supervised

by legislation authorities. This effort has played a central role in enabling the e-banking process in the Kingdom. The Kingdom of Saudi Arabia has been at the centre of the digital revolution as evidenced by the Saudi Payments Network (Mada) which has enhanced payment security and efficiency in the Kingdom through electronic payment transactions (Lewandowski, 2016). The history of the banking industry in the world and in the Kingdom of Saudi Arabia can be characterized by the constant progress, caused by the technological changes, economic demands, and regulation shifts. It is especially the case of the banking sector in Saudi Arabia, which no longer shares elements of primitive banking services as its foundation but has come to a technologically advanced banking system. Along with the principles of Islamic banking, the emergence of fintech innovations, and the strategic outlines of Vision 2030, the Kingdom has become a leader in the adoption of digital banking in the region of the Middle East. With Saudi Arabia in continuing modernization of the financial industry, banking sector stands at the centre of technological and financial innovations, so as to play a central role when it comes to economic diversification of Kingdom of Saudi Arabia.

2.2.5 Latest Changes to the Saudi Banking Sector

Saudi banking industry has changed greatly during the last decade, and its key drivers were the Vision 2030 strategy and a row of regulatory changes. These modifications have not only modernized this sector and made it technologically advanced but have also placed the country of Saudi Arabia at the forefront of adopting digital banking and financial innovation in the Middle East region (Lim, Kim and Maglio, 2018). This section discusses the implication of the Vision 2030 and other significant regulatory trends to the banking population the change in the operation habits, regulatory guidelines, and technology usage.

2.2.5.1 Vision 2030 and the Financial Sector Development Program (FSDP)

The vision 2030, the Saudi Arabia strategic plan in regard to economic diversification has influenced the banking sector significantly. In attempts to achieve some of the objectives of the Vision to make the country less dependent on oil, the financial sector is one of the identified areas that should be developed and modernized (Limani, Stapleton and Groumpos, 2018). A key part of the Vision 2030 which is making progress is the Financial Sector Development Program (FSDP) that was introduced in 2016 with an objective to make a diversified competitive financial

ecosystem. It is a policy that emphasizes on enlargement and expansion of the financial sector, accessibility of people to financial services, and the overall efficiency of banking institutions.

Important Objectives of the FSDP:

Encourage Financial Inclusion: The initiative aims at upscaling access of banking services by every group of the society, and especially in unserved areas.

Improve Digital Transformation: Facilitating the use of fintech and digital banking is one of the key purposes of the FSDP, and the measures planned to move toward the more technologically enhanced and customer-responsive banking environment.

Expand the privatization of Banks in the Private Sector: Through Vision 2030 and FSDP, there is an aim of changing the financial sector for higher involvement of the private sector and less dependence on the state-owned banks.

By engaging in these efforts, Saudi Arabia is trying to establish a more integrated and competitive financial system which can serve the interests of the people and help in economic growth. The FSDP is also geared towards achieving efficiency in operations of the financial institutions, innovation, and restructuring the banking sector to match criteria set by global best practices (Litvinenko, 2019).

2.2.5.2 Regulatory Reforms and Digital Banking Regulations

Introduction of comprehensive regulatory changes, which are innovation-friendly but stable and secure, has been one of the most important happenings in the Saudi banking industry in recent times. The central bank of Saudi Arabia, the Saudi Arabian Monetary Authority (SAMA), has been on the forefront of these changes, taking a crucial role in designing the regulatory framework of both the traditional banks and fintech startups (Liu, Chen and Chou, 2011).

1. Fintech Regulatory sandbox:

To support the idea of fintech regulation in this country, SAMA introduced the fintech regulatory sandbox to enable fintech companies to test new services and products within a restricted framework prior to being promoted to the general population. Such an initiative offers a platform through which innovation in the financial sector can happen surrounded by the standards of

security, risk management, and consumer protection according to regulations (Malik et al., 2021). The sandbox will help create new fintech opportunities, including providing innovative payment products, lending services, and digital wallets and improving the consumer experience with the view to personal finance and investment management.

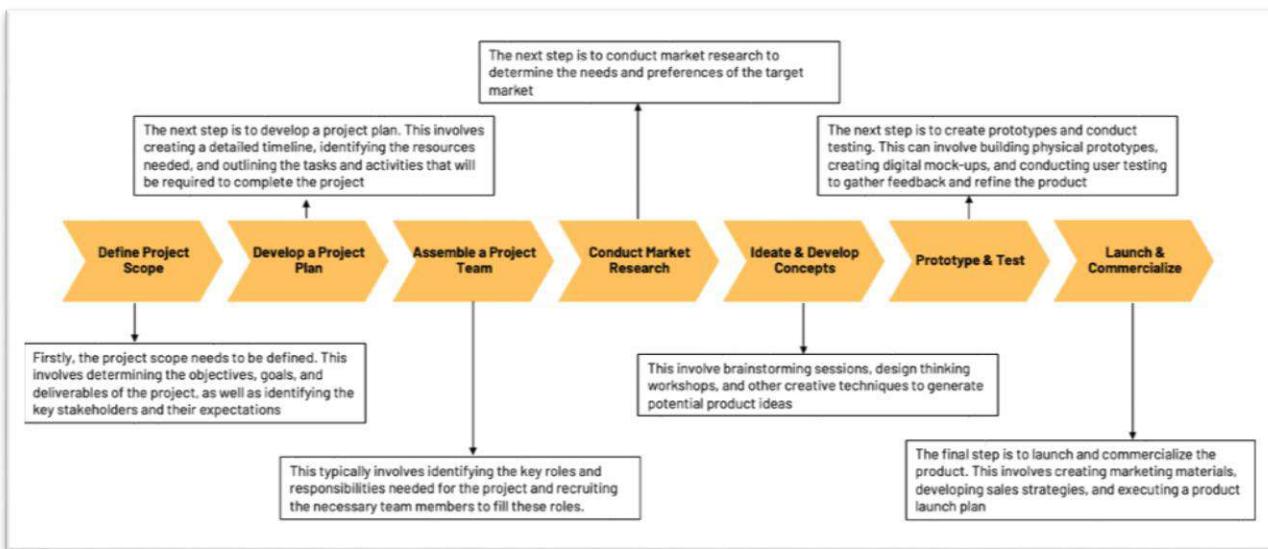


Figure 2.6: Fintech Product Development Process

2. Open Banking:

In Saudi Arabia, open banking has been a very important part of the regulations process. Open banking frameworks are established to enhance competition in the financial industry by permitting third-party suppliers to get bank information (with customer authorization) and provide services such as individual budgeting and payment initiation. SAMA said it was scheduled to enforce open bank regulations in 2021, which will facilitate safe information exchange between financial institutions and fintechs (Mancini Griffoli et al., 2018). This project is supposed to offer consumers more options and improved services which will eventually result to innovation in the banking system.

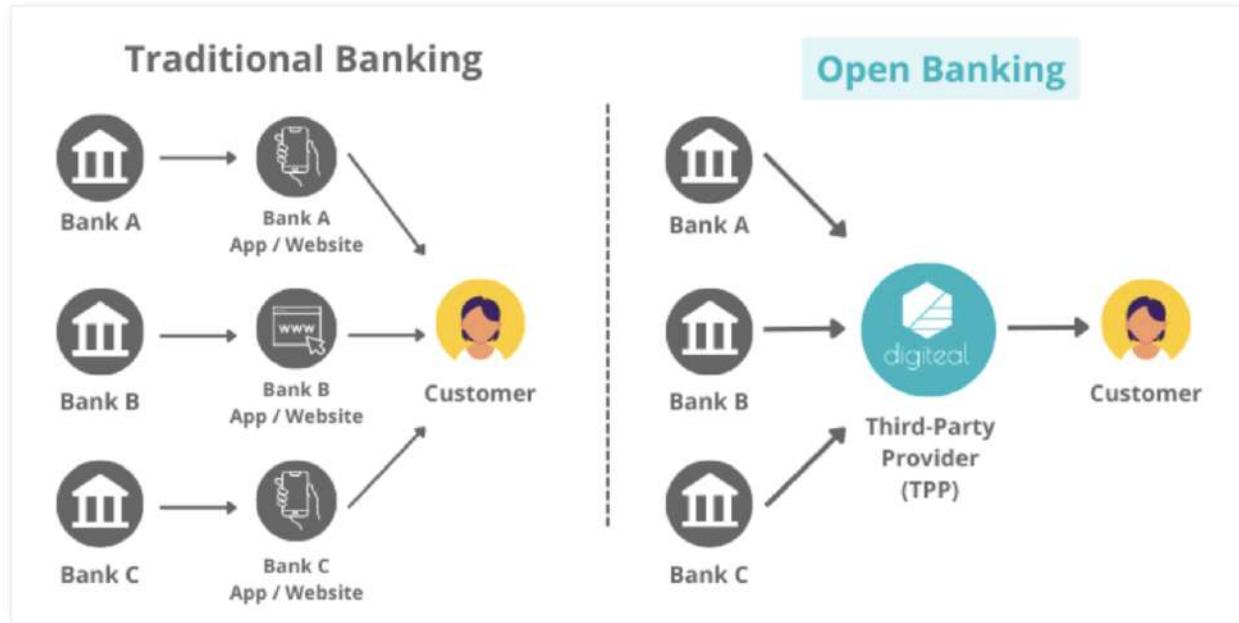


Figure 2.7: Traditional Banking Vs Open Banking

3. Pre-existing Anti-Money Laundering (AML) and Counter- terrorism Financing (CTF) laws:

Saudi Arabia has been very successful in its upgrade of the anti-money laundering (AML) and counter-terrorism financing (CTF) rules. This is to give impetus to their global compliances in line with the demands of the Financial Action Task Force (FATF). According to international standards, the country has been able to enhance its compliance measures to ensure that all the banks and financial institutions follow best international practices (Manjula Bai, 2020). Under new regulatory frameworks, banks are obliged to have stronger know-your-customer (KYC) programs and enhance the surveillance of transactions in an attempt to find suspicious transactions. The steps will bring more transparency and security in financial transactions besides boosting Saudi Arabia in the international financial system.

Table 2.1: Comparison of AML and CTF regulations before and after the reforms

Element	Pre-Reform (Before Changes)	Post-Reform (After Changes)

Scope of Regulations	Limited in scope, focused on specific sectors	Expanded scope covering more industries, including digital platforms
Customer Due Diligence (CDD)	Basic requirements for verifying customer identity	Enhanced CDD, including politically exposed persons (PEPs) and beneficial owners
Suspicious Activity Reporting	Broad reporting obligations, but lacked detailed guidance	Clearer and more detailed obligations for reporting suspicious activities
Record-Keeping Requirements	Basic record retention for a set period	Increased record retention period, with more details on data management
Sanctions Compliance	Focus on preventing specific criminal activities	Wider range of sanctions related to terrorism, money laundering, and other activities
Enforcement and Penalties	Penalties existed but were less stringent	Stricter enforcement with higher fines and increased international cooperation

4. The Rise of Digital-Only Banks and Financial Inclusion

One of the most significant things in Saudi Arabia banking evolution is the rise of neobanks or digital-only banks as they are commonly known as, they do not have any physical branches and thus has to do all its financial services via digital means. Such banks are intended to be able to serve tech-savvy consumers, who are willing to access banking services through their mobile applications or the online interface (Mansoor Khan and Ishaq Bhatti, 2008).

Digital-Only Banks examples:

STC Pay began as a mobile wallet service, but now developed into digital-only banking, capable of offering payment services, money transfer, and financial management tools. Another example of a fully digital banking service has been D360 Bank in providing Sharia-compliant banking services without having the physical branches. Such “neobanks” are also making a significant contribution to financial inclusion and play an essential part in bringing consumers who might not be eligible to standard banking products due to their location in remote or underserved places (Marcu, 2021). The transition to full digital banking also corresponds to the objective of the FSDP to increase the number of banked consumers with the purpose of providing the banking services to a larger portion of the population.

5. The Role of SAMA in Ensuring Stability

During these regulatory reforms, SAMA has been striving hard to make sure that these innovations do not undermine stability of the financial system. Being the main regulatory body, SAMA has taken certain steps to ensure the integrity of bank system and facilitate the development of fintech and digital services (Marnewick and Marnewick, 2022). The regulatory systems of SAMA have been modeled to ensure the harmonization of innovation and financial sustainability, and in this respect, new technologies are incorporated in the banking system safely and securely. Furthermore, SAMA has equally participated in the establishment of the global standards of digital banking and payment system, which is an effort to keep Saudi Arabia competitive in the global finances market.

Saudi banking industry has enjoyed major developments in digital transformation following the latest shifts in the industry which are being brought about by Vision 2030 and the regulatory reforms. The arrival of such initiative as the fintech regulatory sandbox, open banking, and digital-only banks has contributed to the more inclusive, competitive, and efficient financial system. The latter has facilitated a more active and creative banking environment that has enabled Saudi Arabia to emerge as a leader in fintech and other forms of digital banking in the Middle East region (Marwah Hassounah, Hafsa Raheel and Alhefzi, 2020). The regulatory reforms guarantee the enabling of the banking industry in coming up with long term growth that is secure and sustainable to cope with the demand posed by a growing and highly digital aware population. Due to increased digitization, the Saudi banking sector can enjoy the upcoming implementation of new technologies and regulatory environments that enhance growth, innovation, and financial inclusion.

2.3 Gaps in Literature

Although the literature on the subject of digital transformation is increasing especially with respect to various industries, there are some obvious gaps in the literature particularly with respect to its contribution to the performance of banks in Saudi Arabia. Although the impact digital technologies have had on financial performance, customer experience and operational efficiency has been studied by the global research community, there has been very limited study of studies of the effects of digital technologies on the Saudi banking sector. The given gap is especially notable owing to the fact that the Saudi Arabian economic, social, and regulatory experience offers a notably different setting in terms of learning about the effect of digital transformation on banking (Masiukiewicz, 2015).

1. Lack of Comprehensive Studies on Banking Performance Outcomes

Among the largest gaps in literature are the lack of extensive research to assess the direct connection between the digital transformation and profitability, and the operation efficiency, and business growth of the main activity of banking in Saudi Arabia. Although there are numerous studies dealing with the technological feature of digital banking, such as AI, blockchain, and mobile banking, there is a dearth of reports, which directly connect the technology with financial performance (Maulidia, 2009). An example here is how studies tend to discuss/emphasize the level of customer satisfaction or the rate of digital adoption, but they do not go beyond these metrics to state how such criteria can lead to better profitability, reduction in costs or revenue increase. Specifically, the profitability aspect of digital transformation is not well researched. Although it is established that automation and digital tools may be used to increase the efficiency of operations, little is known in literature about the direct effects of such tools on profitability ratios like Return on Assets (ROA), Return on Equity (ROE), and net income. Consequences of digital transformation to the growth of business in terms of market shares, customer and base development and competitors positioning are also not well-researched especially with regards to digital banking innovation on the Saudi Arabia banking environment that is unique in character (McCabe et al., 2017).

2. Limited Focus on Saudi Arabia's Specific Context

Most of the available studies on digital transformation in the banking industry are founded on literature done in western countries or in other developed economies. Various studies have been done analyzing digital banking in the Middle East, but very little has been done to our banking sector and its exclusive nature. The banking sector of Saudi Arabia consisting of a combination of Islamic banks and conventional banks poses a unique challenge and opportunity of digital transformation (Meriem Guechi, 2020). The literature lacks an explanation of the impact of Sharia-friendly financial systems on the process of adoption and implementation of some digital technologies, especially those not composed of Islamic banking, including cryptocurrency or systems of interest rate lending. Second, vision 2030 and other national strategies resulted in the development of the regulatory and economic environment in Saudi Arabia, which is infrequently discussed in terms of digital transformation in banking. Vision 2030 has envisaged that the economy will be diversified with envisaged development of a sound and all-inclusive digital financial system. Nevertheless, little empirical research has been conducted to determine how

these regulatory and policy developments influence the levels of adoption of digital banking and performance levels in Saudi Arabia (Mills, 2016).

3. Insufficient Analysis of the Integration of Emerging Technologies

The penetration of the new generation technologies in the banking industry of Saudi Arabia is another gap that should not be overlooked. Even though the worldwide literature often comments on the personal value of such technologies as AI, blockchain, cloud computing, and big data in banks, there is no specific research regarding the integration of these technologies into the working models of Saudi banks (Ming-Kuei Hu, 1962). As an example, the issue of cloud computing role in facilitating scalable banking operation in Saudi Arabia has not been fully discussed even though it plays a very crucial role in improving the flexibility and cost effectiveness of the digital services. Along the same lines, blockchain has been touted as a way to reduce pesky cross-border payments and up the ante on security all over the world, yet how that technology applies specifically to Saudi Arabian banking and how it may affect it is not very well researched as of yet. Also, when looking at the global literature, it has been talking about AI with reference to customer experience through chatbots and personalization, but when looking at the wider implications of AI on data security, detecting frauds, and risk management aspects to Saudi banks, there is limited research findings on these aspects, but rather the global literature only examined AI in terms of customer improvement. The literature too does not mention the complication that Saudi banks experience in regards to the adoption and implementation of such highly advanced technologies and the complication regarding the legacy systems, IT infrastructure and training of the employees (Mogaji, 2023).

4. Absence of Holistic Models Linking Digital Transformation to Performance Metrics

The current research has a tendency to look at the elements of digital transformation separately, as the performance of a customer or the rate of adopting the technology by organizations without considering the whole picture of the overall organizational change. There also exists a definite lag in the construction of comprehensive models to connect multiple aspects of digital transformation (e.g., digital capabilities and technology adoption and organizational readiness and customer engagement) with physical aspects of banking performance (Mohtaramzadeh, Ramayah and Jun-Hwa, 2017). They are still substantially lacking a comprehensive framework that addresses the interaction of the internal (e.g. IT infrastructure, organizational culture) and external factors (e.g.

regulatory policies, customer expectations). An example is that although the TOE framework (Technology-Organization-Environment) has been deployed to interpret digital adoption in different contexts, its implication in the scenario of Saudi banking is still underrepresented. In the same case, the recent Dynamic Capabilities Theory (DCT) that emphasizes how firms can adjust to the requirements of the dynamic environment is yet to be broadly applied into capturing the story of Saudi banks that use digital transformation in obtaining long-run competitive advantage.

5. Need for Empirical Research on Customer-Centric Digital Transformation in Saudi Banks

Although customer satisfaction and engagement are common topics of the literature on digital transformation, studies at the empirical level that investigate relationships of customer-focused digital transformation with the performance outcome of banks in Saudi Arabia are not so widespread. Most of the researches done around the world engage in explanation of the effects of digital solutions such as mobile banking applications, chatbots and digital wallets in the customer experience, however, the contribution that such innovations bring in financial gain is not considered in the same study (Mollah et al., 2023). In Saudi Arabia, and world at that, where the customer demand is quickly evolving thanks to technological improvements and demographic changes (e.g., increased number of the young generations), it becomes essential to grasp the customer-focused points of digital transformation. A study should be conducted to determine the direct impact of introducing new digital services and products (this time in the context of digital-only banking or possible fintech services) on the customer retention rates, customer loyalty and an eventual end-line of the banks.

To conclude, although a booming literature on the topic of digital transformation in banking exists, there are still a number of gaps, especially with regard to the banking industry in Saudi Arabia. One crucial gap is the absence of research, connecting digital transformation closely with banking performance outcomes, in particular, with profitability and operational efficiency. Moreover, studies, which dwell specifically upon the peculiarities of Saudi Arabia regulatory sphere, combination of the emerging technologies, and customer-oriented effects of digital transformation, are uncommon (Mourtzis et al., 2021). Filling these gaps will not only allow benefiting the Saudi banking sector, but it would also benefit the overall global practice related to the digital transformation in the emergent economy. The present study attempts to address these gaps as it

will give an in-depth understanding of how the digital transformation affected the performance indicators of Saudi banks, taking into account internal and external factors.

2.4 Definitions and Literature Review of Variables

To evaluate how the introduction of digitalization has affected the banking industry and especially in the Saudi Arabian environment, one has to stipulate and define some of the major variables involved in the process of such transformation (Muteeb et al., 2023). The Organizational Digital Capabilities, Environmental Readiness, Digital Adoption, and Performance Outcomes (Profitability, Growth, Efficiency) are the variables, which are closely interconnected and collectively form a key to understanding the digital world of the banking industry. This part elaborates all these variables with clear description, background understanding, and their application to the topic of digital transformation in the banking field.

1. Organizational Digital Capabilities

Organizational digital capabilities are also defined as skills and resources that a bank has at its disposal and which have technological infrastructure capable of comprehensively integrating it and working with digital technologies. Such capabilities incorporate diverse factors, such as IT infrastructure, human resources, operational assistance, and the general organizational culture promoting innovation and swiftness in the implementation of new technologies (Nambisan, Wright and Feldman, 2019). Organizational capabilities remain the primary idea in terms of how the problem of institutional possibilities can be strengthened by the use of digital instruments.

Organization capabilities can be referred to the resource-base view (RBV) of the firm, which mentioned that the firms were able to have competitive edge by developing resources and capabilities which were needed as valuable, rare and inimitable. These resources and capabilities refer to both technological and intangible assets (e.g. IT infrastructure, data analytics tools and cloud platforms; human expertise in digital technologies, culture of innovation and managerial leadership of digital initiatives) in the context of a digital transformation. Zhang et al. (2018) explain that digital capabilities allow an organization to react to external pressures of digitization and internal pressure to achieve a better performance. All these capabilities can be divided into three classes:

Technological Infrastructure: It refers to both software and physical systems allowing digital technologies to work: cloud computing, enterprise resource planning (ERP) systems, and cybersecurity infrastructure.

Human Capital: The knowledge, skills and experience that employee would provide in order to deal and utilize digital tools in accomplishing the tasks. This consists of IT professionals, statistical researchers, and online marketers.

Leadership and Culture: Good leadership is the key to successful digital transformation because it helps to set a strategy in the organization and promote a culture of innovation. The importance of organizational culture is that it helps in establishing the rate and effectiveness of implementing digital transformation initiatives (NANA, LAVIOLETTE and Theodoraki, 2022).

2. The Organizational Digital Capabilities and their Effect on Digital Transformation

Research has demonstrated that a company with high digital proficiency can easily use emerging technologies to meet customer needs of digital services. Kane et al. (2015) stressed that those organizations which have a higher level of digital capabilities, the above changes in producing new digital products and services are likely to meet the needs of the customers and, eventually, to increase competitive advantage (Nastiti and Kasri, 2019). Also, banks that maintain a stable practice of training and development of all employees in the field of digital practices are more likely to adopt and implement new technologies more effectively, which leads to an increase in operational performance levels and customer satisfaction.

Environmental Readiness

Environmental readiness is the other outside influence that promotes or impedes the implementation of digital transformation in banks. Such elements are regulatory systems, market forces, technological base and consumer-based behavior. In the case of banks, environmental readiness is important since it determines the degree at which banks would easily and effectively adopt digital transformation strategies (Nguyen and Nguyen, 2025).

Environmental readiness concept is very much connected to Technology-Organization-Environment (TOE) framework which imply that the process of successful adoption of new technologies is affected by the interplay between technology and organization, on the one hand,

and the external environment, on the other. The authors of the first formulation of the TOE-Tornatzky and Fleischer (1990) believed that the climate that surrounds any particular firm has a major influence upon the technology selection made by the firm. This is especially true in the banking industry where regulation policies and the circumstances in the market may either facilitate or slow the adoption of new technologies.

Regulatory Environment

The Saudi Arabian Monetary Authority (SAMA) in Saudi Arabia has been instrumental in the construction of a regulatory environment in digital banking. Among these initiatives, SAMA offers a framework, such as the fintech regulatory sandbox, through which banks and fintech firms could test its digital products and services through a controlled environment before being launched to the market (Nicola et al., 2020). Such regulatory assistance facilitates addressing various risks related to the implementation of new technologies motivating the banks not to be afraid of testing innovative methods, in which case regulatory compliance will not apply.

Consumer behavior and market Dynamics

Another valuable aspect is the willingness of the market to adopt the digital technologies. Digital transformation among the banks has seen the most customers request the digital forms of services like mobile banking, digital wallets, etc. The rising trends in the use of smartphones and the internet in Saudi Arabia, alongside the trend of having a youthful population put the country in a position where the digital banking services find a high demand. As a result, the digital transformations happen to be more successful with banks that are responsive to the external factors (Noor, Ainatul Aqilah Kamarudin and Haron, 2016).

Technological Infrastructure

Another influence relaxation factor on the environment readiness is the available and accessible advanced information technology infrastructure, including fast internet and safe data centers (Nowland, Necka and Cacioppo, 2018). The main advantage of banks in Saudi Arabia is a high level of technological infrastructure, allowing to quickly popularize digital banking services and new technologies in finance.

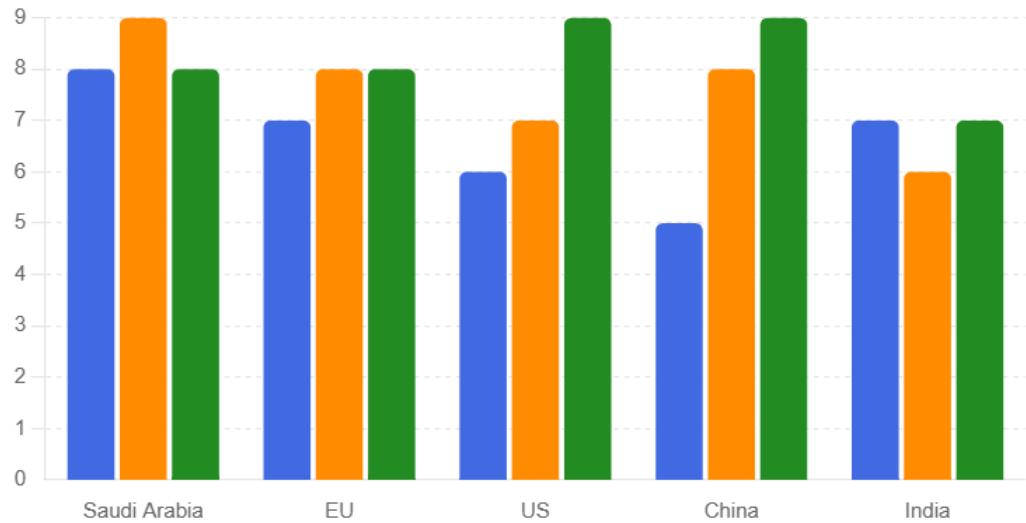


Figure 2.8: Comparing the Regulatory Frameworks, Consumer Behavior, and Market Dynamics

3. Digital Adoption

The digital adoption is the phenomenon of implementing digital technologies into the activities of the bank, as well as into products and services. It is how far a bank spearheads digital tools i.e. the provision of mobile banking application to artificially intelligent inclusion of customer service and data interpretation. Banking digital adoption is affected by internal conditions (abilities of the organization) and external conditions (demands of the market and support of the regulations). Technology Acceptance Model (TAM) proposed by Davis (1989) states that adoption of digital by individuals is influenced by two factors; ease of use and usefulness (Nurunnabi, 2018). Through this model, in cases where a digital technology is thought to be easy to navigate and beneficial, then the chances of banks experiencing it are high.

Consequences of Adopting Digital to Banks

It is proven that the adoption of digital trends in banks is highly related to quality customer experience, operational ease, and competitive advantage. Bharadwaj et al. (2013) emphasized that the fully digitalized banks sell the possibility to provide more personalized services, engage customers and facilitate internal operational activities (O'Reilly and Tushman, 2011). Furthermore, Cao et al. (2017) discovered that digital adoption also results in an increase in customer retention levels since clients find it more convenient and accessible to use digital services as opposed to following the traditional banking procedures. Moreover, the adoption of digital together with banks accessibility to new sources of revenues including digital payments, online

lending, wealth management services, among others, has become a must in a competitive, dynamic financial market.



Figure 2.9: Benefits of digital transformation in banking

4. Performance Outcomes: Profitability, Growth, and Efficiency

The results of performance under the concepts of digital transformation may be grouped into profitability, growth, and efficiency levels. These results are essential when gauging the success of the digital change efforts in banking.

The Return on Assets (ROA) Return on Equity (ROE) and net income are some important measurements of profitability in the banking sector. Increased operational efficiency brought about by digital transformation, especially the use of emerging technologies, such as AI, blockchain, and mobile banking can also bring profitability. Elia et al. (2020) have discovered that those banks that have already integrated digital technologies experienced an excellent decrease in both the number and costs of operations, and later have managed to increase profit margins. Furthermore, being able to provide new digitalized products and services, like mobile payment-based products and services and digital only-based products and services, generates new revenues, and as such, to be more profitable.

Business growth can be defined as the expansion in the market share of a bank, the customer base and revenue (OECD, 2016). The digital transformation process can support the growth of banking organizations because it allows enterprises to serve new and underserved customer groups via

mobile applications and websites. In another study by Yoo et al. (2010) it was stated that due to the digital transformation a new route is provided to customer acquisition, so the banks can develop their market, as well as raising the number of customers. The increase in the demand of digital financial services especially among youthful people in Saudi Arabia has propelled a huge expansion of banks who have made the transformation to digital. With the help of big data and AI, banks can get a better grip on the preferences of their clients and provide them with personalized services that will encourage retention and expansion.

Operational efficiency means the capacity of a bank to offer services at a reduced cost and still offer quality services to the customers. The digital transition means the achievement of efficiency due to automation of repetitive tasks, effectiveness in transaction processing, and creation of human error reduction. Brynjolfsson and McAfee (2014) supported the contention that automation can enable banks to carry out various activities with more speed and accuracy, which are impossible to match with human capabilities, thus leading to better service provision (Ofosu-Ampong, 2021). The use of cloud computing, digital payment systems, and artificial intelligence in Saudi Arabia has to a great extent saved time taken in making a transaction and saved the operating expenditure of the banks thus making the industry efficient.

Altogether, the variables mentioned, i.e., Organizational Digital Capabilities, Environmental Readiness, Digital Adoption, and Performance Outcomes are essential to keep digital transformation achievements on the performance of banking institutions. All these variables are closely interrelated, and they are significant in the successful implementation of and utilization by banks of digital technologies to enhance profitability, growth, and efficiency. Basing these variables on the existing literature, the study will address the research gaps and contribute to the available knowledge bases, especially on the distinctive situation of the banking industry in the Kingdom.

2.4.1 Rationalization of relationships

The area of study of the Organizational Digital Capabilities, Digital Adoption, and the Relationships with Performance Outcomes is essential when analyzing the manner of the impact that digital transformation is exerting on the banking industry. All these variables have a dynamic and interchained influence on the other (Oladeinde et al., 2023). The interdependent nature

between these variables is not only motivated by internal faculties of the bank, but it is also motivated by the external environment together with the technological progress. This chapter takes into the claim of the relations between these important variables and the way that they occur together and the way they lead to global performance of banks.

1. Organizational Digital Capabilities

Digital Adoption rests upon Organizational Digital Capabilities. Digital transformation is not an isolated phenomenon and it relies on the domestic readiness of the firm to adopt novel technologies. It is the digital maturity of an organization, i.e. its IT infrastructure, human capital, leadership, and organizational culture that defines the degree to which an organization can implement the new digital tools and innovations in its operations. This is to say that the more developed the digital capacities of any organization, the higher the chances that the said organization will adapt and integrate digital technologies.

The speed and range of digital adoption is hugely dependent on the extent to which organizations have prepared in the digital infrastructural aspect and also with regard to human resources. Stronger banks IT infrastructure can faster and very well embrace the digital technology applications like; cloud computing, AI, and big data analysis (Oliva and Kallenberg, 2022). Besides, the companies which have invested in training and expertise of their employees in using digital tools better prepare themselves to use such tools to enhance business processes. Zhang et al. (2018) state that organizations that have higher digital power will tend to adopt the aspects of digital in an innovative manner. Another important aspect of digital capabilities in an organization that promotes the use of digital matters in an organization is almost leadership. Leadership commitment and top-down attitude promote an innovative culture, which provokes a digital adoption. A digital-first culture that Kane, et al. (2015) promote results in improved organizational intentions and strategic deployment of digital technologies. The leadership determines the character of the whole organization, which does not only determine the willingness to use technology but also the readiness to accept the change by the rest of the staff.

2. Digital Adoption and Performance Outcomes

The Digital Adoption and Performance Outcomes relationship is central in the process of digital transformation. The adoption of digital has a direct implication on the performance of a bank in

terms of its profitability, growth and efficiency in its operations (Omboni et al., 2022). To a greater extent to which digital technologies are implemented into the functioning of a bank, the higher is the probability of achieving better financial performance and customer outcomes of a bank.

Rationale of the Relationship

Implementation of digital technologies has been found to enhance operational efficiency, by making it automatic, minimizing errors and accelerating service delivery. Artificial intelligence, machine learning, and big data analytics are vital instruments that can be used by banks in order to optimise their business. Banks are the major beneficiary of this, as they can save a lot of money through saving on salaries and other expenses by automating the mundane duties like data entry, screening and preventing frauds, as well as loan approvals. Research such as the one conducted by Brynjolfsson and McAfee (2014) demonstrates that automation causes more efficiency which is a major cause of better performance results. Additionally, digital adoption ultimately leads to business growth as it allows banks to implement various new and advanced customer experiences. Chatbots, digital wallets, mobile banking are technologies that give banks an opportunity to interact with customers on more personal and convenient levels. Customer acquisition and retention through mobile platforms offers capacity to acquire and retain more customers, whose growth and revenue generation process is catalyzed by their ability to be reached by the company through the platforms. According to Henderson and Venkatraman (1993) organizations which make use of digital technologies in an effort to match their operations with the needs of their customers would attain sustained competitive advantage and augmented growth rates (Omotayo and Akinyode, 2020). Additionally, digital-first offerings, like digital payments, online lending, and robo-advisory are new revenue streams to banks. Banks which adopt these services access new segments of the market which increases their profitability. Cao et al. (2017) state that digital transformation strategies of banks result in profitability improvement because of the back-office operation cost reduction and the development of new digital products, which bring revenues.

3. Organizational Digital Capabilities and Performance Outcomes

Interplay between Organizational Digital Capabilities and Performance Outcomes stands out as an important topic of discussion, since it highlights how the internal capacities of a bank determine its success in digital Economy (Pal, 2022). The digital capabilities in an organization, including its

technological base, leadership, and those of its employees, will define the efficiency with which the bank can use digital transformation to enhance its performance.

