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THE IMPACT OF DIGITAL TRANSFORMATION ON THE QUALITY OF BANKING SERVICES IN THE KINGDOM OF SAUDI ARABIA: AN APPLIED STUDY ON BANK CUSTOMERS IN RIYADH

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Abstract

This study aims to determine the impact of digital transformation on the quality of banking services in the Kingdom of Saudi Arabia, focusing on banks in the Riyadh region. To achieve the study's objectives, the participants were selected from the study population using a random sample, with 393 individuals surveyed. The study employed a descriptive-analytical approach to address its topic and achieve its goals. The questionnaire was employed to collect data. It included two dimensions: the independent variable, representing the dimensions of digital transformation (digital technologies, information security, digital financial services, and digital operations management), and the dependent variable, representing the quality of banking services (reliability, responsiveness, tangibility, empathy, and security). The data were analyzed and the hypotheses tested using SPSS for descriptive statistical analysis and AMOS for advanced inferential statistical analysis. According to the study, there is a positive correlation between the level of digital transformation and the dimensions of banking service quality in Saudi banks in Riyadh. The study concluded with several recommendations, the most important of which are: To develop the financial sector, it is crucial to continue investing in digital infrastructure, enhance user experience, and enhance cybersecurity in line with global trends and the Kingdom of Saudi Arabia's Vision 2030.

Keywords: Digital Transformation**,** Quality of Banking Service.

1. INTRODUCTION

The emergence of digital transformation, a term used to describe major technological developments, has had a profound impact on human life and led to the development of new technological methods. This has prompted banking institutions to adopt new strategies that are compatible with these developments in order to improve the quality of services provided and to offer services that are compatible with the changing needs and desires of consumers (Kaneel et al., 2015). Unprecedented economic and social changes are being caused by these technological developments (Coudrecher, 2002). Organizations have experienced a qualitative leap due to digital transformation, which has had an impact on various industries and institutions around the world (Broekhuizen et al., 2021). The world is witnessing tremendous developments in digital technologies, big data, cloud computing, blockchain, and artificial intelligence systems (Skare et al., 2021). The competition between organizations to attract digital technology and develop services for customers in line with these developments has increased. The enhancement of transparency and security in banking services is achieved through digital transformation, as digital technology can provide advanced systems for protecting customers' financial and personal data. Digital transformation means using digital technology to improve operational performance and provide better customer services,

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leading to huge changes in the way banking services are provided and how customers interact with banking institutions (Chirariuri, 2021). Banks can also provide transparent information about banking offers, fees, and prices, allowing customers to choose the services that best suit them. Digital transformation enhances trust, customer satisfaction, and service quality (Davis et al., 2020). Today, the banking industry is facing the overarching challenge of digital transformation of banks. Digital transformation in the financial industry is linked to obstacles that appear to hinder the smooth implementation of digital approaches, and it is noteworthy that this issue has not been adequately addressed in current academic literature (Diener et al, 2021). Digital transformation is fundamentally changing the way financial institutions operate and deliver value to customers, and it encompasses a wide range of technologies, including mobile banking, online payments, blockchain, artificial intelligence, and big data analytics (Jejeniwa et al, 2024). The banking sector is a vital economic sector in both developed and developing countries, as it is the foundation of economic life. This sector plays the role of financial intermediary between savers and investors, and it provides many other financial and banking services. It aids in providing financial resources for economic activity to grow and develop, while also combating hoarding and reaping benefits for savers (Akrousg et al, 2009). Rapid and significant developments resulting from global transformations, particularly with the advent of globalization and the accompanying deregulation, have compelled banks to reconsider their policies and adopt strategies that enable them to adapt to these changes by offering new products that satisfy their customers. This is especially crucial given that the product offered by banks—namely, the service—is highly sensitive to its delivery method due to its intangible nature (Gilbert et al., 2007). These developments and changes have driven banks to adopt new strategies that align with these advancements in order to enhance the quality of services provided and offer services that meet the evolving needs and desires of consumers (Kaneel et al., 2015). Furthermore, these technological advances are causing unprecedented economic and social changes (Corrocher, 2002). Specialists in economic and administrative thinking have been paying attention to the quality of banking services as a new trend. Recently, the banking sector has adopted the concept of service quality as a proactive step to enter the arena of global competition. This competition has led to significant transformations in the banking services sector, shifting from traditional methods of providing services to consumers to electronic models. The latter facilitates service delivery and accessibility for customers, minimizing effort and inconvenience, and has played a crucial role in measuring banking performance (Alnaser et al., 2018). Banks work to provide the best services to achieve customer satisfaction by utilizing modern and advanced technological tools to improve the quality of services provided to customers (Iglesias, 2009). The services sector has a unique and complex nature and characteristics compared to the goods sector, and it has a significant impact on national economies. To provide banking services that are successful, there are complex processes that must meet customer expectations while also improving profitability and competitiveness. To achieve service excellence, this represents a challenge and a crucial entry point (Zeithaml et al., 1990). Given the importance of the banking sector in the Saudi economy, this study focuses on

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the key factors influencing digital transformation and the quality of banking services in Saudi banks.

1.2. Study Problem

The concept of digital transformation is a widely recognized phenomenon that has recently attracted significant attention from researchers. Our world is witnessing unprecedented developments and the emergence of numerous technologies, such as artificial intelligence, the Internet of Things, big data, and cloud computing, in banking operations. Banks have faced significant challenges as they strive to meet the evolving needs and demands of their customers due to the expansion of digital banking services.

The problem addressed in this study answers the following main question:

- What is the impact of digital transformation on the quality of banking services for bank customers in the Kingdom of Saudi Arabia?

This question branches into a set of the following individual questions:

- Is there a significant positive correlation between the level of digital transformation in its dimensions (digital technologies, information security, digital operations management, and digital financial services) and the reliability dimension in banks in Riyadh?
- Is there a significant positive correlation between the level of digital transformation in its various dimensions (digital technologies, information security, digital operations management, and digital financial services) and the tangible dimension in banks in Riyadh?
- Is there a significant positive correlation between the level of digital transformation in its dimensions (digital technologies, information security, digital operations management, and digital financial services) and the responsiveness of banks in Riyadh?
- Is there a significant positive correlation between the level of digital transformation in its various dimensions (digital technologies, information security, digital operations management, and digital financial services) and the security dimension in banks in Riyadh?
- Is there a significant positive correlation between the level of digital transformation in its various dimensions (digital technologies, information security, digital operations management, and digital financial services) and the empathy dimension in banks in Riyadh?

1.3. Study Objectives

The Study Aims to:

- Understanding the extent to which digital transformation contributes to improving the quality of banking services provided to customers.

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- Introducing the digital technologies used to improve the quality of banking services and challenging their efficiency and effectiveness.
- Understanding the concept of digital transformation, its importance, steps, and dimensions.
- Understanding the concept of banking service quality
- Identifying new opportunities that digital transformation can offer banks in providing distinctive and innovative banking services.

1.4. Importance of the Study:

The Saudi banking sector's radical transformations and the adoption of advanced financial technologies have led to the importance of this study. With the increasing use of digital channels such as banking applications, electronic payment systems, and artificial intelligence in service delivery, it has become essential to measure the impact of these innovations on the quality of service provided to customers. The significance of this study lies in its comprehensive understanding of how digital transformation impacts quality indicators such as reliability, responsiveness, security, and tangible value. Saudi banks benefit from this by improving their digital strategies and increasing customer satisfaction and loyalty. The study's findings also contribute to supporting decision-makers in the banking sector in developing policies and procedures that promote competitiveness, creativity, and innovation. Furthermore, it fills a knowledge gap in Arabic literature concerning the assessment of the impact of digital transformation in the Saudi Arabian banking environment, which is characterized by its advanced regulatory and technological landscape.

2.THEORETICAL FRAMEWORK

2.1. The Concept and Definition of Digital Transformation:

The use of digital technologies is driving a transition or change in work systems. By understanding the links between technology and people, we can adopt and accelerate change and increase efficiency and growth. The concept of digital transformation is a modern concept, but it has begun to gradually replace the concept of digitization, which was used in 2004 and refers to bringing about technological revolutions. The size of the company is fully linked by considering technological innovations, strategic dimensions, and human dimensions (Consiel, 2021).

- Digital transformation is a process supported by digital technologies that bring about changes in organizations and has a tremendous impact on organizational evaluation through the Internet of Things, big data analytics, cloud computing, mobile technologies, and artificial intelligence (Feroz et al., 2021).
- Digital transformation is defined as the use by an organization of digital technology in managing its business, services, and operations, in processing and analyzing its data, in the interaction between its members, and in carrying out its transactions

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electronically in a fully secure digital technological environment based on protected databases (Jonssn et al., 2020).

