ADOPTING SMART QUALITY PRACTICES WITHIN THE FRAMEWORK OF DIGITAL BUSINESS TRANSFORMATION: A CASE STUDY OF AL-RASHEED BANK IN MOSUL

Zaid Khaleel Ibrahim, Faculty of Administration and Economics, University of Mosul, Mosul, Iraq. Email: zaid.khaleel@uomosul.edu.iq

Noor Sabah Issa, Faculty of Administration and Economics, University of Mosul, Mosul, Iraq. Email: noor.sabah@uomosul.edu.iq

Omar Ali Ismael, Faculty of Administration and Economics, University of Mosul, Mosul, Iraq. Email: omer_ali@uomosul.edu.iq

Received 12 July. 2024
Accepted 17 Nov. 2024

Abstract. *The research is centered on illuminating intelligent quality through the application of artificial intelligence tools. These encompass intelligent automation, smart sensing, comprehensive data analysis, intelligent quality monitoring, information security, and continuous employee training. The aim is to transition towards digital banking operations at Al-Rasheed Bank. The descriptive-analytical approach was adopted by examining numerous sources related to the research topic to provide a theoretical perspective. As for the practical aspect, it relied on analyzing the survey results using statistical software (SPSS, Version 28) to obtain the findings and present recommendations. The research yielded several key findings, most notably confirming the existence of a correlation with a percentage reaching 83.9%. Additionally, it demonstrated an impact with a percentage of 78.9% between smart quality practices and the transition towards digital business. This research employed a questionnaire survey to delineate and diagnose the main variables, aiming to ascertain the extent of the impact of the independent variable on the dependent variable. This research stands out in its comprehensive and data-driven exploration of a set of artificial intelligence tools (smart quality), taking into consideration a wide array of factors and their practical effects to enhance banking operations for digital transformation in the Iraqi environment.*

Keywords: Smart Quality, Artificial Intelligence Tools, Digital Business, Al-Rasheed Bank

1. Introduction

Digital transformation faces multiple challenges, including cybersecurity concerns, budget constraints, and cultural resistance within the organization. Addressing these challenges requires clear strategies such as appointing specialized teams, utilizing digital adoption platforms, and providing continuous training for employees to fully leverage new digital technologies (Whatfix, 2024). The success of digital transformation relies on integrating smart quality management systems, empowering leaders and employees, and overcoming organizational and cultural challenges to ensure effective and sustainable implementation (Siemens Blog Network; McKinsey & Company).

Quality is considered the starting point for achieving excellence and sustainable performance in any organization. This is accomplished by establishing a strong foundation to ensure the quality of the products or services the organization provides. The use of smart technology in quality management represents a significant step towards the future. It constitutes a new and fundamental approach that draws its strength from using intelligent analytics and artificial intelligence techniques to improve quality and make informed decisions. Within this approach, organizations view the quality function as a partner and a value provider, rather than just a business cost. This perspective helps them integrate quality and compliawq

nce into everyday operations while enabling speed and efficiency (Practice, 2021).

This research aims to conduct a comprehensive analysis and evaluation of the impact of implementing smart quality practices within the framework of the transition to digital business at Rasheed Bank in Mosul, Iraq. By investigating the benefits and challenges associated with adopting smart quality techniques, this research aims to provide valuable insights into the effectiveness and potential of these technologies in improving digital operations at Rasheed Bank.