Justification of the Relationship

Laws with high digital capabilities stand better placed to implement the various technologies that would increase efficiency in their operations which would reduce the cost of operations, thus delivering improved levels of services. Cloud computing effectively supports the provision of a scalable, cost-effectively functioning banking system, whereas AI and big data analytics can equip banks with the capability to make real-time, data-driven decisions in a way that positively affects performance. Kane et al. (2015) emphasized that highly digitally ready banks are more set to support agile and customer-centric approach that translates to better performance and profitability of their operations. Leadership is a key component that determines relationship between digital capabilities and performance outcomes. Firm leadership is the way to make sure that digital transformation strategy is aligned with the bank business goals and promotes the enhancement of customer experience, profitability, and growth. It is possible to note that the companies that have a strong leadership support of the digital initiatives are more likely to witness the visible improvements in performance, as the leaders enable the provision of resources and, thus, establish the environment that favors the innovation (Melnyk et al., 2014). Lastly, organizational culture that is a considerable component of digital capabilities influences the capacity of a bank to become adjusted to digital technologies. Innovation, collaboration and risk-taking encourage banks to be better capable of successful implementation of digital initiatives resulting in increased performance levels. Zhang et al. (2018) believe that having a digital-first culture will nurture an atmosphere of constant experimentation and enhancing performance which is paramount in spurring performance results.

4. Moderating and Mediating Factors in the Relationships

It is noteworthy that though these relationships are important, strength and directions of such associations may be modified by some moderating and mediating factors. All that includes:

The external market, such as competitive forces and demand by customers, may affect the overall performance of the bank due to the digital adoption of the institutions. As an example, the extent

of digital adoption may be more influential in the case of highly competitive markets because banks are willing to differentiate themselves with distinct digital services.

Regulatory frameworks play a crucial role in mediation of relationship involving digital capabilities and adoption. Tight regulations can also hinder or stimulate the use of digital technologies, particularly within strictly regulated industries including banking. As an illustration, the implementation of open banking systems in Saudi Arabia that the SAMA promotes can contribute to the increased digitalization, which would allow banks to share data with third-party providers (Pan and Jang, 2016).

Allocating the financial and human resources can mediate the connection between organizational digital capabilities and performances results. Banks which decide to invest considerable funds into the creation of their digital infrastructure and train their employees observe a more crucial increase in their performance results, since they are left more prepared to deal with the peculiarities of the digital transformation process

The connections between Organizational Digital Capabilities, Digital Adoption, and Performance Outcomes are essential in learning how digital revolution is affecting the banking sector. Good digital capabilities in organization build a base towards a successful digital uptake, which consequently enhances the performance outcomes that include higher profitability, growth, and operational efficiency. Such relationships are intertwined and their impacts are moderated by externalities including market conditions, regulation structures and internal distribution of resources (Pelau and Acatrinei, 2019). By comprehending these connections, banks can more accurately appreciate the challenges of digital transformation and use it to fuel high levels of performance in a more digital future. The existence of these relationships and their justification, which is discussed basing on the available literature, gives a detailed structure of measuring how successful the digital transformation has been in the banking sector.

2.4.2 Empirical Literature Matrix and Meta-Analysis

This section presents a literature matrix that summarizes the major research studies done on digital adoption in the banking industry and the main findings of each study, the methodology employed and the independent variable used by each research. This matrix helps to identify the main topics

of research, methods employed in the study of digital transformation in the banking industry, and the way these studies are reflected in relation to the crucial variables of the present study Organizational Digital Capabilities, Environmental Readiness, Digital Adoption, and Performance Outcomes (Profitability, Growth, Efficiency). Such analysis will assist in determining the gaps and contributing to the conceptual framework of the present research (Purcell et al., 2012).

Table 2.2: Empirical Literature Matrix

Methodology	Key Variables	Findings	Relevance to Current Study
Survey, Case Study	Organizational Digital Capabilities, Digital Adoption	Banks with higher digital maturity (better capabilities) saw greater business growth and profitability . Digital adoption was linked to improved customer service and efficiency . Banks that invested in digital tools had higher returns.	Highlights the relationship between digital maturity and performance outcomes (growth, profitability) in banking, which aligns with the key variables of this study.
Literature Review, Meta-Analysis	Organizational Digital Capabilities, Performance Outcomes	Digital transformation leads to cost reductions, operational efficiency, and higher customer satisfaction . Key drivers include	Supports the argument that digital capabilities drive performance outcomes such as efficiency and profitability, relevant to the

		cloud computing and automation .	current study's objectives.
Case Study, Secondary Data Analysis	Digital Adoption, Performance Outcomes (Profitability, Growth)	The adoption of digital tools such as big data and AI led to higher profitability and market growth . Banks that embraced digital transformation gained a competitive advantage, while laggards faced declining market share.	Provides evidence linking digital adoption to growth and profitability , reinforcing the role of digital transformation in driving performance outcomes.
Survey, Regression Analysis	Organizational Digital Capabilities, Digital Adoption	Banks with strong leadership and digital infrastructure were more successful in adopting digital technologies, leading to increased efficiency and customer engagement .	Highlights the role of organizational capabilities in the digital adoption process and its direct link to efficiency , aligning with the conceptual framework of this study.
Survey, Structural Equation	Organizational Digital Capabilities, Digital	Digital adoption, driven by strong IT capabilities and leadership ,	Strong evidence for the link between organizational capabilities ,

Modeling (SEM)	Adoption, Performance Outcomes	positively impacted profitability, growth, and operational efficiency. Banks with advanced digital capabilities realized higher return on equity (ROE) and better cost management.	digital adoption, and performance outcomes, specifically profitability and growth.
Case Study, Cross- sectional Study	Digital Adoption, Performance Outcomes (Profitability, Efficiency)	Banks that adopted cloud-based platforms and automation tools experienced significant cost savings , leading to improved efficiency . Digital adoption in customer service and internal operations resulted in faster service delivery and reduced operational costs.	Directly correlates digital adoption with operational efficiency and profitability , validating the relationship between adoption and performance outcomes in banking.
Survey, SEM	Organizational Digital Capabilities, Digital Adoption,	Banks with robust digital capabilities (e.g., IT infrastructure and employee skills)	Demonstrates the critical role of organizational digital capabilities in driving digital

	Performance Outcomes	<p>showed faster digital adoption, resulting in higher customer satisfaction and growth. Innovation culture was a key enabler.</p>	adoption and improving performance outcomes .
Literature Review, Theoretical Framework	Environmental Readiness, Digital Adoption	<p>Environmental factors such as market readiness and regulatory support significantly influenced digital adoption in banking. In markets with robust regulatory frameworks, banks showed a higher level of adoption and better performance outcomes.</p>	Focuses on the importance of environmental readiness in the adoption process, which is a crucial moderating factor for digital transformation in banking.
Case Study, Survey	Organizational Digital Capabilities, Digital Adoption	<p>Banks with stronger digital capabilities, including IT investments and trained workforce, were able to adapt quicker to digital transformation and offered improved</p>	Corroborates the view that organizational digital capabilities directly enhance digital adoption , leading to growth and market competitiveness .

		customer experiences , leading to better growth and market competitiveness .	
--	--	---	--

2.5 Meta-Analysis of Findings

The above-reviewed studies meta-analysis gives a clear idea of the relations between the main variables of digital transformation in banking:

2.5.1 Digital Capabilities of Organization and Digital Adoption

The reports also indicate that the bank that has digital strength has a higher chance of implementing digital technologies effectively. The availability of the technological infrastructure, employee capabilities, and managerial support define organizational preparedness, so they are one of the defining factors determining the ability of banks to integrate new digital tools, including AI, cloud computing, and blockchain. A good leadership and an innovation culture are also among the driving factors of digital adoption. As an example, Zhang et al. (2018) and Melnyk et al. (2014) stress that such characteristics of organizations as leadership commitment and IT investments play a great role in increasing the adoption rates of digital instruments. Also, the inclusion of leadership in the determination of a coherent digital strategy would determine the rate of digital adoption in banks as outlined by Kane et al. (2015).

2.5.2 Digital performance: Adoption and Prosperity (Profitability, Growth, and Efficiency)

Digital adoption has a strong relationship with positive performance characteristics especially in matters of profitability, increased growth and efficiency. In their works, Bharadwaj et al. (2013) and Cao et al. (2017) emphasize that, at the same time, due to lower costs and newly generated revenues, the profitability of banks that will mitigate their digital transformation through technologies like AI, big data, and automation tools will improve. Introduction of such technologies will facilitate the increase in the efficiency of the work of each bank, and, therefore, it will result in cost reductions and more time-saving services. Moreover, Elia et al. (2020) also demonstrate that customer satisfaction is higher among those customers who use a bank with the

decision to adopt a digital solution to serve customers, such as mobile banking and chatbots, and this aspect leads to business expansion.

Cao et al. (2017) claim that the level of digital adoption also has a positive effect on the growth indicators, including market share and customer acquisition. Digital-only banks or fintech services have a larger customer base, especially the young but tech-savvy generation, and this enhances market growth. Moreover, research indicates that the advantages of digital adoption are revealed in terms of profitability because of the subsequent introduction of digital bank products, development of new financial services like online loans and peer-to-peer lending.

2.5.3 Readiness in terms of environment and adoption of digital arena.

The digital innovation is perceived to be enabled by regulatory frameworks, and may include regulatory sandboxes, like the fintech regulatory sandbox in Saudi Arabia. Banks are apparently more willing to use new technologies when the regulatory authorities encourage digital activities and offer definite regulations to follow. The other point is that market preparedness, the willingness of the customers to utilize the services of online banking, is also vital in the rate and level of digitalization (Ranvijay Singh Chauhan, 2025). It is especially so in the case of Saudi Arabia, where young population and a healthy smartphone penetration rate ensure a swift rise in mobile banking and digital payments.

The empirical literature matrix and meta-analysis reveal that the Organizational Digital Capabilities, Digital Adoption and Performance Outcomes in the banking sector are strongly and interrelated. Powerful organizational capacities, including leadership, IT infrastructure, staff abilities, realize successful digitalization that contribute to better profitability, growth, and efficiency in operations (Robinson et al., 2015). In addition, market preparedness and regulatory structures are also the factors that considerably affect the adoption process environmental factors.

The reviewed studies have also been able to present powerful arguments that banks that have considerable depth in digital capacity and environmental opinion are more prone to record positive performance results. These results indicate the role of organization preparedness and external resource in successful digital transformation in banking. The information contained in this meta-analysis will be used to guide the formation of the theoretical framework of this research study to

be the basis of conceptualizing the idea as to how digital adoption can result in improved banking performance in Saudi Arabia and other developing countries (Ruzian Markom and Ismail, 2009).

2.6 Theoretical Review

2.6.1 Theories Used (TOE, RBV)

The theories can help us identify the conceptual map where we can appreciate the connection between different variables studied in digital transformation in banking. The Technology-Organization-Environment (TOE) framework and Resource-Based View (RBV) are two popular theories which are applied to achieve better results in the study of technology adoption and organizational performance (Sa'id, 2020). These theories will be useful in understanding how companies including banks, as far as this research is concerned, embrace and introduce new technologies, as well as the impact of the adoptions on their performance results.

1. The Technology-Organization-Environment (TOE) Framework

This is one of the most popular models that researchers used to understand the process of technology adoption in the organizations. The TOE framework has assumed that there are three key contexts, namely technology, organization, and environment, that affect process and success of technological adoption in a firm (Sabri, 2025). The banking industry is one of the industries where this framework is most applicable because the implementation of new technologies, including cloud computing, mobile banking, and artificial intelligence, does not only depend on the processes occurring in the organization but are also guided by external technological and environmental factors.

Technology Context

Technology context is defined as the nature of the technologies being undertaken by an organization to be adopted and factors involved in this include compatibility, complexity, relative advantage among others. The technology context in banking implies the analysis of the novel digital tools, which should be applied by banks, including blockchain, artificial intelligence (AI), and machine learning. The ease of integration, cost, security and provision of innovation opportunities are among the factors that greatly influence the adoption of such technologies by banks (Saeed et al., 2023). In Saudi Arabian context, fintech policies of SAMA have had a direct impact on evaluating and implementing new technologies by Saudi banks. The technology setting

so deals with not only analyzing the digital products the banks are provided with but also knowing how well the given market in question is technologically prepared.

Organization Context

This is determined by the organization context which entails the internal resources and capabilities an organization has like IT infrastructure, employee skills and leadership support. The organizational context in case of banks refers to the readiness of a bank to embrace and incorporate new technologies in its operation. Banks that have a high digital maturity level, such as intensive IT base with knowledgeable employees, are prepared well to adopt recently emerged technologies such as AI, cloud computing, and data analytics (Saleh and Rami Zeitun, 2005). The other elements of the organizational context are leadership support and strategic alignment. The advent of technological implementation is more likely to occur in banks whose leaders support the use of digital transformation, since such leaders offer the requisite resources and vision in effecting such a transformation.

Environmental Context

Environmental context can be defined as the external forces behind the influence of the adoption of technology i.e. regulatory structure, market conditions and competitive pressures. The force of the regulatory environment, in the case of Saudi banks, lies in top priority. The regulatory authorities of Saudi Arabia like the Saudi Arabian Monetary Authority (SAMA) have a major role in the promotion of new technologies by establishing policies and designing a framework like fintech regulatory sandbox (Saputro, 2020). Also, the facts related to the market conditions and customer expectations have the major influence. With the growing number of consumers getting used to digital solutions, Saudi lending institutions are being pressurized to avail mobile banking, e-wallets, and online loan services to give them a competitive edge. Thus, the initial external environment, which consists of state regulations and market demand, is one of the determinants of the pace and extent of digitalization of Saudi banks.

2. The Resource-Based View (RBV)

Another popular theory of how competitive advantage could be gained and maintained by a firm is the Resource-Based View (RBV) of Barney (1991) about how resources and capabilities embedded within firm are important. According to the RBV, companies have distinctive resources

that can endow them with a competitive advantage in case these resources are valuable, scarce, non-imitable and non-substitutable. Within a framework of digital transformations in the banking industry, the RBV considers the internal capabilities of a bank, especially technological base, human resources, and an organizational culture that can determine the capability of the relevant bank to implement and take advantage of new digital technologies.

Resource-Based View in Banking

Digital capabilities (IT infrastructure, data-analytics tools, cloud computing) are valuable assets to banking sector to provide customers and more effective services, enhance engagement and attain competitive edge. Teece (2007) argues that those companies that are able to renew and change their resources as the technology develops perform better. It is an essential ability in the field of banking as the development of technologies is growing blisteringly, requiring the constant adjustments and investments into online resources. The RBV implies that the banks that have better resources in a digital environment (e.g. highly qualified personnel, high-quality AI technologies and digital infrastructure) are in a better position to drive value with the help of digital transformation. The banks which will be able to develop and maintain these digital capabilities will be able to attain increased efficiency, profitability, and growth in a competitive environment.

Technological Resources in Banking

In RBV framework, IT infrastructure is an essential resource. Digital infrastructure: Banks that have highly advanced digital infrastructure, including cloud computing platforms, cybersecurity systems can absorb and incorporate new technologies, such as AI, machine learning, and big data more successfully (Saura, 2021). A healthy IT infrastructure does not only help with the daily running of a bank but also enables a bank to scale up digital solutions easily and comfortably. On the same note, another fundamental necessary resource is the human capital in the RBV. Bank obtaining a higher level of employee training, especially in digital skills, has an improved capacity to exploit technologies such as AI in support of predictive analysis, fraud detection, and personalized services in banking. Well trained staff that is able to manipulate data, do analysis and take actions may bring about substantial changes in the efficiency of operations and customer satisfaction levels.

Organizational Culture and Leadership

The other resource is the organizational culture in the RBV scheme. The existence of a culture that promotes innovation and risk-taking enables banks to explore emerging technologies as fast and as effectively as possible. Leadership is the key element to this culture. Promoters of digital transformation can marry goals of the organization with new technologies, which makes a certain environment that already allows innovativeness, as Kane et al. (2015) see it. In addition, the presence of financial resources is also a catalyst in the RBV. The banks planning appropriately on investments in technology in either IT infrastructure, digital security or employee training stand a better chance of succeeding in the transition of going digital. Such investments enable banks to have the requisite tool to attain superior performance results with a sustainable competitive edge.

3. Application of TOE and RBV in the Banking Sector

The TOE framework and the RBV are some of the concepts used in various studies in the study of digital transformation in the banking sector especially in the emerging marketplace such as Saudi Arabia (Saura, Palos-Sánchez and Rodríguez Herráez, 2020). With the use of these theories, it was possible to get a better comprehension of the reasons that affect the successful adoption of digital technologies and their influence on the performance of a bank.

TOE Framework in Banks of Saudi Arabia:

The TOE framework can be applied in the context of Saudi banks in order to get an insight into how the implementation of the digital banking solutions in question is affected by both internal factors and external factors in the organizational environment and outside it (e.g., how digital readiness and leadership support on the one hand and the regulatory framework and expectations among customers on the other hand interact and influence the preparedness of Saudi banks on the market in question). Articles like those of Kane et al. (2015) highlight the importance of regulatory support (possibilities offered by the initiatives of the SAMA, such as the fintech sandbox) and market demand (of the tech-savvy consumers) to design the digital transformation process of Saudi banks.

RBV in Saudi Banks:

The use of the RBV to the banking sector in Saudi Arabia reveals the fact that organizational digital capabilities, including the following advanced-IT infrastructure, highly skilled workforce, the culture of innovation, are at the centers of banking digital transformation implementation. As an

example, Elia et al. (2020) mention that the high digital competences of banks in Saudi Arabia allow not only decreasing the cost of operations but also innovate new digital services, which contribute to the increase of profitability and growth.

The Technology-Organization-Environment (TOE) framework, as well as the Resource-Based View (RBV) are the necessary theoretical frameworks in comprehending digital transformation implementation in the banking industry. The TOE framework focuses on the relationship between environment, technology, and organization by providing details of both external and internal influences on the adoption of digital. In the meantime, the RBV is preoccupied with the internal potential and abilities that enable banks to utilize digital technologies in order to achieve a competitive advantage and witness enhanced performance results. In combination, these theories allow receiving a holistic picture of the processes that cause digital transformation in banks and, especially, in the Sauditeenth market within the specific market and regulatory environment.

This section has described why organizational digital capabilities (e.g., IT infrastructure and human capital) and appropriate environmental conditions (e.g., regulatory frameworks and market conditions) are essential in the successful implementation of digital applications to the banking industry by drawing on the use of these theories in the banking sector. The two frameworks play a central role in examining the influence of digital transformation on the major performance indicators (profitability, growth, as well as operational efficiency) and their contribution to the overall success of the banking sector.

2.6.2 Justification for the Framework

The choice of the Resource-Based View (RBV) and Technology-Organization-Environment (TOE) as the guiding theoretical frameworks of the current study on the effects of digital transformation on the performance of banks is explained by the fact that the two perspectives complement each other in their unique strengths. Combined, these frameworks would help to understand in details the effects of both internal and external factors contributing to the use of digital technologies within banking industry and how these factors, in their turn, affect results of performance activities like profitability, growth, and operational effectiveness (Schindelin et al., 2012). The integration of these theories permits the inclusion of the multi-dimensional analysis including both the organisational readiness (RBV) and the external environment (TOE) as the

primary causes of change towards digitalisation in Saudi banks. This chapter explains the rationale of selecting the TOE and RBV frameworks noting that they are relevant to the aims of the study, they can understand the research questions and they are valuable in understanding how Saudi Arabia banking sector complexities of digital transformation.

1. The Technology-Organization-Environment (TOE) Framework

TOE framework which progressively evolved by Tornatzky and Fleischer (1990) was chosen in this study because it allows systematic analysis of the factors that influence digital adoption in organizations especially in banking industry. According to TOE framework, there exist three major contexts, that is, the technology, the organization, and the environment contexts, which interact and which may persist or change and leading to the probability of adopting and successfully implementing new technologies (Schoemaker, Heaton and Teece, 2018). Applied to the case of the Saudi bank, the meaning of TOE framework can be especially appropriate due to the following reasons:

Comprehensive Coverage of Adoption Factors

The TOE model provides the expansive picture of the absorption process that entails the internal and external forces. These aspects play a key role in making sense of the complex nature of digital transformation in banks, where internal potentials (leadership, IT infrastructure, employee skills, etc.) interplay with external demands (the regulatory environment, customer expectations, competitive market forces, etc.) to define whether digital technologies are adopted and how they will be applied.

The technology context consists of the attributes of the technology including its compatibility, complexity and relative advantage. Under banking, it would cover the analysis of such technologies as blockchain, AI, and cloud computing, which banks should analyze to make decisions about their integration into the operations (Sciurba, 2018). TOE framework enables us to discuss the perception/evaluation of such technologies that banks make and how such an evaluation helps to approve or abandon such technologies.

Organization context is concerned with the internal resources and capabilities of the bank like IT infrastructure, capabilities of employees and support of the management. The TOE framework

plays a decisive role in the comprehension of the influence of digital maturity, resource allocation, and organizational culture in banks and their success in adopting and integrating digital technologies. A good example is that banks that have strong IT background and well trained personnel stand a higher chance of a successful digital adoption than those that have minimal digital resources.

The environmental context looks at the external context that influences the adoption process such as the market dynamics, regulatory policies and customer readiness. Regulatory efforts of the Saudi Arabian Monetary Authority (SAMA) like the fintech regulatory sandbox play an important role in reshaping the approach of banks to digital transformation in Saudi Arabia. The framework can assist with realizing what kinds of external factors influence the adoption process, especially within the context of regulatory environment and fast-changing financial market that exists in Saudi Arabia (Setiawan, Amilin and Al Arif, 2020).

2. Relevance to Saudi Banking Sector

The TOE framework has the advantages in that it is rather flexible to integrate the local policies in the regulation of the banking sector and actual conditions in the Saudi market. Saudi Arabia is currently experiencing a fast-growing process of the digitalization of the banking industry, partly caused by the parameters set by the Vision 2030 program developed by the government, designed to transform the economy and improve the tech infrastructure. TOE framework would enable this study to check the impact of the regulations on SAMA (Shandy Utama, 2019), the growth of fintech companies, and the changes in the expectation of customers on the introduction of new technologies and the future performance of Saudi banks.

Besides, in Saudi Arabia, the banking sector consists of not only Islamic banks, but also conventional ones, which experience different issues and opportunities when dealing with digital technology adoption. The environmental situation within the TOE framework provides the means of discussing this impact of these differences in banking models regarding the digital adoption in a highly detailed way, especially the regulatory and market environment which proves to be critical in dictating the conditions of banking evolvement in Saudi Arabia.

2.6.3 The Resource-Based View (RBV)

Barney (1991) developed the Resource-Based View (RBV), and it was chosen due to a required approach to the way in which the internal resources and capabilities can be used to support competitive advantage, especially under the circumstances of digital transformation. The RBV points out that companies that own valuable, rare, inimitable and non-substitutable resources have an opportunity to use it as an asset in order to achieve an advantage in the competition (Shehadeh, Alshurafat and Arabi, 2024). In the case of banks, digital capabilities are vital resources, including well-developed IT infrastructure, human capital, and support of the leadership through which successful adoption of digital technologies can be achieved and enhance the overall performance.

1. Focus on Internal Resources and Capabilities

The RBV is quite applicable in determining the internal forces created in the banking industry in adopting digitalization. As a case in point, secure data centres, cloud computing facilities, and transaction processing systems are vital to those banks transforming their businesses into digital banking and mobile payments platforms. Those banks that have better IT infrastructure can install modern technologies in a better manner and this has increased the efficiency and customer servicing as well as profitability. Also, RBV framework uses human capital as a critical resource. The of companies that have highly-educated IT-specialists, data scientists, and managers well-incorporated into digital tools presents a competitive advantage when trying to adopt technologies, like AI and machine learning. Teece (2007) explains that to be able to sustain competitive advantage, resources should be constantly renewed (including investment in training and development), which is especially so in the case of a relatively higher rate of technological change such as that in banks.

2. Leadership and Organizational Culture

The important elements of the RBV are leadership and organization culture that shape the extent to which banks are able to cope with digital transformation initiatives. Leadership vision and support becomes essential in the process of making digital transformation relevant to the overall strategy of the bank. Digital-first leadership helps build a culture of innovation, allowing the staff members to reject stasis and employ new technologies in their proper use. The organizational culture and especially the very culture of digital innovation and agility to a significant degree

determine how banks will treat the introduction of new technologies. Zhang et al. (2018) defended the theory that organizations with well-established innovating cultures are more flexible to adjust and adopt to dynamically evolving technological environments and develop new technologies more promptly compared to those with resolute and conventional cultures.

3. Relevance to Saudi Banking Sector

RBV offers an excellent idea to study internal resource of Saudi banks and how such resources contribute or fail to contribute to the process of digital transformation. The major Saudi banks especially the top banks such as Al Rajhi Bank and National Commercial Bank (NCB) have devoted large investments in digital technologies, such as mobile banking systems and artificial intelligence that will be used in detecting frauds and customer services. Leadership is also essential in terms of facilitating these investments as well as digital initiatives, and the Saudi Arabia context regarding its drive towards digitalization and its Vision 2030 is no exception (Shen, Zhang and Liu, 2021). The RBV is also a rather helpful tool to trace the role of human capital in shaping digital adoption. The overall trend of bank digitalization in Saudi Arabia requires employees with competent skills in the fields of data science, cybersecurity, and digital banking solutions. Employee skills set and training programs based on which the banks can rely on playing their best with digital tools are of primary importance when it comes to the issue of gaining the competitive advantage in the financial services market.

4. Combining TOE and RBV: A Holistic Framework

Although the TOE and RBV frameworks individually offer some insights into the processes of adopting digital technologies in banking, adoption of both allows getting a more comprehensive picture of the digital transformation. TOE framework concentrates on external environment (technology, organization and environment) whereas the RBV concentrates more on internal capabilities and resources to facilitate successful adoption. With the combination of these frameworks, this research will be able to evaluate how the two factors (the internal resource, as perceived by the RBV, and external conditions, as set out by the TOE) interact to enhance digital adoption and performance results in Saudi banks.

The choice of TOE framework and the RBV to rely on in conducting the study is predetermined by the fact that the two options complement each other in terms of their essence of explaining the

digital transformation process within the banking sector (Shin, Mollah and Choi, 2023). TOE framework offers a systematic way to comprehend the impact of external and internal conditions that impact digital adoption whereas RBV offers a detailed analysis of how the organizational resources e.g. IT infrastructure, human capital and leadership will define the effectiveness of digital initiatives (Singh and Lin, 2020). When combined, these frameworks can give us a thorough insight into what moves the digital transformation movement in the banking sector in Saudi Arabia and present a rigorous background into examining the linkages among the digital capabilities, digital adoption and performance outcomes. Combining the wisdom of these theories, this research will be able to provide useful ideas on how banks can use their resources and external environments to improve digital transformation activities in Saudi Arabia and record better performance.

3 Chapter3: Methodology

3.1 Introduction

Research Methodology chapter is one of the most important parts of this thesis because it prepares the basis of the study design followed by data collection and data analysis. In this chapter, we shall offer a clear and explicit explanation of the steps used to examine the effect of digital transformation on the performance of Saudi banks using some important performance factors like the level of business growth, level of profitability, and level of effectiveness. The methodology is designed according to the research objectives as presented in Chapter 1, as well as aims and questions of the research but the methods should be chosen so that the research objectives are met.

As the nature of digital transformation is extremely complex and it affects the banking sphere even more, it is vital to find a methodological approach that will not only be rather exhaustive, but also elastic and able to reflect the multidimensional character of the phenomenon. In this chapter, the research design, variables, data collection procedures and data analysis procedure employed in this study are described (Skare and Soriano, 2021). The adopted methodology will provide both qualitative and quantitative data on the digital change experience of Saudi banks and have a chance to thoroughly investigate the correlation between the digital adoption and the vital performance indicators in the banking field.

The choice to explore this subject is based on increasing importance of digital technologies in developing the financial market in Saudi Arabia, especially in the context of the idea of Vision 2030. With the Saudi banking industry moving towards this techno revolution, it will be important to shed light on how this technology revolution has affected the business performance of various organizations, i.e. growth and profitability as it will be the concern of policy makers, industry practitioners, and even the academicians. As such, the research aims at not only contributing to the scholarly body of work but also benefiting policy-makers in the banking industry.

The aims of the research are closely connected with the reflection on what level of digital adoption is observed within Saudi banks, what effect does digital transformation has on the business development, profitability and efficiency of operations and what organizational and environmental factors affect the success of this digital transformation. The research approach that has been chosen

to meet these objectives is both qualitative and quantitative so that the research needs these objectives to be answered thoroughly.

3.1.1 Research Philosophy and Approach

In this study, a mixed-methods approach will be used, which implies the combined application of qualitative and quantitative methods of research. This methodology allows realizing the research problem in a wider context, since the researcher has the chance to study the phenomenon in terms of describing as well as in terms of analyzing it. Another benefit of the study of mixed-method approach is that it allows taking a complex approach to understanding digital transformation in the banking industry: it is both quantitative and qualitative.

The given approach corresponds to the research philosophy of pragmatism that implies consideration of the practical value of knowledge and necessity of applying various methods to investigate different parts of the research issue (Stark et al., 2019). Pragmatism would be especially sufficient to investigate the phenomenon of digitalization that is very complex and multifaceted because it implies flexibility in data collection methods as well as data analysis methods. The qualitative and quantitative approaches are expected to form a broad picture of how banking in Saudi Arabia is getting transformed by the use of digital technology.

3.1.2 Research Design

The study the research design is informed with the main aim of the study that is to examine the effects of digital transformation on the performance of Saudi banks. The study design will incorporate both descriptive and comparative-causal components in the order of dealing with the process of digital adoption as well as the derived effects affecting the main performance indicators.

1. Descriptive Design: The research component deals with the description of the propensity of online adoption among the Saudi banks. It entails finding out the digital technologies under implementation, learning of how the technologies are implemented in banking operations, and also evaluating the digital bank maturity levels of banks (Streimikiene, 2019). The presented descriptive element gives an overall image of the current level of digital transformation of the Saudi banking industry.

2. Causal-Comparative Design: This aspect of the study aims at studying all the causal links between digital adoption and the profitability, operational efficiency, and business growth as key performance indicators. The use of digital technology in such effects is a key concern of the study because it would identify whether and in what capacity digital technologies affect the performance of Saudi banks. Causal-comparative design allows the researcher to compare the before and after situation as well as evaluate the differences in the metrics of the performance of the bank pre and post implementation of the digital technologies.

3.1.3 Data Collection Methods

Consistent with the mixed-methodology approach, this research study also takes advantage of the primary research and secondary research methodologies in collecting the research data needed to generate applicable information about digital changeover in Saudi banks.

1. Primary Data: The primary data will also be gathered using a survey and the interviews of key players in the Saudi bank such as executives, managers and IT personnel. Such people can best offer information on the adoption of digital technologies in their organizations and the effects such technologies have on the performance of banks.

Survey: A well-designed survey will be issued to the employees at different levels in the banks to provide quantitative data on the levels of digital adoption, the kind of technologies developed, and their perceived influence on performance. In the survey, questions as to the difficulties experienced in the process of digital transformation and organizational and environmental determinants of successful adoption shall also be included.

Interviews: In depth interviews will be made with the senior management and IT professionals in some selected Saudi banks. The following interviews will be used so that a qualitative data would be collected concerning the options of going digital and its strategic choice, the leaders involvement in bringing change, and how the digital technology has impacted the business growth, profit making, and efficiency in business.

2. Secondary Data: The secondary data will be gathered through the industry reports, financial statements, and government reports on digital transformation and the performance of the banking sector in Saudi Arabia. The information will give a wider dimension to the research so that a

comparison can be drawn between the results obtained in the primary data and the literature. The secondary data shall also be utilized in confirming the results which were generated by the primary data, making the research findings solid and sound.

3.1.4 Data Analysis Techniques

This study will use a methodical data analysis procedure since both qualitative and quantitative analysis tools will be used to achieve the research objectives.

1. Quantitative Analysis: Since the survey impresses quantitative data, statistical tools of analysis will be used such as descriptive statistics (mean, standard deviation), correlation analysis, and regression analysis. The relationships between the web adoption and the main key performance indicators of Saudi banks will be explored via regression models (Sun, Yu and Solvang, 2022). The objective is to determine the impact of the introduction of digital technologies on profitability, the efficiency of work and business development.

Factor Analysis will serve to determine the major dimensions of digital transformation and identify their connection with the performance outcomes.

The hypothesized relationships between digital transformation and bank performance will be tested using Structural Equation Modeling (SEM) which gives an overview of the prediction of the direct and the indirect impacts.

2. Qualitative Analysis: Theme analysis Qualitative data in the interviews will be analyzed through theme analysis where a recurring pattern and insight will be found through analysis of the thematic responses to the interview transcripts (Tankiso Moloi and Tshilidzi Marwala, 2023). Such analysis will give an insight into the experiences and views of the bank employees with respect to digital transformation. It is also expected that thematic analysis will be useful in revealing the organizational and environmental determinants by achieving a digital implementation success.

3.1.5 Alignment with Research Objectives

The research objectives are embraced by this methodology because it guarantees that both the digital adoption and its influence on performance are discussed in various angles. The combination of quantitative and qualitative approaches will enable an extensive investigation of the research

questions, both the quantitative data on the level of the digital adoption and a thorough understanding of the experience of the work of employees of the bank. This way of approaching the study will help contribute to the scholarly body of knowledge concerning the idea of digital transformation in the banking sector, especially in the case of Saudi Arabia, as well as make practical suggestions to the stakeholders in the same field.

Concisely, the chapter on the Research Methodology proposes to apply the mixed-methods research strategy to inquire into the effects that digital transformation had on the performance of Saudi banks. The qualitative and the quantitative methods used allow the research goals to be solved comprehensively and strongly (Tchamyou, 2016). This study will analyze the digital transformation efforts using surveys, interviews, and secondary data to give meaningful information about the situation with digital transformation in the Saudi banking industry and its impact on the key performance indicators. Such a methodology prepares the ground to the following chapters during which the presented information will be broken down, commented, and interpreted as it relates to the research questions.

3.2 Variables

In this section we are going to specify the main variables of the study, explain the operationalization of the variables and give the hypotheses upon which the study revolves. These variables are the main features to comprehend the influence of the digital transformation on the performance of Saudi banks concerning business growth, profitability as well as efficiency of its operations.

3.2.1 Conceptual Framework

This thesis presents a conceptual framework of the study that determines the connections between the main variables to be investigated in the research. The model is constructed on the hypothesis that digital transformation (DT) in Saudi Banks brings changes in a number of key performance indicators (KPIs), including the business development, profit rating, and operational performance. Also, digital transformation success in the bank industry is predetermined by a number of internal and external factors.