- It is also defined as the use of new digital technologies such as mobile phones, artificial intelligence, cloud computing, blockchain, and the Internet of Things to enable and improve business operations, streamline processes, and create new business models (Warner, 2019).
- Digital transformation in the banking sector is defined as a technological, administrative and cultural development process undertaken by banks to meet the changing needs of their customers and employees by leveraging digital capabilities to build and innovate new business models and banking services, improve customer experience and digitize services with the aim of developing financial performance, reducing banking risks and supporting competitive advantage, and thus creating value for the bank (Westerman et al. 2014).

2.2. The Importance of Digital Transformation in Banking Services:

The importance of digital transformation lies in banks, governments, and institutions. Adapting to technological changes and developments is an inevitable necessity. Its importance can be explained in the following points (Mir, R.A. et al., 2022).

- Building new business models that help simplify procedures and reduce service delivery time
- Increased speed, flexibility, and accuracy in receiving banking services, in addition to fewer or no errors.
- A reduction in errors is achieved by raising the level of transparency and governance.
- Modern technologies can be utilized to enhance performance, forecasting, and future planning.

2.3. Forms of Digital Transformation:

Digital transformation has multiple forms and degrees that vary from one organization to another according to the degree of its activity, but there are some that are classified as the most used in digital transformation, namely: (Hemerling et al.2018):

2.3.1 Smartphone applications: These are the most widely used technology today, allowing organizations to create their own applications to manage their activities and facilitate their services for both members and beneficiaries.

2.3.2 Artificial intelligence: This refers to the ability of certain electronic programs, applications, and computer systems to simulate and imitate human behavior and mental abilities, and to determine the capacity for learning and reasoning.

2.3.3 Blockchain technology: is a database that functions like a distributed network, often referred to as a distributed ledger, that can record blocks of secure, encrypted data. This unique technology enables collaboration between entities within a network the same

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network, allowing them to transfer value or information without the need for a central authority (Blochain, 2019)

2.3.4 Cloud computing: Cloud computing provides the possibility of renting information technology instead of buying it or investing heavily in databases, software and hardware. This includes services such as operating systems, servers, storage, databases, networks, applications, analytics and intelligence, via the Internet. These services are known as cloud computing. These services enable faster innovation and flexibility in allocating resources in addition to monitoring costs (Brown, 2023).

2.3.5 The Internet of Things is a system that connects the digital and real world to form a global network. Internet of Things technology uses sensors and data transmission technology integrated into devices and equipment. By using a data network (Internet), objects can be coordinated and controlled with the aim of providing added value to the user (Shambour, 2019).

2.3.6 Big data: This refers to the enormous amount of data produced daily within the global network, not only in terms of quantity but also in terms of its quality and complexity, as well as the speed of its analysis and delivery. It is also a common term used to describe the enormous growth and impact of data analytics in the knowledge industry with technological development (Lakhsmi et al., 2018).

3. DIMENSIONS OF DIGITAL TRANSFORMATION

The dimensions of digital transformation are as follows:

3.1 Digital Technologies:

Digital transformation is a significant technological shift that relies on internet analytics technologies, which have developed significantly in the past three years, making it easier for many organizations to transform.

An integrated system of specialized hardware, operating systems, storage media, and software that operates within advanced technological environments and efficient data centers is necessary for the digital transformation process. This ensures the optimal use of all digital assets and delivers a superior level of service to the organization's employees and customers. The efficient management and operation of the technological system and network infrastructure require dedicated professional teams (Aroba, 2022).

3.2. Information Security:

Information security refers to the number of practices, procedures, and technical policies adopted by organizations to conduct their business in their digital environment with an acceptable degree of security, applicable to all activities, operations, and technical matters within the organization, to avoid the risks of hacking and threats to the security of its information or the information of its customers (yose et al, 2016**).**

Information security is defined as the level of protection given to information systems and the difficulty of unauthorized access to them. It refers to the level of user confidence in

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the security, protection, and privacy of that information, and the degree of trust in the safety and protection of risks that information systems or personal or organizational data may be exposed to, resulting from security vulnerabilities and unauthorized breaches (Raval et al., 2007).

3.3. Digital Financial Services:

Providing financial services through digital transformation can reduce costs and save time, thus promoting financial inclusion and increasing transparency (Salam, 2023).

3.4. Digital Operations Management:

Using modern digital technology to improve and streamline business and banking operations, saving time, effort, and costs, includes cloud computing, artificial intelligence, analytics, and banking applications. It involves managing digital operations using advanced technology to provide the organization's services digitally, ensuring ease, speed, and security of access. In digital operations management, the organization is responsible for overseeing online processes, developing them, solving problems, and protecting the security of information transmitted over its network (Raval et al., 2007). It also expresses a set of interrelated activities or tasks to provide the required services, where organizations must establish a technical system that allows for the development of procedures to ensure the effective implementation of digital transformation. In order to provide information and procedures in a documented and complete manner (Alam, 2021), organizations must continuously make efforts to manage and analyze data in an organized and effective manner.

3.2.1 The Impact of Digital Transformation on the Quality of Banking:

Digital transformation in the banking sector is a comprehensive process that encompasses technological, administrative, and cultural development undertaken by financial institutions to meet the evolving needs of their customers and employees. This is achieved through leveraging digital capabilities to build and innovate new business models and banking services. Digital transformation also aims to improve customer quality and experience, digitize services, enhance the bank's financial performance, reduce banking risks, and bolster its competitive advantage. The bank's market position is strengthened and added value is added by digital transformation in the end (George, 2014). Banking services are vast and varied, going beyond just depositing money. Personal banking services such as current and savings accounts, personal loans, and financial deposits are available. There are also banking services offered to organizations and companies, including providing financial facilities and loans for business projects, as well as international financing. Banking services also allow for the withdrawal and deposit of funds in various ways, primarily by visiting a bank branch, using an ATM, or accessing the bank's website. Banking services can also be viewed as a set of financial transactions and services provided to institutions. When a bank deals with individuals, this is known as retail banking. If the bank is involved in capital markets, it encompasses a range of banking services for businesses, including loans, credit, savings accounts, and current accounts (August 2021).

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4. QUALITY OF BANKING SERVICES

4.1. Service Concept:

- (Ramaswany 1996) defined it as “a set of procedures or transactions that take place between the employer and the service recipient, as well as to produce outputs that satisfy the customer.”
- (Zeithmal et al.1996) defined it as a set of actions, processes, and achievements.
- (Kotler et al. 1991) defined it as an activity or intangible benefit that one party can provide to another to satisfy an unmet need without this resulting in a transfer of ownership from the producer to the customer, and that the production of the service may or may not be related to a tangible material output.

(Yong ,2008) reviewed the definitions of service and pointed out that service has several noteworthy features that deserve attention and observation, in order to gain a better understanding of the concept of service, which are as follows:

- A service is a performance or accomplishment; it occurs through an interaction process between the customer and the service provider.
- Other factors, such as material resources and the surrounding environment, play an important and crucial role in the process of producing and consuming the service.
- The customer needs the service to satisfy a specific need or to solve a particular problem.

4.2 Quality of Banking Services:

There are many definitions of banking service quality, but it can be defined as:

It refers to the efforts made by the organization to meet and satisfy the needs and desires of customers, and to align these efforts with customers' mental perceptions of the service to achieve their satisfaction and fulfill their desires (Mohhan et al., 2013).

- It was defined by (Swar 2023) as "the extent to which banking services provided are appropriate to meet customer expectations and meet their needs in line with banking industry standards."
- (Adam 2016) defined it as "studying the needs and desires of the bank's customers by collecting information from various sources, then working to meet them in accordance with the bank's resources and capabilities. In addition to continuously monitoring these needs and providing feedback to address any shortcomings in meeting those requirements."

It has also been defined as "the ability of a bank to respond to or exceed customer expectations and requirements.

Through quality, banks seek to support their competitiveness by providing excellent services that enhance their position and standing in the market. (Lovelock et al 2004).

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4.3. Characteristics of Banking Services:

Banking services are characterized by several features, including (AL-hawar, 2006).

- Banking services are not protected by patents, and any new service created by one bank can be offered by another bank.
- Banking services are indivisible and cannot be separated when provided.
- Banking services are not protected by patents, and any new service created by one bank can be offered by another bank.
- Banking services cannot be created in advance or divided; they are produced and provided at the same moment the customer applies for them.
- The quality of banking services is not subject to inspection by a bank employee before being provided to customers.
- The provision of banking services is not standardized, and the method of service provision varies from customer to customer depending on the degree of interaction between the bank employee and the customer.

5. DIMENSIONS OF QUALITY OF BANKING SERVICE

The dimensions of banking service quality are outlined in (Quinn et al, 2009):

5.1 Reliability refers to the extent to which a bank fulfills its obligations and delivers banking services as promised, reliably, accurately, and correctly. The importance of reliability is greater than its definition; it is like bankruptcy when a bank fails to provide the service as promised.