By scrutinizing the relevant literature, and evaluating case studies and data, the study is expected to address various parameters, and describe, and measure the relevance of such methods about digital business quality in Iraqi banks. Moreover, this investigation will reveal how the adoption of these technologies affects the phase of moving into digital banking at Rasheed Bank located in Mosul. It is worth mentioning that the results of this study will undoubtedly contribute to updating information about the most appropriate smart quality techniques that will be used at banks. Moreover, there will also come up important aspects connected with smart quality practices and their effect on performance enhancement and improving customer satisfaction levels in the banking industry. To summarize, the digitization of banking

practices is an essential aspect of today's banking and will be even more critical. Those banks that adopt it will likely have a competitive edge in the digital era. Consequently, smart quality techniques can be considered as an indispensable element when looking at the effect of digital business on customer satisfaction levels. When examining the potential advantages and difficulties associated with these tools, it is crucial to develop a roadmap that can help companies in Iraq to successfully move into a digital business sphere, with greater ease. Policymakers and stakeholders would benefit from this research as it would provide them with crucial details on the right decision-making approaches that would facilitate the successful incorporation of the digital economy within banking operations at the national level.

2. Literature Review

2.1. Smart Quality

Smart quality is all about using technology, data, and smart manufacturing methods to streamline operations, make informed decisions, and aim for the highest possible quality level, which could be 100% perfect. In regard to 'Smart Quality,' this is considered to be the measure of the quality of services and products formed in a given process (Yang et al., 2023). According to Xu et al. (2018), Smart Quality is defined as a system that uses recurring pattern entities to identify both present and past quality problems so that appropriate measures are implemented promptly after tracing the causes. The idea here is to start work now in preparation for the future foundation of knowledge in the quality area. It is a statistical control process, which is employed by using and analyzing historical data with the help of artificial intelligence methods as per Kim & Ryu (2020). The method serves to preclude outputting faulty products in the future and enables innovation across value chains through the use of comprehensive information that ensures the best availability of information resources. Smart Quality has become more of a quality control tool rather than the measurement of production processes in quality management in recent years. Also, it covers the whole processes within the organization's production life cycle, including quality aspects on procurement, design, planning, production, distribution, and marketing. Three major categories that Smart Quality applications can be classified into are pre-manufacturing, during manufacturing, and post-manufacturing (Oztemel 2021). In the same way, a Smart Quality Control System has been launched that applies automated ways of overseeing production processes to identify anomalies with the help of devices like thermal imaging cameras, laser projectors, and mobile computers (Yudin et al., 2020). Additionally, it's regular for Smart Quality Management societies to take computer vision-based inspection technology and machine learning as handy. A deep learning-based vision system has been implemented

to identify and classify defective products while ensuring accuracy (Wang et al., 2019).

Leader and Corporation (2020) emphasizes that "Smart Quality" techniques such as 3D scanning and BIM have been used in construction processes. It has been highlighted that quality inspection using these smart technologies was not only more time-efficient than previous quality inspections but could also be achieved with a reduced workforce.

Sundaram and Zeid (2023) pointed out that "Smart Quality" involves intelligent inspection as an artificial intelligence-based system that enhances model performance and addresses many factors that affect the optical inspection process. It partially automates the inspection process and allows control over the effects of various significant and other environmental factors. Chesalin et al. (2020) provided an overview of the "Smart Quality" tools that can be employed to address quality-related issues within an organization.

On the other hand, the European Commission has emphasized that humans remain the most valuable assets of any company. They are skilled, intelligent, adaptable, creative, and outperform most intelligent machines, technologies, or smart robots (Müller, 2020). In response to this shift in focus, the concept of "Smart Quality Management" in Industry 5.0 has been introduced, emphasizing the pivotal role of the research and innovation sector in supporting the industry's long-term service to humanity (Bajic et al., 2023).

Therefore, it is important to emphasize that establishing Smart Quality Management in Industry 5.0 and business is not an alternative to the current Industry 4.0 concept but is the result of a forward-looking perspective on the need for engineers and workers' skills, knowledge, and the ability to collaborate with machines and robots on one hand, and flexibility in manufacturing processes, business performance, and environmental impacts on the other hand (Zizic et al., 2022).

Reviewing relevant literature highlights numerous areas in which intelligent systems are used to enhance the quality of processes, products, and services. Some of these areas can be listed as follows: (Oztemel, 2021; Xu et al., 2018).