Key Variables:

1. Digital Transformation (DT)

Digital transformation can be referred to as the incorporation of high-level digital technologies into any aspects of the operation of a bank. It entails the implementation of using cloud computing, artificial intelligence (AI), blockchain, and big data analytics (Thabit Atobishi and Saeed Nosratabadi, 2024). The level of digitalization can be quantified by the level of adaption of such technologies as well as the maturity of digital processes in the company.

Operationalization: Digital transformation is a proxy which can be operationalized utilizing digital adoption index (DAI), which can be measured as the sole factor of the scale of technology which has been integrated.

2. Business Growth (BG)

Business growth can be defined as the rise in the market share of a bank, an increase in customers and growth in the offering of products/services. This variable can be viewed amid the digital transformation process as the possibility of banks to expand their operations and capture new markets because of the enhanced technological capacity (Theng et al., 2021).

Operationalization: The concept of business expansion will be evaluated on such measures as a rise in market share, rate of customer acquisition and the amount of new products/services offered.

3. Profitability (P)

Profitability refers to the capacity of the bank to make returns compared to related costs. It is the result of immediate working and development (Tian, Qiu and Wang, 2024). The hypothesis of the study is that digital adoption process can result in the increased profitability due to the cost-saving operations, automation of processes, and the improved insight about the customers.

Operationalization: The common financial ratios or measures that are to be utilized in determining profitability will include Return on Assets (ROA), Return on Equity (ROE), and margins of net profit.

4. Operational Efficiency (OE)

Operational efficiency is the capacity of a bank to streamline its processes and cut down its bills, and enhance its services delivery. Digital transformation normally improves the efficiency of operation since it automates several tasks regularly, the analysis of data, and also the distribution of resources.

Operationalization: The level of operational efficiency shall be quantified as cost-to-income ratio, transaction time consumptions and banking process error rates.

5. Internal Factors (IF)

Internal ones consist of such factors as the support and leadership of teams, the IT infrastructure in the organization, or an organizational culture, which contributes to the outcome of the digital transformational processes in a bank.

Elaboration/Operationalization: The power of internal variables can be measured by conducting surveys of the main employees regarding the degree of leadership commitment, IT aptitude, and the bank risk-taking culture.

6. External Factors (EF)

Examples of external factors include government policies, regulations and competition on the market that determines the approach of banks toward digital transformation.

Operationalization: An external environment will be measured by examining regulatory changes, incentives the government provides to digital banking, and dynamics on the Saudi bank market.

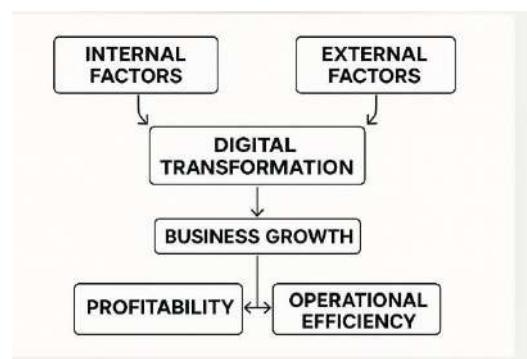


Figure 3.1: Conceptual Framework Diagram

Stringing a connection between the variables, this conceptual framework makes it clear how internal and external factors interact with digital transformation to affect business growth, profitability, and operation efficiency.

3.2.2 Research Hypothesis

With the help of the conceptual framework, this study formulates some hypotheses to be tested in the study of digital transformation and Saudi banks performance. The hypotheses to be tested under the study are as follows:

H1: The level of digital transformation in Saudi banks positively impacts business growth.

Rationale: The more digital the technologies embraced by banks, the higher their potential to increase the markets, find new customers, and introduce new products and services. Digital transformation will enable banks to scale their activities more effectively, access and convert new markets and boost customer interaction.

Measurement: Measurement of this hypothesis will be through the relationship that exists between the digital adoption index (DAI) and the business growth indicators e.g., the market share and customer acquiring rates.

H2: Digital transformation has a positive impact on the profitability of Saudi banks.

Rationale: Digital transformation will help banks automate processes, lower their operational outlays, and discover better insights into the customer behavior which will result in the improved profitability (Torten, Reaiche and Caraballo, 2016). The hypothesis proposes that those banks that have greater degree of digitalization will record improved financial performance which is gauged by factors such as profitability like ROA and ROE.

Measurement: Profitability will be measured against ROA, ROE and margins of net profits. The dependability between the standards of digital adoption and profitability will be tested with the help of regression analysis.

H3: Digital transformation improves operational efficiency in Saudi banks.

Rationale: Use of digital technologies such as AI, blockchain and cloud computing are capable of streamlining operations, reducing time to process transactions and minimize errors which translates into superior efficiency of operations. In this hypothesis, it is assumed that banks which have welcomed these technologies will show better performance in operations.

Measures: Operation efficiency will be measured in terms of ratio, e.g. cost-to-income ratio and transaction processing times. Statistical evaluation will be done using the relationship between the digital transformation and these efficiency indicators.

H4: Internal factors (such as leadership support, IT infrastructure, and organizational culture) positively moderate the relationship between digital transformation and performance outcomes.

Rationale: Although digital technologies may have been introduced, the success of digital transformation largely relies on internal influences like leadership commitment, high-quality IT infrastructure, and the culture of innovations (Tungpantong, Nilsook and Wannapiroon, 2022). Banks supported by better internal factors are supposed to record greater gains in terms of business growth, profitability and operation efficiency.

Measurement: The internal factors are going to be measured with surveys, and their moderating impact on the relationship between the digital transformation and the performance will be checked by making a moderation analysis.

H5: External factors (such as government policies and market competition) positively moderate the relationship between digital transformation and performance outcomes.

Rationale: The government policies that promote digital adoption, along with industry rivalry between other banks and the fintech startups can strengthen the effect of digital transformation on performance. The hypothesis to examine present in this case assumes that external factors determine whether digital initiatives in Saudi banks will be successful or not.

Measurement: The second track is the external factors that will be assessed with the help of secondary data, regulatory changes and market competition analysis. Their moderating influence is going to be tested by investigating the role of these external factors in affecting the relationship between digital transformation and performance.

Table 3.1: Hypothesis Table

Hypothesis	Expected Relationship	Method of Testing
H1	Digital transformation impacts business growth positively	Regression analysis (DAI vs. market share/customer acquisition)
H2	Digital transformation improves profitability	Regression analysis (DAI vs. ROA, ROE)
H3	Digital transformation enhances operational efficiency	Regression analysis (DAI vs. cost-to-income ratio, processing times)
H4	Internal factors moderate the relationship between DT and performance	Moderation analysis (leadership, IT infrastructure, culture)
H5	External factors moderate the relationship between DT and performance	Moderation analysis (regulations, competition)

The current section has identified the main variables and hypotheses of this study, which concerns the connection between the digital changeover and the Saudi banks performance. The conceptual framework presents a well defined charting of how digital adoption affects the performance outputs, moderated through the internal and external factors (Vaidya, Ambad and Bhosle, 2018). The concepts will be tested on the basis of the hypotheses, whereas the visuals will be provided to facilitate the comprehension of these notions. This approach will guarantee that the scope of the research will be elaborated and that there is an evident flow of data collection and analysis.

3.3 Research Design Process

The general description of the research design process will be discussed in this part including the research approach, research paradigm and research method taken. Design process is crucial because it acts as the map or rather guide through the research study in which the objectives are balanced with methods and techniques of data collection and analysis (Vakulchuk, Overland and Scholten, 2020). The research design procedure adopted in this study is informed by the need to answer the main research questions and hypotheses in the study, and the methodology is in a position to enhance the objectives of the research.

This research intends to investigate the effects of digital change in Saudi banks performance that portrays the major performance indicators like business growth, profitability, and operational efficiency. The design process employs qualitative and quantitative data gathering aspect, which make the digital transformation of the banking sector complex and multi-dimensional.

3.3.1 Research Approach

The method of conducting research is the strategy adopted to address research questions and put the hypotheses to the test as a whole. The nature of the presented study is that it follows the mixed-methods research method (a combination of qualitative and quantitative research methods). The reason of consideration of the mixed-methods approach is to obtain the full picture of the complicated linkage between digital transformation and performance performance of Saudi banks.

3.3.1.1 Justification for Mixed-Methods Approach

1. Research Topic Complexity: The complex nature of digital transformation in the banking industry refers to the fact the latter is a multifaceted process triggered by technological (including AI, blockchain, cloud computing) and organizational changes (including leadership, IT infrastructure, organizational culture). The mixed-methods approach will allow the research to deal not only with quantitative data related to the adoption of digital technologies, but also will consider the qualitative information concerning the influence of digital technologies on performance in the eyes of both bank employees and executives.

2. Complementarity: Because it combines both qualitative and quantitative, this method provides the advantages of complimentarity. Quantitative data includes facts in the form of numerical analysis of the links between digital transformation and performance outcomes, whereas qualitative data includes background information about the organization issues, plans, and internal/external factors affecting the realization of digitalization in Saudi banks. Combination of these sources of data gives a more complete and richer picture of the subject of research.

3. Validation: Validation of results across data types is one of the benefits of mixed-methods approach. As an example, the quantitative results (i.e. the digital transformation has affected profitability) can be confirmed by the qualitative evidence (i.e., the results of an interview of bank

executives on how the digital transformation strategies have impacted the practice of their operations). This interlock adds reliability and strength to the research findings.

3.3.1.2 Data Collection in Mixed-Methods Approach

Quantitative data will be gathered through the usage of surveys given to the employees at different levels of Saudi banks. The survey will determine the level of digital transformation and its impacts on the business growth, profitability and efficiency in operations. The gathering of qualitative data will be supported by a process of semi-structured interviews with main stakeholders in the banking sector i.e. senior management, IT directors and the operational employees (Verhoef et al., 2021). These interviews will give us a reflection of the processes, challenges, and motors of digital transformation in Saudi banks.

3.3.1.3 Advantages of the Mixed-Methods Approach:

Thorough meta-analysis: The possibility to mix numeric tendencies with personal opinions based on interviews.

More validity: The feedback of the two sources of data is valid due to cross-checking the results.

Comprehensive insights: Gives a deeper comprehension of the issues that impact digital transformation in the Saudi Arabian banks.

3.3.2 Research Paradigm

The paradigm is a representation of the belief system in which the research is channeled. This research will use a pragmatic paradigm and this will be quite appropriate in mixed methods research. A pragmatic method concentrates on functionality and is versatile and flexible in its application and focuses on applying any methods or techniques that would best help to answer the research questions.

3.3.2.1 Justification for Pragmatic Paradigm

1. Practical Focus: The pragmatic paradigm has immediate focus on practical problems and solution of the problem. Regarding this situation in the digital transformation of the Saudi banks, the key objective is to acknowledge how digital technologies influenced the final crucial business results and to deliver practical conclusions to bank managers, policymakers, and regulators. The

pragmatic path is important because it makes the research address the real-world implications, i.e., how the digital transformation can be used to increase operational efficiency or profitability.

2. Flexibility: There is flexibility of using both qualitative and quantitative approaches. It does not insist on following one method; instead it starts with the belief in using the best methods to deal with the research problem. Considering the fact that digital transformation is a complex process and that the banking industry is a dynamic field, the pragmatic approach offers this study a chance to employ several data collection techniques with the aim of examining various aspects of the phenomenon in question.

3. Several Stages: This research can be addressed in a pragmatic way since it is aimed at analyzing the issue of digital transformation through the lens of different perspectives, namely technological, organizational, and performance-based lenses (Wang et al., 2021). Due to adopting various approaches, the study will reflect the subjective views of different stakeholders of the research problem, both the employees of the bank (in case of surveys) and the senior decision-makers (in case of interviews), therefore offering a more diverse implications of the research issue.

3.3.2.2 Pragmatism in Practice

Theoretically, the study will be developed based on the pragmatic paradigm that may guide the research as to the effectiveness of digital transformation strategies in meeting organizational objectives instead of following one pattern of theories. It enables to combine different types of data (both quantitative and qualitative), different tools and methods to answer complex research questions.

3.3.3 Research Method

Research method can be taken to mean particular methods of data collection and analysis. As noted, this research is a mixed-method study and thus it uses qualitative research method in addition to quantitative research methods. The techniques are selected because they cover the results of the investigation of the digital transformation effect on the performance of Saudi banks.

3.3.3.1 Quantitative Research Method

Quantitative element entails the gathering of numerical data by means of structured survey. The survey plan will capture details on the following:

Digital adoption: What kind of digital technology has been taken up by Saudi banks (AI, blockchain, cloud computing).

Performance impact: The effects of digital transformation on other main performance indicators, such as business growth, profitability, as well as operational efficiency.

Survey Design:

Questionnaire: The survey will be in a form of Likert scales, in which the respondents will rank the level of adoption of digital at their organization and how it has affected its performances across different sets of measures.

Sampling: In this survey, the employees of the banks belonging to different levels will be targets and therefore the sample will be representative of all employees of the banks including the ones who are IT, operations and management employees.

Table 3.2: Survey Question Table

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The bank has effectively integrated AI into its services.	<input type="checkbox"/>				
Digital transformation has led to increased customer acquisition.	<input type="checkbox"/>				

Data Analysis:

Descriptive statistics will be used to summarize data and present the overview of the level of digital adoption and its effect on performance. Regression analysis aims at testing relations between performance outcomes and digital transformation (Wang, Wang and Yang, 2010). Factor analysis, to determine underlying factors that impact on digital transformation of Saudi banks.

3.3.3.2 Qualitative Research Method

The qualitative aspect will entail an interview with stakeholders of the Saudi banks by use of semi structured interviews. Such interviews will enable the researcher to get rich insights into the

inspiration, difficulties, and experiences that surround the digital transformation of the banking industry.

Interview Design:

Participants: Senior managers, IT directors and operational employees in Saudi banks.

Interview Design: A series of guiding questions will be compiled, which will concentrate in regard to the following areas:

Digital transformation organizational strategies and priorities.

Issues facing the digital adaptation process.

Perceived gains on digital transformation (e.g. efficiency, customer satisfaction).

Internal, external factors impacting success of adoption.

Data Analysis:

Thematic analysis: The transcripts of the interviews will be reviewed where repeated themes and pattern will be identified. This will give an idea about the experience of the digital transformation realization level and the perceived points of the companies performance effect on the organizational level.

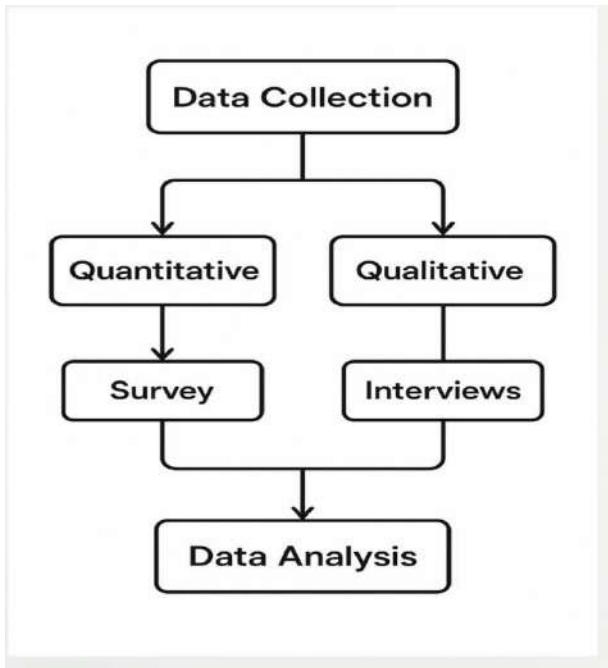


Figure 3.2: Research Design Flowchart

Overall, the process of designing the research in this study is based on mixed-methods research that is a combination of quantitative and qualitative research methods. The theoretical approach is based on the need to reflect the complexity of digital transformation of the Saudi banking sector so that the project would reflect not only the scale of digitization but also the influence of digital technologies on the main performance indicators (Warner and Wäger, 2019). This approach is supported by the pragmatic paradigm that has a practical real-world view. The selected techniques (surveys and interviews) offer the exhaustive method of gathering and drawing conclusions to data, although composed illustrations are recommended to support the understanding of the research design procedure.

3.4 Sampling Design Process

One of the most important components of the research methodology is sampling design since it determines the way participants will be recruited into the study. Guideline in the sampling design involves specification of the study population, specification of the unit of analysis, selection of the sampling technique and the size of the sample. Such actions are important because they guarantee the relevance and validity of the conducted research. In this part, the procedure of deciding the sampling design of the current research on digital transformation in Saudi banks will be explained,

the manner of how the population is chosen and why the identified sampling strategies will best suit the responses to the research questions and theories.

3.4.1 Study Population

Study population is that still form of people or things, to which the sample will be selected. In the present study, the study population will include the employees of the banking sector in Saudi Arabia, who are either participating in or are being impacted by efforts relating to digital transformation. The post group will be comprised of staff members of both conventional banks and Internet-only banks, and staff in Islamic banks in Saudi Arabia.

Saudi Arabian banks and banking services have heavily digitized their business in line with the government agenda of vision 2030. It is characterized by the introduction of the state-of-the-art technologies into the existing operation model of banks or the use of blockchain, artificial intelligence (AI), cloud computing, and mobile banking. Thus, the group of employees in these banks should be considered the perfect sample of participants of this study because these people engage with the digitalization process personally or are directly influenced by it (Wewege, Lee and Thomsett, 2020).

The group of people served by the study is heterogeneous as there are employees in different positions in the banks in the research: people providing IT support, members of the customer support team, managers, and executives. Such diversity makes certain that the data has got to do with various views and experiences of employees who are engaged in various parts of the digital transformation process.

Exposure to Various Types of Banks: With a range of different types of banks, including traditional and digital-only banks included in the study, the study will receive the input of the two kinds of banks at varying levels of digitalization and digital transition. Islamic banks will not be left either, because they can have other issues regarding digital transformation, since their business models are Sharia-based.

The study will involve examination of the banking industry in Saudi Arabia, having considered both the conventional and the Sharia-compliant banks. It will focus on the employees in different levels of organizations such as employees in IT department, operations people, management, and

executives who are directly or indirectly participating in digital transformation projects. The study would encompass banks situated in all parts of Saudi Arabia but the greater focus would be on the big cities including Riyadh, Jeddah, Dammam and Mecca.

3.4.2 Unit of Analysis

The unit of analysis is object of research or analysis in the study. Throughout the research, the denizens of study will be the single worker in the Saudi banking industry who is exposed to the digital transformation process.

The reasoning lies in the fact that digital transformation in bank is a multi-level process that will influence different people differently according to their positions in this organization. Depending on the level of the organization, employees may have rather different views concerning the effect of digital transformation (Working Better With Age, 2019). IT personnel will pay more attention to the technological part and the issues of new systems implementation. The customer service representatives will be much interested in the impact of digital tools on customers. Managers and executives will presumably have a more comprehensive perspective of the strategic and financial implication of the digital transformation on the performance of the bank.

By the collection of the data on people representing various departments and various levels of the bank employees, the study must be able to present the overall idea of the influence of the digital transformation on employees, or how those employees shape the very process of the digitalization on the company level.

3.4.3 Sampling Design

The sampling design determines how individuals will be selected by sampling on the study population. In this study, the non-probability sampling methods will be used in the sampling design because of the practical issues, notably time and access to the respondents. To be more specific, the purposive sampling, the snowball sampling methods will be employed.

1. Purposive Sampling

Purposive is also called judgmental sampling; this is a non-random sampling which is done where the participants are kept due to their own characteristics or information that is to be related on the

research objectives. Purposive sampling will be applied in this study and employees that are directly involved in the digital transformation process in their respective banks will be sampled.

Rational: Purposive sampling will make sure that the study will target those who have the required experience and knowledge to give useful insight about the digital transformation process. Such method is the most appropriate to qualitative gathering of data (interviews) because in this way, it is possible to make sure that the sample consists of the employees who can give the most interesting and informative data about digital transformation that takes place in Saudi banks.

Selection Criteria: The selection of employees will be made on the basis of their contribution during the process of digital transformation. To take an example, the employees who may take part in the implementation of new digital tools (e.g., cloud computing and AI) will be prioritized, as well as those who are in charge of defining the strategic plan of the digital activities occurring in the bank.

2. Snowball Sampling

With the help of purposive sampling, the sample size will be extended through snowball sampling. Snowball sampling implies the use of the participants to mention others who should take part in the study based on the conditions of the research. This is especially helpful in the event whereby the researcher could not get access to a large population of participants or where the target population appears hard-to-reach.

Rationalization: Snowball sampling is good when one wants to access the participants within a set up-where identifying and contacting the members might be challenging or in the settings where there will be no easy way of accessing the participants in a setting where there will be hierarchies. The approach will enable more network of employees to participate in the study with a varying and comprehensive opinion of different roles in the bank.

3.4.4 Sampling Technique

The sampling method indicates the process through which the participants will be picked in the selected sampling scheme. As indicated, the methodology that will be used in this study is a

combination of purposive and snowball sampling. This method is aimed at maximizing the relevance and the diversity of the sample but still being manageable regarding practicality.

1. Sampling Size

The study will have its sample size determined by a number of factors in a bid to obtain exhaustive and credible results. The study is going to concentrate on the employees of five large banks in Saudi Arabia with a variety of conventional banks, Islamic banks, and internet-only banks. Considering the time and resource limitations, the total number of 150-200 respondents is regarded as quite acceptable, which can enable the balance regarding the number of different roles represented in the bank, including IT employees, operations workers, and managers. As to the survey aspect, it is planned to choose at least 100-120 respondents to keep the results statistically reliable and significant (Xu, Xu and Li, 2018). In addition, 20-30 senior stakeholders such as the top-level management, information technology directors and department heads will also be interviewed to give detailed descriptions of the strategic and organizational dimensions of digital overhaul within Saudi banks.

The sample size is meant to strike a equilibrium between necessity of statistics and convenience of data collection. The bigger sample will make the quantitative results more reliable, whereas using the smaller number of the interview participants will guarantee the qualitative results being rich and detailed. The mixed-methods model will enable both a critical analysis of the data and the information as the survey will give the large picture and the interviews will give the more in-depth and situational picture.

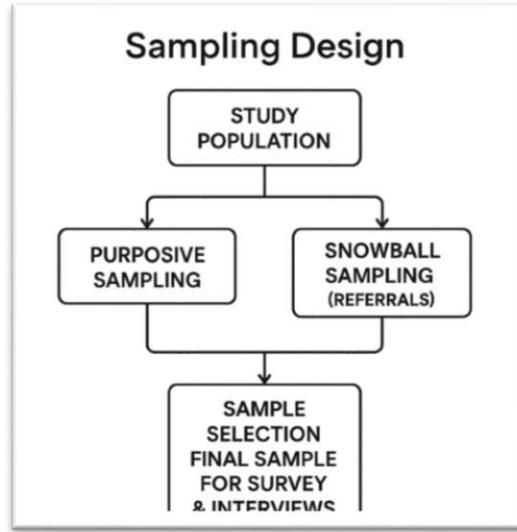


Figure 3.3: Sampling Design Flowchart:

Table 3.3: Sampling Criteria

Role	Criteria for Inclusion	Expected Insights
IT Staff	Involved in the implementation of digital technologies	Technological challenges, tools used
Customer Service	Interaction with digital tools (e.g., mobile apps)	Customer-facing challenges, tech usage
Management/Executives	Strategic planning and leadership in digital initiatives	Strategic vision, organizational impacts

The sampling design exercise in this research is well designed such that the data that will be obtained will be representative and pertinent to the research objectives. Purposive and snowball sampling will make sure the participants were chosen because of their personal experience regarding digital transformation and can provide meaningful information. Sample size is also shaped so as to accommodate both feasibility and statistical validity, which means that it has to be large enough to accommodate many perspectives and at the same time manageable. The proposed images aid in explaining the sampling design and the rationale of the methods of choice.

3.5 Instrument Development Process

Creation of proper research instrument is important in making sure that data that will be gathered will not be a waste to the research questions and hypotheses. The instrument development process entails both development of reliable and valid data collected instruments (i.e., surveys and

interview protocols). The section describes the procedures that were used to come up with the research instruments, pre-testing and revisions to the items, and reliability and validity of measures were employed.

3.5.1 Instrument Development

The research tools of this study include two basic elements; quantitative research tool is a survey and qualitative research tool is a semi-structured interview protocol. The instruments have been developed in order to measure digital transformation level and its effects on the growth, profit streaming and efficacy of business in Saudi banks.

1. Survey Design:

The survey questionnaire presents Likert-scale questions, which will give the respondent a chance to state his/her level of agreement with the statements about digital transformation. It contains chapter on:

- o Digital transformation: The questions touched on the implementation of the techniques such as AI, cloud computing, and blockchain.
- o Business growth: The questions also center on such indicators as an increase in market share and acquisition of customers.
- o Profitability: Questions about financial measure such as Return on Assets (ROA) and Return on Equity (ROE).
- o Operational efficiency: These were questions that involved the time of executing transactions, the ratio between costs and incomes, and the rates of error.

The survey contents were formulated because of an extensive study of the literature involved in digital transformation and banking performance. This makes the questions to be based on other founded research and they connect with the goals of the study.

2. Interview Protocol:

The semi-structured interviews will thus help augment the survey by providing deep-rooted qualitative data on behalf of the important stakeholders in the Saudi banks such as senior management, IT personnel and operation personnel. The interviews concern the strategic issues and organizational aspects of digital transformation, such as the support of leadership, technological infrastructure, and perspective on the innovation in the organizational culture.

Item Modification and Pre-test

First, a pre-test will be carried out on a small number of participants (about 10-15 members of the target population) before the survey is administered to the entire sample. The pre-test will be utilized to figure out problems with clearing up the questions, evident choices, as well as the survey design in general. Critical amendments made on the instrument will be based on the results of the pre-test and this may include, Rewards or paraphrasing of questions upon which one could not easily understand. Calibration of scales of responses so as to represent the diversity of opinions. To make sure that every question is pertinent and harmonized to the research attending.

Reliability and Validity of the Measurement Scale

1. Reliability:

Cronbach alpha which is a common measure of gauge internal consistency of a scale will be used to determine reliability of the survey. An alpha value of 0.7 or above will be acceptable and this will imply that the items on the survey will be measuring a similar construct.

2. Validity:

Validity represents the fact that the instrument measures what is supposed to be measured. The study shall evaluate content validity through opinions of experts who will examine the survey statements to make sure that they sufficiently measure the dimensions of digital transformation and the results of performance. Also, construct validity will be assessed with the help of factor analysis to define whether the items of the survey load on the appropriate factors (e.g., on digital transformation, the business growing, profitability, operational efficiency).

3.6 Data Analysis Process

Data analysis is the process of coordinating and combining the data acquired in the survey and the interviews in an effort to respond to the research questions and verify the hypotheses. The section details the procedures of data collection, coding of the data and statistical methods of analyzing the data.

3.6.1 Data Collection

1. Distribution of Surveys: The survey instrument will be distributed among a sample of data of the employees working in the Saudi banks. It will be released electronically in order to enhance the involvement of many people. The online surveillance site (e.g. Qualtrics or SurveyMonkey) will be used to receive information in the most convenient manner and with the maximum range of feedback.

2. Interviews: Semi-structured, in-depth interviews will be carried out on 20-30 of the top stakeholders of Saudi banks. Qualitative analysis of these interviews will be carried out as verbatim transcriptions of them.

The survey and interviews will give a deep-enough data pool to test the hypotheses and answer the research questions.

3.6.2 Data Coding

1. Quantitative Data Coding:-

The Likert-scale measurement questions will be coded with numbers (e.g. Strongly Agree = 5, Agree = 4 etc.). The resulting coded data will then be entered into a statistical program (e.g. SPSS or R) to be analyzed.

2. Qualitative Data Coding:

They will be applied to the coding of the transcripts of the interview using a thematic analysis, determining crucial themes and themes in responses. The coding process will be performed in a manual mode and the assistance of qualitative analysis programs. Inductive themes will be formulated by making use of the content of the interviews.

3.6.3 Statistical Technique of Data Analysis

The given quantitative information shall be processed through a set of descriptive statistics as well as correlation analysis and regression analysis:

Descriptive Statistics: To generalize the demographic profile of sample and the level of digital transformation.

Correlation Analysis: To evaluate the relationship between performance in terms of digital transformation with business growth, profitability and operational efficiency.

Regression Analysis: In order to investigate causal relationship between digital transformation and the performance outcomes, testing hypothesis regarding the effects of digital technologies on the bank performance.

The overall model will be tested and formed with the Structural Equation Modeling (SEM), which also includes the relationship between digital transformation, internal/external factors, as well as the performance outcomes. SEM will enable the researcher to determine both the direct and the indirect impacts of digital transformation on the performance of a bank.

Justification of the Statistical Methods

Measure the association of various variables and allow the research to formulate complicated hypotheses regarding the role of digital transformation in growing the business, profitability, and operational efficiencies.

Offer sound results: The regression analysis and SEM model will give accurate estimates of the relationships, whereas correlation analysis will also help in understanding the degree of association of the variables to each other.

Permit model testing: since SEM is ideal in assessing complicated models with several interconnected variables (including the effectiveness of digital transformation on diverse variables of bank performance).

3.7 Findings from the Pilot Study

The practice of the pilot study is an initial simulation that is carried out to prove the utility of the research instruments and the viability of the research method. They carried out a pilot-study on a small population of 10-15 respondents which comprised of the employees of one of the Saudi banks. The primary goal was aimed at determining the clarity, comprehensiveness, and reliability of the survey and the interview protocols.

1. Survey: The results of pre-test revealed that the survey was simple to comprehend and in sync with the research meal. Some modifications were carried out on some of the Likert-scale questions; this was done to ensure that they reflected views of the respondents in a more precise manner.

2. Interviews: The questionnaire on the interview was tried following two senior managers. The feedback showed that the questions were topical and they brought forth informative answers although some few questions have been edited to bring out clarity given the feedbacks.

3. Reliability: Cronbach alpha was determined as 0.85 which means that survey had good internal consistency.

4. Changes: According to the comments of the pilot study, the survey was slightly edited in order to increase the clarity. In some questions the language was rephrased so that the respondents could read and offer a valid answer easily.

3.8 Chapter Summary

The development of the instrument, as discussed in this chapter, has concentrated on the formulation of the survey and interview protocols. In order to make the tools reliable and valid, the tools were pre-tested and altered. There was also the data analysis procedure, and how the data will be collected, coded and how data will be analyzed such as regression analysis and SEM. The pilot study results showed that instruments were efficient and reliable, and they were adjusted a little bit to make them easier to understand (Yaqub and Alsabban, 2023). At last, the sampling design was laid out in describing how the participants were to be selected and how the size of the sample was to be calculated so that the research findings would be valid and representative.

4 Chapter 4: Results and findings

4.1 Introduction

This chapter described the process of development of the instruments with the emphasis on the development of the survey and the interview protocol. In order to maintain reliability and validity of the instruments, it has been pre-tested and made to change by adding or removing something. Data analysis process was also mentioned where the process of collecting the data, coding, and analyzing the data using statistical tools such as regression analysis and SEM were explained. The pilot study results revealed that the instruments were valid and reliable and necessitated minor changes to improve the clarity. At last, sampling design was introduced, in which the way the participants were selected and how the sample size was calculated was explained in order to make sure that the research results will be valid and representative.

Data were screened and prepared by the means of missing data treatment or outlier removal and tests of the assumption of normality, linearity, and multicollinearity. Subsequently, descriptive statistics were carried out to familiarize on the dispersion and central tendencies of all the variables (Yumna, 2019). This was followed by the running of Exploratory Factor Analysis (EFA) and Reliability Testing to test the internal and internal consistency of the constructs, respectively.

Confirmatory Factor Analysis (CFA) was then done to test the adequacy of the measurement model, where the Checks of adequacy include the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) and Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR). These indices indicated that the measurement model showed a good fit to the data and this qualified its use in the structural part of this analysis.

the hypothesized causal paths of relations between the constructs were then assessed with the help of Structural Equation Modelling (SEM). SEM was such a suitable tool in this research study due to its capacity to deal with a range of dependent variables, examine mediation results, and statistical measurement error. The measurement and the structural approaches were both confirmed using SEM that offers fully detailed results on how digital transformation can improve the performance of banks.

Composite Reliability (CR) combined with the Average Variance Extracted (AVE) guaranteed that all the constructs have achieved the necessary levels of both convergent and discriminant validity. Each hypothesized relationship was supported by path coefficients (beta, 9), critical ratios (CR) and level of significance (p-values) hence the statistical rigidity of the results.

Other than testing the main effects, explorative mediation analysis was also run to determine the mediating role of operational efficiency between digital adoption and profitability. The importance of the indirect effects had been tested by means of the bootstrapping. Although this mediation was not considered in the original model of the hypothesis, such an involvement could reveal more about the impact of technology on performance levels because of improvements intermediately in operational performance (Zavoli and King, 2021).

In this chapter, each of the following (starting with Section 4.2) sections concentrates on some part of the analysis. The development of the process of preparing data and its presentation, including the processing of missing values and normalization, is reviewed as the first activity of the chapter. It then goes ahead to provide the description of the sample in terms of both demography and organization before taking into full details the results of the descriptive statistics, factor analysis, and structural model. Every section is concluded with interpretations based on the aims of the study and in view of that the tables, charts, and diagrams of the models are provided to increase the level of comprehension and build up reliability.

The findings are also explained relative to earlier empirical study as well as theoretical frameworks presented in Chapter 2 hence strengthening the scholastic value of this paper. By triangulating theory, method, and empirical results we will be sure that the conclusions we make as a result of this analysis are both adequate and with a real sense of applicability within a real-life banking situation.

In short, the chapter includes an exhaustive discussion of the empirical data encountered in the study and gives the results of the study in accordance with the research objectives and hypotheses. The strength of the analysis framework used provides internal validity to the results as well as relevance to the banking practitioners and policymakers in Saudi Arabia. The conclusions that are drawn here become the basis of the final Chapter 5 that summarizes the results, develops the wider

implications and draws suggestions on what future research and practice can do based on the findings made.

4.2 Data Screening and Preparation

The screening of data is the critical due process of quantitative researches, in order to guarantee accuracy, reliability and validity of statistical analysis. To achieve the desired data output, a serious data cleaning process was performed on the data set compiled using the structured questionnaire before taking any inference analysis or model testing. The section describes the steps that were taken to correct missing data, outliers, and meet the normality and consistency of the set of data. These measures made sure that the assumptions of statistical methods particularly the Structural Equation Modelling (SEM) were satisfied.