5.2 Tangible: This includes all the physical aspects and facilities associated with providing the service, such as the appearance of the workers, the equipment used, and the physical facilities.

5.3 Safety: This refers to the extent to which employees are familiar with their job duties, enabling them to provide a service free from any type of risk.

5.4 Response: This reflects the bank's desire to help customers and respond to their needs quickly.

5.5 Empathy: Empathy refers to showing a friendly attitude towards the customer and a desire to provide the best services according to their wishes and personal interactions. This often works in smaller banks, and addressing customers by their names is also beneficial. (Abdul Rahman, 2024)

6. CONCEPTUAL MODEL

Considering the research problem and questions, a research model was developed that illustrates the **direct relationships between the variables, as shown in Figure (1) below**.

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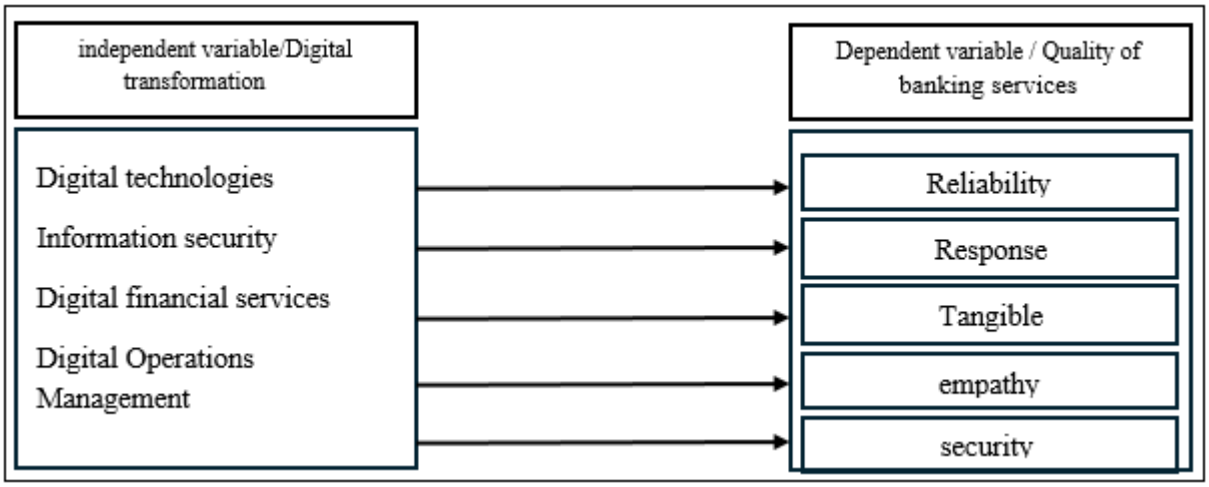

Figure 1: Direct Relationships Between the Variables

Based on the research model, the research hypotheses were formulated as follows:

- There is a statistically significant positive correlation between the level of digital transformation and its dimensions (digital technologies, information security, digital financial services, digital operations management) and the reliability dimension in banks in Riyadh.
- There is a statistically significant positive correlation between the level of digital transformation and its dimensions (digital technologies, information security, digital financial services, digital operations management) and the responsiveness dimension in banks in Riyadh.
- There is a statistically significant positive correlation between the level of digital transformation and its dimensions (digital technologies, information security, digital financial services, digital operations management) and the dimension of tangibility in banks in Riyadh.
- There is a statistically significant positive correlation between the level of digital transformation and its dimensions (digital technologies, information security, digital financial services, digital operations management) and the empathy dimension in banks in Riyadh.
- There is a statistically significant positive correlation between the level of digital transformation and its dimensions (digital technologies, information security, digital financial services, digital operations management) and the security dimension in banks in Riyadh.

7. METHODOLOGY

This study relies on the analytical descriptive approach, which involves collecting data through the development of a questionnaire to measure the dimensions of digital transformation and banking service quality among commercial banks in Riyadh City. The

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questionnaire was distributed to a random sample of bank customers who use digital or integrated banking services in the city. The sample size was determined according to Cochran's Formula for large populations, setting significance at the 0.05 level (95 percent confidence level) and a margin of error of ±5%, yielding an initial sample size of 384 respondents. After discarding some inaccurate responses for analysis, the sample size was increased to encompass 393 participants to ensure data quality. Following the data collection process, it was analyzed using the SPSS software for descriptive statistical analysis and AMOS software for advanced statistical analysis. The following methods were applied:

a. Stability analysis: apparent validity, validity and stability tests, including construct validity, discriminant validity, and consistency measure using Cronbach alpha and composite reliability.

b. Descriptive statistical methods: frequencies and percentages to describe participants' demographic characteristics, means and standard deviations to indicate the level of participants' awareness about the variables.

c. Inferential statistical methods (SEM, Structural Equation Modeling): Structural equation modeling was used to analyze causal relations

   * Measurement Model Fit Test: To examine the validity and reliability of measurement instruments according to criteria which were extracted from validity and variance analysis.

   * Structural model testing: Causal effects' paths of all dependent and independent constructs (Path Coefficients) and their significance as t-values.

d. Quality of Fit Indices: A suite of fit indices (e.g., CFI, GFI, TLI, RMSEA) were utilized to evaluate the model adequacy.

Thus, these methods lead to an accurate analysis of complex relationships among variables and produce trustworthy results in this survey. This approach is based on sophisticated analysis techniques in order to ensure the validity and reliability of the findings of the study, formulating a holistic understanding of interconnections between digital transformation and quality in banking services and their influence on.

8. RESULTS AND DISCUSSION

This section includes the field study procedures and descriptive statistical results.

8.1. Study Tool

The electronic questionnaire constituted the main instrument of data collection. The device was designed to measure three basic dimensions. (1) Demographic features of bank customers: Gender, age and educational level. The second dimension consisted of digital transformation features (digital technologies, cyber security, digital financial services, and digital operations management). The third dimension was composed of the

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elements of banking service quality (reliability, responsiveness, tangibility, empathy and security).

A panel of experts in management and banking evaluated the content validity of the questionnaire. Internal consistency of the TTAS was also examined with Cronbach Alpha to determine item consistency.

8.2. Descriptive Analysis of Study Data.

The aim of descriptive statistical analysis and the intention behind performing it is to present a comprehensive image of what extent characteristics are potentially crafted by the study population/sample and describe trends in respondents' answers in terms concerning the dimensions of the digital transformation process along with banking services quality. This exploratory analysis is an important step before proceeding with the SEM, as it informs us about the general characteristics of our data distribution, how much our sample represents well the target population, and what can be said about customers' opinion in terms of digital transformation level and E-service quality.

Descriptive analysis of sample characteristics.

Table 1: Characteristics of the study sample (demographic data)

Sample characteristics	Categories	repetition	Percentage%
Gender	male	233	59.3
	female	160	40.7
	the total	393	100.0
the age	18-25 years	134	34.1
	26-35 years	90	22.9
	36-45 years	102	26.0
	46years more	67	17.0
	the total	393	100.0
Educational level	secondary	105	26.7
	universal	230	58.5
	Postgraduate studies	58	14.8
	the total	393	100.0

Table (1) displays the demographic distribution of the 393-participant study sample. Males account for 59.3% of the sample, while females account for 40.7%. The highest percentage of participants falls within the 18-25 age group (34.1%), followed by the 36-45 age group (26%), then the 26-35 age group (22.9%). The age group of 46 and older represents the smallest percentage at 17%. The data shows that the majority of participants have a university degree (58.5%), followed by those with a secondary school diploma (26.7%), and those with postgraduate education make up 14.8%. Overall, the demographic characteristics reflect an acceptable diversity in the sample in terms of gender, age, and educational level, thus supporting its suitability for the purposes of the study.

Descriptive statistical analysis of the study's themes.

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First: Dimensions of digital transformation in the quality of banking services.