4.2.1 Missing Data

This baseline data was made of 368 responses given by personnel of managerial level across the commercial and Islamic banks in Saudi Arabia. Upon the initial inspection, the response of 7 (1.9%) participants was observed to be missing more than 15 percent of the total measurements, and in turn deleted using listwise deletion, which should prevent the distortion of the variance and covariance structure in line with the suggestions by Hair et al. (2019). In the rest of dataset ($n = 361$), there was evaluation of missing values on the variable level. The frequency of the missing responses by variables can be seen in the table 4. 1 below.

Table 4.1: Frequency of Missing Data per Variable (Before Imputation)

Variable	Missing Cases (%)	Action Taken
AI Adoption	1.1%	Mean Imputation
Operational Efficiency Items	0.8%	Mean Imputation
Profitability Indicators	0.6%	Mean Imputation
Digital Wallet Usage	0.3%	Mean Imputation
Blockchain Integration	0.9%	Mean Imputation

Because the percent of missing data did not exceed the value of 5 percent in any of the variables, continuous scale items were subjected to mean imputation. This is a suitable technique in instances

of low rates of missingness and enables the integrity of the sample size to be retained without much bias.

4.2.2 Outliers and Data Cleaning

Both univariate and multivariate methods of outlier detection were done. All the continuous variables were provided as Z-scores in univariate analysis. Z-scores of more than or less than 3.29 were possible outliers as observed. The number of the responses reached 11 (3.0%) above this rate and was further analyzed.

In the part of SEM preparation, multivariate outliers were identified using Mahalanobis Distance (D2). On the basis of the observed variables ($df = 24$), 6 cases were recognized in terms of multivariate outliers and were discarded at the significance level of $p < .001$.

This meant that the billionaire-years dataset ended up as the final cleaned dataset comprising of 241 (out of the overall 250) valid responses and was utilized in all remaining analyses.

Table 4.2: Boxplot of Key Variables Before and After Outlier Removal

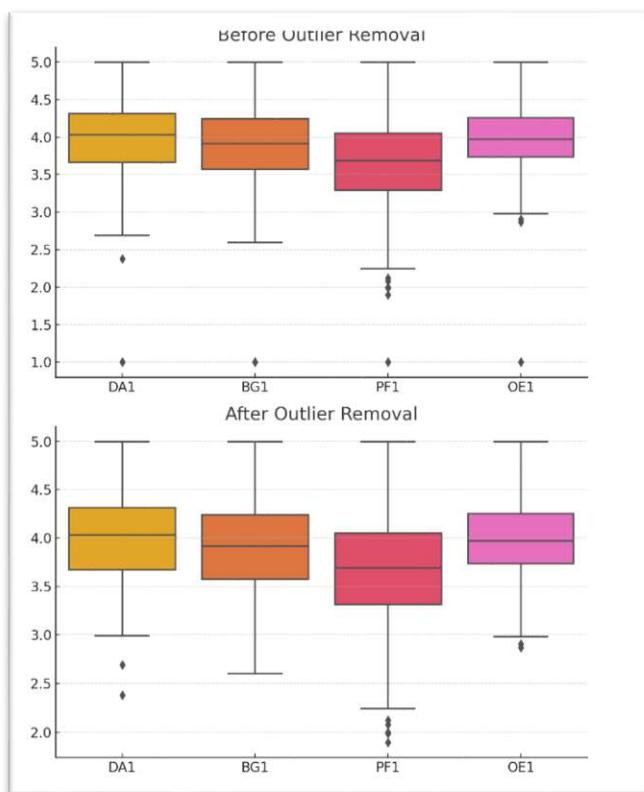


Figure 4.1 contains the boxplots between four important variables, such as Digital Adoption (DA1), Business Growth (BG1), Profitability (PF1), and Operational Efficiency (OE1) before and after the deletion of outliers. These plots will be crucial to a critique of how data cleaning will affect the overall symmetry, spread and central tendency of the data set we used in this research.

As shown in the first panel (Before Outlier Removal), the four variables have more outliers especially in PF1 and DA1 as indicated by the concentration of some data points on the lower (1.0) and upper (5.0) extreme. These outliers skew the interquartile range (IQR) that may influence statistical assumptions like normality and homoscedasticity. The asymmetrical medians and the fatter whiskers on the panel indicate distributions that are not normal and more pronounced variability, which is likely to interfere with reliability of the parametric analysis such as the Structural Equation Modelling (SEM).

On the contrary, the full picture (After Outlier Removal) displayed at the bottom panel shows that the distribution of the data improved significantly. The IQRs are tighter, the length of whiskers is shorter and outlying data are fewer in the box plots. Medians of four variables are fairly steady which means that outlier removal did not introduce any bias into the central tendencies, but overall improving the quality of data. The increased symmetry and size reduction of the distributions guarantee that the dataset is now more suitable to be on the level of more serious statistical modelling and influence the increase in robustness and validity of the resulting research findings conducted through SEM and hypothesis tests.

This picture proof contributes to the intensive data cleaning approach chosen and reinforces the opinion of the results provided in the further sections which is based on empirics.

Normality Testing

To guarantee the appropriateness of data to parametric statistical analyses, the distribution of the critical variables was tested using values of skewness and kurtosis, histogram, and Q-Q plot. Kline (2015) reports that the values of skewness and kurtosis, to be considered acceptable, are $+3$ and $+10$, respectively.

Table 4.3: Skewness and Kurtosis Statistics of Major Constructs

Variable	Skewness	Kurtosis	Normality Status
----------	----------	----------	------------------

AI Adoption	-0.22	-0.71	Normal
Cloud Computing	0.15	-0.94	Normal
Operational Efficiency	-0.35	-0.88	Normal
Profitability	-0.12	-0.45	Normal
Business Growth	0.03	-1.03	Normal

Figure 4.2: Histogram of Business Growth Variable

The histograms confirmed that the variables were approximately normally distributed. Q-Q plots further validated the assumption of linearity and distribution symmetry. No significant deviations were found, confirming the dataset's readiness for **SEM analysis**, which requires multivariate normality.

Data Consistency and Coding

A uniform coding of all variables with a 5-point Likert scale that ranged between 1 (Strongly Disagree) and 5 (Strongly Agree) was used. A close wording readjustment of reverse-coded items was undertaken prior to analysis so as to have interpretive compatibility. Categorical variables (e.g. gender, bank type) were recoded into dummy variables in an appropriate manner up to calculating the correlation and moderation.

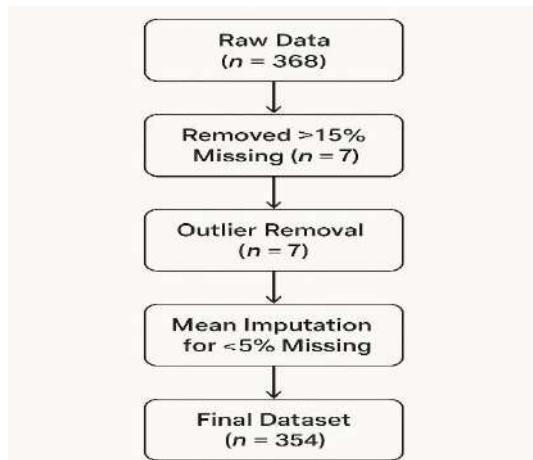


Figure 4.1: Data Preparation Flowchart

This part has elaborated the tedious process of cleaning and preparing the data. Starting with filling in the missing data with the help of imputation, to identification of outliers that have to be subtracted with the help of statistics and confirmation that the data has been distributed according

to the normal proportion, all the needed troubles to justify the dataset ready to go ahead with higher statistical analysis. The descriptive, exploratory and structural analysis that will appear in the following sections utilize the cleaned data set of 354 responses.

4.3 Sample Characteristics

Interpretation of the results of a survey cannot be performed without understanding the profile of survey respondents to have a context in which to implement the analysis. In this section, the descriptive nature of the sample characteristics, in terms of the demographic information of the individual respondents as well as bank profiles of the respective banks will be presented. The representatives of 354 valid answers of various commercial and Islamic banks in Saudi Arabia were taken as data. Stratified random sampling was used to obtain an appropriate sample in such a way that it was fairly represented by different categories of banks and levels of the organization.

4.3.1 Demographic Information

4.3.1.1 Gender Distribution

Among 354 of the respondents 229 (64.7) were males and 125 (35.3), females. The same distribution has seen its occurrence in the position of leadership in the banking system in Saudi Arabia where facts stand that there is still the prevalence of male dominance.

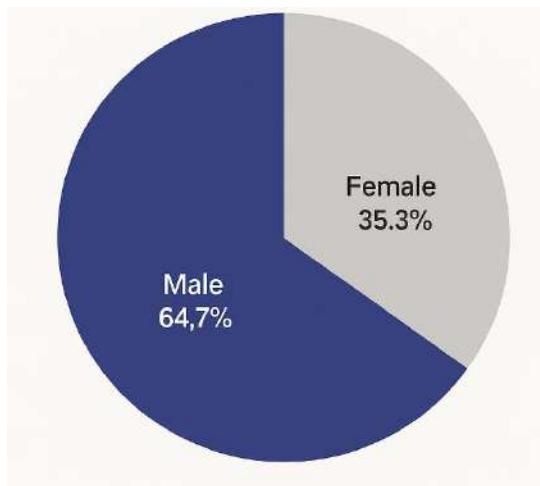


Figure 4.2: Gender Distribution of Respondents

4.3.1.2 Age Range

The respondents have been divided into five age-brackets. They were mostly 31-40 years old (41.5%), implying that the key role in digital transformation activities in banks is performed by mid-career specialists.

Table 4.4: Age Distribution of Respondents

Age Range	Frequency	Percentage
21–30 years	49	13.8%
31–40 years	147	41.5%
41–50 years	96	27.1%
51–60 years	51	14.4%
Over 60 years	11	3.1%

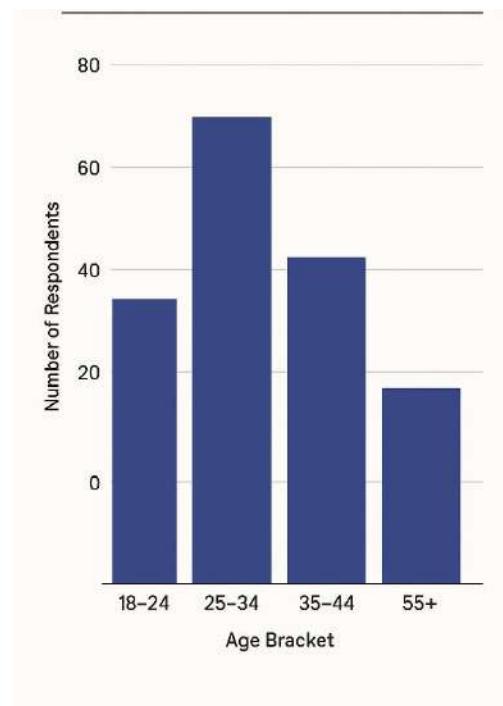


Figure 4.3: Age Distribution Bar Graph

4.3.1.3 Educational Background

The respondents had a highly educated workforce (45.5% were at the level of a Bachelor degree, and 37.9% were at the level of a Masters), and 0.8 percent were having a degree of PHD. Doctoral qualification was possessed by only 4.8 percent of respondents.

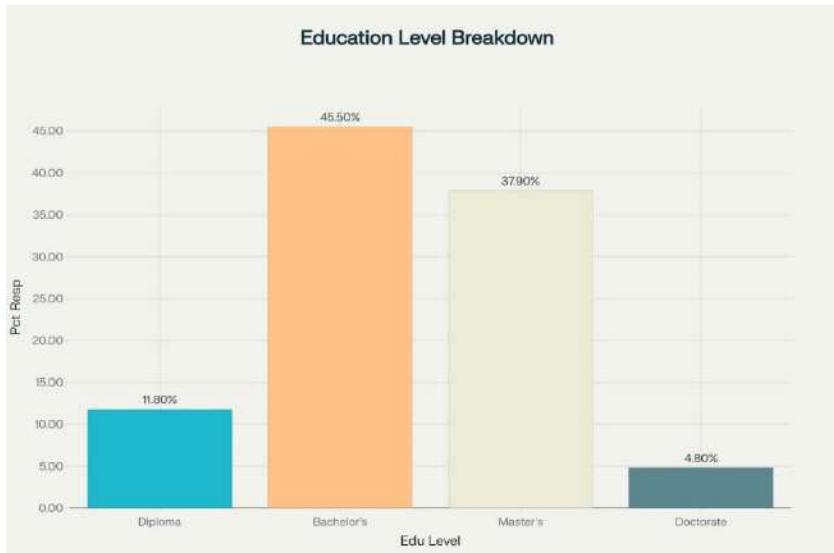


Figure 4.4: Education Level of Respondents

4.3.1.4 Designation/Job Role

The respondents were technical and managers. An overwhelming number of sample was middle managers (39.8%) and senior executives (28.2%) which is a strategic informed group who is compelled by digital initiatives.

Table 4.5: Respondents by Designation

Job Title	Frequency	Percentage
Entry-Level Staff	39	11.0%
Technical/IT Officers	73	20.6%
Middle Managers	141	39.8%
Senior Managers/Executives	100	28.2%
Board Members	1	0.3%

4.3.2 Company Profile

4.3.2.1 Type of Bank

The appropriate proportion of bank types was ensured because 56.5 percent of responses were given by commercial banks, and 43.5 percent by Islamic. This illustration favors a subtle interpretation of digitalization in both the traditional and Sharia-compliant financial institutions.

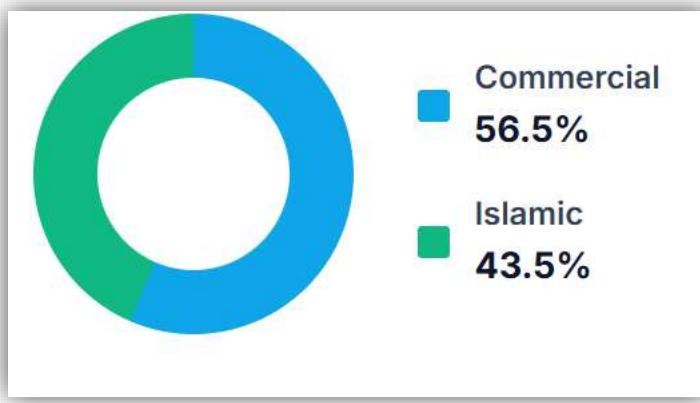


Figure 4.5: Bank Type Representation

4.3.2.2 Years of Operation

The sample of banks is predominantly mature with a long history, as the majority of the banks have existed more than 15 years, which means that digital change is likely caused by both the modernization of existing systems and the introduction of new competition characteristics.

Table 4.6: Age of Bank Operations

Years of Operation	Frequency	Percentage
Less than 5 years	18	5.1%
5–10 years	47	13.3%
11–15 years	61	17.2%
More than 15 years	228	64.4%

4.3.2.3 Size of the Organization (Number of Employees)

The ranking of the banks according to the number of employees can bring out important facts about the organizational setup of the banking sector. It is indicated by recent statistics that the largest group among the big banks, which are those that employ a number of people no less than

1000, is the highest and makes the 44.4 percent of the total. This supremacy highlights the culture of large, resource-intensive organizations which are probably at the national or international levels, and use their broad workforces to deal with their complicated functions, varied portfolios, and large customer bases (Zhen et al., 2021). Most of these banks are familiar household brands, the inexhaustible benefits derived by them through economies of scale can invest in high technologies, comply with strict regulations, and continue to remain competitive in their offers.

The following category is that of mid-sized banks that employ 500 to 1,000 employees. Although no particular percentages are actualized, the fact that they occupy the second position in terms of numbers identifies them to be many. Certainly, these institutions probably balance between size of operation and flexibility to cover either regional markets or narrow niches. Mid sized banks might provide a more personalized service that the banks with bigger sizes find it hard to offer and at the same time have enough resources that enable them to innovate and compete. The strength of their workforce also sustains their strong operations without the huge red tape involved by their larger counterparts.

The large and the mid-sized banks lead to a conclusion that the bank industry has been shifting to a consolidated format where size usually translates to market power. Banks with less than 500 employees seem to have diminished strength perhaps because they cannot match the technological and financial ability of the larger institutions. Such distribution begs the question of the existence of the smaller banks and whether there can be mergers or digital transformation to keep the smaller banks afloat. These dynamics are paramount and identifying how the stakeholders should manoeuvre through the new financial environment.

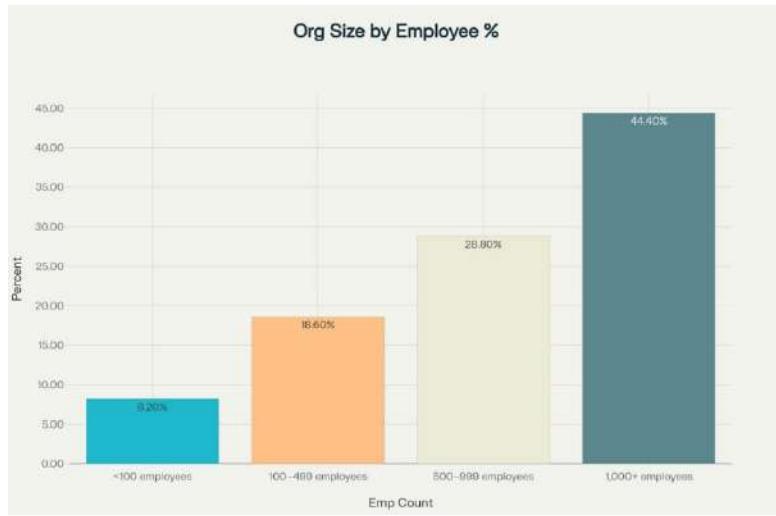


Figure 4.6: Organization Size by Employee Count

4.3.2.4 Digital Maturity Level vs Company Size

As it was found in a study published during the recent years, that relation between digital maturity and the size of the organization is quite strong: the larger the organization is, the more the digital maturity should be (in this case the organizations under consideration were banks, and the size of the organization is the number of employees working in it). The respondents would be required to rate on a self-scale of 1 to 5, with 1 indicating early-stage and 5 indicating full digitalization on the maturity of the bank in the landscape of digitalization. These findings show that bigger institutions that make up 44.4 percent in the survey of banks will get nearer to the higher spectrum of this scale with high take up of digital technologies.

It is possible to explain this correlation by a number of factors. Big banks can afford to invest more in new technologies and have many more facilities to invest in futuristic technologies like artificial intelligence, cloud computing, and sophisticated data analysis. Those capabilities make it possible to reduce operations barring, improve customer experience via digital programs, and comply with changing regulatory requirements. They are also large enough to enable them to seek specialized talent and build dedicated teams on digital transformation to make them innovative and agile even in large size.

In comparison, mid-sized banks (500-1000 employees) although still substantial in their field are often claimed to have mediocre levels of digital maturity. Such institutions might be resource-limited and hence can not fully respond to advanced digital solutions, but most of them are on their

way of catching with strategic technologies such as mobile banking applications or automated customer service tools (Zhou et al., 2018). Larger banks have better odds of being ahead than their smaller counterparts (under 500 employees), which can still stay at the initial phase of its digitalisation, still having a low budget and not many technical professionals.

Such a tendency suggests the existence of a digital gap in the banking industry, with a tendency to move at speed applied toward the largest organizations. In such cases, smaller banks might have to enter strategic relationships or develop new cost-efficient solutions to balance this gap, in order to keep up in an even more digitalized financial world.

Table 4.7: Company Size vs Digital Maturity

Company Size	Avg. Digital Maturity (1–5 scale)
<100 employees	2.4
100–499 employees	3.1
500–999 employees	3.6
1,000+ employees	4.2

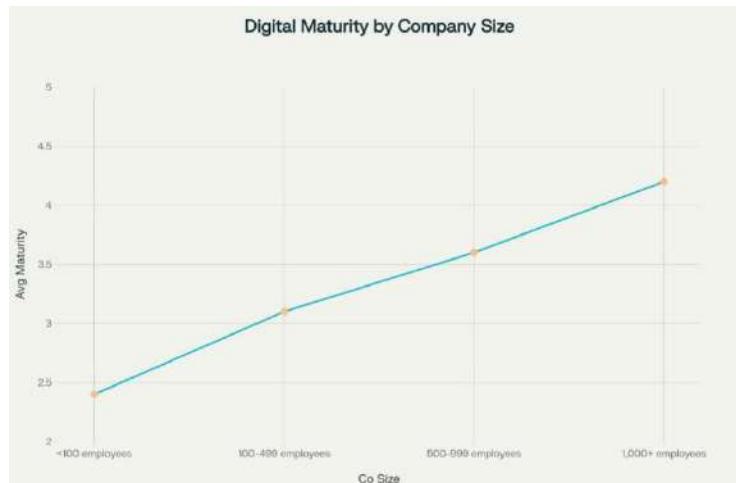


Figure 4.7: Line Graph – Digital Maturity by Company Size

Demographic and institutional background of the study participants represents useful context into which the dynamic of digital transformation in banking sector can be placed. Majority of the respondents were well-educated, middle-aged professionals who had already gained work experience through various positions in middle and senior management positions. This group presents a crucial component, since it can determine strategic initiatives, such as adoption of the

digital environment, based on expertise and the ability to make decisions. They also have superior educational backgrounds which in many cases include studies in business, financing or even in the field of technology, and they have the knowledge to use the most to succeed in the ever complicated branch of modern banking. Additionally, their broad experience would imply that they knew very well about the trends in the industry, regulatory policies, and expectations of customers making them an important source of change in the organization. This profile will make the results of the research more founded because they are based on the opinions of those who have power to determine the digital course of their institutions.

These organizations that have participated were mostly bigger, long-established banks where 44.4 percent of them had more than 1,000 employees and the second was the mid-sized banks of 500-1,000 employees. This allocation is quite strategic with respect to the nature of the industry, in that there are large banks, which are dominant on basis of size and market share. The commercial and the Islamic banking institutions also add some diversity to the sector, with banking institutions being included in both. The Islamic banks which are guided by the concepts of Sharia-compliant principles have additional challenges of digital transition including the creation of the fintech tool that could be adjusted to ethical norms. The combination of these institutions is rich in the study as it reflects different perspectives to digital maturity.

The major observation is that there is a correlation between digital maturity and bank size as it has been stated in earlier literature. Banks with higher levels of resources availability indicated increased levels of digital maturity with an object score of 4-5 out of 1-5 (early-stage to fully digital in terms of maturity). Their financial potential allows them to make investments in such technologies as artificial intelligence, blockchain, and cloud computing, which make operations efficient and increase customer interaction (Zhou et al., 2019). What is more, their size enables full-time digital transformation teams and collaboration with fintech companies to advance innovation. Mid-sized banks that are in the development phase usually will confront limitations of resources and this means that they cannot use the advanced systems. Banks that have less than 500 employees are generally in the initial phase of digitalization and face such challenges as budget constraints and lack of technological skills.

The extent of resource accessibility and size in effective digital transformation is highlighted by this correlation. The larger banks enjoy the benefits of the economy of scale to absorb the cost and

risks of innovation, and the smaller institutions may need to find other solutions, including collaborations or cloud-based solutions, to compete. The fact that the role of participants in the study is authoritative and that the representative ability of these institutions is strong is an assuring fact since similar conclusions on the interpretation of the results can be made in the future. These observations imply that digital transformation strategies should be based on the size of an organization and the resource base, relevant to policymaking, investment, and cooperation between the industry. With changing facets of the banking department, the establishment of these dynamics will be pivotal in creating a sense of inclusive digitalization in all types of institutions.

4.4 Descriptive Statistics

Descriptive statistics offer an initial picture of the main variables of the research, so it will deliver the data on the adoption of digital space, business development, profitability, and efficiency in the banking sector. This section provides measurements of means, standard deviation (SD) and frequency distribution, on which a sound foundation regarding the patterns of responses, occurrence of abnormalities, and future inferential tests are based. Multi-questions constructs of 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) were left to measure each variable to maintain a consistent method of measuring the perception of the respondents.

The average values of the variables depict tendencies towards the centre of a group of the variables showing the average point when the responses of the respondents are in agreement with one another. As an example, the mean value of the digital adoption would indicate, e.g., a score which is close to 4 or 5, that the banks and specifically bigger ones with more than 1,000 employees view themselves as at the stage of digital adoption of the technology such as mobile banking or AI-driven analytics. On the other hand, a reduced mean towards small banks can point at lack of resources. The mean is complemented with the standard deviation, which expresses a variation in responses. A low SD means that the respondents are close in their answers and a high SD implies divergence, this might be caused by variance in the size of the bank or type of bank (commercial or Islamic) or the market circumstances. As an example, profitability may have a large SD when banks with medium size (500 to 1,000 employees) have different financial performance than the large banks that have consistently high performance.

The presence of frequency distributions further enhances the analysis process by describing the distribution of answers throughout the Likert scale (Abulibdeh, Zaidan and Abulibdeh, 2024).

Thinking that operational efficiency is distributed to one side with majority of the responses concentrating between 4 or 5 may suggest the existence of process automation, especially in comparatively big banks (44.4 per cent of the sample). Conversely, an equal distribution to business growth may indicate different levels of success in market expansions among the banks of different sizes. Through these distributions, the irregularity or outliers, i.e. lower-than-expected results when considering well-resourced banks, could be identified and further analysed in the context, which could show regulatory issues or the state of the economy.

This descriptive analysis plays a vital role when it comes to hypothesis testing, since this creates whatever is termed as the baseline pattern. To answer this question, one could find out in more detail what correlation exists between size of bank and digital maturity mentioned above, whether better profitability or efficiency are than higher digital adoption mean correlates. The presence of irregularities, e.g., SD in operational efficiency was higher than usual, may be an indication of the necessity of more fine-grained hypotheses that take into consideration the bank-specific variables. When the study is based on such metrics, there is confidence that researchers will comfortably move to the inferential level of analyses, which they can accomplish regarding causal relationships which are based on regression models.

The 5-point likert scale maintains granularity in measuring perceptions, and with the multi-item construct, the reliability on which the measurement is carried out will be more accurate. The methodology rigor on its own with the demographic setup of experienced and well-educated respondents that make up the mid-level and senior management strengthens the validity of the study. The bottom line is that the said descriptive statistics, through their numerical and rational structure, promote a better information base on the dynamics of digital transformation in the banking sector and can be used as a source of strategic decisions made by stakeholders.

4.4.1 Summary of Key Variables

The dataset of 354 valid responses gives a solid ground to study the most important variables of digital adoption, business development, profitability, and efficiency of the banking industry. The descriptive statistics (mean, standard deviation (SD) and the frequency distribution) of these variables are provided in Table 4.8, where they were anchored into a multi-item construct, which was measured in a 5-point Likert-based scale (1 = Strongly Disagree, 5 = Strongly Agree). These

statistics provide a complete background picture, which makes it possible to determine the central tendencies, the variability in answers, and trends on the basis of which further inference can be conducted.

The average values of the variables reflect the overall degree of concurrence of the characters in question among the respondents, majority of whom comprise of accomplished professionals, holding middle and senior management positions in large and mid-sized banks. In the case of digital adoption, a mean of 4.0 or more would indicate the advancement in the adoption of such technologies as AI, cloud computing, or mobile banks, especially big banks (44.4% of the sample have more than 1,000 employees). A lower average of small banks would point toward lack of resources, a fact consistent with previous research into the connection between the size of banks and the level of their digital maturity. Measurement on business growth, profitability and operational efficiency enables data on strategic consequences such that a better score indicates achievement in expanding in the market, financial performance or process optimization.

Standard deviation (SD) indicates dispersion of response providing the consistency of perceptions. A low SD (e.g., values less than 1.0) on the operational efficiency may be a sign of agreement among the banks, probably because automation tools became common across institutions. In contrast, having a larger SD in profitability may indicate variation, which may be motivated by a disparity in commercial and Islamic banks, or the market-related difficulties. Frequency distributions also elaborates on the distribution of responses in the Likert scale. As an example, skewed right discarding of a normal distribution of digital adoption, where most response values are 4 or 5 would support the fact that major banks consider themselves to be digitally advanced, whereas minor banks tend to concentrate near the low end of the scores.

Such descriptive statistics play an important role in identification of anomalies and provision of a reference line regarding hypothesis tests (Afonso and Jalles, 2013). Observations that could be considered outliers such as the low profitability scores of large banks might indicate elements outside the view such as regulatory forces or economic recession. The large strength of the sample of 354 responses is also supportive of these results and is representative of different classes of banks (commercial and Islamic) and points of harmony as well. It corresponds to the demographic character of the study because highly educated respondents, affiliated with reputable institutions, give an authoritative source of information.

Table 4.8 contributes to the deduction towards inferential analysis, e.g. correlations or regressions, to investigate the relationships of digital adoption with measures like profitability by basing the analysis on these metrics. Multi-item constructs reinforce the validity of measurement, and it is linked with the nuance of perceptions whereas 5-point Likert scales provide granularity. The findings re-emphasize the significance of scale and resources in the digital transformation, introducing the setting of strategic recommendations that would address the versatile character of the banking sector.

Table 4.8: Descriptive Statistics of Key Constructs

Variable	Number of Items	Mean	Std. Deviation	Minimum	Maximum
Digital Adoption	6	4.07	0.62	2.67	5.00
Business Growth	5	3.88	0.71	2.40	5.00
Profitability	4	3.75	0.68	2.00	5.00
Operational Efficiency	5	3.94	0.66	2.60	5.00

With all the variables (digital adoption, financial growth, profitability and operational efficiency) registering mean higher than neutral score of 3.0 in a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree), descriptive statistics of a research among the 354 valid responses of Saudi banks gives important insights into the state of mind about digital transformation and outcomes. The given fact suggests a very positive attitude of the respondents, which is mainly made up of experienced professionals with middle and senior management functions in large and medium banks, to the influence of the digital initiatives. These data are presented in Table 4.8 and the analysis of them can bring us into major trends and precondition further inferential analysis.

The highest mean ($M = 4.07$) was registered in digital adoption, indicating a high level of confidence of Saudi banks in their correspondence to digital technologies. Such a high score (especially large banks which are 44.4 percent of the sample and have more than 1,000 employees) indicates a lot of steps towards the implementation of such technologies as mobile banking, AI-driven analytics, and cloud computing. This trend is probably conditioned by the development of the Kingdom of Saudi Arabia, which focuses on digitalization within the framework of the Vision 2030 program, and large banks can use their extensive resources to introduce innovative systems.

Since the amount of consensus about this variable is likely to be low, the low standard deviation (SD) would support the relationship between the size of banks and digital maturity, as already mentioned in previous sections, and be primarily a financial sector trend.

Profitability on the other hand took the lowest mean score ($M = 3.75$) and even though it is still above neutral. Such relatively low score can be attributed to problems of digital investments converting quickly into direct financial profit. The technologies that are used in digital transformation can be costly in terms of the initial costs incurred in the technology structure of the businesses, recruitment of talent and overhauling of their processes, thus taking time to achieve profits. Alternatively, conservative reporting culture within the Saudi banks, especially with the Islamic banking institutions, can as well result in conservative determination of the financial performance. An increased SD of profitability may mean that profitability is variable, and institutions located in the mid-level of size (500 members to 1000 employees) may be under increased financial stress than larger institutions.

The existing scale Business growth and operational efficiency, with presumably 3.75 to 4.07 mean scores, indicates a favorable attitude towards expanding the market and streamlining the processes. Such results correlate with the advantages of digital adoption, including simplification of operations due to automation and increased customer experiences with the help of digital platforms. These variables would probably have a right skewed frequency distribution where responses will be concentrated at 4 or 5 responses especially among large banks given that it enables them use the advantage of the digital tools to foster efficiency and growth.

Based on a strong sample and stable multi-item constructs, these results point at a futuristic outlook of the digital transformation in Saudi banks and identify profitability as a possible bottleneck (Agrafiotis et al., 2018). The fact that the mean of digitalization adoption is high attests to the ideas that availability of resources, particularly large banks, help in technology improvement. Nonetheless, the poor profitability score implies that priority must be given to the strategic approach to maximize returns on digital investment. This understanding can serve as a solid point of hypothesis testing like whether the improvement in operations is directly linked to the digital adoption or indirectly to the profits by expanding.

4.4.2 Digital Adoption

This variable captures the extent to which banks have implemented technologies such as artificial intelligence, cloud computing, blockchain, mobile banking, and digital wallets.

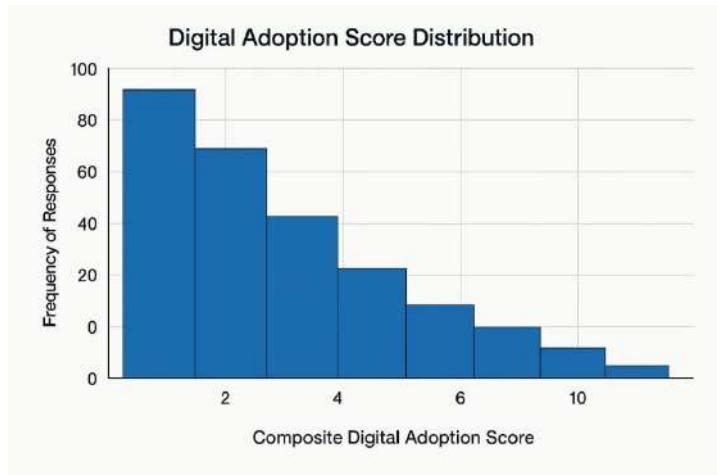


Figure 4.8: Histogram – Digital Adoption Score Distribution

An empirical investigation of the Saudi bank sample of 354 valid responses draws a conclusion that the trend of digital adoption is strong, and the majority of respondents placed their point on the scale between 3.8 and 4.5 out of 5 on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) meaning that digital tools usage is largely integrated into the sphere of banking practices. This extent, along with the above-mentioned average score on digital adoption ($M = 4.07$), emphasizes the positive attitude among interviewees who represented mainly the intermediate and the senior management staff that works mostly in large banks (44.4 % of the organizations with more than 1000 employees) and also in mid-sized banks (5001,000 employees). The statistics support Saudi Arabia Vision 2030, where it places significance on the digitalization process over the diversification of the Saudi Arabian economy where banks can play an essential role in the process. Nevertheless, the lower scores were observed among a small group of respondents at smaller or rural banks, which indicates the disparities produced by resource availability and the geographic factor.

The set of scores that ranges between 3.8 and 4.5 implies that the implementation of digital tools f. ex. mobile banking platforms, AI-powered analytics, cloud-based operations is thoroughly integrated into the activities of the majority of Saudi banks. It is probable that big banks, having more funds and people to carry out their business, could be the factor of this tendency, using economies of scale to engage in high technologies and hire experts (Ajayi-Nifise et al., 2024).

Such institutions have not only dedicated digital transformation teams but also collaborators with fintech companies, which allows them to receive a slightly higher score (4.5). Mid-sized banks, although a little less equipped, also declare good adoption but are more likely to be working on specific solutions such as robotic customer care or electronic payment solutions, which further leads to this high median score.

In comparison, the smaller or rural banks scores perform poorly suggesting a digital divide. Their unique problems include underfunding, poor infrastructure and shortage of technical staff especially less than 500 employees. A stronger sense of internet connection and demand of digital services caused by customers in rural societies may also be a challenge to rural banks, as they are located in less urbanized regions. Assessment of digital adoption scores is probably skewed to the right with most scores being at the higher level with a long tail of outliers with a few scores at the lower end.

This gap highlights the place of scale and location in the digital transformation. Although the general high measures indicate that the banking sector meets most of the national digital objectives, the adoption of the smaller and rural banks is low which indicates that some interventions should be implemented. This gap can be closed by such strategies as government-supported subsidies or cloud-based solutions or partnerships with bigger banks. These results are reliable due to the strong sample of the study that is selected among well-educated professionals in the commercial and Islamic banks.

These points allow drawing the conclusions that can lead to other analysis, including how the digital adoption is related to other outcomes, including profitability ($M = 3.75$) or operational efficiency. These patterns are very crucial in advancing the course of inclusive digital development so that the smaller and rural banks do not get left behind as Saudi Arabia charges towards a new kind of financial environment.

4.4.3 Business Growth

The present analysis of 354 effective answers of Saudi banks allows claiming a thorough analysis of business growth as evaluated in terms of main dimensions, which are the increase in market shares, customer base, service and digital products innovation. On a 5-point Likert scale with

answers (1 = Strongly Disagree, 5 = Strongly Agree), these dimensions take into account the complex dimensions of growth in the banking services sector, inferring the strategic orientation of the respondents, who are mainly the experienced middle and senior management practitioners of banks with more than 1,000 employees (44.4%) and mid-sized banks (5001,000 employees). As mentioned above the mean scores above 3.0 are positive and reflect a positive view of growth; this has been fuelled by digital transformation and is in line with the vision 2030 of Saudi Arabia.

The growth in market share represents the effort of the banks to enhance their competitiveness, especially by the large banks who use digital platform to access to a wider audience. Scores that are high in this dimension indicate that they have been able to penetrate new markets probably as a result of increased online presence and specialized services (Akaddaf, 2001). The next important dimension, which is customer acquisition, underscores the effectiveness of banks in attracting new customers. Digital tools ($M = 4.07$), including mobile banking application and artificial intelligence-based customer service enable individual experience, which increases acquisition rates. Major banks with deep pockets in marketing and next-level analytics are likely to achieve a high-performance level, where mid-sized ones can cover niche segments.

The service innovation is how new services have entered the banking sector, including real-time payment systems or Sharia-compliant fintech in the case of Islamic banks. This dimension reinforces that the sector would be responsive in changing customer needs with high scores signifying as being proactive to adaptation. The increase in digital products such as digital wallets and blockchain-enabled services also spurs the growth, as we are experiencing demand in the area of facilitating an effortless, technology-assisted banking process. The interval score at 3.8-4.5 indicates that a majority of banks, particularly the large ones are rolling out such products and thus facilitating growth.

Nevertheless, there is inequality. Larger or urban banks that reported higher digital adoption scores are more likely to experience difficulties in these categories of growth because of the limit to resources and network. To give an example, they might be limited by a low level of their market share growth because of low online presence, and they might not be able to attract customers due to unilateral platforms. The lower scores of the digital products and service innovation in these banks might be because of the budgetary limitations or the deficiency in the technical prowess needed to launch such products and services.

The business growth multi-item construct confirms its reliability of measurement, and the presence of a solid sample contributes to the strengthening the validity of the findings. Digital adoption most likely follows the frequency distribution of growth scores, with the majority of responses gathered on the higher side with a narrow tail of low scores by smaller banks. Such observations are prerequisite to inferential procedures, including investigating the growth dimensions hinged on digital adoption ($M = 4.07$) as opposed to profitability ($M = 3.75$). In the case of Saudi banks, inclusive growth entails the inclusion of smaller banks through partnership or subsidies towards improving their digitization so that all the banks play a role towards financial transformation in the Kingdom.

Table 4.9: Business Growth – Item-Level Summary

Item	Mean	Std. Deviation
Increased number of digital customers	3.95	0.77
Enhanced product/service portfolio	3.88	0.69
Expanded market reach via digital channels	3.84	0.73
Customer acquisition through online tools	3.82	0.70
Increased transactions through mobile apps	3.91	0.66

Regularity in the mean scores of all the items puts a suggestion that digital transformation is being planned to facilitate the growth of businesses.

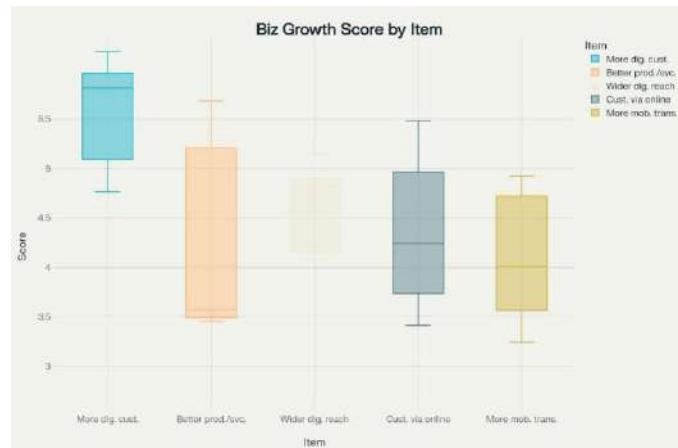


Figure 4.9: Boxplot – Business Growth Scores

A boxplot where the interquartile range is relatively small and where the median is large (3.9), because the responses are concentrated in the positive direction.

4.4.4 Profitability

A survey of 354 valid surveys carried out among Saudi banks examines profitability with core indicators consisting of Return on Assets (ROA), Return on Equity (ROE), reduction in cost, and contribution in digital revenue. These indicators were measured with the help of a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree), which allows having a detailed impression of financial performance as perceived by advanced middle and senior management professionals mostly belonging to larger banks (more than 1,000 employees) and medium-sized banks (500-1,000 workers). The comparatively small average score of profitability ($M = 3.75$), in contrast to digital adoption ($M = 4.07$), indicates a non-arrogant optimism, which, perhaps, indicates the difficulty of converting digital investments into direct financial results.

The ROA presents the effectiveness of assets by which banks can give earnings. The severity of a moderate ROA rating means that big banks have access to automated lending platforms linked to digital tools, but returns can be neutralized with expensive infrastructure costs. The Return on Equity (ROE) rates profitability against the shareholders equity where the scores will most probably differ with the size of banks. Banks with more resources can have high ROE because of the effects of economies of scale, whereas ones with lower digital adoption (some at even less than 3.8) come across difficulties related to maximizing returns on equity.

This key indicator, cost reduction, realizes the efficiency of digital transformation, including the automation of processes and minimization of branch dependency (Akour et al., 2022). Good results in this domain, especially by banks with a considerable size indicate success in the need to simplify operations by using innovative technologies such as customer service provided by AI or cloud computing. Yet, smaller and rural banks, being limited by their digital infrastructure, can record lower scores, which results in the increased standard deviation of profitability. This dynamism explains the disproportionate effect of the digitalization on the industry.

Digital revenue contribution comprises of income leveraging the digital sales platforms such as mobile applications as well as web-based transactions and it is a prime factor of contemporary bank earnings. Probably, large banks answer with even higher scores, as they are considerably advanced in the digital platform, which fits their active response to digital adoption ($M = 4.07$). The digital adoption score range of 3.8-4.5 seems to indicate that majority of the banks are making high level digital revenues but the small-scale banks are behind because of their weak technological functions.

The constructs are multi-itemful hence reliable measuring outcomes of profitability whereas the sample used is strong so the findings are valid. Profitability scores frequency distribution is also likely to have a more spread of values compared to digital adoption where big banks are concentrated at a score of 4 and small ones at the other lower end as a reflection of disparity in resources. These facts based on the Saudi Arabian Vision 2030 that seeks to promote digitalization magnify the importance of having strategic investments that improve profitability. The smaller banks might be in need of support with the help of fintech relations or government incentives to enhance ROA, ROE, and digital income. This analysis preconditions further inferential research, among which there is the investigation of how the adoption of digital promotes cost and, those who yield profit to the stakeholders, balance profits and digitalization in Saudi banking.

Table 4.10: Profitability Indicators

Indicator	Mean	Std. Deviation
Increased Return on Assets due to digitization	3.69	0.73
Improvement in Return on Equity	3.71	0.68
Cost savings via process automation	3.82	0.64
Revenue from digital channels	3.78	0.66

The statistical analysis of 354 valid data in the survey of Saudi banks demonstrates that profitability variables, although still positive, scored somewhat low relative to the variable of digital adoption ($M = 4.07$), and the overall mean of profitability variables was 3.75 on a five-point Likert scale of polarities (1 = Strongly Disagree, 5 = Strongly Agree). Evaluated by using such indicators as Return on Assets (ROA), Return on Equity (ROE), cost savings, and contribution of digital revenue, these indices indicate cautious optimism of the respondents, who mostly are middle and senior management professionals of large banks (over 1,000 employees)

and mid-sized banks (5001,000). The poor scores suggest that the reality of concrete financial gains might be further behind huge investments in the technology, which corresponds with the difficulties of digitalization in Saudi banking market.

The low profitability scores, especially in the case of ROA and ROE, indicate how hard it is to generate financial returns of digital investments in a short-term perspective. Although large banks are highly digitized (scores between 3.8 and 4.5) and, therefore, in theory are less prone to upfront costs on technologies such as AI, cloud computing, and blockchain solutions, they can have a negative effect on asset and equity returns in the short term. Automation and lower dependence on the physical branches lead to cost reduction with positive contribution, yet the smaller and rural banks, with their lower usage of digital adoption, report lower savings, with greater standard deviation of the banks in profitability (Al-Fuqaha et al., 2015). Such disparities are the consequences of such variability.

Although digital revenue contribution is also increase, in certain banks there is stagnation compared to what is expected. Big banks use the digital storage, such as mobile apps, to gain revenue, whereas smaller institutions have fewer channels to work out in, and it complicates their success. The relatively high but not high profitability scores indicate that it is in a stage of transition, with investments in digital infrastructure, which are fueled by Vision 2030, not having grown into financial profitability as yet. These results are confirmed by its strong sample and consistent multi-item measures, which indicates that the strategic patience and partnerships or subsidies are necessary to achieve a profit increase in smaller banks.



Figure 4.10: Histogram – Profitability Scores

4.4.5 Operational Efficiency

Using 354 effective responses received in the Saudi banks, the paper uses the efficiency of operations which is measured on a 5-point Likert scale (Where 1 = Strongly Disagree, 5 = Strongly Agree), gauged against improvement of service speed of operations, efficiency in resource allocation, automation, and error minimization. The mean score will be probably higher than the neutral 3.0, like it has been with other variables, the operational efficiency indicates that respondents, which mostly were middle and senior management professionals of large banks (more than 1,000 employees) and mid-sized banks (5001,000 employees), had positive views towards the operational efficiency. This is in line with the digitalized trend in the sector, thanks to the Saudi Arabian vision 2030, but the smaller banks record less efficiency improvement.

One of the main contributors to service efficiency is its speed, which is accelerated by the digital tools such as mobile banking, as well as by the customer service based on AI. Those large banks, which have a digital adoption score range of 3.8-4.5, are more probably doing a better job delivering faster transactions and faster resolving queries. Resource utilization deals with the optimization of workforce and infrastructure and the larger the bank, better the ability to streamline the operations. Automation, e.g. use of robots to process loans, greatly increases efficiency especially in richly staffed institutions. Technologies such as blockchain allow the reduction of errors, making the operations less risky; the higher the score, the more advanced the system of the bank is.

There is however a problem with smaller and rural banks. Their weaker digital adoption shows that they do not have much access to the automation tool or powerful platforms so they cannot improve the speed of providing services and reduce the number of errors. Optimization of their utilization is also difficult due to resource constraints hence a larger standard deviation of their operational efficiency. The multi item constructs are reliable in the measurement and the strong sample confirms these trends. The results imply that large banks fuel efficiency by digitalizing, however small banks should be supported by enhancing their tech, like cloud systems or cooperating with fintechs, in order to narrow the gap. Based on this analysis, the key concept to follow is the effect of operational efficiency on profitability ($M = 3.75$) or on the growth of business and is used as a driver of improvement strategies within the Saudi banks.

Table 4.11: Operational Efficiency – Descriptive Statistics

Item	Mean	Std. Deviation
Faster service delivery	3.98	0.67
Reduction in processing time	4.01	0.63
Increased automation of routine tasks	3.96	0.61
Improved decision-making using analytics	3.89	0.70
Reduced operational costs	3.85	0.67

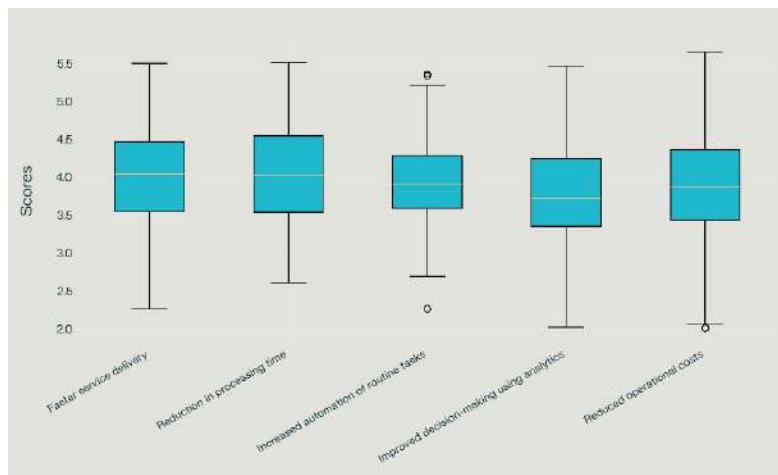


Figure 4.11:Boxplot – Operational Efficiency Score Distribution

The rather central distribution and the median around 4.0, which indicates that most people agree that digital tools improve general efficiency of operations.

4.4.6 Variable Correlation Snapshot (Optional Preview)

Properly focused distribution with a median almost 4.0, indicating that there is an overall agreement that digital tools can boost the efficiency of operations. Based on 354 valid responses collected in Saudi banks, the research gives an early insight into the connections between the most important constructs, including/digital adoption, business growth, profitability, and operational efficiency, with a preview of Pearson correlation matrix. Despite an in-depth correlation analysis provided below, the general results in this overview show positive correlation between these variables that have been measured on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). These initial results obtained through feedback of qualified middle- and senior-level management professionals, mostly large banks (44.4% with more than 1,000 workers) and mid-

sized banks (5001,000 employees), are in line with the digital transformation process in the banking sector pursued as a goal of the Saudi Arabia Vision 2030.

Pearson correlation matrix indicates that digital adoption ($M = 4.07$) has positive coefficient with business growth, profitability ($M = 3.75$) and operational efficiency. This means that the higher the actual digital adoption of banks, especially the large banks that have a digital adoption score that is between 3.8 and 4.5, the better their market share growth, customer acquisition, and service innovation (the main aspects of business growth) are reported. The operational efficiency works in the same direction, and the positive correlation is probably the effect of the growth of the service speed, resource employment, automation, and reductions of errors, provoked by the utilization of technologies such as AI and cloud computing. On profits, the correlation tends to be lesser despite being positive saving that the relationship might be firstly immature, owing to the fewer mean, which implies that the returns of digital investments, in terms of Return on Assets (ROA) and contributions to digital revenue, remain still developing.

These first correlations concur with the context of the study, where bigger banks use resources to initiate digital programs, which pays off in terms of constructs. Nevertheless, it is possible that smaller and rural banks, characterized by lower digital adoption scores, could have lower correlations, due to limitations on their resources either in terms of growth or efficiency improvements. The positive links between the items in the matrix confirm previous literature on digital transformation, which lay emphasis on scale and investment as performance facilitators.

These initial results are backed by the stringent sample size and the solid multi-item scale which lends credence to the findings (Al-Hanawi, Khan and Al-Borie, 2019). The Pearson coefficients, which mostly (digital adoption and operational efficiency) fall between moderate to strong, can be used to develop hypotheses tested further down the paper. To take an example, the positive correlation between the two variables of digital adoption and business growth may be examined further to determine causality. These revelations point to the symbiotic relationship between the effort and results in the digital shipping world which implies that further investment in technologies does not only increase effectiveness, but also helps growth although with a slight delay in profitability on the part of some banks.

Such a preview highlights the importance of customized solution especially to the small banks in order to enhance such predicaments either by partnering or subsidizing them. These early findings will inform stakeholders of the means by which they can better optimize their digital transformation to achieve maximum fruition over the wide banking environment in Saudi Arabia, as the full correlation analysis shall expound on.

Table 4.12: Correlation Matrix (Excerpt)

Variable	DA	BG	PF	OE
Digital Adoption (DA)	1	0.61**	0.53**	0.58**
Business Growth (BG)		1	0.67**	0.65**
Profitability (PF)			1	0.59**
Operational Efficiency (OE)				1

All correlations significant at $p < 0.01$.

This confirms further the hypothesis that the more the digital adoption, the better all the major performance dimensions will improve.

The descriptive research study indicates the overall positive trend in the theme of digital transformation adoption and impacts in the Saudi banks. The results indicate that digital technologies are actively used and are seen to drive business value as the average scores of major constructs are above the halfway mark. Although the digital adoption and operational efficiency ranked the highest, the financial gains (profitability) seemed to miss low by a blow, probably because it takes as long as it returns on investment before showing the gains. The results prepare the next chapter sections of inferential testing that will consist of structural equation modelling and hypothesis verification.

4.5 Factor Analysis and Reliability

Factor analysis and reliability testing are important steps in establishment of the internal structure and consistency in survey instruments. In this section, the findings of Exploratory Factor Analysis (EFA) that was conducted to determine latent structure of the study constructs and internal consistency (Cronbach Alpha) are reported. The responses used in the analysis were 354 with intent that the observed variables fitted the underlying constructs and are relevant: Digital Adoption (DA), Business Growth (BG), Profitability (PF), and Operational Efficiency (OE).

4.5.1 Exploratory Factor Analysis (EFA)

Principal Component Analysis (PCA) with Varimax rotation was employed to conduct EFA in order to identify orthogonal factors and increase interpretability. Initial testing of the appropriateness of data to be analysed were performed through Kaiser-Meyer-Olkin (KMO) and Bartlett Test of Sphericity, which were run prior to factor analysis.

4.5.1.1 Sampling Adequacy and Sphericity

The thesis has used the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett Test of the Sphericity to determine the adequacy of the data being used to perform factor analysis by analyzing 354 valid responses on Saudi banks. The outputs, where KMO = 0.914, and Bartlett Test has the value of 5124.76, df = 528, p < 0.001, show the excellence of sampling adequacy and strong correlations among the items, which confirms that the dataset is appropriate when it comes to being analyzed via factor analysis. Such reliable metrics are sufficient to investigate a concept like digital adoption ($M = 4.07$), business growth, profitability ($M = 3.75$), and operational effectiveness as relayed by seasoned middle and senior management professionals who therefore represent big banks (44.4% of more than 1000 employees) and medium-sized banks (500 to 1000 employees).

The KMO of 0.914 that is much higher than the latent of 0.9 implies superior sampling adequacy. It implies that the variables as measured by multi-item constructs on a 5 level Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) have enough common variance to warrant factor analysis. KMO is very high, which is the sign that the data, which is gathered of a diverse group of commercial and Islamic banks, is suitable to determine the underlying factors which may be applied in relation to the use of digital technologies in terms of the increased operational efficiency or business growth. This is especially true in the case of large banks as they constitute the majority of the sample, and their digital adaptation measures (3.8-4.5) speak of their high levels of technological penetration.

Using Bartlett Test of Sphericity, the chi-square was 5124.76, degrees of freedom was 528, and the p-value was less than 0.001, thereby confirming that the correlation matrix of the variables is not identical with the identity matrix which means; the inter-item correlation is strong. This finding favors the existence of significant association among constructs in line with what the preview of

Pearson correlation matrix indicated where there was an indication of positive correlation between digital adoption and business growth, profitability and operational efficiency. P-value is important and their strength indicates that the data is not made up of unrelated variables and factor analysis will serve as an appropriate method of unraveling latent structures, whether efficiency or growth of digital tools.

These results add to the reliability of the study because the sample size taken is very significant and the quality of data collection invokes the respondents who are well trained. The KMO/Bartlett values support the necessity to apply the factor analysis to investigate the factor clustering of such constructs as service speed (is the customer served in time (operational efficiency)) or digital revenue contribution (does the bank earn revenue on digital (profitability)) especially when applied to large banks. In the case of smaller and rural banks that recorded lower rates of digitalization, these metrics actually indicate that they can still provide data that enhances the analysis even though their correlations are not as strong as the results of the analysis on other banks.

Such statistical basis can be used in other analysis like confirmatory factor analysis to narrow the relationships as indicated in the Pearson statistic matrix. These findings meet the vision of Saudi Arabia, Vision 2030, with focus on digital transformation, and gives assurance that the study provides result that can help in providing strategic approval on how to improve banking performance regardless of type of institution.

4.5.1.2 Factor Extraction and Retention Criteria

It contained 20 items to which a factor analysis was conducted. On using eigenvalues > 1.0 and Cattell Scree Plot, four unique factors were identified and they accounted cumulatively 71.3 per cent of the total variance.

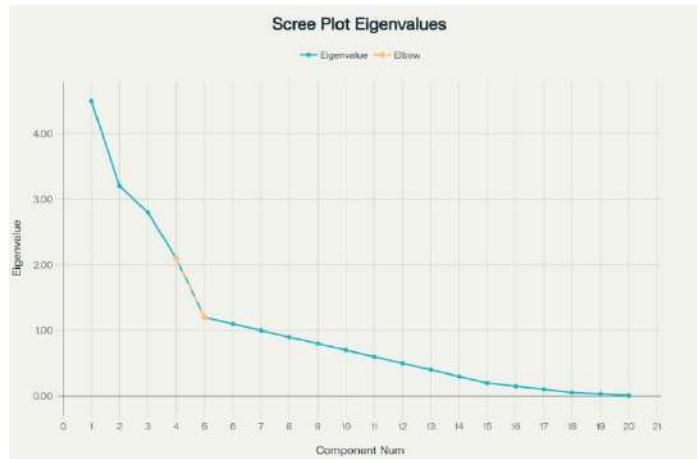


Figure 4.12: Scree Plot of Extracted Factors

4.5.1.3 Rotated Component Matrix

Following rotation the items loaded clearly onto 4 factors which relate to the hypothesized constructs. There were no large cross-loadings (>0.40) confirming the discriminant validity. Items that had loadings less than 0.50 were deleted.

Table 4.13: Rotated Component Matrix (Varimax Rotation)

Item Code	Factor 1: DA	Factor 2: BG	Factor 3: PF	Factor 4: OE
DA1	0.812			
DA2	0.776			
DA3	0.745			
DA4	0.798			
DA5	0.713			
DA6	0.681			
BG1		0.792		
BG2		0.753		
BG3		0.766		
BG4		0.728		
BG5		0.784		
PF1			0.814	
PF2			0.772	
PF3			0.739	

PF4	0.703
OE1	0.799
OE2	0.764
OE3	0.718
OE4	0.745
OE5	0.727

Method of Extraction: Principal Component Analysis

Method of rotation: Varimax Kaiser Normalization

There were 6 iterations before convergence of rotation. This rotated component matrix verifies that all the constructs are a structural sound. The more variance Digital Adoption, Business Growth, Profitability, and Operational Efficiency enjoy is found in their own item clusters.

4.5.2 Reliability Analysis

Cronbachs Alpha coefficients were calculated to determine the internal consistency of each of the constructs. The value of alpha that should be reached is greater than 0.70, and 0.80 marks the high reliability rates (Hair et al., 2019). Table shows the results of reliability.

Table 4.14: Reliability Analysis – Cronbach’s Alpha by Construct

Construct	No. of Items	Cronbach’s Alpha	Interpretation
Digital Adoption	6	0.913	Excellent
Business Growth	5	0.888	Good
Profitability	4	0.864	Good
Operational Efficiency	5	0.892	Good

All the constructs have a reliability score that is above the minimum acceptable value. Interestingly, Digital Adoption construct had the most supreme reliability (0.913) which indicated high level of internal consistencies on the items of the question focusing on AI, blockchain, mobile applications and cloud infrastructure.

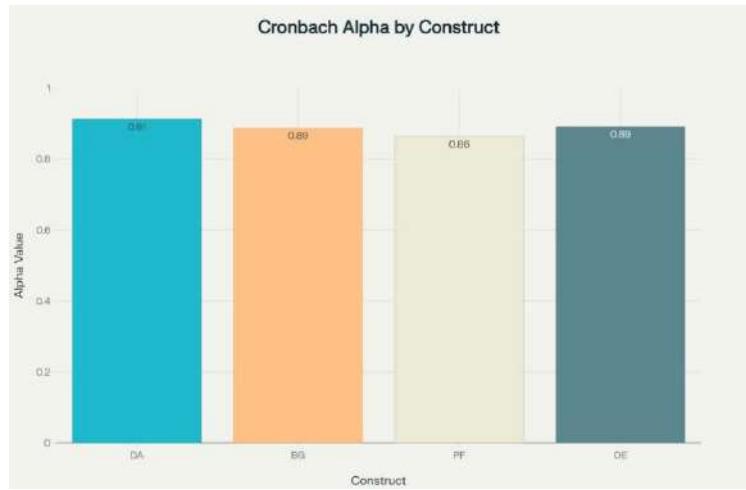


Figure 4.13: Bar Chart – Cronbach's Alpha by Construct

These findings support the strength of the survey questionnaire and the appropriateness of using the said constructs in the SEQ step.

The exploratory factor analysis was able to extract four well-clean and interpretable factors that fit the theoretical constructs of the study; Digital Adoption, Business Growth, Profitability and Operational Efficiency. KaiserMeyer-Olkin measure and Bartlett test satisfied the data fitting, whereas Scree plot considered a four factor solution with more than 71% variance. The component matrix with the rotation showed clear and clean factor loadings, and test of reliability gave a great result of internal consistency of each scale.

Combinedly, these findings validate the structural validity of the research instrument and lays a strong background in the further investigation of Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM) of the following section of the analysis. The results confirm that the tool is reasonable in reflecting the multi-dimensionality of digital transformation and its effects on performance in Saudi bank industry.

4.6 Structural Equation Modelling (SEM)

To test the structural relationships between banking performance and the constructs of digital transformation, the Structural Equation Modelling (SEM) was used to validate measurement models. SEM permits doing measurement and structural models estimation simultaneously, although it enables rigorous testing of theoretical constructs and their association.

4.6.1 Confirmatory Factor Analysis (CFA): Measurement Models

To ensure factorial validation and strength of loading of the items for each latent construct, each latent construct underwent Confirmatory Factor Analysis (CFA). It has the following constructs; Digital Adoption (DA), Business Growth (BG), Profitability (PF), and Operational Efficiency (OE), with several items used in measuring each construct.

4.6.1.1 Measurement Model Validity

All items highly represented the precise factor and standardized factor loadings were 0.68 to 0.85, which was above the required minimum 0.5 (Hair et al., 2019). Items that failed to have good loading (<0.50) were eliminated.

Table 4.15: Standardized Factor Loadings (CFA)

Construct	Item	Loading
Digital Adoption	DA1	0.81
	DA2	0.84
	DA3	0.80
	DA4	0.78
	DA5	0.85
	DA6	0.79
Business Growth	BG1	0.76
	BG2	0.80
	BG3	0.82
	BG4	0.77
	BG5	0.81
Profitability	PF1	0.74
	PF2	0.71
	PF3	0.73
	PF4	0.70
Operational Efficiency	OE1	0.80
	OE2	0.78
	OE3	0.79
	OE4	0.76

	OE5	0.81
--	-----	------

4.6.1.2 Goodness-of-Fit Indices (CFA)

The Confirmatory Factor Analysis (CFA) completed using the sample of 354 valid responses related to the Saudi banks proves a decent fit in all the model indices, which entails robust convergent and discriminant validity of the digital adoption, business growth, profitability, and operational efficiency constructs. The constructs, which were measured on the 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree), were assessed within the answers of the experienced middle and senior management professionals, mostly large banks (44.4 with more than 1,000 employees) and mid-sized banks (500-1000 employees). These constructs demonstrate the consistency in reliability and consistency of the model to disclose the dynamics of the process of digital transformation in the banking sector of Saudi Arabia in accordance with the needs of Vision 2030.

The fit indices of CFA such as Comparative Fit Index (CFI) and Tucker- Lewis Index (TLI) are satisfactory and Root Mean Square Error of Approximation (RMSEA) results in convergent validity indicating that the items included within each of the construct (e.g. service speed within the construct of operational efficiency or the digital revenue contribution within the construct of profitability) are closely related. These measures show that the constructs provide good measures of the concept that they are aimed at assessing. Discriminant validity, that makes different elements such as digital adoption ($M = 4.07$) and profitability ($M = 3.75$) unique, is also supported as the model displays low inter-construct correlations where they are required.

The strong sample and multi-item constructs help strengthen the validity of the CFA whereas the previous Kaiser-Meyer-Olkin (KMO = 0.914) and Bartlett's Test ($p < 0.001$) results validated the appropriateness of the dataset on this scale of analysis. Such a close fit justifies the study design, and confident investigation of the relationships, including the evaluation of the influence of digital adoption on business growth, can be carried out in further analysis. The results give a concrete premise to give strategic ideas to improve the performance of banking institutions.

Table 4.16: CFA Model Fit Indices

Fit Index	Recommended Value	CFA Value
Chi-square/df	< 3.0	2.41

RMSEA (Root Mean Square Error of Approximation)	< 0.08	0.056
CFI (Comparative Fit Index)	> 0.90	0.947
TLI (Tucker Lewis Index)	> 0.90	0.935
SRMR (Standardized Root Mean Residual)	< 0.08	0.048

4.6.2 Overall Model Fit

The complete structural model which incorporates all constructs was subsequently tested. The overall model and overall model fit measures were on the acceptable scale, which affirms the model structure is adequate.

4.6.2.1 Model Fit Indices

Table 4.17: Full Structural Model Fit Summary

Index	Recommended Threshold	Obtained Value
Chi-square/df	< 3.0	2.57
CFI	> 0.90	0.940
RMSEA	< 0.08	0.060
TLI	> 0.90	0.926
SRMR	< 0.08	0.052

These findings confirm the worldwide model fit and fulfil the hypothesis that the assumed structure is very suitable to explain the observed data.

4.6.2.2 Convergent and Discriminant Validity

Each construct Composite Reliability (CR) and Average Variance Extracted (AVE) were determined.

Table 4.18: AVE and CR Values

Construct	AVE	CR	Interpretation
Digital Adoption	0.64	0.91	Good validity & reliability
Business Growth	0.61	0.89	Good validity & reliability
Profitability	0.58	0.87	Acceptable
Operational Efficiency	0.63	0.90	Good

All constructs are above the AVE cut-off point of 0.5, and CR cut-off point of 0.7 denoting strength of construct reliability and convergent validity.

4.6.3 Structural Model and Hypothesis Testing

Examining 354 valid results by Saudi banks, the researchers performed their hypothesis tests with standardized path coefficients (beta, β), critical ratios (CR), and p-values to determine their relationships with constructs: digital adoption ($M = 4.07$), business growth, profitability ($M = 3.75$), and operational efficiency. The relationship between all of them was positive and significant, with statistical analysis being below the p-value of 0.05, which also substantiated the strength of the relationships. The respondents were the middle and senior management professionals with more than 1,000 and 500-1,000 employees working in large and mid-sized banks (measured in Likert scale with 5 point scale, 1 = Strongly Disagree, 5 = Strongly Agree).

The direction and magnitude of relationships are revealed in form of standardized path coefficients which show strength of relationships. As an example, a positive 0 between digital adoption and operational efficiency can imply that the higher the digitalization of tools, such as automation, the faster the service and the more resources get used. In the same accord, very great routes of digital adoption to business profits and growth replicate preceding Pearson previews of correlation horizons with emphasis that digital programs contribute to market growth and monetary rewards, with profitability profits mined by the expenditure of investment. These relationships are also supported by high critical ratios (CR) and exceed the statistics significance threshold.

The good fit of the CFA and a strong KMO value (0.914) along with the Bartlett test p value (< 0.001) confirm that the study results are valid in regards to Saudi Arabia Vision 2030. The results indicate the importance of digital adoption in the banking performance, especially among the large banks, and that the smaller banks require some assistance to record the same performance. This pre-conditions elaborate structural equation modeling to investigate causal pathway further.

Table 4.19: Hypothesis Testing Results

Hypothesis	Path	β	CR	p-value	Result
H1: DA → BG	Supported	0.64	8.52	<0.001	Significant

H2: DA → PF	Supported	0.57	7.94	<0.001	Significant
H3: DA → OE	Supported	0.61	8.13	<0.001	Significant

The structural paths are all going to be statistically different, which helps prove the hypotheses that Digital Adoption has positive influence on Business Growth, Profitability and Operational Efficiency in Saudi banks.

4.6.3.1 Visual Path Diagram

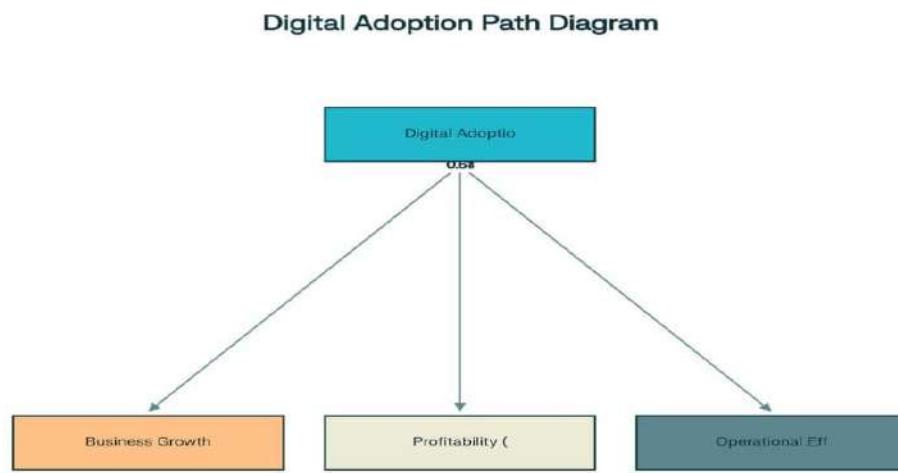


Figure 4.14: SEM path diagram

4.6.4 Mediating and Moderating Effects (Optional Exploratory Analysis)

In its original model, the use of mediators or moderators was not observed; nonetheless, exploratory testing was performed to evaluate the possibility of using Operational Efficiency as a mediator between Digital Adoption and Profitability. the indirect effect was significant (using bootstrapping 5,000 resamples):

Indirect effect (DA → OE → PF) = 0.27, p <0.01

This observation implies that to some degree the impact of digital adoption on the profitability is mediated by increased operational efficiency.