Table 2: Descriptive Statistical Analysis Statements Dimensions of the Digital Transformation Axis in Banking Service Quality

N	phrase	arithmetic mean	standard deviation	Level of response	ranking
1.Digital technologies dimension					
1	The bank's digital technologies are responsible for ensuring the privacy and security of customer data	3.65	1.070	High	1
2	The bank provides digital financial services that are in line with global digital service standards.	3.58	1.113	High	2
3	The bank's use of state-of-the-art operating equipment ensures efficient use of all assets.	3.50	1.178	High	4
4	The bank's digital technology enables customers to communicate quickly and continuously.	3.57	1.14	High	3
	Total phrases	3.58	1.12	High	2
2.Information security dimension					
5	Making electronic payments linked to my online account makes me feel secure.	3.53	1.199	High	1
6	To ensure the security of my account information, the bank gives me periodic guidance.	3.46	1.216	Medium	4
7	The bank protects its digital infrastructure from hacking.	3.50	1.221	High	2
8	Security of electronic transactions related to customer accounts via the internet is a key concern for the bank's policy.	3.48	1.163	Medium	3
	Total phrases	3.50	1.19	High	4
3. The dimension of digital financial services					
9	The bank offers high-quality digital financial services.	3.52	1.219	High	3
10	Digital transformation is the basis for the bank's outstanding financial services.	3.54	1.197	High	1
11	New and innovative job opportunities are created by the bank to contribute to economic growth.	3.53	1.204	High	2
12	Banking services can be provided without having to visit branches thanks to digital processes.	3.48	1.223	Medium	4
	Total phrases	3.52	1.21	High	3
4. Digital Operations Management Dimension					
13	The bank could manage digital transactions related to customer accounts.	3.67	1.140	High	1
14	Digital transactions for customer accounts are managed satisfactorily by the bank.	3.57	1.121	High	3
15	The bank's digital operations help speed up the execution of traditional banking operations.	3.61	1.186	High	2
16	The technical system and technological infrastructure are managed by qualified personnel at the bank.	3.53	1.169	High	4
	Total phrases	3.60	1.15	High	1

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Table (2) provides a descriptive statistical analysis of the dimensions of digital transformation in banking service quality, as determined by study participants' responses. The arithmetic mean and standard deviation were used to measure responses, with the response level and ranking determined for each statement .All statements regarding digital technologies received a high level of response. The statement "The digital technologies owned by the bank maintain the privacy and security of customer data" ranked first with an arithmetic mean of 3.65, followed by the statement "The bank provides digital financial services that conform to global digital service standards" with an average of 3.58. In terms of information security, the highest response score was for the statement "I feel safe when making electronic payments related to my online account" with an average of 3.53, while the statement "The bank provides me with periodic guidance that ensures the security of my account information" received the lowest average (3.46), with an average response level. Regarding the dimension of digital financial services, the phrase "The bank provides distinguished financial services based on digital transformation" came in first place with an average of 3.54, while the phrase "Digital operations facilitate the provision of banking services without referring to branches" received the lowest arithmetic average (3.48), reflecting an average response. Finally, in the digital operations management dimension, the statement "The bank has the means to manage digital operations related to customer accounts" ranked highest with an average of 3.67, while the statement "The bank has qualified personnel responsible for managing the IT system and technological infrastructure" came in fourth with an average of 3.53. The high level of response in all dimensions substantiated the effectiveness of digital transformation in improving the quality of banking services.

Dimensions of banking service quality:

Table 3: Descriptive Statistical Analysis Statements Dimensions of the Banking Service Quality Axis

N	phrase	arithmetic mean	standard deviation	Level of response	ranking
1.Dependability dimension					
17	The bank employs modern technology and is always striving to improve it.	3.75	1.142	High	1
18	The bank's online applications provide me with the ability to track all digital transactions made on my account.	3.69	1.127	High	2
19	Diverse and effective communication channels are available through the bank's digital service provider.	3.61	1.160	High	3
	Total phrases	3.68	1.14	High	1
2.Response dimension					
20	The digital service's procedures and steps are defined by ease and simplicity.	3.69	1.125	High	1
21	The bank provides me with immediate solutions to my banking problems.	3.62	1.111	High	2
22	Clear guidance on conducting digital transactions is provided by the bank.	3.59	1.119	High	3

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N	phrase	arithmetic mean	standard deviation	Level of response	ranking
23	Navigating between available digital services is made easier by digital services.	3.56	1.153	High	4
	Total phrases	3.62	1.14	High	3
3.Safety dimension					
24	The bank's website is known for providing services that are accurate and error-free.	3.67	1.152	High	1
25	All services provided by the digital service provider receive continuous updates.	3.65	1.131	High	3
26	Access to other people's account information and data is not permitted by digital services.	3.63	1.101	High	2
27	The bank's digital services website provides me with security and my banking information is private.	3.59	1.131	High	4
	Total phrases	3.64	1.12	High	2
4.The dimension of empathy					
28	The bank's management prioritizes the interests of customers.	3.61	1.103	High	3
29	Digital transformation is working to deliver information to me in a language I understand.	3.70	1.169	High	1
30	The bank demonstrates a personal interest in its clients.	3.53	1.158	High	4
31	Digital transformation works to understand and address the circumstances of beneficiaries.	3.62	1.168	High	2
	Total phrases	3.61	1.14	High	4
	5.The dimension of tangibility				
32	The bank offers clean and air-conditioned waiting areas.	3.69	1.090	High	1
33	The bank's digital services are convenient and attractive.	3.56	1.135	High	3
34	The bank's employees are well-groomed	3.62	1.152	High	2
35	The staff is sufficient to provide me with the assistance I require in dealing with digital technologies.	3.55	1.211	High	4
	Total phrases	3.60	1.15	High	5

Table (3) presents the descriptive statistical analysis of the dimensions of banking service quality based on the responses of study participants. The level of response and ranking is determined by using the arithmetic mean and standard deviation for each statement . In terms of reliability, all statements recorded a high level of response, with the statement "The bank uses modern technology and is constantly developing it" ranking first with an average of 3.75, followed by the statement "I can track the details of all digital transactions that take place on my account through the bank's electronic applications" with an average of 3.69. In the responsiveness dimension, the statement "The procedures and steps of the digital service are easy and straightforward" received the highest average (3.69) and ranked first, while the statement "Digital services facilitate navigation between available digital services" came in fourth place with an average of 3.56 .In the security dimension, the statement "The bank's website provides accurate and error-free services" ranked first

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with an average of 3.67, while the statement "I feel secure and my banking information is private on the bank's digital services website" received the lowest average in this dimension (3.59), but still showed a high level of response. In the empathy dimension, the phrase “digital transformation works to deliver information to me in a language I understand” ranked first with an average of 3.70, followed by the phrase “digital transformation works to appreciate and deal with the beneficiary’s circumstances” with an average of 3.62, while the phrase “the bank cares about customers personally” received the lowest average (3.53) in this dimension. Finally, in the tangibles dimension, the statement "The bank provides clean, air-conditioned waiting areas" scored the highest average (3.69), while the statement "There are enough staff available to provide the assistance I need with digital technologies" came in fourth with an average of 3.55 .Digital transformation's quality banking services support a significant enhancement of customer experience, as demonstrated by a high level of responsiveness in all dimensions.

8.3. Study Assumption Test:

Confirmatory factor analysis (CFA) was performed as a prerequisite to the examination of models and hypothesis testing, in order to indicate an important stage for assessing the quality of measurement instruments adopted according to the study. The purpose of this analysis is to guarantee that the indicators (elements or items) are valid measures of the theoretical concepts. This validation is essential to ensure the data collected genuinely reflects the intended constructs in the underlying model. Presentation of the measurement quality test for the axis A diagnosis. The axis was tested by both confirmatory factor analysis and reliability tests as follows.

8.3.1. Measurement Quality Test:

In this part of the study, and to ensure the accuracy and reliability of the results before proceeding to test the study hypotheses, the quality of measurement of the study model variables was assessed by applying both confirmatory factor analysis and reliability testing, as follows:

First: Confirmatory Factor Analysis (CFA):

After verifying that the preliminary data was appropriate for statistical analysis, a confirmatory factor analysis was applied to test the validity of the measurement model (demonstrate empirically that it reflects rue nature of relationship between underlying variables and is anted to its dimensions or indicator). Confirmatory factor analysis (CFA) is a base technique in structural equation modeling; within CFA one implements a theory-based model to define the factors of the variables and then tests how well this model fits the data. Through confirmatory factor analysis, we can evaluate the construct validity of variables with convergent validity tested by the extracted value of average variance extracted (AVE) and reliability of indicators of composite reliability coefficient (CR). Goodness of Fit indices including CFI, TLI, RMSEA etc are used to evaluate whether the model fits the data. This step is very important: it needs to be completed prior to structural model analysis in order to guarantee the instruments are a reliable and valid measure of the intended concept, and that the lagrangian variables reflect consistently their latent

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constructions. Thus, the results of confirmatory factor analysis can prove that the measurement model has a good reliability and improve on the stability and validity of structural model. The following results demonstrate the fit of the measurement model.