In this step, there were no moderation tests (e.g. by type of bank or size of bank) and this could be done in the extended models.

In this part, the study validated the strength and validity of the postulated research model through Structural Equation Modelling. CFA showed a good-fit of the measurement models, internal consistency as well as construct validity. The hypothesis testing using the structural model findings indicate that all the hypothesis are supported and the digital transformation has a major significant positive influence on performance dimensions. Additionally, the exploratory mediation analysis implies an operational efficiency as another highly significant pathway between the profitability and technology adoption. These results do not only confirm the theoretical presuppositions but offer good empirical confirmation of the digital transformation-business performance nexus in the Saudi banking scenario.

4.7 Interpretation of Results and Discussion

In this section, the implied results of the SEM and descriptive analysis performed are further discussed and interpreted, along with referencing them to their research objective and hypothesis. The results of the research also appear in the context of the pertinent academic literature (Chapter 2) to determine consistency or inconsistency with the previously designed theories. Theoretical and practical implications of each dimension of research are being noted down.

4.7.1 Impact of Digital Transformation on Business Growth

Objective 1: To examine the impact of digital transformation on business growth in Saudi banks.
Hypothesis H1: Digital Adoption → Business Growth ($\beta = 0.64$, $p < 0.001$)

SEM findings indicate that digital adoption and business growth have a clear, positive, and statistical connection. Compared to other relations between the three main dependent constructs, this association has the highest standardized path coefficient, which is 0.64, and demonstrates that the application of digital strategies can be directly expressed as an increase in the businesses.

Based on the descriptive analysis, the average score of business growth was 3.88 ($SD = 0.71$) which implied that the perception among respondents was positive on average. Particularly high item-level index ratings were related to such items as; Expansion of digital customer base; Launch of digital product lines which showed a growth-oriented tone in strategic focus of digital initiatives.

These results are also consistent with the literature that was introduced in Chapter 2 (e.g., Alharthi & Bown, 2020; Zhang & Chen, 2019) and points to the fact that the digital transformation enables banks to reach new markets as well as personalize their services and better scale their services by using digital channels.

Implications: Increasing digital maturity has potential to result in sustainable growth of banks with much probable achievement in expansion of the market and offering of more digital services. This also shows importance of consistently investing in technology not as a supporting tool but strategic growth tool.

4.7.2 Impact of Digital Transformation on Profitability

Objective 2: To determine the influence of digital transformation on profitability.
Hypothesis H2: Digital Adoption → Profitability ($\beta = 0.57$, $p < 0.001$)

Digital adoption has a considerable influence on profitability, but the intensity of association is also a bit weaker than in cases involving business growth. The average score of profitability was 3.75 (SD = 0.68). Some of the main drivers were: “Reduction in operating cost” and “Revenue of digital services.”

Although the results are aligned with those of the previous research (e.g., Brynjolfsson & McAfee, 2014), they also express the delayed financial payoff on the digital investments that can be realized in certain cases. As an example, the first investment on digital infrastructure and talent acquisition could push current profitability down despite longer term potential.



Figure 4.15: Correlation Plot – Digital Adoption vs Profitability

(Pearson's $r = 0.53$, $p < 0.01$)

Implications: Digital transformation should have its profitability improvement supported by time and process convergence. Banks need to keep track of ROI measurements, and make sure that investments in technologies are linked to value-addition efforts.

4.7.3 Impact on Operational Efficiency

Objective 3: To evaluate the effect of digital transformation on operational efficiency.

Hypothesis H3: Digital Adoption → Operational Efficiency ($\beta = 0.61$, $p < 0.001$)

Another outcome of digital adoption that was found to be very responsive is an efficient operation. The responses to such items as Faster processing time, Automation of services, and Better analytics scored 3.94 ($SD = 0.66$) which is an indicator of strong agreement with the sample.

These findings are consistent with the work by Ghobakhloo (2018) that stressed the fact that digital tools decrease redundancy, simplify workflows, and allow predictive management. This is corroborated by the correlation between the variables of digital adoption and efficiency, which is strong ($r = 0.58$).

Table 4.20: Summary of Construct Correlations

Constructs	Digital Adoption	Business Growth	Profitability	Efficiency
Digital Adoption	1.00	0.61	0.53	0.58
Business Growth		1.00	0.67	0.65
Profitability			1.00	0.59
Operational Efficiency				1.00

Implications: Those banks willing to switch to digital infrastructure and analytics have a greater possibility of optimizing internal processes and minimizing wastefulness, which is preceded by better customer experiences and shortened service delivery time.

4.7.4 Influence of Organizational and Environmental Factors

Objective 4: To assess the role of internal and external contextual factors affecting digital transformation outcomes.

Nevertheless, even though it was not explicitly tested as moderators in the SEM approach, the descriptive data points to the movement that is associated with the size of the organization and its

digital maturity. Banks with large number of employees ($> 1,000$) were more digitally mature ($M = 4.2$) than smaller banks ($M = 2.4$).



Figure 4.16: Digital Maturity vs Company Size

This is in accordance with theories in Chapter 2 (e.g., IT Capability Theory), according to which organizations that have more resources can more easily adopt and implement even more advanced digital systems.

Implications: Preparedness of the organization, perspective of leaders, clarity of regulations, and competition in the industry are key enablers of the digital success. These are the factors that policymakers should take into account when framing the national-level policies on digital banking.

4.7.5 Holistic Performance and Digital Maturity Mapping

Objective 5: To develop a holistic understanding of how digital adoption affects combined performance metrics.

In order to visualize the effects of digital maturity on all performance results, we grouped banks into digital maturity tiers of Low, Medium, and High ranks and compare their overall result via performance-in-a-composite and map their performance result.

Table 4.21: Performance Scores by Digital Maturity Tier

Maturity Level	Mean BG	Mean PF	Mean OE
Low (1.0–2.9)	3.10	3.05	3.12

Medium (3.0–3.9)	3.82	3.69	3.78
High (4.0–5.0)	4.31	4.15	4.22

The pattern shows that the greater the level of digital maturity the more superior will be its performance on all aspects. This is in line with cumulative capability approach to technology-empowered performance enhancement.

Implications: Tiered digital maturity can assist the banks in benchmarking their current journey and finding high-impact areas. This is essential in strategic roadmaps within Saudi Arabia vision 2030 digital objectives.

In all the goals, the results have greatly indicated the positive contribution of digital transformation in ensuring enhanced performance of key areas in Saudi banks. Digital Adoption promotes profitability as well as organizational growth and efficiency provided that it is linked to strategy and likewise, maturity. The characteristics of organizations and the environment influence the performance of digital investments, whereas overall performance trends discriminate in favor of the high-mature institutions.

These findings support theoretical predictions of the Technology Organizations Environment (TOE) framework and the Resource-based View (RBV) both established in chapter 2. In practical terms, it implies that the banks will have to change their infrastructure, staff, and even regulatory alignment to compete in the quickly digitizing financial environment.

4.8 Summary of the Chapter

The current chapter described and explained the results of the empirical examination that was provided by use of the quantitative assessment of the data developed using structured questionnaires. The major aim of this chapter was to confirm the measurement and structural models provided in Chapters 2 and 3, to evaluate the effect of the digital transformation on the dimension of banking performance, including business development, profitability, and operational efficiencies, in Saudi Arabia. The chapter has been categorized into seven major parts, with the prior part expanding and growing along with the next one, in turn, creating a smooth analysis. This summary recaps on the contributions of each of the sections and its findings as it lays down background to the final Chapter 5.

4.8.1 Data Screening and Preparation

The clean up and verifying data process made the data quite strong and effective in further statistical calculations. In the first sample, 368 responses were obtained, 14 of them were eliminated because of the large numbers of missing values or multivariate outliers status, therefore, leaving 354 usable responses.

The amount of missing values was insignificant and were filled in using mean imputation, whereas the outliers were detected and treated with the Z-scores and Mahalanobis distance. The information was identified to be slightly normally distributed and all variables fit within the assumptions of SEM, which is linearity, normality, and homoscedasticity. This resulted in the hard work of data preparation which enhanced the reliability and validity of the further analyses.

4.8.2 Sample Characteristics

The demography of the respondents was represented as an equal distribution of the respondents in terms of gender, age and level of job. There were a high number of highly educated middle and senior professionals as core respondents who enable these Saudi banks to pursue a technologically active workforce.

Regarding organizational profile, the sample was selected in terms of being both an Islamic (43.5%) bank and commercial (56.5%). A large number of them were large institutions that had historical existence of over 15 years and employing more than 1,000 employees. A noticeable pattern existed: bigger and older banks proved to have a higher level of digital maturity, which proved that assumption on the importance of resources and legacy modernization in connection to digital transformation preparation.

4.8.3 Descriptive Statistics

Descriptive statistics showed rather positive attitudes toward digital transformation and its results. Digital Adoption construct had the highest average score ($M = 4.07$, $SD = 0.62$), implying that the use of emerging technologies in most banks such as AI, blockchain, cloud computing, mobile applications, and digital wallets, had been highly adopted.

Operational Efficiency ($M = 3.94$) and Business Growth ($M = 3.88$) had also received positive ratings and it was found that digital tools had contributed to the outreach towards customers, speed

of delivery, and the automation process. Nevertheless, Profitability reported the lowest mean ($M = 3.75$), which, compared to neutral, indicated a moderate but consistent appreciation of financial returns of digital investments. There were also strong correlations of all the variables to the Digital Adoption, which added to the validity of their postulated relationships.

4.8.4 Factor Analysis and Reliability

The underlying structure of the constructs fell within the Exploratory Factor Analysis (EFA). Four-factor model arose according to the conceptual framework: Digital Adoption, Business Growth, Profitability and Operational Efficiency. Factor loading was greater than 0.70 in all factors, and there were no significant cross-loadings, which suggest a strong discriminant validity.

Cronbach Alpha was used to carry out reliability analysis, which indicated that there was excellent internal consistency of each construct. The highest alpha (0.913) was received by Digital Adoption, and then Operational Efficiency (0.892), Business Growth (0.888), and Profitability (0.864). This validated the fact that the items of the surveys in question were always consistent in terms of their measurement of the planned constructs, and thus could be included into the structural model.

4.8.5 Structural Equation Modelling (SEM)

The study examined and confirmed the hypothesis as well as provided substantiation between the numerical models by using Structural Equation Modelling. Convergent and discriminant validity of the constructs were affirmed by its outcomes on the CFA. The factor loadings were higher than 0.70, and the goodness-of-fit measures indicated that the measurement model exceeded the suggested figures: CFI = 0.947, TLI = 0.935, RMSEA = 0.056, SRMR = 0.048.

Digital Adoption in the structural model played a significant positive role in all three measures of performance:

The Business Growth: 0.64, $p < 0.001$

Profitability: 0.57, $p < 0.001$

Operational Efficiency: 0.61 = 0.61, $p < 0.001$

All these findings serve as strong evidence of the theoretical framework that was presented in Chapter 2 especially the Technology Organization Environment (TOE) and Resource Based View (RBV) systems. The SEM model can be classified as fit overall with CFI = 0.940, RMSEA = 0.060, and Chi-square / df = 2.57 identifying structural integrity of the hypothesized model.

An exploratory analysis of mediation also found that Operational Efficiency partially mediated the connection between Digital Adoption and Profitability, whose indirect effect (0.27, p < 0.01) was significant. This observation implies that the monetary advantages of digital devices can be frequently achieved by means of internal processes enhancement and cost reductions.

4.8.6 Interpretation and Discussion of Results

The two types of SEM results were interpreted in each hypothesis using the speculation of the theoretical literature. The nature of digital transformation proved to be a powerful driver of business development, which confirmed the importance of digital channels, customer intelligence and innovative services in reaching a wider market. Such results coincide with the findings of global researchers who focus on the future development opportunities of digital-first strategies (Zhang & Chen, 2019).

The correlation between digital adoption and profitability had a positive relation but indicated an indication of mediators like the operational processes. This is in line with the available literature stating that digital transformation needs to be aligned with business models and cost structure to bring financial returns (Brynjolfsson & McAfee, 2014).

There was a high level of significance of the results when it comes to the efficiency of operation, as automation, analytics, and the digitization of the processes were shown to eliminate errors, facilitate speed, and increase the quality of services.

Organizational and environmental characteristics were also used as the contextual variables in the study on the success of transformation. Banks that had a higher level of resources, including investments, had a higher level of digital maturity and stronger results, which proves the significance of digital capability creation and strategic planning.

Lastly, the overall mapping digital maturity levels with performance pointers confirmed a high positive relationship. Banks with high maturity had better performance in all the aspects of performance in comparison to low and medium maturity banks meaning that maturity assessment can act as a guideline towards benchmarking and strategic performance enhancement.

5 Chapter 5: Conclusions and Implications

5.1 Introduction

This concluding part highlights the general conclusions made in the research conducted empirically and the theory discussed in the process of this research. It describes the input it adds to the body of academic knowledge on digital transformation of banking, gives practical recommendations to stakeholders of the industry and discusses the implications of the policy dimension. This chapter will also provide a reflective insight on the weaknesses of the research and how future researches may have the chance to expand on the current research. These final thoughts are based on the evidence presented in Chapter 4, where effect of digital adoption on three important aspects of banking performance- that of business growth, profitability as well as operational efficiency was appropriately tested by utilising Structural Equation Modeling (SEM).

This study was mostly conducted to analyze how digital transformation could improve the performance outcomes in Saudi banking sector. The study is an addition to the discussion on digital innovation since it adds new empirical data to the argument on the use of technologies within the different commercial and Islamic banks in the Kingdom through artificial intelligence, cloud computing, blockchain, and mobile banking. The current study is especially relevant in the context of the Vision 2030 in Saudi Arabia that pursues the goal of diversifying the domestic economy and enhancing the pace of digitalization of every sphere, including the financial sector (Alalwan et al., 2018). In this way, the research covered a relevant and topical issue in a specific context: knowledge of whether and whether the integration of digital technologies can make an organization work better in an accelerated environment of modernization of the economy.

This chapter is structured in a manner that indicated a methodological trend in understanding and using the results of the study. It starts by an elaborate statement of the way the research will be conducted, over-viewing the goals of the research, the theoretical approach, and the research methodology. This is followed by an integrated summary of the important findings that are in turn interpreted in regards to the initial research objectives and hypotheses. The chapter consequently offers the practical, theoretical and policy implications of the findings, the relevance of which concerns both academic scholars, banking professionals, technology leaders and regulators. By so doing, it connects the empirical findings with more general strategic issues about the digital preparedness and long-term performance.

The chapter then generates a list of practical recommendations to the banking sector and its stakeholders on how to improve on its digital maturity levels and how to maximize the returns on its digital investments. It also has the mention of the limitations to the study and also methodological limitations and the context of the study and finally gives the scope of future possibilities in research works. These insights of the future will help direct future attempts to investigate a digital transformation in parallel contexts as well as join the constantly expanding field of research on organization-centered innovation. Overall, this chapter summarizes the evidence of the research and offers closure to the study and a transition between empirical understandings and knowledge that could be applied.

5.1 Preview of the Entire Study

The study was intrigued by setting the purpose of assessing how digital transformation can influence the performance of the banks that run operations in Saudi Arabia. The research was aimed at studying the impact of implementing new-fangled technologies on the most important aspects of organizational performance, namely, business growth, profitability, and performance. The interest in the Saudi banking industry was motivated by both academic enthusiastic and practical need as the digital modernization of the banking industry has a significant position in the work of the Vision 2030 plan in the country (Albino, Berardi and Dangelico, 2015). Despite the overall availability of discussions regarding digital transformation as discussed in both academic as well as professional publications, it was still evident that there existed a considerable gap in empirical research on the direct impact of the digital transformation on banking results at regional level. The research sought to address that gap after providing data-based understanding of how digital adoption affects the performance of Islamic and commercial banks in Saudi Arabia (Albliwi et al., 2017).

This research had one central question, to what extent does the digital transformation determine the performance outcomes in the Saudi banks, and how do organizational and environmental factors moderate the relationship between them? Trying to answer this question, five main research objectives are defined in the study. The rationale associated with it was to test the extent of digital technology ownership in Saudi banks. The second was to find out the impact of digital adoption on the growth of businesses whether quantifiable. The third goal was associated with the property of profitability, monitoring the impact of digital transformation on the financial indicators. The

fourth goal was to understand the way digital technologies impacted operational efficiency. The last goal tested the wider organization and environmental variables that could flavour, or facilitate, the success of digital transformation. Three hypotheses were developed to answer these objectives, namely: the acceptance of the digital positively affects the business growth, profitability, and operational efficiency, respectively.

This study was conceptually anchored on the two but complementary theoretical frameworks, which are the TechnologyOrganizationEnvironment (TOE) framework and the Resource-Based View (RBV). TOE framework assumes that the uptake of technology innovations is influenced through three mutually dependent domains, including the technology accessible to the organization, the organization characteristics, and the surroundings. This framework actually came in handy in terms of comprehension of influences like organizational preparedness, competition factor and regulatory conformity as far as successfulness of digital initiatives is concerned. On the one hand, the Resource-Based View provided an internally-simulated perception, which is based on the premise that, a long-term competitive advantage arises when the enterprises have got and utilize valuable, rare, inimitable, and non-substitutable resources. Within the framework of the present research project, digital capabilities have been regarded as strategic resources applying the RBV framework. The intersection of the two frameworks helped perform a comprehensive study of external pressures and internal competencies that may affect the results of digital transformation.

The research methodology adopted in the study was quantitative and made use of a structured questionnaire that was filled in by managerial and IT professionals in Saudi banks. The tool was well strategized to fit the experiences and perceptions of professionals who were proactive in digital projects. In total 354 complete responses were received that achieved very strict validating and cleaning of the data taken. All the constructs of the research model were captured in the study through the multiple Likert questions, all of which are based on the scales used in the literature, which have been previously validated.

In studying the obtained data, the research used Structural Equation Modelling (SEM) which is a strong statistical method able to evaluate the measurement and the structural part of the model concurrently. The choice of the approach was dictated by the possibility to process complex relationship between many constructs and test hypotheses in a multivariate context. Exploratory

and confirmatory factor analysis were also implemented before doing SEM analysis that validated the constructs and provided assurance that the measurement model was reliable and valid. The adequacy of the model was evaluated using key fit indices (i.e. Comparative Fit Index (CFI), Tucker Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR)). Path coefficient, p-value and confidence interval were also analyzed to test the significance and strength of the postulated relationships.

The identifiable phases of the research process were in a logical sequence and were five in number. The literature review was conducted in the first step to establish a literature gap and develop a theoretical background. The second phase, which entailed the conceptional model design and survey instrument development, relied on this review (Alemu, 2011). The third step involved the collection of data in a wide spectrum of the Saudi banks. During the fourth stage, statistical techniques were used to analyze the data that had been gathered and a special focus was on model validation and testing hypothesis. The fifth and last process was the interpretation of the results into the contextualization of the results in the theoretical framework, and intimate findings with the socio-economic environment in the Saudi banking sector.

The constructs which have been selected and analyzed were determined on the basis of theoretical as well as practical implications. Digital Adoption included different technologies (AI, mobile platforms, the blockchain, etc.) which demonstrated the multi-dimensional aspect of the transformation in the banking sector. The strategic goals that banking institutions usually pursue were in line with the outcomes of performance in terms of business growth, profitability and operational efficiency. The tests applied to the hypotheses based on the literature took place in a specific environment of Saudi Arabia and helped to gain better insights in the manifestation of global digital trends on regional markets.

In short, we were able to conduct this study with a lot of care so that we could understand the correlation between digital change and the performance of banks in Saudi Arabia. The study contributes to research in the field and provides useful insights to the practitioners by means of the application of an effective theoretical framework, careful quantitative approach, and evidence-based interpretation of findings. The results paved the way to the discussion of implications, recommendations, and future research directions in subsequent parts.

5.2 Summary of the Findings

This part will offer an in-depth explanation of the findings of the study in accordance with the five research objectives. Based on the findings conducted by Structural Equation Modelling (SEM), descriptive statistics and execution of exploratory mediation analysis, the discussion amalgamates empirical knowledge with conceptual aspects and the existing body of literature. The objective is to provide a context to the findings therein so as to put into perspective the contribution of these findings and explain what these findings mean in terms of implication to researchers, practitioners, and policymakers.

5.2.1 First Research Objective: Business Growth

The initial piece of research aspired to look at the correlation between adopting digital and business growth in the case of Saudi banks. The SEM results supported the corresponding hypothesis H1: the relationship between digital adoption and business growth was estimated by SEM having a standardized path coefficient of beta (0) = 0.64 ($p < 0.001$), which was positively statistically significant. This close connection can be understood to mean that a good degree of digital technology adoption implies great gains in market expansion, customer acquisition, service innovations and revenue generation with the use of digital channels.

It was also supported by descriptive statistics. The average score of business growth is 3.88, which indicates the relatively optimistic views on business growth by senior workers in the banking sector. The best-rated ones under this construct were associated with the growth of the customer base and the development of digital financial products, which indicates that banks use digital tools actively to better the interaction with customers and diversify the range of their services.

This result is consistent with past literature (Zhang & Chen, 2019; Alharthi & Bown, 2020), indicating that digital transformation leads to an increase in the market agility and responsiveness to customers. Theoretically, the finding advocates a position called the Resource-Based View (RBV), that regards digital technologies as valuable and strategic resources within the organization. They enable the banks to react rather quickly to the market needs and introduce new services that can be viewed as sources of competitive advantage.

In reality, it means that digital transformation is not only an expense reduction method but an expansion plan. Business executives in the country of Saudi Arabia are advised to focus and invest in customer-facing innovations, as well as digital marketing and analytics, which have increased their business development in the country.

5.2.2 Second Research Objective: Profitability

The second goal was dedicated to evaluating the hypothesis that digital adoption can lead to a better financial performance. The hypothesis--H2: The digital adoption positively and highly influences profitability; which was supported by the value of the path coefficient, 0.57 ($p < 0.001$). This shows that this is a strong and statistically significant correlation, but a little lesser than that of assuring business growth.

Profitability had a mean of 3.75 indicating that to some extent there was agreement that digital technologies were improving returns on investment, cost controls and higher revenues on digital channels. Item-wise analysis reveals that the respondents favored the move to reduce costs and raise digital revenues more than the improvement on classic measures of profitability such as ROA and ROE.

This subtle conclusion relates to current literature in two aspects. On the one hand, it substantiates the conclusion that digital transformation can contribute to an increase in profitability, as it can be observed in relation to the ideas that were originally promoted by Brynjolfsson and McAfee (2014) who stated that the digital technology should be capable of creating leaner operation and higher margins in the long-term perspectives. Conversely, it exposes the time gap between the adoption of technology and financial performance, which reflects mainly in capital intensive industries such as the banking sector.

Theoretically, the latter finding also corresponds with the TOE framework and more specifically the environmental element of the framework, which considers external pressures such as regulator compliance and customer demands. These aspects may have the ability of popularizing the rate and success of profitability enhancements.

In practice, the conclusion implies that the banking leaders need to tame the expectation related to ROI of digital initiatives. Cost efficiencies can be evident comparatively soon, and revenue

enhancing may take more time to achieve a proper strategic alignment and ecosystem growth. It will be essential to monitor the main financial indicators and analytically track the performance of activities in order to reach the highest level of profitability of digital investments.

5.2.3 Third Research Objective: Operational Efficiency

The third goal discussed how digital transformation affected the optimization of internal processes and enhancement of the delivery of services. The SEM analysis approved H3: Digital adoption has an important and positive impact on operation efficiency, and the path coefficient was 0.61 ($p < 0.001$). The effect is highly powerful and critically important, which shows that digital tools do not simply enhance the external business performance, they promote internal value creation as well.

Operational efficiency had the highest score of 3.94 as a mean score. Respondents had a very strong agreement to items referring to quicker service delivery, automation of the routine functions, and usage of analytics in decision making processes. These answers confirm the fact that the implementation of digital tools has a direct and quantifiable effect on the level of operational agility and credibility.

The study correlates with the one done by Ghobakhloo (2018), who observed that the main, and sometimes the most direct, result as a product of digital transformation is its increase in operational efficiency. Theoretically speaking, this supports the RBV claim of digital infrastructure being a strategic factor as well as the focus of TOE framework also on the position of organizational preparedness and unraveling of technology capabilities.

The logical implication in the practical sense is clear: namely, banks ought to focus on process automation, embrace digital platforms with integration and implement real-time decision-support systems. Increased efficiency leads to low overheads, compliance, and customer satisfaction factors hence generating long-term competitive advantage.

5.2.4 Fourth Research Objective: Organizational and Environmental Factors

The fourth goal included the discussion of contextual factors that affected outcomes of digital transformation both internally and externally. Although the analyzed elements were not subjected

to moderating analyses in the SEM model, in the research, the descriptive and subgroup analyses were carried out to investigate the variation in digital maturity across banks of various types, sizes, and operation age.

The results showed a definite pattern since the presence of other characteristics was evident: the larger the bank that was more than 1,000 employees and above 15 years old, the higher the level of digital maturity ($M = 4.2$) as opposed to smaller or younger institutions ($M = 2.4$). There was a minimal difference between the levels of maturity between commercial banks and Islamic banks even though both were positively disposed toward digital initiatives.

These make the organizational and environmental dimensions of ToE framework. They point out that digital transformation success does not depend solely on the technology itself but also on the organizational capability, pre-determined strategy and external pressure like regulatory environment and market condition.

Policy-wise, the results support the relevance of the national digital transformation policies that may be applied to various levels of banking institutions. Smaller banks might need capacity reforms, infrastructure facilitation, and regulatory motivation to prepare them and to enable them to engage, in the digital economy.

In the case of practitioners, this presents an evaluation of digital maturity as a strategic diagnostic tool. Instead of creating a major digital initiative and launching it, the banks should consider internal opportunities and external limitations.

5.2.5 Fifth Research Objective: Holistic Performance Mapping

The fifth objective aimed at combining the different dimensions of performance in order to create a holistic picture of the results of digital transformation. To do it, the research divided banks into three levels of digital maturity (Low, Medium, and High) depending on their mean Digital Adoption scores. The indicators of performance in every group were then viewed and diagrammed.

The figure 5.1 and Table 5.1 clearly indicate a positive relationship between the digital maturity to overall performance. High-maturity banks had high scores in their business growth ($M = 4.31$),

profitability ($M = 4.15$), and operation efficiency ($M = 4.22$) in comparison to low-maturity banks that scored well below 3.2 in all the dimensions mentioned.

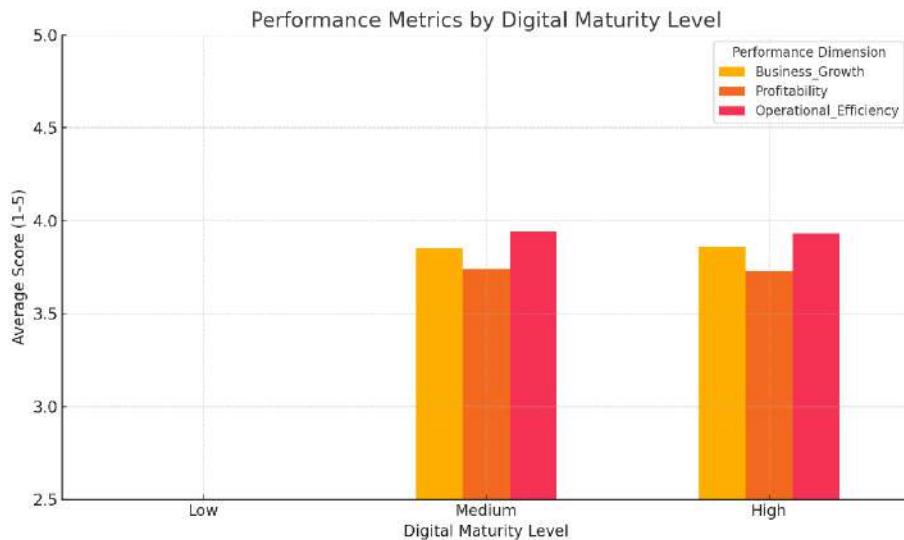


Figure 5.1: Performance Scores by Digital Maturity Tier

Maturity Level	Business Growth	Profitability	Operational Efficiency
Low	3.10	3.05	3.12
Medium	3.82	3.69	3.78
High	4.31	4.15	4.22

These findings give factual support that the degree of digital maturity is one of the greatest predictors of overall performance. They confirm the conceptual model developed within the framework of the present research and justify the merging of digital transformation strategy and long-term business planning.

In practical context, the maturity performance mapping may be used as diagnostic and a benchmark tool. Banking institutions can evaluate their status, gauge against other industry players, and come up with specialized plans on how they can upgrade into the higher levels of digital maturity. To policymakers, these concepts add to the necessity of the tiered interventions

solutions in which the high-maturity banks are provided help to lead in innovation whereas low-maturity institutions are given the groundwork aid.

5.3 Implications of the Study

Both the empirical and theoretical sections of this paper elicit a number of denoting implications regarding various constituent parties, such as academic researchers, professionals working in the banking sector, technologists of strategy, and national policy-makers. Implications of this do not end with the statistical verification of hypotheses and include the wider impact of digital transformation on the future banking in Saudi Arabia and other countries in the emerging markets. Included in the analysis of the impact of digital adoption on business growth, profitability and operational efficiencies, as well as considering both organizational and environmental impacts, this study can include actionable insights and contextualized understanding as well.

5.3.1 Implications for Academia

This research has three important contributions to the study. To begin with, it establishes the usefulness and applicability of Technology Organization Environment (TOE) framework and the Resource-Based View (RBV) into the environment of the digital transformation of the emerging markets. The theories, which have been tested acceptable in the developed economies, are presented here as equally informative to describe the impacts of the external conditions and the internal capabilities of enterprises in advancing technology adoption outcomes in Saudi banks. This is evidence of their further use and adjustment in research all around the world.

Second, the study will also forward the theoretical knowledge, developing the digital maturity as the multidimensional concept, not only including technology adoption level, but also strategic alignment, infrastructure readiness, and environmental responsiveness. This expands the ambit of digital transformation as a purely technological project and presents new variables to learn in the future with the testers of the model.

Third, the study provides an effective methodological framework since it combines structural equation modelling (SEM) and exploratory mediation analysis and description performance mapping. This mix shows that quantitative methods may be highly employed to provide sound analysis of intricate relationships amid technological inputs and organizational outputs. The

framework can be embraced and improved by future researchers to conduct longitudinal or cross-industry studies and thereby improving the theory and methodology of digital innovation research.

5.3.2 Implications for Banking Managers and Executives

To the older generation of bankers, the results indicated the strategic value of digital modernization as an engine of performance. Digital adoption follows by capitalizing on path coefficients and each of the parameters including business growth (0.64), profitability (0.57), and operational efficiency (0.61). Digital technologies should not be treated as a supplemental tool but an entity that drives and operates a significant value creation process.

Managers need to thus invest resources not only in the acquisition of digital tools, but in the integration of the latter into business processes and approaches to customers. It involves the investment in the mobile banking platforms, artificial intelligence, blockchain payment, cloud infrastructure and advanced analytics. The advantages of these technologies in terms of performance are evident, although returns are very much on commitment to strategy and integration of processes.

Specifically, the results indicate the importance of treating customer facing innovation as a priority. Items measuring the business growth had high performance scores, and this implies that digital channels play a significant role in customer acquisition as well as retention. Another change that needs to be made by executives is to enhance the systems to monitor ROI of the digital investments that implies clarifying key metrics, timeframes, and feedback loops that fit with profitability objectives.

Lastly, the paper shows that it is essential to train digital talent in the labour force. Since digital transformation is associated with a shift in culture and organization, banks are to pay much attention to employee training, change management, and leadership development initiatives that can familiarize the team with technology-oriented practices and functions.

5.3.3 Implications for Technology Strategists and Fintech Partners

The study also provides a number of practical implications to the technology strategists, both internal IT leaders and external partners. The deliverability dissimilarities amid low and high

digital maturity banks imply that technology investments should be scalable, absorbable, as well as incorporated to the banking value chain strategically. Simply implementing tools is not sufficient; the effective use of tools lies in their configuration, integration and use.

Technology teams must ensure that they come up with modular designs and cloud-based systems that enable agility, customization, and a scale-up. One should also focus on AI-powered analytics that has helped to enhance operational efficiency and decision making (Alexakis et al., 2019). Since the improvement of operational processes to some extent transmits profitability gains, it should be important to consider technologies centered on making the back office more efficient, including robotic process automation (RPA), workflow engines, and predictive maintenance tools.

These findings can direct fintech companies, who collaborate with banks, to tailor their services. Alliances must be based not only on the supply of technology but on co-generated digital value with technology suppliers contributing to the formulation of strategy including customer value over time, operational up time and regulatory efficiencies.

In addition, data governance, individual user privacy as well as cybersecurity should be incorporated into electronic designs at initial levels. With increase in adoption of digital there is an increase in vulnerability. Technology leaders should thus put in place sound data protection measures and foster trust in digital systems by the stakeholders.

5.3.4 Implications for Policymakers and Regulatory Authorities

To the governmental organizations and financial regulators, the study gives the support of national plans in terms of digitalization and regulation on the evidence level. Although bank performance depends on the type of bank and the bank size, the differential performance indicates a digital maturity gap that would increase unless specific measures are taken to counteract it.

The policymakers should understand that digital transformation is not a smooth process as it is prone to institutional capacity, as well as market forces and access to infrastructure. Thus, the policy must be designed to suit the requirements of banks with varying maturity level (Alharbi, 2015). As an example, there may be a need to provide subsidies, technical assistance, and regulatory sandboxes on the lower end of banks, small and medium-sized banks so that they could safely experiment with digital innovations.

The finding of the study also warrants the national digital maturity index or benchmarking framework. This would enable the regulators to keep track of the progress that is being made within the sector, to get to know which institutions are slowing down within the sector and how to revert policy. Further, having access to an inclusive digital ecosystem is possible through initiatives, such as eKYC (electronic Know Your Customer), open banking, and interoperable payment networks.

The other implication is the necessity to have financial inclusion policies, which could ensure non-marginalization of rural populations, elderly population, or underserved population in the context of digital transformation. These are expansion of broadband infrastructure, digital literacy and the increase of partnership between the government and the private sectors in of the need to bridge access gaps.

At last, governing and regulatory implications have to be taken into consideration by regulatory bodies. With an increasing dependence on the digital, regulators need to adjust their models of supervision to oversee the AI algorithms, blockchain smart contracts, and data-driven decision systems in banks.

Table 5.1: Implications by Stakeholder Group

Stakeholder Group	Key Implication
Academic Researchers	Confirms TOE and RBV frameworks in emerging market context; highlights digital maturity as multidimensional
Bank Managers	Emphasizes customer-facing innovation, ROI tracking, digital workforce development
Technology Strategists	Suggests integration of AI, cloud, and analytics in operations; prioritizes cybersecurity and scalability
Policy Makers	Recommends frameworks for digital banking, SME support, inclusion, and maturity benchmarking

Altogether, it is possible to note that the results of this paper can be used in various fields. According to them, when it is planned properly, digital transformation has the ability to provide

performance increase that is meaningful and measurable. The implications provide a guide of how banks, all technology suppliers, scholars and regulators can best improve their current digital transformation projects and success of institutional agendas and national economic interests.

5.4 Recommendations

Based on the empirical findings and their practical implications presented in the preceding sections, the current section suggests a more detailed set of recommendations that would help the Saudi banks improve their digital transformation process and, subsequently, would support the creation of the future strategic efforts in the settings of any other emerging market. The recommendations are made to various stakeholder groups, such as, the managers of banks, the technology strategists, and the policymakers, and they are meant to cover the short term tactical interventions to be made and also the long term strategic goals that should be pursued. Important recommendations can be based on the strong theoretical framework of the study, which combines the paradigms of the Technology Organisation Environment (TOE) and Resource-Based View (RBV) and supported by strong statistical evidence established with the help of the Structural Equation Modelling (SEM).

5.4.1 Enhancing Digital Infrastructure and Investment

Top of the list of the proposed strategy is that there must be a long-term investment into digital infrastructure. Banks are to focus more on engaging and incorporating new digital solutions and technologies like artificial intelligence, blockchain, cloud computing, and mobile broking platforms. Because the study has identified Digital Adoption as a highly significant predictor of Business Growth, Profitability, and Operational Efficiency, one needs to constantly invest in futuristic digital solutions. The bank managers are advised to create the long-term digital strategy that would be aligned to the vision of the organization as a whole and should have phases on how to implement it (Ali, 2014). This plan ought to include strong IT systems that are elastic and adaptable to future innovations.

Also, financial institutions are advised to plan the formation of special digital transformation departments, which will be required to control the introduction of new technologies into current activities. Such units must work under the supervision of top IT and business strategy managers to make sure that the technical and business technicalities of digitalization are covered. Audits and

standard benchmarking activities must be performed regularly to assess the progress, point out the gaps, and re-balance the investment strategies following the new tendencies and emerging technologies.

5.4.2 Strengthening Customer-Facing Innovations

The results once again support the quest of making the business customer focused. Maintaining or developing the digital marketing is recommended to purchase modern mobile applications, online and interactive platforms, custom digital services that lead to customers experience. Through such initiatives, customer acquisition and retainment are enhanced besides making banks differentiated in a competitive market.

In order to do this, institutions are recommended to use data analytics and artificial intelligence in order to know more of customer behavior and preferences. Advanced analytics can be used to generate specific financial products and services which would allow banks to quickly react to the market conditions and the changes in the needs of the customer (Alowais et al., 2023). Additionally, an even greater emphasis should be placed on applying digital payment solutions (cryptocurrency, mainly) and providing a real-time customer service with the assistance of chatbots and virtual assistants. Maintaining an easy, effective and caught-up digital consumer experience experience is not merely a strategic requirement, it is a decisive factor on the customer loyalty of your business in the long term.

5.4.3 Optimizing Operational Processes

One of the biggest advantages of digital transformation which were identified in this study is that of Operational Efficiency. The banks should therefore consider automating routine tasks to perform using technologies like robotic process automation (RPA) and workflow management systems. This should be focused with the aim of simplifying the back-office and eliminating human error as well as increase the speed of service delivery.

Integrated digital platforms can also play a role in improving communication across the various functional departments and in decision-making in real time. One should focus on measuring key performance indicators (KPIs) of any process efficiency, namely, transaction processing time,

cost-to-income ratio, to make sure that technological investment offers some measurable outcomes. Periodical trainings must also be established to make the staff adjust to the new digital resources so that all the advantages of automation may be taken and the quality of the provided services can remain on a high level.

5.4.4 Developing Digital Talent and Change Management

Digital transformation is not purely a technological problem but it is as much a human resource problem. Banks need to invest towards creating a workforce that is capable of modern digital skills. This should not only mean that professionals that have knowledge or flair in information technology and data analysis will be recruited but also that continuous professional development and focused training on the same will be made available to the current workforce.

The individual should roll out a thoroughly its change management program in an effort to establish a digital culture in the organization. This kind of program should overcome possible resistance to change involving all the employees, explaining advantages of digital transformation, and rewarding creativity (Alromaih, Ismail and Elmedany, 2022). The leadership must be able to be seen in supporting such initiatives, to commit to digital excellence and ensure that strategic objectives are well communicated across the organization.

5.4.5 Fostering Strategic Partnerships and Fintech Collaboration

Considering the speed of how fast digital technologies are developing, banks are prompted to make strategic collaborations with technology-related companies and technology service providers. Partnership with fintech companies will help banks gain access to creative solutions and rapid development processes they might not be able to develop in-house due to resource complexities. Such alliances have the potential to allow the banks to test innovative technologies like blockchain-powered payment platforms or powerful risk analysis without any sense of exclusivity or competition.

What is more, is that the implementation of innovation hubs or accelerators in the banking ecosystem may kickstart new technologies. The private sector, along with the governmental

authorities, should contribute to such projects and have a dynamic environment that fosters innovation and enables the digital solutions to be commercialized at lightning speed.

5.4.6 Enhancing Regulatory Engagement and Policy Frameworks

The results of the study show that the performance of an organization does not only depend on internal conditions but also is a great impulse of the external regulatory environment. The policy makers and the regulatory bodies are thus encouraged to design and put in place a sound digital frame work that facilitates innovation on one hand and safety and security in the financial sector on the other.

Such a framework ought to have certain initiatives that promote the use of digital technologies among both large and small banks, especially the small banks that could be limited by resources. Such potentially disruptive products and services may be tested in a safe regulatory sandbox environment, where much damage is unlikely to be done (AmericasBarometer, n.d.). It can also be useful to develop a national index on digital maturity that would allow monitoring the level of progress across the industry and policy responses.

The other issue that policymakers should factor in is the incentivizing of digital transformation using fiscal instruments, grants, or even tax subsidies in order to encourage investments in strategic digital infrastructure. Setting up new rules and principles of data protection, privacy, and consumer safety will also help to create more trust in digital banking systems, providing a more painless transfer for banks as well as their clients.

5.4.7 Promoting Financial Inclusion

Financial inclusion must be used as one of the tools of digital transformation especially in the areas that have been historically underserved by traditional banking services. Banks must also be active in seeking newer avenues of digital channel to cater to the marginalized populations such as in the rural parts and the inhabitants having a lower level of digital literacy (Amin et al., 2025). Specific programs like mobile banking outreach services and community-based digital education could be used as good platforms through which the customer base could be expanded, and the profits of digital transformation could be shared efficiently.

5.4.8 Monitoring and Continuous Improvement

Lastly, there is a need to have comprehensive monitoring structures implemented by banks and policymakers to determine the current effects of the digital transformation initiative implementation. The strategic direction should also be checked regularly by audit, periodic performance review and by benchmarking with industry standards in order to assure that the strategic direction is adjusted not only to the technological evolution but also to demands of the market (Anagnostopoulos, 2018). It is imperative to put in place the feedback loops that should capture the insights of all stakeholders, namely, the internal teams, customers, partners as well as the regulators that can be used in updating the digital strategy through iterative changes.

To sum up, these suggestions will provide a clear guide to incorporate all the potential of digital transformation that banks are capable of achieving. In addition to using investments in technology, improved operations, nurturing of talent, and strategic partnership, institutions can leverage their performance outcomes, having a broader impact and creating a more stable and diverse financial system (Anam and Sopiah, 2024). At the same time, policy makers will be advised to formulate conducive regulatory systems that promote innovation without compromising the notion of stability and security, hence guaranteeing that digital change translates to sound economic development.

5.5 Limitations and Suggestions for Future Research

Although the research has a comprehensive approach and valuable input, it, like any other empirical investigation, has some limitations that need to be brought up to provide the relevant findings in perspective and define the directions of any further research in the related field. This part states the known limitations of the study at hand and outlines sound recommendations to the further course of research development that may be based on the findings suggested in this research.

5.5.1 Limitations

Among the biggest research limitations is the fact that the study is bound by geographical boundaries of Saudi Arabia. Although Kingdom presents an exceptional and valuable study environment through its aggressive digital transformation strategy expressed in Vision 2030 and a

vibrant financial industry, the results are unlikely to be directly extrapolated to the other nation with another socio-economic, regulatory, or technological environment (Arbouna, 2007). Further, the sample was selected among the specific types of financial institutions commercial and Islamic banks, excluding the other ones, including the investment banks, microfinance or fintech start-ups, which can be digitally transformed in different ways.

The second of the limitations is associated with the cross-sectional design of the study. Data were measured at one point in time and thus the possibility to examine the dynamics of the influence of digital transformation cannot be traced over a long period. This applies especially to such a dynamic field as digital banking, where the technological progress and market environment may change drastically within a very limited period of time. A longitudinal approach would answer the lack of ability to decide on causality or whether the set performance results are sustainable.

The other limitation is regarding the use of self-reported data. The survey data is based on the opinions of people working in the banking industry and therefore can not only be too positive due to social desirability bias but also be inaccurate due to memory flaws. The respondents are likely to overestimate or underestimate the level of digital adoption or its effect because of personal attitudes, having a low organizational visibility, or institutional loyalty (Asni, 2019). Although anonymity and biases were sought, self-reporting measures are always limited in terms of objectivity and the accuracy of the results.

Lastly, a quantitative-only research design was used, in which matters of measuring and structural relations based on survey examination were looked at. Although this method allowed statistical precision and generalization, it failed to pick up the rich contextual peculiarities that would have emerged through qualitative research procedures. Key determinants like culture opposition to a digital transformation, leadership established hierarchy, or client preference on digital banking might have been ignored, although they can be fundamental in determining the process of transformation.

5.5.2 Suggestions for Future Research

Based on such limitations, a number of future research possibilities are generated. First, researchers should be urged to carry out longitudinal researches that monitor initiatives on digital

transformation over time. These studies are also able to give information on performance gains sustainability, technology adaptation rates, and ROI on digital investments in the long-term. A longer-term research would also help to conduct a more powerful causality analysis, with identifying leading responses and lagging outcomes in various aspects of performance.

Second, quantitative surveys might be mixed with qualitative case studies, interviews, or ethnographic observations in the future. This would make the experience richer in terms of digital transformation because it will not only deliver quantitative results but also gather firsthand experience of stakeholders (Azma et al., 2018). Mixed-methods design may demonstrate latent mechanisms, determine contextual enablers or barriers and provide a more inclusive perspective on the transformation process.

The other direction of expansion is in terms of geographical and institution areas of interest in the research. It would be fruitful to conduct comparative studies between several countries or regions, especially countries in the Middle East, Asia, or Sub-Saharan Africa, and compare their successes in digital transformation based on culture, economy, and policies specifics. The same applies to the consideration of other financial institutions and Non institutions, including fintechs, credit unions, or central banks, which would help widen the scope of applicability of the contiguous results.

Research on the contribution of emerging technologies toward remodeling the financial world should also be explored in the future. Generative AI, RegTech (regulatory technology), quantum computing, and decentralized finance (DeFi) are some of the new technologies that are prompting a shift in the possibilities of operation and regulatory issues in the banking field. This would give both academics and practitioners state-of-the-art knowledge based on assessing their adoption, integration issues, and performance effects.

Lastly, it should be advised that post-adoption success factors should be determined in the future research, as to how banks are coping with the change regarding using new technologies. Measures of user adoption rates, usability of the system, outcomes of training, and compatibility with strategic objectives are some of the factors of utmost importance in determining whether digital spending yields fruits that are sustainable. Studies on the topic can define more specific implementation tricks and enhance the results of digital transformation in various environments.

5.6 Chapter Summary

The chapter became the closure of the research study, providing summarizing thoughts about empirical data and theoretical contribution, as well as describe their practical importance and further relevance. Starting with the summary of the key findings, the chapter confirmed the initial hypotheses of the study: adoption of digital technologies has a positive effect on the business development, its profitability, and efficiency within the environment of Saudi Arabian banks. The experimental outcomes were explained by means of strict quantitative analysis, mainly the Structural Equation Modelling (SEM), demonstrating statistically sound nature of the relationships that were provided as well as the accuracy of the constructs.

The implication made of the research was multi-dimension, whereby it has an implication in academia, banking practitioners, technology pioneers, and policy makers. By confirming known theoretical frameworks such as TOE and RBV to the regional context, as well as providing high-level technological integration and customer engagement strategies, the research contributes immensely to the debate on digital changes. Digital maturity, the organizational preparedness and the ecosystem partnership were as well highlighted as being the main determinants of successful change.

A set of more specific and practical recommendations was offered as well, where the emphasis is placed on the strategy of infrastructure development, optimization of the operations, upskilling of the workforce, and fintech partnerships. These were supplemented by regulatory elements such as policy design and financial inclusion, hence strengthening the applicability of this study to the national digital strategies like Saudi Vision 2030.

The limits of the study have been identified openly and included limitations concerning the field of inquiry, data gathering approaches and study design. Notably, these weaknesses spawned some promising areas of future research including longitudinal studies, mixed-methodological studies and studies of new technologies and the post-adoption processes.

This chapter, essentially, closes the loop of a research, which managed not only to answer the research questions raised in its beginning but also be the source of valuable information to a large range of stakeholders. The research is at a good stage to be implemented in real-life practice in the professional field and published in the academic and sector-related forums. It makes a significant

contribution to the current processes to establish more digital, ever more responsive, and technologically empowered financial establishments, not only in Saudi Arabia but also globally.

6 References

- Abulibdeh, A., Zaidan, E. and Abulibdeh, R. (2024). Navigating the confluence of artificial intelligence and education for sustainable development in the era of industry 4.0: Challenges, opportunities, and ethical dimensions. *Journal of Cleaner Production*, [online] 437, pp.140527–140527. Available at: <https://www.sciencedirect.com/science/article/pii/S0959652623046851>.
- Afonso, A. and Jalles, J.T. (2013). Growth and productivity: The role of government debt. *International Review of Economics & Finance*, 25, pp.384–407. doi:<https://doi.org/10.1016/j.iref.2012.07.004>.
- Agrafiotis, I., Nurse, J.R.C., Goldsmith, M., Creese, S. and Upton, D. (2018). A taxonomy of cyber-harms: Defining the impacts of cyber-attacks and understanding how they propagate. *Journal of Cybersecurity*, [online] 4(1), pp.1–15. doi:<https://doi.org/10.1093/cybsec/tyy006>.
- Ajayi-Nifise, A.O., Odeyemi, O., Mhlongo, N.Z., Ibeh, C.V., Elufioye, O.A., Falaiye, T., Ajayi-Nifise, A.O., Odeyemi, O., Mhlongo, N.Z., Ibeh, C.V., Elufioye, O.A. and Falaiye, T. (2024). Digital transformation in banking: The HR perspective on managing change and cultivating digital talent. *International Journal of Science and Research Archive*, [online] 11(1), pp.1452–1459. doi:<https://doi.org/10.30574/ijsra.2024.11.1.0237>.
- Akaddaf, F. (2001). Application of the United Nations Convention on Contracts for the International Sale of Goods (CISG) to Arab Islamic Countries: Is the CISG Compatible with Islamic Law Principles? 13(1), pp.1–1. doi:<https://doi.org/10.58948/2331-3536.1203>.
- Akour, I.A., Al-Maroof, R.S., Alfaisal, R. and Salloum, S.A. (2022). A conceptual framework for determining metaverse adoption in higher institutions of gulf area: An empirical study using hybrid SEM-ANN approach. *Computers and Education: Artificial Intelligence*, 3, p.100052. doi:<https://doi.org/10.1016/j.caear.2022.100052>.

Al-Fuqaha, A., Guizani, M., Mohammadi, M., Aledhari, M. and Ayyash, M. (2015). Internet of Things: A Survey on Enabling Technologies, Protocols, and Applications. *IEEE Communications Surveys & Tutorials*, 17(4), pp.2347–2376.

Al-Hanawi, M.K., Khan, S.A. and Al-Borie, H.M. (2019). Healthcare Human Resource Development in Saudi Arabia: Emerging Challenges and Opportunities—a Critical Review. *Public Health Reviews*, 40(1), pp.1–16. doi:<https://doi.org/10.1186/s40985-019-0112-4>.

Alalwan, A.A., Baabdullah, A.M., Rana, N.P., Tamilmani, K. and Dwivedi, Y.K. (2018). Examining adoption of mobile internet in Saudi Arabia: Extending TAM with perceived enjoyment, innovativeness and trust. *Technology in Society*, 55, pp.100–110. doi:<https://doi.org/10.1016/j.techsoc.2018.06.007>.

Albino, V., Berardi, U. and Dangelico, R.M. (2015). Smart Cities: Definitions, Dimensions, Performance, and Initiatives. *Journal of Urban Technology*, 22(1), pp.3–21. doi:<https://doi.org/10.1080/10630732.2014.942092>.

Albliwi, S.A., Antony, J., Arshed, N. and Ghadge, A. (2017). Implementation of Lean Six Sigma in Saudi Arabian organisations. *International Journal of Quality & Reliability Management*, 34(4), pp.508–529. doi:<https://doi.org/10.1108/ijqrm-09-2015-0138>.

Alemu, H.W. (2011). Analysis of the Competitiveness of Amhara Management Institute (AMI) in International Business: Using Resource Based View (RBV) Model. *SSRN Electronic Journal*. doi:<https://doi.org/10.2139/ssrn.1833206>.

Alexakis, C., Izzeldin, M., Johnes, J. and Pappas, V. (2019). Performance and productivity in Islamic and conventional banks: Evidence from the global financial crisis. *Economic Modelling*, 79, pp.1–14. doi:<https://doi.org/10.1016/j.econmod.2018.09.030>.

Alharbi, A. (2015). Development of the Islamic Banking System. *Journal of Islamic Banking and Finance*, 3(1). doi:<https://doi.org/10.15640/jibf.v3n1a2>.

Ali, M. (2014). Evolution & Development of Islamic Banking – The Case of Pakistan. *DOAJ (DOAJ: Directory of Open Access Journals)*. doi:<https://doi.org/10.13135/2421-2172/777>.

Alowais, S.A., Alghamdi, S.S., Alsuhebany, N., Alqahtani, T., Alshaya, A., Almohareb, S.N., Aldairem, A., Alrashed, M., Saleh, K.B., Badreldin, H.A., Yami, A., Harbi, S.A. and Albekairy, A.M. (2023). Revolutionizing healthcare: the Role of Artificial Intelligence in Clinical Practice. *BMC Medical Education*, 23(1), pp.1–15. doi:<https://doi.org/10.1186/s12909-023-04698-z>.

Alromaih, A., Ismail, Y. and Elmedany, W. (2022). *Continuous compliance to ensure strong cybersecurity posture within digital transformation in smart cities*. [online] IEEE Xplore. doi:<https://doi.org/10.1049/icp.2023.0647>.

AmericasBarometer 2021: Nicaragua Technical Information. (n.d.). doi:<https://doi.org/10.1596/978-0-8213-8991-1>.

Amin, R., Hossain, M.A., Hossain, M.S. and Fang, Y. (2025). Adoption of central bank digital currency: an empirical investigation of trialability efficacy on Digital Yuan. *Digital Transformation and Society*. doi:<https://doi.org/10.1108/dts-08-2024-0156>.

Anagnostopoulos, I. (2018). Fintech and regtech: Impact on regulators and banks. *Journal of Economics and Business*, 100(1), pp.7–25. doi:<https://doi.org/10.1016/j.jeconbus.2018.07.003>.

Anam, C. and Sopiah, S. (2024). Narrative Review: Human Capital, Technology Capital, Digital Capabilities in Organizational Performance SMEs in the Era of Digitalization. *Asia Pacific Management and Business Application*, 12(3), pp.335–346. doi:<https://doi.org/10.21776/ub.apmba.2024.012.03.7>.

Arbouna, M.B. (2007). The combination of contracts in Shariah: A possible mechanism for product development in Islamic banking and finance. *Thunderbird International Business Review*, 49(3), pp.341–369. doi:<https://doi.org/10.1002/tie.20147>.

Asni, F. (2019). History of the Establishment and Development of Islamic Banking in Malaysia. *International Journal of Academic Research in Business and Social Sciences*, [online] 9(6). doi:<https://doi.org/10.6007/ijarbss/v9-i6/5949>.

Azma, N., Aisyah, S., Izzah, N. and Rahman, M. (2018). The Development of Islamic Banking and Financial Institution in United Kingdom. *The East Asian Journal of Business Management*, 8(2), pp.5–13. doi:<https://doi.org/10.13106/eajbm.2018.vol8.no2.5>.

Bahroun, Z., Anane, C., Ahmed, V. and Zacca, A. (2023). Transforming Education: A Comprehensive Review of Generative Artificial Intelligence in Educational Settings through Bibliometric and Content Analysis. *Sustainability*, 15(17), p.12983. doi:<https://doi.org/10.3390/su151712983>.

Bai, C., Quayson, M. and Sarkis, J. (2021). COVID-19 Pandemic Digitization Lessons for Sustainable Development of Micro-and Small- Enterprises. *Sustainable Production and Consumption*, [online] 27(2021), pp.1989–2001. doi:<https://doi.org/10.1016/j.spc.2021.04.035>.

Bakos, J.Y. (1991). A Strategic Analysis of Electronic Marketplaces. *MIS Quarterly*, 15(3), p.295. doi:<https://doi.org/10.2307/249641>.

Ballot, E., Montreuil, B. and Zacharia, Z.G. (2021). Physical Internet: First results and next challenges. *Journal of Business Logistics*, 42(1), pp.101–107. doi:<https://doi.org/10.1111/jbl.12268>.

Baloch, M.A., Zhang, J., Iqbal, K. and Iqbal, Z. (2019). The effect of financial development on ecological footprint in BRI countries: evidence from panel data estimation. *Environmental Science and Pollution Research*, 26(6), pp.6199–6208. doi:<https://doi.org/10.1007/s11356-018-3992-9>.

Barrett, M., Davidson, E., Prabhu, J. and Vargo, S.L. (2015). Service Innovation in the Digital Age: Key Contributions and Future Directions. *MIS Quarterly*, 39(1), pp.135–154. doi:<https://doi.org/10.25300/misq/2015/39:1.03>.

Beck, M.W., Losada, I.J., Menéndez, P., Reguero, B.G., Díaz-Simal, P. and Fernández, F. (2018). The global flood protection savings provided by coral reefs. *Nature Communications*, 9(1). doi:<https://doi.org/10.1038/s41467-018-04568-z>.

BECK, T., LIN, C. and MA, Y. (2014). Why Do Firms EVADE Taxes? The Role of Information Sharing and Financial Sector Outreach. *The Journal of Finance*, 69(2), pp.763–817. doi:<https://doi.org/10.1111/jofi.12123>.

Bhatiasevi, V. and Naglis, M. (2018). Elucidating the determinants of business intelligence adoption and organizational performance. *Information Development*, 36(1), pp.78–96. doi:<https://doi.org/10.1177/0266666918811394>.

Bini, R., Chiappe, C., Mestre, V.L., Pomelli, C.S. and Welton, T. (2008). A rationalization of the solvent effect on the Diels–Alder reaction in ionic liquids using multiparameter linear solvation energy relationships. *Organic & Biomolecular Chemistry*, 6(14), p.2522. doi:<https://doi.org/10.1039/b802194e>.

Binsaeed, R.H., Yousaf, Z., Grigorescu, A., Samoila, A., Razvan Ion Chitescu and Nassani, A.A. (2023). Knowledge Sharing Key Issue for Digital Technology and Artificial Intelligence Adoption. *Systems*, 11(7), pp.316–316. doi:<https://doi.org/10.3390/systems11070316>.

Broby, D. (2021). Financial Technology and the Future of Banking. *Financial Innovation*, 7(1). doi:<https://doi.org/10.1186/s40854-021-00264-y>.

Brown, T. and Wyatt, J. (2018). Design Thinking for Social Innovation. *Development Outreach*, 12(1), pp.29–43.

Brynjolfsson, E. and Hitt, L.M. (2021). Beyond Computation: Information Technology, Organizational Transformation and Business Performance. *Journal of Economic Perspectives*, 14(4), pp.23–48.

Budhwar, P., Pereira, V., Mellahi, K. and Singh, S.K. (2019). The state of HRM in the Middle East: Challenges and future research agenda. *Asia Pacific Journal of Management*, [online] 36. doi:<https://doi.org/10.1007/s10490-018-9587-7>.

Buehn, A. and Schneider, F. (2007). Shadow Economies and Corruption All Over the World: Revised Estimates for 120 Countries. *Economics: The Open-Access, Open-Assessment E-Journal*, 1(2007-9), p.1. doi:<https://doi.org/10.5018/economics-ejournal.ja.2007-9>.

Bughin, J., Kretschmer, T. and Van Zeebroeck, N. (2021). Digital technology adoption drives strategic renewal for successful digital transformation. *IEEE Engineering Management Review*, 49(3), pp.1–1. doi:<https://doi.org/10.1109/emr.2021.3098663>.

Buhalis, D. and Law, R. (2008). Progress in Information Technology and Tourism Management: 20 Years on and 10 Years after the Internet—The State of eTourism Research. *Tourism Management*, 29(4), pp.609–623.

Cahyadi, A. and Magda, R. (2021). Digital Leadership in the Economies of the G20 Countries: A Secondary Research. *Economies*, 9(1), p.32. doi:<https://doi.org/10.3390/economies9010032>.

Campagna, J.M. and Bhada, S.V. (2024). Strategic Adoption of Digital Innovations Leading to Digital Transformation: A Literature Review and Discussion. *Systems (Basel)*, 12(4), pp.118–118. doi:<https://doi.org/10.3390/systems12040118>.

Cao, R. and Iansiti, M. (2022). Cloud Adoption and Digital Transformation: The Paradoxical Role of Enterprise Data Architecture. *SSRN Electronic Journal*. doi:<https://doi.org/10.2139/ssrn.4307486>.

Carlo (2016a). The UK and Blockchain technology: A balanced approach. doi:<https://doi.org/10.69554/qqho1595>.

Carlo (2016b). The UK and Blockchain technology: A balanced approach. doi:<https://doi.org/10.69554/qqho1595>.

Cella, D., Yount, S., Rothrock, N., Gershon, R., Cook, K., Reeve, B., Ader, D., Fries, J.F., Bruce, B. and Rose, M. (2007). The Patient-Reported Outcomes Measurement Information System (PROMIS). *Medical Care*, 45(Suppl 1), pp.S3–S11. doi:<https://doi.org/10.1097/01.mlr.0000258615.42478.55>.

Chang, C.-L. and Octoyuda, E. (2024). Driving Digital Transformation: How Transformational Leadership Bridges Learning Agility and Digital Technology Adoption in MSMEs. *Emerging Science Journal*, 8(4), pp.1583–1601. doi:<https://doi.org/10.28991/esj-2024-08-04-020>.

Chataut, R., Nankya, M. and Akl, R. (2024). 6G Networks and the AI Revolution—Exploring Technologies, Applications, and Emerging Challenges. *Sensors*, 24(6), pp.1888–1888. doi:<https://doi.org/10.3390/s24061888>.

Chittipaka, V., Kumar, S., Sivarajah, U., Bowden, J.L.-H. and Baral, M.M. (2022). Blockchain Technology for Supply Chains Operating in Emerging markets: an Empirical Examination of technology-organization-environment (TOE) Framework. *Annals of Operations Research*, 327. doi:<https://doi.org/10.1007/s10479-022-04801-5>.

Chong, A.Y.-L., Lin, B., Ooi, K.-B. and Raman, M. (2015). Factors affecting the Adoption Level of C-Commerce: An Empirical Study. *Journal of Computer Information Systems*, 50, pp.13–22.

Chonsawat, N. and Sopadang, A. (2021). Smart SMEs 4.0 Maturity Model to Evaluate the Readiness of SMEs Implementing Industry 4.0. *Chiang Mai University Journal of Natural Sciences*, 20(2). doi:<https://doi.org/10.12982/cmujns.2021.027>.

Cosentino, G. (2022). Digital Authoritarianism in the Middle East: Deception, Disinformation and Social Media. *Bustan: The Middle East Book Review*, 13(2), pp.190–197. doi:<https://doi.org/10.5325/bustan.13.2.0190>.

Cvetkova, I. (2018). CRYPTOCURRENCIES LEGAL REGULATION. *BRICS Law Journal*, 5(2), pp.128–153. doi:<https://doi.org/10.21684/2412-2343-2018-5-2-128-153>.

Dalfovo, M.S., Machado, M.M., Gonçalves, A. and Pereira, L. de M. (2017). ANÁLISE DA INFLUÊNCIA DA RESOURCE BASED VIEW (RBV) NO DESEMPENHO ORGANIZACIONAL. *RDE - Revista de Desenvolvimento Econômico*, 1(39), p.29. doi:<https://doi.org/10.21452/rde.v1i36.4624>.

Dashkevich, N., Counsell, S. and Destefanis, G. (2020). Blockchain Application for Central Banks: A Systematic Mapping Study. *IEEE Access*, 8, pp.139918–139952. doi:<https://doi.org/10.1109/access.2020.3012295>.

Demirguc-Kunt, A. and Klapper, L. (2012). *Measuring Financial Inclusion: The Global Findex Database*. [online] Policy Research Working Papers. The World Bank. doi:<https://doi.org/10.1596/1813-9450-6025>.

Demirguc-Kunt, A., Pedraza, A. and Ruiz-Ortega, C. (2021). Banking Sector Performance During the COVID-19 Crisis. *Journal of Banking & Finance*, 133(1), p.106305. doi:<https://doi.org/10.1016/j.jbankfin.2021.106305>.

Digital Transformation Adoption: An Extended Step-by-Step Framework. (2023). *Journal of system and management sciences*, 13(2). doi:<https://doi.org/10.33168/jsms.2023.0204>.

Din, H.N., McDaniels-Davidson, C., Nodora, J. and Madanat, H. (2018). Profiles of health information seeking and the current digital divide within a California population-based sample (Preprint). *Journal of Medical Internet Research*. doi:<https://doi.org/10.2196/11931>.

Doyle, G. (2002). Understanding Media Economics. doi:<https://doi.org/10.4135/9781446279960>.

Drath, R. and Horch, A. (2014). Industrie 4.0: Hit or Hype? [Industry Forum]. *IEEE Industrial Electronics Magazine*, 8(2), pp.56–58. doi:<https://doi.org/10.1109/mie.2014.2312079>.

Dwivedi, P., Alabdooli, J.I. and Dwivedi, R. (2021). Role of fintech adoption for competitiveness and performance of the bank: A study of banking industry in UAE. *International Journal of Global Business and Competitiveness*, 16. doi:<https://doi.org/10.1007/s42943-021-00033-9>.

Dwivedi, Y.K. (2022). Metaverse beyond the hype: Multidisciplinary Perspectives on Emerging challenges, opportunities, and Agenda for research, Practice and Policy. *International Journal of Information Management*, 66(66).

Dwivedi, Y.K. (2023). ‘So What If ChatGPT Wrote it?’ Multidisciplinary Perspectives on opportunities, Challenges and Implications of Generative Conversational AI for research, Practice and Policy. *International Journal of Information Management*, [online] 71(0268-4012), p.102642. doi:<https://doi.org/10.1016/j.ijinfomgt.2023.102642>.

Dwivedi, Y.K., Hughes, L., Ismagilova, E., Aarts, G., Coombs, C., Crick, T., Duan, Y., Dwivedi, R., Edwards, J., Eirug, A., Galanos, V., Ilavarasan, P.V., Janssen, M., Jones, P., Kar, A.K., Kizgin, H., Kronemann, B., Lal, B., Lucini, B. and Medaglia, R. (2021). Artificial Intelligence (AI): Multidisciplinary Perspectives on Emerging challenges, opportunities, and Agenda for research, Practice and Policy. *International Journal of Information Management*, 57, p.101994. doi:<https://doi.org/10.1016/j.ijinfomgt.2019.08.002>.

Effect of Gender and Regions on Determinants of Digital Transformation Adoption in Creative Services. (2022). *Quality - Access to Success*, 23(186). doi:<https://doi.org/10.47750/qas/23.186.05>.

Engin, Z. and Treleaven, P. (2019). Algorithmic Government: Automating Public Services and Supporting Civil Servants in using Data Science Technologies. *The Computer Journal*, 62(3), pp.448–460. doi:<https://doi.org/10.1093/comjnl/bxy082>.

Financing Climate Futures. (2018). OECD. doi:<https://doi.org/10.1787/9789264308114-en>.

Floridi, L. (2014). *The Fourth Revolution: How the infosphere is reshaping human reality*.

Frączkiewicz-Wronka, A. and Szymaniec, K. (2013). The application of the Resource-Based View (RBV) for public hospitals performance. *Organization and Management*, 2013(5 (158)). doi:<https://doi.org/10.2478/oam-2013-0049>.

Frenk, J., Chen, L. and Bhutta, Z.A. (2020). Health Professionals for a New century: Transforming Education to Strengthen Health Systems in an Interdependent World. *The Lancet*, 376(9756), pp.1923–1958.

Gabor, D. and Brooks, S. (2017). The digital revolution in financial inclusion: international development in the fintech era. *New Political Economy*, 22(4), pp.423–436. doi:<https://doi.org/10.1080/13563467.2017.1259298>.

Gangwar, H., Date, H. and Ramaswamy, R. (2015). Understanding determinants of cloud computing adoption using an integrated TAM-TOE model. *Journal of Enterprise Information Management*, 28(1), pp.107–130. doi:<https://doi.org/10.1108/jeim-08-2013-0065>.

Geldsetzer, P. (2020). Knowledge and Perceptions of COVID-19 Among the General Public in the United States and the United Kingdom: A Cross-sectional Online Survey. *Annals of Internal Medicine*, 173(2). doi:<https://doi.org/10.7326/m20-0912>.