Quality assurance test for a variable: Digital transformation in banking service quality:

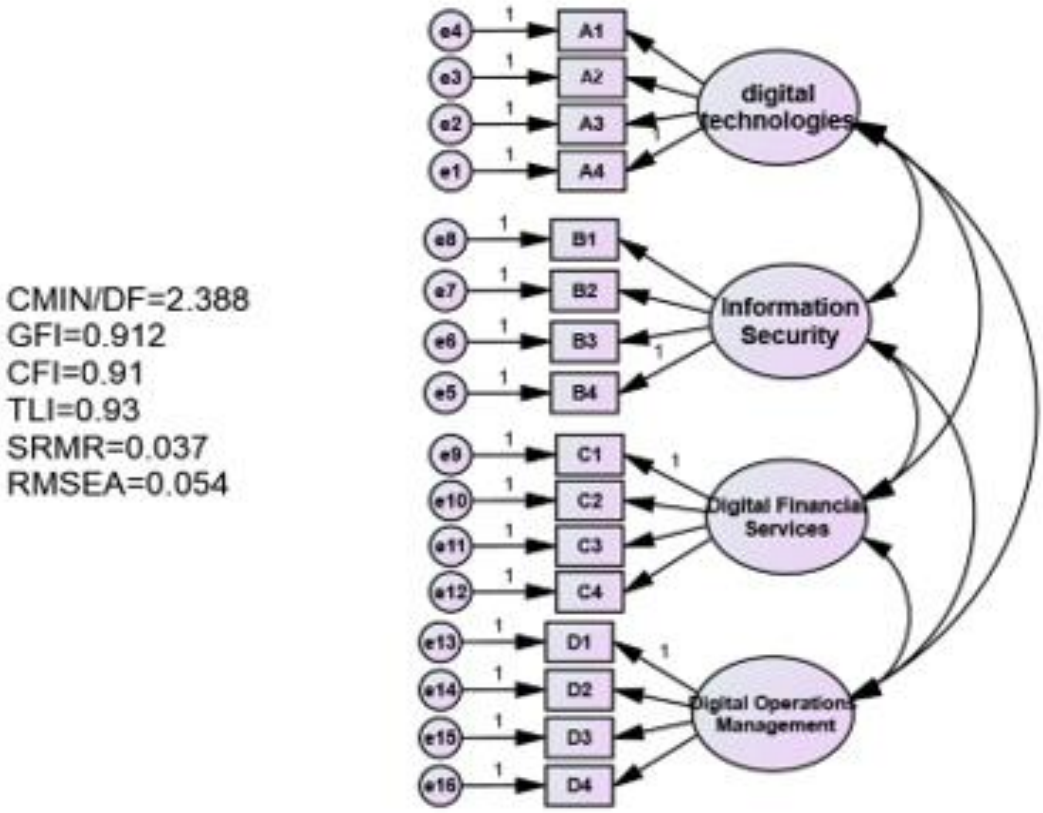

Figure 2: Confirmatory factor analysis of the variable: Digital transformation in banking

Table 4: Model Fit Indices for the Digital Transformation Variable

Index	Calculated value	Standard value	Significance
CMIN/DF	2.388	≤ 3	It indicates the suitability of the model
GFI	0.912	≥ 0.90	Highly compatible
CFI	0.910	≥ 0.90	Highly compatible
TLI	0.930	≥ 0.90	Highly compatible
SRMR	0.037	≤ 0.08	Good match
RMSEA	0.054	≤ 0.08	Good match

Table (4) shows the fit quality indicators for the measurement model for the digital transformation variable in banking service quality. The CMIN/DF value was 2.388, which is less than the standard limit (3), indicating that the model is suitable for the data. The

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GFI value was 0.912, which is higher than the standard value (≥ 0.90), indicating excellent fit of the model with the data. The CFI and TLI values of 0.910 and 0.930, respectively, were also achieved, which are higher than the standard limit (≥ 0.90), reflecting high model quality. The SRMR and RMSEA values of 0.037 and 0.054, respectively, were lower than the standard limits (≤ 0.08), reflecting excellent fit of the model with the data. Based on these indicators, it can be said that the proposed model has strong statistical fit quality and accurately and reliably represents the data.

(2) Measurement quality test for the variable: Banking service quality

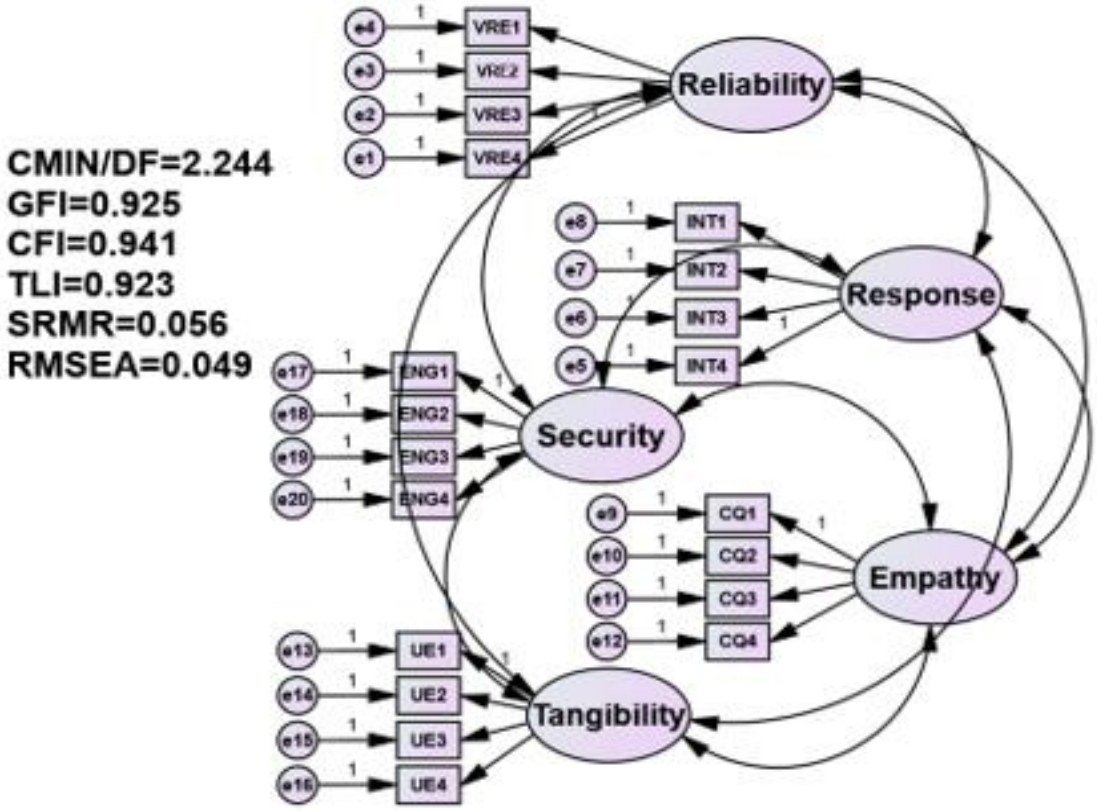

Figure 3: Confirmatory factor analysis of the banking service quality variable

Table 5: Model Fit Indices for the Banking Service Quality Variable

Index	Calculated value	Standard value	Significance
CMIN/DF	2.244	3≥	It indicates the suitability of the model
GFI	0.925	≥ 0.90	Highly compatible
CFI	0.941	≥ 0.90	Highly compatible
TLI	0.923	≥ 0.90	Highly compatible
SRMR	0.056	≤ 0.08	Good match
RMSEA	0.049	≤ 0.08	Good match

Table (5) shows the results of the fit quality indicators for the measurement model for the banking service quality variable. The CMIN/DF value was 2.244, which is less than the

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standard limit (3), indicating that the model is suitable for the data. The GFI value was 0.925, which is higher than the standard value (≥ 0.90), indicating an excellent fit of the model with the data. The CFI and TLI values of 0.941 and 0.923, respectively, were also higher than the standard limit (≥ 0.90), reflecting high model quality. The SRMR and RMSEA values of 0.056 and 0.049, respectively, were lower than the standard limits (≤ 0.08), reflecting an excellent fit of the model with the data. These indicators indicate that the proposed model has a strong statistical fit quality and accurately and reliably represents the data.

8.3.2. Validity and Reliability Analysis:

Prior to the examination of the structural model and hypotheses, one must check measurement properties of a measuring instrument in order to ascertain how valid and reliable it is for the construction being measured. Testing the validity and reliability of instruments is important in quantitative studies because it investigates whether the instrument is good enough to represent our theoretical concepts, and whether it produces constant results. To perform these experiments, different statistical tests are created as follows:

The purpose of Convergent Validity is to determine if various measures are indeed related. Convergent validity is confirmed when the standard load coefficients are higher than 0.7, the composite reliability (CR) value is also higher than 0.7, and mean variance (AVE) is higher than 0.5, respectively. By testing the hypotheses of this statistical evidence, it was demonstrated that the research instrument could accomplish convergent validity. As can be found in Table 6, the standardized load coefficient of all measurement items is higher than the recommended 0.7 criterion, and the CR and AVE values are also higher than the predetermined lower limits. This proves the achievement of convergent validity and confirms the appropriateness of research instruments to construct the analytical model, which reinforces the reliability of findings**.**

Table 6: Convergent Validity of Study Variables:

variable	AVE	CR
1. Digital transformation in the quality of banking services	0.71	0.80
2.Quality of banking service	0.68	0.78

2.Measurement reliability was estimated using both the composite reliability coefficient (CR) and Cronbach's alpha coefficient to verify the internal consistency of the items measuring each dimension .The results for the extracted mean variance (AVE), composite reliability (CR), and Cronbach's alpha values for each dimension are presented in the table below, confirming the model's robustness in terms of reliability and validity, thus paving the way for its adoption in subsequent structural analysis.

8.3.3. Internal Consistency Reliability:

Internal reliability is a measure of the consistency of individuals' responses to items measuring the same dimension in a research instrument. Internal reliability was verified using both Cronbach's alpha and the composite reliability coefficient (CR). The latter is a

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more accurate indicator than alpha because it takes into account the actual loading factors for each item, thus better reflecting the consistency of items within a single dimension. The results of the analysis, presented in Table 7, show that all Cronbach's alpha and composite reliability coefficients exceeded the acceptable minimum (0.7). The research instrument's reliability is enhanced because the items measuring each dimension have a high degree of internal consistency and reliability. These results indicate that the study instruments achieve a high level of internal consistency and reliability, which ensures the stability and reliability of the measurements obtained from them.

Table 7: Internal Consistency Reliability:

variable	CR composite reliability	Cronbach's Alpha
1. Digital transformation in the quality of banking services	0.81	0.83
2.Quality of banking service	0.77	0.73

The study instruments have achieved acceptable levels of reliability and validity according to established statistical standards, as evidenced by the validity tests and internal consistency tests (Cronbach's alpha and composite reliability). Therefore, these instruments can be relied upon to measure the study variables without any risks related to reliability or construct validity .Therefore, these results support proceeding to the next step, which is testing the main and sub-hypotheses of the study using appropriate statistical methods (such as structural equation modeling (SEM) in AMOS software), in order to verify the nature of the relationships between the variables and estimate the strength and direction of the effects assumed in the theoretical model of the study.

8.4. Study Assumption Test:

The main hypothesis, which states that, was tested.

1- There is a statistically significant positive relationship between the level of digital transformation and its dimensions (digital technologies, information security, digital financial services, digital operations management) and the reliability dimension in banks in Riyadh**.**

2- There is a statistically significant positive relationship between the level of digital transformation in its dimensions (digital technologies, information security, digital financial services, digital operations management) and the responsiveness dimension in Riyadh.

3- There is a statistically significant positive relationship between the level of digital transformation in its dimensions (digital technologies, information security, digital financial services, digital operations management) and the dimension of tangibility in Riyadh.

4- There is a statistically significant positive relationship between the level of digital transformation and its dimensions (digital technologies, information security, digital

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financial services, digital operations management) and the empathy dimension in banks in Riyadh.

5- There is a statistically significant positive relationship between the level of digital transformation and its dimensions (digital technologies, information security, digital financial services, digital operations management) and the security dimension in banks in Riyadh.

To test the hypotheses, the study employed structural modeling by estimating the standard path coefficients (β) and verifying their statistical significance using t-values (critical ratios) and their associated p-values. The structural model was tested using maximum likeness estimation, which allowed for the derivation of indicators regarding the strength and direction of the assumed relationships. The results of the model's relationship estimation are presented below:

Firstly, there is a statistically significant positive relationship between the level of digital transformation in its dimensions (digital technologies, information security, digital financial services, digital operations management) and the dimension of reliability in banks in Riyadh.

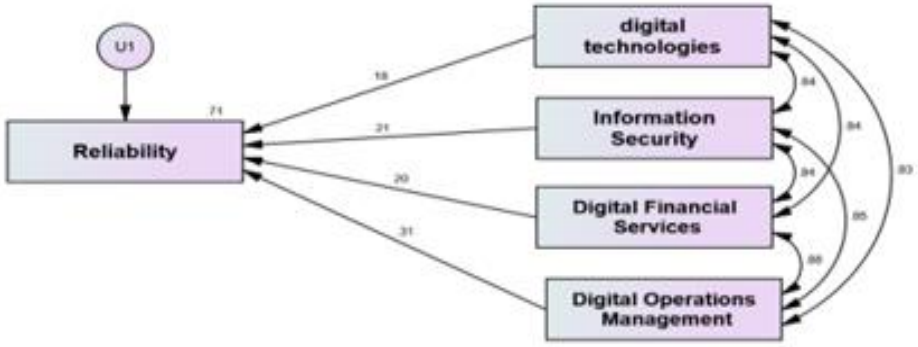

Figure 4: shows the results of assessing the relationship between the level of digital transformation and the reliability dimension in banks in Riyadh.

Table 8: Results of assessing the relationship between the level of digital transformation and the reliability dimension in banks in Riyadh

The relationship between variables	B	SE	CR	P	decision
Digital technologies → Reliability	0.190	0.059	3.205	0.001	statistically significant
Information security → Reliability	0.206	0.058	3.537	0.000	statistically significant
Digital financial services → Reliability	0.189	0.063	3.023	0.003	statistically significant
Digital Operations Management → Reliability	0.305	0.064	4.777	0.000	statistically significant

Table (8) presents the results of the estimated causal relationships between the level of digital transformation and the reliability dimension in banks in Riyadh, according to the

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results of the structural modeling (SEM) analysis. All relationships between the variables indicate statistical significance at the 0.05 level ($P < 0.05$), meaning that all pathways between digital transformation and the reliability dimension in banks fulfill the expected causal relationships according to the first hypothesis.

1. The relationship between digital technologies and reliability: It appears that there is a statistically significant positive effect between digital technologies and reliability (B = 0.190, CR = 3.205, P = 0.001), indicating that improving digital technologies enhances the level of reliability in banking services.
2. The relationship between information security and reliability: The results show that information security also has a positive impact on reliability (B = 0.206, CR = 3.537, P = 0.000), which means that enhancing information security contributes significantly to increasing customer confidence in reliability.
3. The relationship between digital financial services and reliability: It was found that digital financial services positively affect reliability (B = 0.189, CR = 3.023, P = 0.003), highlighting the role of digital services in enhancing reliability and service quality.
4. The relationship between digital operations management and reliability: The results showed that digital operations management has the greatest positive impact on reliability (B = 0.305, CR = 4.777, P = 0.000), indicating that the efficiency of digital operations management significantly enhances reliability.

Finally, the R^2 value of 0.71 indicates that the studied variables explain 71% of the variance in reliability, reflecting the strong relationship between digital transformation and the reliability dimension in Riyadh banks. The data and statistical analysis strongly support the first hypothesis that asserts a positive relationship between the level of digital transformation and the reliability dimension.

Secondly, there is a statistically significant positive relationship between the level of digital transformation in its dimensions (digital technologies, information security, digital financial services, digital operations management) and the responsiveness dimension in banks in Riyadh.

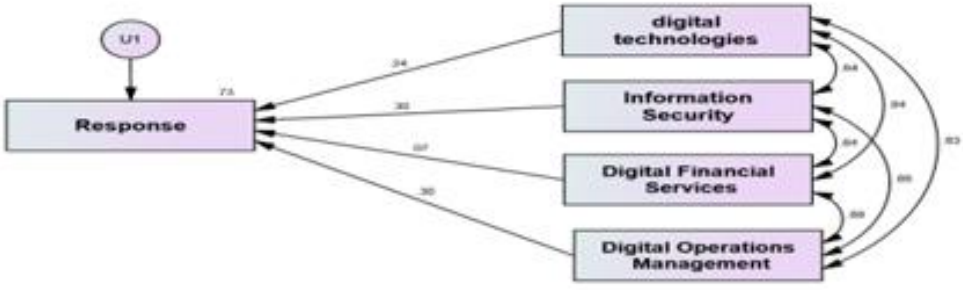

Figure 5: shows the results of assessing the relationship between the level of digital transformation and the responsiveness dimension in banks in Riyadh.

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Table 9: Results of assessing the relationship between the level of digital transformation and the responsiveness dimension in banks in Riyadh

The relationship between variables	B	SE	CR	P	decision
Digital technologies → Response	0.240	0.056	4.261	0.001	statistically significant
Information security → Response	0.285	0.055	5.147	0.000	statistically significant"
Digital financial services → Response	0.068	0.060	1.148	0.251	Not statistically significant
Digital Operations Management → Response	0.292	0.061	4.804	0.000	statistically significant

R2=0.73

Table (9) presents the results of the relationship assessment between the level of digital transformation and the responsiveness dimension in Riyadh banks, according to structural modeling (SEM) analysis. Some relationships between the variables are statistically significant, but others are not, which contributes to the evaluation of the validity of the second hypothesis.