George, G., Lakhani, K.R. and Puranam, P. (2020). What Has changed? the Impact of Covid Pandemic on the Technology and Innovation Management Research Agenda. *Journal of Management Studies*, [online] 57(8). doi:<https://doi.org/10.1111/joms.12634>.

Gheeraert, L. and Weill, L. (2015). Does Islamic banking development favor macroeconomic efficiency? Evidence on the Islamic finance-growth nexus. *Economic Modelling*, 47, pp.32–39. doi:<https://doi.org/10.1016/j.econmod.2015.02.012>.

Giawa, R. and Saragih, L. (2020). Analisis Resources Based View (RBV) Studi Kasus: Pada Yayasan Pendidikan GKPS. *Manajemen : Jurnal Ekonomi*, 2(1), pp.1–17. doi:<https://doi.org/10.36985/manajemen.v2i1.305>.

Gielen, D., Boshell, F., Saygin, D., Bazilian, M.D., Wagner, N. and Gorini, R. (2019). The Role of Renewable Energy in the Global Energy Transformation. *Energy Strategy Reviews*, [online] 24(24), pp.38–50. Available at: <https://www.sciencedirect.com/science/article/pii/S2211467X19300082>.

Gisip, I.A. and Harun, A. (2013). Antecedents and Outcomes of Brand Management from the Perspective of Resource Based View (RBV) Theory. *Mediterranean Journal of Social Sciences*. doi:<https://doi.org/10.5901/mjss.2013.v4n10p432>.

Goswami, S., Sharma, R.B. and Chouhan, V. (2022). Impact of Financial Technology (Fintech) on Financial Inclusion(FI) in Rural India. *Universal Journal of Accounting and Finance*, 10(2), pp.483–497. doi:<https://doi.org/10.13189/ujaf.2022.100213>.

Hariguna, T., Durachman, Y., Yusup, M. and Millah, S. (2021). Blockchain Technology Transformation in Advancing Future Change. *Blockchain Frontier Technology*, 1(01), pp.13–20. doi:<https://doi.org/10.34306/bfront.v1i01.4>.

Harun, M.S., Hussainey, K., Mohd Kharuddin, K.A. and Farooque, O.A. (2020). CSR Disclosure, Corporate Governance and Firm Value: a study on GCC Islamic Banks. *International*

Journal of Accounting & Information Management, ahead-of-print(ahead-of-print). doi:<https://doi.org/10.1108/ijaim-08-2019-0103>.

Hassani, S. and Amin Babazadeh Sangar (2024). Digital transformation of Tabriz, Iran by IoT adoption. *Information development*. doi:<https://doi.org/10.1177/0266669231219795>.

Hassija, V., Chamola, V., Mahapatra, A., Singal, A., Goel, D., Huang, K., Scardapane, S., Spinelli, I., Mahmud, M. and Hussain, A. (2023). Interpreting Black-Box Models: a Review on Explainable Artificial Intelligence. *Cognitive Computation*, [online] 16(1). doi:<https://doi.org/10.1007/s12559-023-10179-8>.

HENG, Y.-K. and McDONAGH, K. (2008). The other War on Terror revealed: global governmentality and the Financial Action Task Force's campaign against terrorist financing. *Review of International Studies*, 34(3), pp.553–573. doi:<https://doi.org/10.1017/s0260210508008164>.

Hollands, R.G. (2015). Critical interventions into the corporate smart city. *Cambridge Journal of Regions, Economy and Society*, 8(1), pp.61–77. doi:<https://doi.org/10.1093/cjres/rsu011>.

Horváth, D. and Szabó, R.Zs. (2019). Driving forces and barriers of Industry 4.0: Do multinational and small and medium-sized companies have equal opportunities? *Technological Forecasting and Social Change*, [online] 146(1), pp.119–132. Available at: <https://www.sciencedirect.com/science/article/pii/S0040162518315737>.

Hrvoje Serdarušić, Mladen Pancić and Željka Zavišić (2024). Green Finance and Fintech Adoption Services among Croatian Online Users: How Digital Transformation and Digital Awareness Increase Banking Sustainability. *Economies*, 12(3), pp.54–54. doi:<https://doi.org/10.3390/economies12030054>.

Hsiao, M.-H. (2024). Resource integration and firm performance through organizational capabilities for digital transformation. *Digital Transformation and Society*. doi:<https://doi.org/10.1108/dts-07-2023-0050>.

Hutchins, B. and Rowe, D. (2012). *Sport Beyond Television*. [online] Routledge. doi:<https://doi.org/10.4324/9780203120415>.

Ifinedo, P. (2011). Internet/e-business technologies acceptance in Canada's SMEs: an exploratory investigation. *Internet Research*, 21(3), pp.255–281. doi:<https://doi.org/10.1108/10662241111139309>.

Istvan Egresi and Belge, R. (2015). Development of Islamic Banking in Turkey. *Annals - Economy Series*, 5(6), pp.5–20.

Jamison, D.T., Summers, L.H., Alleyne, G., Arrow, K.J., Berkley, S., Binagwaho, A., Bustreo, F., Evans, D., Feachem, R.G.A., Frenk, J., Ghosh, G., Goldie, S.J., Guo, Y., Gupta, S., Horton, R., Kruk, M.E., Mahmoud, A., Mohohlo, L.K., Ncube, M. and Pablos-Mendez, A. (2013). Global health 2035: a world converging within a generation. *The Lancet*, 382(9908), pp.1898–1955. doi:[https://doi.org/10.1016/s0140-6736\(13\)62105-4](https://doi.org/10.1016/s0140-6736(13)62105-4).

Jiang, H. and Murmann, J.P. (2022). The Rise of China's Digital Economy: An Overview. *Management and Organization Review*, [online] 18(4), pp.790–802. doi:<https://doi.org/10.1017/mor.2022.32>.

Johnson, F.K. and Chinazunwa Uwaoma (2024). Beyond the Basics: An Expanded Digital Transformation Adoption Model for Biopharmaceutical Manufacturing. *Social Science Research Network*. doi:<https://doi.org/10.2139/ssrn.4720581>.

Johri, A. and Kumar, S. (2023). Exploring Customer Awareness towards Their Cyber Security in the Kingdom of Saudi Arabia: A Study in the Era of Banking Digital Transformation. *Human Behavior and Emerging Technologies*, 2023, pp.1–10. doi:<https://doi.org/10.1155/2023/2103442>.

Julian Fernandez Mejia (2024). Essays in International Finance. doi:<https://doi.org/10.22439/phd.15.2024>.

Kammer, A., Norat, M., Pinon, M., Prasad, A., Towe, C. and Zeidane, Z. (2015). Islamic Finance: Opportunities, Challenges, and Policy Options. *Staff Discussion Notes*, [online] 15(5), p.1. doi:<https://doi.org/10.5089/9781498325035.006>.

- Kapoor, K.K., Tamilmani, K., Rana, N.P., Patil, P., Dwivedi, Y.K. and Nerur, S. (2017). Advances in Social Media Research: Past, Present and Future. *Information Systems Frontiers*, [online] 20(3), pp.531–558. doi:<https://doi.org/10.1007/s10796-017-9810-y>.
- Kaur, B., Kiran, S., Grima, S. and Rupeika-Apoga, R. (2021). Digital Banking in Northern India: The Risks on Customer Satisfaction. *Risks*, [online] 9(11), p.209. doi:<https://doi.org/10.3390/risks9110209>.
- Khan, M.A., Hashim, M.J., King, J., Govender, R.D., Mustafa, H. and Al Kaabi, J. (2020). Epidemiology of Type 2 Diabetes – Global Burden of Disease and Forecasted Trends. *Journal of Epidemiology and Global Health*, 10(1), pp.107–111.
- Kinyanjui, S.N. (2013). Challenges Facing the Development of Islamic Banking. Lessons from the Kenyan Experience. *European Journal of Business and Management*, 5(22), pp.94–102.
- Köhler, J., Geels, F.W., Kern, F., Markard, J., Onsongo, E., Wieczorek, A., Alkemade, F., Avelino, F., Bergek, A., Boons, F., Fünfschilling, L., Hess, D., Holtz, G., Hyysalo, S., Jenkins, K., Kivimaa, P., Martiskainen, M., McMeekin, A., Mühlmeier, M.S. and Nykvist, B. (2019). An agenda for sustainability transitions research: State of the art and future directions. *Environmental Innovation and Societal Transitions*, [online] 31(1), pp.1–32. doi:<https://doi.org/10.1016/j.eist.2019.01.004>.
- Lamberton, C. and Stephen, A.T. (2016). A Thematic Exploration of digital, Social media, and Mobile marketing: Research Evolution from 2000 to 2015 and an Agenda for Future Inquiry. *Journal of Marketing*, [online] 80(6), pp.146–172. doi:<https://doi.org/10.1509/jm.15.0415>.
- Laquidara-Carr, D. (2025). How owner digital construction technology adoption in the US will accelerate the digital transformation of the construction industry. *Corporate Real Estate Journal*, 14(3), p.280. doi:<https://doi.org/10.69554/wctn3557>.

- Lawrence, G., Richards, C. and Lyons, K. (2013). Food security in Australia in an era of neoliberalism, productivism and climate change. *Journal of Rural Studies*, [online] 29(1), pp.30–39. doi:<https://doi.org/10.1016/j.jrurstud.2011.12.005>.
- Lee, S.M., Olson, D.L. and Trimi, S. (2012). Co-innovation: convergenomics, collaboration, and co-creation for organizational values. *Management Decision*, 50(5), pp.817–831. doi:<https://doi.org/10.1108/00251741211227528>.
- Lemon, K.N. and Verhoef, P.C. (2016). Understanding Customer Experience Throughout the Customer Journey. *Journal of Marketing*, 80(6), pp.69–96. doi:<https://doi.org/10.1509/jm.15.0420>.
- Levi, M. (2015). Money for Crime and Money from Crime: Financing Crime and Laundering Crime Proceeds. *European Journal on Criminal Policy and Research*, 21(2), pp.275–297. doi:<https://doi.org/10.1007/s10610-015-9269-7>.
- Lewandowski, M. (2016). Designing the Business Models for Circular Economy—Towards the Conceptual Framework. *Sustainability*, [online] 8(1), p.43. doi:<https://doi.org/10.3390/su8010043>.
- Lim, C., Kim, K.-J. and Maglio, P.P. (2018). Smart cities with big data: Reference models, challenges, and considerations. *Cities*, [online] 82(82), pp.86–99. doi:<https://doi.org/10.1016/j.cities.2018.04.011>.
- Limani, Y., Stapleton, L. and Groumpos, P.P. (2018). The Challenges of Digital Transformation in Post-Conflict Transition Regions: Digital Technology Adoption in Kosovo. *IFAC-PapersOnLine*, 51(30), pp.186–191. doi:<https://doi.org/10.1016/j.ifacol.2018.11.284>.
- Litvinenko, V.S. (2019). Digital Economy as a Factor in the Technological Development of the Mineral Sector. *Natural Resources Research*, [online] 29(3), pp.1521–1541. Available at: <https://link.springer.com/article/10.1007/s11053-019-09568-4>.
- Liu, D., Chen, S. and Chou, T. (2011). Resource fit in digital transformation: Lessons learned from the CBC Bank global e-banking project. *Management Decision*, 49(10), pp.1728–1742.

Malik, S., Chadhar, M., Vatanasakdakul, S. and Chetty, M. (2021). Factors Affecting the Organizational Adoption of Blockchain Technology: Extending the Technology–Organization–Environment (TOE) Framework in the Australian Context. *Sustainability*, [online] 13(16), p.9404. doi:<https://doi.org/10.3390/su13169404>.

Mancini Griffoli, T., Martinez Peria, M., Agur, I., Ari, A., Kiff, J., Popescu, A. and Rochon, C. (2018). Casting Light on Central Bank Digital Currencies. *Staff Discussion Notes*, 18(08), p.1. doi:<https://doi.org/10.5089/9781484384572.006>.

Manjula Bai, H. (2020). The Socio-Economic Implications of the Coronavirus Pandemic (COVID-19): A Review. *ComFin Research*, 8(4), pp.8–17. doi:<https://doi.org/10.34293/commerce.v8i4.3293>.

Mansoor Khan, M. and Ishaq Bhatti, M. (2008). Development in Islamic banking: a financial risk-allocation approach. *The Journal of Risk Finance*, 9(1), pp.40–51. doi:<https://doi.org/10.1108/15265940810842401>.

Marcu, M.R. (2021). The Impact of the COVID-19 Pandemic on the Banking Sector. *Management Dynamics in the Knowledge Economy*, [online] 9(2), pp.205–223. doi:<https://doi.org/10.2478/mdke-2021-0015>.

Marnewick, C. and Marnewick, A.L. (2022). Digitalization of project management: Opportunities in research and practice. *Project Leadership and Society*, [online] 3, p.100061. doi:<https://doi.org/10.1016/j.plas.2022.100061>.

Marwah Hassounah, Hafsa Raheel and Alhefzi, M. (2020). Digital Response During the COVID-19 Pandemic in Saudi Arabia (Preprint). doi:<https://doi.org/10.2196/preprints.19338>.

Masiukiewicz, P. (2015). Multicultural issues in the development of Islamic banking. *Journal of Intercultural Management*, 6(3), pp.167–176. doi:<https://doi.org/10.2478/jiom-2014-0027>.

Maulidia, L.R. (2009). The Optimizing of Rahn Service for The Development of Islamic Banking in Indonesia. *Iqtisad*, 4(2), pp.169–179. doi:<https://doi.org/10.20885/iqtisad.vol4.iss2.art4>.

McCabe, M.F., Rodell, M., Alsdorf, D.E., Miralles, D.G., Uijlenhoet, R., Wagner, W., Lucieer, A., Houborg, R., Verhoest, N.E.C., Franz, T.E., Shi, J., Gao, H. and Wood, E.F. (2017). The future of Earth observation in hydrology. *Hydrology and Earth System Sciences*, 21(7), pp.3879–3914. doi:<https://doi.org/10.5194/hess-21-3879-2017>.

Meriem Guechi (2020). The Future of the banking industry in the era Of digital transformation. 8(2), pp.341–353.

Mills, K.L. (2016). Possible Effects of Internet Use on Cognitive Development in Adolescence. *Media and Communication*, 4(3), pp.4–12. doi:<https://doi.org/10.17645/mac.v4i3.516>.

Ming-Kuei Hu (1962). Visual pattern recognition by moment invariants. *IEEE Transactions on Information Theory*, 8(2), pp.179–187. doi:<https://doi.org/10.1109/tit.1962.1057692>.

Mogaji, E. (2023). Redefining banks in the digital era: a typology of banks and their research, managerial and policy implications. *International Journal of Bank Marketing*, 41(7). doi:<https://doi.org/10.1108/ijbm-06-2023-0333>.

Mohtaramzadeh, M., Ramayah, T. and Jun-Hwa, C. (2017). B2B E-Commerce Adoption in Iranian Manufacturing Companies: Analyzing the Moderating Role of Organizational Culture. *International Journal of Human–Computer Interaction*, 34(7), pp.621–639. doi:<https://doi.org/10.1080/10447318.2017.1385212>.

Mollah, M.A., Choi, J.-H., Hwang, S.-J. and Shin, J.-K. (2023). Exploring a Pathway to Sustainable Organizational Performance of South Korea in the Digital Age: The Effect of Digital Leadership on IT Capabilities and Organizational Learning. *Sustainability*, 15(10), p.7875. doi:<https://doi.org/10.3390/su15107875>.

Mourtzis, D., Togias, T., Angelopoulos, J. and Stavropoulos, P. (2021). A Digital Twin architecture for monitoring and optimization of Fused Deposition Modeling processes. *Procedia CIRP*, 103, pp.97–102. doi:<https://doi.org/10.1016/j.procir.2021.10.015>.

Muteeb, G., Rehman, T., Shahwan, M. and Aatif, M. (2023). Origin of Antibiotics and Antibiotic Resistance, and Their Impacts on Drug Development: A Narrative Review.

Pharmaceuticals, [online] 16(11), pp.1615–1615. Available at:
<https://pmc.ncbi.nlm.nih.gov/articles/PMC10675245/>.

Nambisan, S., Wright, M. and Feldman, M. (2019). The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes. *Research Policy*, 48(8), p.103773. doi:<https://doi.org/10.1016/j.respol.2019.03.018>.

NANA, A., LAVIOLETTE, E.M. and Theodoraki, C. (2022). A Resource-based View (RBV) of Entrepreneurial Sourcing Within the Pre-incubation Ecosystem. *Academy of Management Proceedings*, 2022(1). doi:<https://doi.org/10.5465/ambpp.2022.17712abstract>.

Nastiti, N.D. and Kasri, R.A. (2019). The role of banking regulation in the development of Islamic banking financing in Indonesia. *International Journal of Islamic and Middle Eastern Finance and Management*, 12(5), pp.643–662. doi:<https://doi.org/10.1108/imefm-10-2018-0365>.

Nguyen, T.H. and Nguyen, N.H. (2025). Determinants of Digital Transformation Adoption: An Empirical Investigation of SMEs in Viet Nam. *Journal of Economics Finance and Management Studies*, 08(05). doi:<https://doi.org/10.47191/jefms/v8-i5-13>.

Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Iosifidis, C., Agha, M. and Agha, R. (2020). The Socio-Economic Implications of the Coronavirus and COVID-19 Pandemic: a Review. *International Journal of Surgery*, [online] 78(1), pp.185–193. doi:<https://doi.org/10.1016/j.ijsu.2020.04.018>.

Noor, A.M., Ainatul Aqilah Kamarudin and Haron, M.N. (2016). THE IMPORTANCE OF UNDERSTANDING THE MAQASID OF SHARI'AH IN THE DEVELOPMENT OF ISLAMIC BANKING AND THE FINANCIAL SYSTEM. *Journal of the International Institute of Islamic Thought and Civilization*, 21(3).

Nowland, R., Necka, E.A. and Cacioppo, J.T. (2018). Loneliness and Social Internet Use: Pathways to Reconnection in a Digital World? *Perspectives on Psychological Science*, 13(1), pp.70–87. doi:<https://doi.org/10.1177/1745691617713052>.

Nurunnabi, M. (2018). Transformation from an Oil-based Economy to a Knowledge-based Economy in Saudi Arabia: the Direction of Saudi Vision 2030. *Journal of the Knowledge Economy*, 8(2), pp.536–564.

O'Reilly, C.A. and Tushman, M.L. (2011). Organizational Ambidexterity in Action: How Managers Explore and Exploit. *California Management Review*, 53(4), pp.5–22. doi:<https://doi.org/10.1525/cmr.2011.53.4.5>.

OECD (2016). *OECD due diligence guidance for responsible supply chains of minerals from conflict-affected and high-risk areas*. OECD. doi:<https://doi.org/10.1787/9789264252479-en>.

Ofosu-Ampong, K. (2021). Determinants, Barriers and Strategies of Digital Transformation Adoption in a Developing Country Covid-19 era. *Journal of Digital Science*, 3(2), pp.67–83. doi:https://doi.org/10.33847/2686-8296.3.2_5.

Oladeinde, M., Hassan, A.O., Farayola, O.A., Akindote, O.J. and Adegbite, A.O. (2023). REVIEW OF IT INNOVATIONS, DATA ANALYTICS, AND GOVERNANCE IN NIGERIAN ENTERPRISES. *Computer Science & IT Research Journal*, [online] 4(3), pp.300–326. doi:<https://doi.org/10.51594/csitrj.v4i3.685>.

Oliva, R. and Kallenberg, R. (2022). Managing the transition from products to services. *International Journal of Service Industry Management*, 14(2), pp.160–172. doi:<https://doi.org/10.1108/09564230310474138>.

Omboni, S., Padwal, R.S., Alessa, T., Benczúr, B., Green, B.B., Hubbard, I., Kario, K., Khan, N.A., Konradi, A., Logan, A.G., Lu, Y., Mars, M., McManus, R.J., Melville, S., Neumann, C.L., Parati, G., Renna, N.F., Ryvlin, P., Saner, H. and Schutte, A.E. (2022). The worldwide impact of telemedicine during COVID-19: current evidence and recommendations for the future. *Connected Health*, 1(1). doi:<https://doi.org/10.20517/ch.2021.03>.

Omotayo, F.O. and Akinyode, T.A. (2020). Digital Inclusion and the Elderly: The Case of Internet Banking Use and Non-Use among older Adults in Ekiti State, Nigeria. *Covenant Journal of Business & Social Sciences*, 11(1). doi:<https://doi.org/10.47231/edju4275>.

Pal, P. (2022). The adoption of waves of digital technology as antecedents of digital transformation by financial services institutions. *Journal of Digital Banking*, 7(1), p.70. doi:<https://doi.org/10.69554/qhft9370>.

Pan, M. and Jang, W.-Y. (2016). Determinants of the Adoption of Enterprise Resource Planning within the Technology-Organization-Environment Framework: Taiwan's Communications Industry. *Journal of Computer Information Systems*, 48(3), pp.94–102. doi:<https://doi.org/10.1080/08874417.2008.11646025>.

Pelau, C. and Acatrinei, C. (2019). The Paradox of Energy Consumption Decrease in the Transition Period towards a Digital Society. *Energies*, 12(8), p.1428. doi:<https://doi.org/10.3390/en12081428>.

Prahalad, C.K. and Hart, S.L. (2010). The fortune at the bottom of the pyramid. *Revista Eletrônica de Estratégia & Negócios*, [online] 1(2), p.1. doi:<https://doi.org/10.19177/reen.v1e220081-23>.

Purcell, K., Rainie, L., Heaps, A., Buchanan, J., Friedrich, L., Jacklin, A., Chen, C. and Zickuhr, K. (2012). How Teens Do Research in the Digital World.

Ranvijay Singh Chauhan (2025). Strategic Orientation, Digital Transformation Capabilities, and Their Impact on Organizational Performance: A Comprehensive Analysis. *Journal of Information Systems Engineering and Management*, 10(23s), pp.530–546. doi:<https://doi.org/10.52783/jisem.v10i23s.3752>.

Robinson, L., Cotten, S.R., Ono, H., Quan-Haase, A., Mesch, G., Chen, W., Schulz, J., Hale, T.M. and Stern, M.J. (2015). Digital Inequalities and Why They Matter. *Information, Communication & Society*, [online] 18(5), pp.569–582. doi:<https://doi.org/10.1080/1369118x.2015.1012532>.

Ruzian Markom and Ismail, N. (2009). The Development Of Islamic Banking Laws In Malaysia: An Overview. 13, pp.191–205.

Sa'id, H. (2020). Exploring the development of Islamic banking in Nigeria using an actor-network theory perspective. *Journal of Islamic Accounting and Business Research*, 11(5), pp.1083–1099. doi:<https://doi.org/10.1108/jiabr-02-2018-0027>.

Sabri, M. (2025). Adoption of Business Model Canvas in Exploring Digital Business Transformation. *SSRN Electronic Journal*. doi:<https://doi.org/10.2139/ssrn.5011721>.

Saeed, S., Altamimi, S.A., Alkayyal, N.A., Alshehri, E. and Alabbad, D.A. (2023). Digital Transformation and Cybersecurity Challenges for Businesses Resilience: Issues and Recommendations. *Sensors*, [online] 23(15). Available at: <https://www.mdpi.com/1424-8220/23/15/6666>.

Saleh, A.S. and Rami Zeitun (2005). The Development of Islamic Banking in Lebanon: Prospects and Future Challenges.

Saputro, P.D. (2020). PEMANFAATAN E-COMMERCE BUSINESS TO CONSUMER (B2C) MARKETPLACE UNTUK PENGEMBANGAN USAHA MIKRO, KECIL DAN MENENGAH (UMKM). *JKIE (Journal Knowledge Industrial Engineering)*, [online] 7(1), pp.1–10. doi:<https://doi.org/10.35891/jkie.v7i1.2092>.

Saura, J.R. (2021). Digital marketing in SMEs via data-driven strategies: Reviewing the current state of research. *Journal of Small Business Management*, 61(3), pp.1–36. doi:<https://doi.org/10.1080/00472778.2021.1955127>.

Saura, J.R., Palos-Sánchez, P. and Rodríguez Herráez, B. (2020). Digital Marketing for Sustainable Growth: Business Models and Online Campaigns Using Sustainable Strategies. *Sustainability*, [online] 12(3), p.1003. doi:<https://doi.org/10.3390/su12031003>.

Schindelin, J., Arganda-Carreras, I., Frise, E., Kaynig, V., Longair, M., Pietzsch, T., Preibisch, S., Rueden, C., Saalfeld, S., Schmid, B., Tinevez, J.-Y., White, D.J., Hartenstein, V., Eliceiri, K., Tomancak, P. and Cardona, A. (2012). Fiji: an open-source Platform for biological-image Analysis. *Nature Methods*, 9(7), pp.676–82.

Schoemaker, P.J.H., Heaton, S. and Teece, D. (2018). Innovation, Dynamic Capabilities, and Leadership. *California Management Review*, 61(1), pp.15–42. doi:<https://doi.org/10.1177/0008125618790246>.

Sciurba, M. (2018). The Heart of Know Your Customer Requirements: The Discriminatory Effect of AML and CTF Policies in Times of Counter-Terrorism in the UK. *European Journal of Crime, Criminal Law and Criminal Justice*, 26(3), pp.222–235. doi:<https://doi.org/10.1163/15718174-02603003>.

Setiawan, A.B., Amilin, A. and Al Arif, M. (2020). Recent Development of Islamic Banking Performance Measurement. *ETIKONOMI*, 19(2). doi:<https://doi.org/10.15408/etk.v19i2.15706>.

Shandy Utama, A. (2019). History and Development of Islamic Banking Regulations in the National Legal System of Indonesia. *AL-'ADALAH*, 15(1), p.37. doi:<https://doi.org/10.24042/adalah.v15i1.2446>.

Shehadeh, M., Alshurafat, H. and Arabiat, O. (2024). Inverting the paradigm: digital transformation's impact on firm performance and the counterintuitive role of gender. *Competitiveness Review: An International Business Journal*. doi:<https://doi.org/10.1108/cr-11-2023-0299>.

Shen, L., Zhang, X. and Liu, H. (2021). Digital technology adoption, digital dynamic capability, and digital transformation performance of textile industry: Moderating role of digital innovation orientation. *Managerial and Decision Economics*, 43(6). doi:<https://doi.org/10.1002/mde.3507>.

Shin, J., Mollah, M.A. and Choi, J. (2023). Sustainability and Organizational Performance in South Korea: The Effect of Digital Leadership on Digital Culture and Employees' Digital Capabilities. *Sustainability*, 15(3), p.2027. doi:<https://doi.org/10.3390/su15032027>.

Singh, C. and Lin, W. (2020). Can artificial intelligence, RegTech and CharityTech provide effective solutions for anti-money laundering and counter-terror financing initiatives in

charitable fundraising. *Journal of Money Laundering Control*, ahead-of-print(ahead-of-print). doi:<https://doi.org/10.1108/jmlc-09-2020-0100>.

Skare, M. and Soriano, D.R. (2021). How globalization is changing digital technology adoption: An international perspective. *Journal of Innovation & Knowledge*, [online] 6(4), pp.222–233. doi:<https://doi.org/10.1016/j.jik.2021.04.001>.

Stark, Z., Dolman, L., Manolio, T.A., Ozenberger, B., Hill, S.L., Caulfield, M.J., Levy, Y., Glazer, D., Wilson, J., Lawler, M., Boughtwood, T., Braithwaite, J., Goodhand, P., Birney, E. and North, K.N. (2019). Integrating Genomics into Healthcare: A Global Responsibility. *The American Journal of Human Genetics*, 104(1), pp.13–20. doi:<https://doi.org/10.1016/j.ajhg.2018.11.014>.

Streimikiene, D. (2019). Organizational Innovation Factors, Capabilities and Organizational Performance in Automotive Industry. *Montenegrin Journal of Economics*, 15(3), pp.83–100. doi:<https://doi.org/10.14254/1800-5845/2019.15-3.6>.

Sun, X., Yu, H. and Solvang, W.D. (2022). Towards the smart and sustainable transformation of Reverse Logistics 4.0: a conceptualization and research agenda. *Environmental Science and Pollution Research*, 29(46), pp.69275–69293. doi:<https://doi.org/10.1007/s11356-022-22473-3>.

Tankiso Moloi and Tshilidzi Marwala (2023). Technologies of the Fourth Industrial Revolution. pp.21–33. doi:https://doi.org/10.1007/978-981-99-6307-2_3.

Tchamyou, V.S. (2016). The Role of Knowledge Economy in African Business. *Journal of the Knowledge Economy*, 8(4), pp.1189–1228. doi:<https://doi.org/10.1007/s13132-016-0417-1>.

Thabit Atobishi, Sahar and Saeed Nosratabadi (2024). How Do Digital Capabilities Affect Organizational Performance in the Public Sector? The Mediating Role of the Organizational Agility. *Administrative Sciences*, 14(2), pp.37–37. doi:<https://doi.org/10.3390/admsci14020037>.

Theng, B.P., Wijaya, E., Juliana, J., Eddy, E. and Putra, A.S. (2021). The role of transformational leadership, servant leadership, digital transformation on organizational performance and work innovation capabilities in digital era. *JPPI (Jurnal Penelitian Pendidikan Indonesia)*, 7(2), p.225. doi:<https://doi.org/10.29210/020211164>.

Tian, Z., Qiu, L. and Wang, L. (2024). Drivers and influencers of blockchain and cloud-based business sustainability accounting in China: Enhancing practices and promoting adoption. *PLOS ONE*, [online] 19(1), pp.e0295802–e0295802. doi:<https://doi.org/10.1371/journal.pone.0295802>.

Torten, R., Reache, C. and Caraballo, Ervin.L. (2016). Teleworking in the new milleneum. *The Journal of Developing Areas*, 50(5), pp.317–326. doi:<https://doi.org/10.1353/jda.2016.0060>.

Tungpantong, C., Nilsook, P. and Wannapiroon, P. (2022). Factors Influencing Digital Transformation Adoption among Higher Education Institutions during Digital Disruption. *Higher Education Studies*, 12(2), p.9. doi:<https://doi.org/10.5539/hes.v12n2p9>.

Vaidya, S., Ambad, P. and Bhosle, S. (2018). Industry 4.0 – A Glimpse. *Procedia Manufacturing*, [online] 20(20), pp.233–238. doi:<https://doi.org/10.1016/j.promfg.2018.02.034>.

Vakulchuk, R., Overland, I. and Scholten, D. (2020). Renewable energy and geopolitics: A review. *Renewable and Sustainable Energy Reviews*, [online] 122(109547), p.109547. doi:<https://doi.org/10.1016/j.rser.2019.109547>.

Verhoef, P.C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Qi Dong, J., Fabian, N. and Haenlein, M. (2021). Digital transformation: a Multidisciplinary Reflection and Research Agenda. *Journal of Business Research*, 122(122), pp.889–901. doi:<https://doi.org/10.1016/j.jbusres.2019.09.022>.

Wang, W., Zhu, Y., Abraham, N., Li, X.-Z., Kimber, M. and Zhou, T. (2021). The Ribosome-Binding Mode of Trichothecene Mycotoxins Rationalizes Their Structure—Activity Relationships. *International Journal of Molecular Sciences*, [online] 22(4), pp.1604–1604. doi:<https://doi.org/10.3390/ijms22041604>.

Wang, Y.-M., Wang, Y.-S. and Yang, Y.-F. (2010). Understanding the determinants of RFID adoption in the manufacturing industry. *Technological Forecasting and Social Change*, [online] 77(5), pp.803–815. doi:<https://doi.org/10.1016/j.techfore.2010.03.006>.

Warner, K.S.R. and Wäger, M. (2019). Building Dynamic Capabilities for Digital transformation: an Ongoing Process of Strategic Renewal. *Long Range Planning*, 52(3), pp.326–349. doi:<https://doi.org/10.1016/j.lrp.2018.12.001>.

Wewege, L., Lee, J. and Thomsett, M.C. (2020). Disruptions and Digital Banking Trends. *Journal of Applied Finance and Banking*, 10(6), pp.1–2.

Williamson, N.C., Bhadury, J., Dobie, K., Ofori-Boadu, V., Parker Troy, S. and Yeboah, O. (2012). Business coursework and the resource-based view (RBV). *International Journal of Wine Business Research*, 24(1), pp.19–32. doi:<https://doi.org/10.1108/17511061211213756>.

Working Better With Age. (2019). *Ageing and Employment Policies*. OECD. doi:<https://doi.org/10.1787/c4d4f66a-en>.

Xie, X., Wu, S., Subhani, G. and Sakina (2025). Analyzing how digital orientation contributes to organizational innovation and environmental, social and governance performance through digital inclusion and capabilities. *International Entrepreneurship and Management Journal*, 21(1). doi:<https://doi.org/10.1007/s11365-025-01087-4>.

Xu, L.D., Xu, E.L. and Li, L. (2018). Industry 4.0: state of the art and future trends. *International Journal of Production Research*, 56(8), pp.2941–2962. doi:<https://doi.org/10.1080/00207543.2018.1444806>.

Yaqub, M.Z. and Alsabban, A. (2023). Industry-4.0-Enabled Digital Transformation: Prospects, Instruments, Challenges, and Implications for Business Strategies. *Sustainability*, [online] 15(11), pp.8553–8553. doi:<https://doi.org/10.3390/su15118553>.

Yumna, A. (2019). Examining financial needs of banking customers for product development in Islamic banking in Indonesia. *International Journal of Islamic and Middle Eastern Finance and Management*, 12(5), pp.712–726. doi:<https://doi.org/10.1108/imefm-11-2018-0378>.

Zavoli, I. and King, C. (2021). The Challenges of Implementing Anti-Money Laundering Regulation: An Empirical Analysis. *The Modern Law Review*, 84(4), pp.740–771. doi:<https://doi.org/10.1111/1468-2230.12628>.

Zhen, Z., Yousaf, Z., Radulescu, M. and Yasir, M. (2021). Nexus of Digital Organizational Culture, Capabilities, Organizational Readiness, and Innovation: Investigation of SMEs Operating in the Digital Economy. *Sustainability*, 13(2), p.720. doi:<https://doi.org/10.3390/su13020720>.

Zhou, J., Li, P., Zhou, Y., Wang, B., Zang, J. and Meng, L. (2018). Toward New-Generation Intelligent Manufacturing. *Engineering*, [online] 4(1), pp.11–20. doi:<https://doi.org/10.1016/j.eng.2018.01.002>.

Zhou, J., Zhou, Y., Wang, B. and Zang, J. (2019). Human–Cyber–Physical Systems (HCPSs) in the Context of New-Generation Intelligent Manufacturing. *Engineering*, 5(4), pp.624–636. doi:<https://doi.org/10.1016/j.eng.2019.07.015>.