1. The relationship between digital technologies and responsiveness: The results show that digital technologies have a positive and statistically significant effect on responsiveness (B = 0.240, CR = 4.261, P = 0.001), indicating that improvements in digital technologies enhance banks' responsiveness to customers.
2. The relationship between information security and responsiveness: It was found that information security has a positive and significant impact on responsiveness (B = 0.285, CR = 5.147, P = 0.000), which means that enhancing information security contributes to increasing the speed and quality of banks' response to customer needs.
3. The relationship between digital financial services and response: In this case, the results showed that digital financial services did not have a significant effect on response (B = 0.068, CR = 1.148, P = 0.251), indicating that digital financial services did not clearly contribute to improving response according to the data studied.
4. The relationship between digital operations management and responsiveness: The results showed that digital operations management has a positive and significant impact on responsiveness (B = 0.292, CR = 4.804, P = 0.000), indicating that improving digital operations management enhances banks' ability to respond to customer needs more efficiently.

Finally, the R^2 value of 0.73 indicates that 73% of the variance in response can be explained by the variables studied, reflecting the model's strength in explaining the relationship between digital transformation and the response dimension.

Based on the results, the second hypothesis, which posits a positive relationship between the level of digital transformation and the responsiveness dimension, can be supported,

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apart from the relationship with digital financial services, which did not show statistical significance. Therefore, the hypothesis is partially supported, as most variables related to digital transformation positively influence responsiveness, except for the variable specific to digital financial services.

Thirdly, there is a statistically significant positive relationship between the level of digital transformation in its dimensions (digital technologies, information security, digital financial services, digital operations management) and the dimension of tangibility in banks in Riyadh.

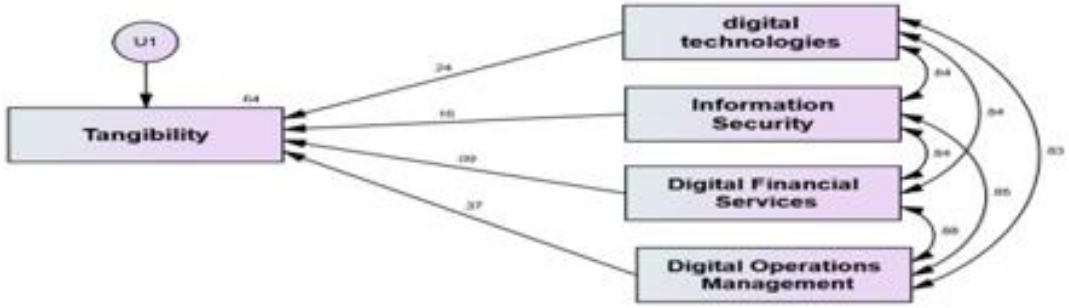

Figure 6: shows the results of assessing the relationship between the level of digital transformation and the tangible dimension in banks in Riyadh.

Table 10: Results of assessing the relationship between the level of digital transformation and the dimension of tangibility in banks in Riyadh.

The relationship between variables	B	SE	CR	P	decision
Digital technologies → Tangible	0.239	0.064	3.757	0.000	statistically significant
Information security → Tangible	0.150	0.063	2.402	0.016	statistically significant
Digital financial services → Tangible	0.080	0.067	1.191	0.234	Not statistically significant
Digital Operations Management → tangibility	0.349	0.069	5.087	0.000	statistically significant

R2=0.64

Table (10) shows how structural modeling (SEM) analysis can estimate relationships between digital transformation and tangible dimension in banks in Riyadh. The third hypothesis, which asserts that digital transformation affects the tangible dimension of banking services, is supported by the results that indicate statistically significant relationships between most variables in the model

1. The relationship between digital technologies and tangibility: The results show that digital technologies have a positive and statistically significant impact on tangibility (B = 0.239, CR = 3.757, P = 0.000). The ability to provide tangible and clear customer experiences and services is enhanced by improving digital technologies in banks.

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2. The relationship between information security and tangibility: The results also showed that information security has a strong positive impact on tangibility (B = 0.150, CR = 2.402, P = 0.016), indicating that ensuring information security enhances tangibility in the provision of banking services and increases customer confidence in dealing with digital services.
3. The relationship between digital and tangible financial services: The results of the analysis showed that digital financial services are not statistically significant (B = 0.080, CR = 1.191, P = 0.234), which indicates that there is no significant effect of digital financial services on tangibility, which may mean that the effect of these services in increasing the tangibility of the banking experience is not noticeable in the current context.
4. The relationship between digital and tangible process management: The results also showed that digital process management also has a positive and significant impact on tangibles (B = 0.349, CR = 5.087, P = 0.004). By improving digital process management, tangibles can be enhanced by improving the speed and efficiency of services provided to customers.

The R^2 value of 0.64 means that 64% of the variance in tangibles can be explained by the studied variables (digital technologies, information security, digital financial services, and digital operations management). The model's ability to explain the relationship between digital transformation and tangibles in Riyadh banks is reflected in this percentage. Based on the results, the hypothesis that digital transformation positively impacts the tangibility of banking services can be supported. Digital technologies, information security, and digital process management demonstrate statistically significant positive effects on tangibility, indicating that these factors contribute significantly to improving customer experience and providing clearer, more tangible banking services. However, digital financial services did not have a significant impact on this dimension.

Fourth, there is a statistically significant positive correlation between the level of digital transformation and its dimensions (digital technologies, information security, digital financial services, digital operations management) and the empathy dimension in banks in Riyadh.

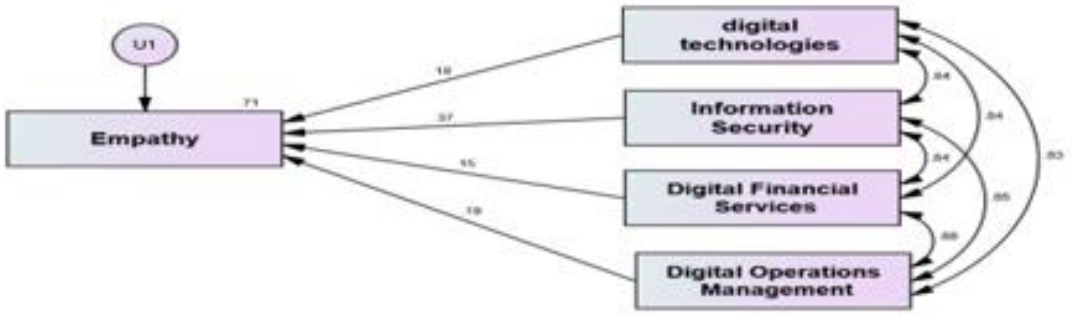

Figure 7: shows the results of assessing the relationship between the level of digital transformation and the dimension of empathy in banks in Riyadh.

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Table 11: Results of assessing the relationship between the level of digital transformation and the dimension of empathy in banks in Riyadh.

The relationship between variables	B	SE	CR	P	decision
Digital technologies → empathy	0.184	0.058	3.194	0.000	statistically significant
Information security → empathy	0.351	0.057	6.186	0.001	statistically significant
Digital Financial Services → Empathy	0.140	0.061	2.292	0.022	statistically significant
Digital Operations Management → Empathy	0.181	0.062	2.902	0.004	statistically significant

R2=0.71

Table (11) presents the results of the estimated relationships between the level of digital transformation and the empathy dimension in Riyadh banks, based on structural modeling (SEM) analysis. The fourth hypothesis, which suggests that digital transformation has an impact on empathy in banking services, is supported by the statistically significant relationships between most variables in the model.

1. The relationship between digital technologies and empathy: The results show that digital technologies have a positive and statistically significant impact on empathy (B = 0.184, CR = 3.194, P = 0.000), indicating that improving digital technologies in banks contributes to enhancing empathy with customers by providing better services and a greater understanding of their needs.
2. The relationship between information security and empathy: The results also showed that information security has a strong positive impact on empathy (B = 0.351, CR = 6.186, P = 0.001), indicating that ensuring information security enhances customers' sense of comfort and confidence in dealing with digital banking services, and thus promotes empathy in service delivery.
3. The relationship between digital financial services and empathy: The results of the analysis showed that digital financial services have a positive and significant impact on empathy (B = 0.140, CR = 2.292, P = 0.022), which means that digital financial services contribute to meeting customer needs in an empathetic manner and enhance their interaction with banks.
4. The relationship between digital operations management and empathy: The results also showed that digital operations management also positively and significantly affects empathy (B = 0.181, CR = 2.902, P = 0.004), indicating that improving digital operations management helps to enhance empathy with customers by facilitating access to services and improving customer experience.

The R^2 value of 0.71 indicates that 71% of the variance in empathy can be explained by the studied variables, reflecting the model's strength in explaining the relationship between digital transformation and the empathy dimension.

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Based on these results, the fourth hypothesis, which posits a positive relationship between the level of digital transformation and the dimension of empathy, can be supported. All the studied variables (digital technologies, information security, digital financial services, and digital operations management) showed statistically significant positive effects on empathy, suggesting that digital transformation significantly contributes to improving the ability to empathize with customers and meet their individual needs more effectively.

Fifth, there is a statistically significant positive correlation between the level of digital transformation and its dimensions (digital technologies, information security, digital financial services, and digital operations management) and the security dimension in banks in Riyadh.

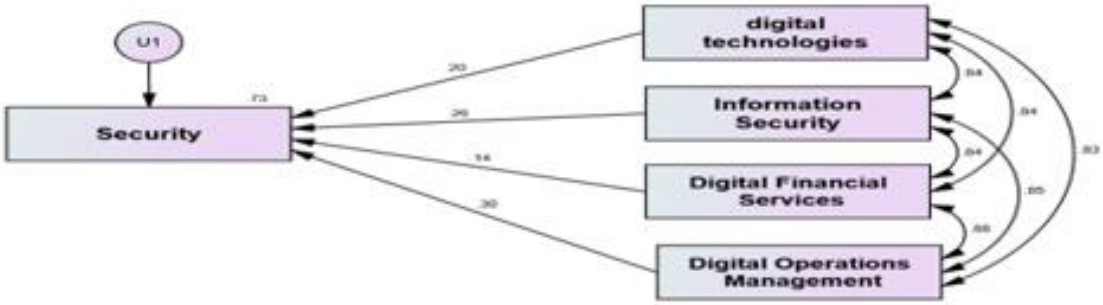

Figure 8: shows the results of assessing the relationship between the level of digital transformation and the security dimension in banks in Riyadh.

Table 12: Results of assessing the relationship between the level of digital transformation and the security dimension in banks in Riyadh:

The relationship between variables	B	SE	CR	P	decision
Digital technologies → security	0.205	0.056	3.646	0.000	statistically significant
Information security → security	0.253	0.055	4.568	0.000	statistically significant
Digital financial service → security	0.128	0.060	2.150	0.032	statistically significant
Digital Operations Management → Security	0.289	0.061	4.756	0.000	statistically significant

R2=0.73

Table (12) presents the results of the relationship assessment between the level of digital transformation and the security dimension in Riyadh banks, based on Structural Modeling (SEM) analysis. The fifth hypothesis, which suggests that digital transformation enhances the security dimension in banking services, is supported by the findings that all relationships between the studied variables show strong statistical significance**.**

1. The relationship between digital technologies and security: The results showed that digital technologies have a positive and statistically significant impact on security (B

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= 0.205, CR = 3.646, P = 0.000), indicating that improvements in digital technologies contribute to enhancing security in banking transactions and protecting customer data.

2. The relationship between information security and safety: It was shown that information security has a strong and positive impact on safety (B = 0.253, CR = 4.568, P = 0.000), which shows that enhancing information security in banks enhances customers' sense of safety while using digital banking services.
3. The relationship between digital financial services and security: The results also show that digital financial services positively affect security (B = 0.128, CR = 2.150, P = 0.032), reflecting the role of digital services in improving security and maintaining the confidentiality of customers' financial data.
4 .The Relationship Between Digital Process Management and Security: The results indicate that digital process management has a significant positive impact on security (B = 0.289, CR = 4.756, P = 0.000), meaning that efficient digital process management contributes significantly to enhancing security in digital transactions.

The R^2 value of 0.73 indicates that 73% of the variance in security can be explained by the studied variables, reflecting the model's ability to strongly explain the relationship between digital transformation and the security dimension. Based on the results, the fifth hypothesis, which posits a positive relationship between the level of digital transformation and the security dimension, can be supported. All the studied variables (digital technologies, information security, digital financial services, and digital operations management) showed statistically significant positive effects on security, indicating that digital transformation significantly contributes to enhancing security in digital banking services and achieving a high level of customer trust and security.

9. DISCUSSION

All the constructs of the analysis measuring measurement that applied with digital transformation impact on banking service quality were by a clarification or identification sufficiently motivated, as affirmed in our analysis. This limits their compatibility with the model and hence makes them important. This study sought to investigate the effect of digital transformation dimensions on banking services quality in Saudi banks as perceived by bank customers in Riyadh. Findings: The findings of this study revealed a significant and positive correlation between dimensions of digital transformation and quality banking services among the banks in Riyadh implying that these banks have been successful in using digital technology to improve service quality. Regression coefficients and levels of significance Results from the regression analysis were confirmed, indicating a strong statistical relationship among the variables that support our research hypotheses. The results are explained as follows:

- Large and positive effects that were significant on reliability associated with the dimensions of digital transformation. Digital technologies, information security, digital financial services and digital operations management enable improved

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service reliability with the most effect from the digital operations management. The coefficient of determination (R^2 = 0.71) displayed a strong model fit regarding the proportion of variance explanation in reliability. This is consistent with the result of (Ahmed,2020) work, which proved that digital transformation increases the accuracy of bank operations and reduces operation errors, also including (Al-Saeed et al. 2021) report, that showed an enhancing of reliability with investment in digitization. The findings also confirm (Lin et al,2009) and (Ganguly ,2021), who further stated digital technologies mainly automation and artificial intelligence enhance service reliability and customer confidence by cutting time in much reduced matters of irrelevance. The current results are consistent with the worldwide practice of linking good digital infrastructure to greater reliability.

- Regarding the responsiveness dimension, the results showed a significant positive impact on digital technologies, information security, and digital operations management, while digital financial services did not show any significant impact. This indicates that this dimension is still in need of improvement to improve responsiveness. The explanatory coefficient (R^2 = 0.73) supported the model's strength in this dimension, partially confirming the hypothesis. This partially aligns with the study by (Alalwan et al. 2020), which found that responsiveness in banks increases with the development of digital operating systems and the degree of automation, while digital financial services may not have a direct impact unless designed with a focus on user experience. Furthermore, (Al-Shammari's study ,2022) demonstrated that responsiveness depends more on the quality of back-end digital systems than on the financial services interfaces, which explains the lack of statistical significance for this dimension in the current study.
- Regarding the tangible dimension, the results demonstrated significant impacts of digital technologies, information security, and digital operations management, while digital financial services did not show any significant impact. This may reflect customers' focus on tangible aspects related to improving digital infrastructure instead of the financial services themselves.

The R^2 value (0.64) indicated a suitable capacity for the model to explain the variance in tangibles. These results are consistent with the literature confirming that digital transformation is reshaping the physical and virtual environment of banking services, as reported in Parasuraman et al.'s study on the quality of electronic services. (Al-Ghamdi,2021) study also supported this trend, indicating that upgrading the digital infrastructure (such as improving application platforms and websites) is part of the tangibles perceived by customers. The lack of impact of digital financial services was noted in (Hussein et al ,2022) study, which linked it to low awareness or limited use of these services among certain customer segments.

- All dimensions of digital transformation were found to have strong positive effects on empathy, showing how digital transformation can enhance the human customer experience by providing a secure and seamless service environment. The high coefficient of interpretation (R^2 = 0.71) confirms the strength of the studied

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relationship. These findings align with (Deloitte,2021) assertion that digital transformation does not diminish the human dimension but rather supports it through digital personalization. The current study demonstrates that (Abdullah,2023) study shows that increased information security positively impacts customers' sense of security and perception of empathy from the bank.

- The security dimension was significantly affected by all aspects of digital transformation, as evidenced by the results. Digital technologies, information security, and digital operations management all had a substantial effect, with digital financial services also playing a positive role. These findings reflect the pivotal importance of cybersecurity and digital infrastructure in building customer trust and enhancing their sense of security.

This dimension showed the highest level of consistency between the current study and previous research, with all digital variables demonstrating a significant impact on security. Most studies (Khan, 2020) and (Morgan, 2021) agree that information security is the most critical pillar for the success of banking digital transformation. A study by (Alghamdi ,2022) also supported this trend in the Saudi context, indicating that customer trust in digital banking services depends primarily on the strength of cybersecurity controls. The study's findings are in complete agreement with the literature that emphasizes the vital importance of information security and digital operations management in enhancing security. In general, findings suggest that digital transformation has considerable influencing power on banking services quality in different aspects but with a different degree to the extent of its impact. This speaks to an ongoing need for investment in digital operations management and cyber security, as well boosting the effectiveness of digital financial services so that they be more responsive as well as tangible.

10.CONCLUSION

This study presents an overview of how digital transformation affects the quality of banking services in Saudi Arabian banks. It explores key issues and future research trends in related fields and offers an overview of definitions and concepts related to digital transformation and banking service quality. Based on the findings, several recommendations are presented to bank officials, particularly those operating in Riyadh. Among the most important recommendations are the continued investment in digital infrastructure, improving user experience, and enhancing cybersecurity in line with global trends and Saudi Arabia's Vision 2030 for developing the financial sector. The study also emphasizes the need to support the sound development of artificial intelligence by providing a suitable regulatory framework. Furthermore, it recommends conducting future studies on digital transformation that encompass a broader range of variables than those covered in this study, while also leveraging the successful experiences of international banks in digital transformation and attempting to replicate and apply them to the banking system in Riyadh.

Conflict of Interest: The author declares no conflict of interest.

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