- Ensuring the quality of processes, products, and services, guaranteeing reliability, and detecting potential deviations.
- Generating alerts for abnormal operations and error detection.
- Predicting the behavior of machines, devices, and related equipment in terms of expected returns.
- Monitoring machinery and condition to ensure machines are in good health.

- Ensuring end-to-end supply chain efficiency, including resource management, from suppliers to customers.
- Handling inventory and improving materials management.
- Implementing computer vision-based inspection using machine learning techniques to detect defective products.
- Deploying intelligent systems to enhance quality standards in the process (design experimentation).
- Benchmarking to allow for system comparisons with their counterparts.

In the same context, Somasundaram et al. (2020) emphasized that the "Smart Quality" system facilitates data storage, processing, and transformation into knowledge for quality issue resolution. This system enables users to retrieve knowledge through an interactive interface between workers and computers. Organized knowledge and enhanced processing can be directly accessed to resolve issues and used as a reference for addressing new problems.

Companies that have adopted the "Smart Quality" system have demonstrated significant enhancements in quality compared to traditional approaches. For instance, "Smart Quality" has empowered organizations to reduce the total cost of quality by up to 50% and has made a measurable impact through five core pillars: Basic Quality Control, Smart Quality Assurance, Process and Product Mastery, High-Quality Smart Work Methods, and Smart Compliance Enterprise (Practice, 2021).

Thus, by improving big data and advanced computing as more efficient and sustainable technologies compared to cloud computing, it is possible to prepare small datasets for use in Smart Quality Management. These small datasets provide valuable insights promptly for the system's operations and are organized in an easy-to-understand manner for everyone (Bajic et al., 2023; Jabrane & Bousmah, 2021).

The impact of Smart Quality in the transformation towards digital banking and financial institutions can be measured through the utilization of intelligent techniques, such as Artificial Intelligence (AI). AI is one of the digital technologies that enables companies to progress and thrive in the digital age, influencing how businesses innovate and transition to digital operations, while also adapting to the evolving needs of customers (Mariani et al., 2023; Verganti et al., 2020).

Research results identified institutions with high performance that use artificial intelligence techniques and related tools and technologies to reestablish their operational functions and methods (Wamba-Taguimdje et al.,

2020). As stated in Yazici et al. (2023)'s words, Machine Learning (ML) is a field within Artificial Intelligence that has been subject to considerable study and research in recent years.

Though machine learning has been defined differently in various literature works, two eminent figures in the field, Arthur Samuel and Tom Mitchell, have given succinct definitions of this term. According to Samuel, machine learning is where computers learn to perform specific tasks without being explicitly programmed to do so. Tom Mitchell defined it as the construction of computer programs that automatically improve with experience. The common feature in these two definitions is computer learning.

Upon a thorough examination of the aforementioned literature, one can discern the paramount prerequisites associated with the notion of "smart quality" as it pertains to the transition toward digital enterprises within organizations. These prerequisites encompass the utilization of intelligent technologies, namely smart automation, smart sensing, extensive data analysis, smart quality control, information security, and the ongoing training of personnel to scrutinize data about quality. They, therefore, facilitate the identification of problems and errors at their initial stage, leading to immediate actions that avert them before they can materialize. An extensive range of sources is targeted to gather the data, including sensors, digital systems, operational procedures, and client interactions. The process involves careful analysis of the gathered information in order to reveal distinctive patterns, novel trends, as well as a thorough understanding of which variables have an impact on product or service quality within an organizational structure. The techniques predominantly used in this operation include:

Smart Automation: The use of smart automation in manufacturing and service processes is an effective way to reduce human errors and improve accuracy. Robots and artificial intelligence systems are capable of performing routine tasks with a high level of precision (Rajeshkumar et al., 2023).

- Intelligent Sensing: Smart sensors and electronic systems are used to collect the required data at the same moment when production or service is provided with its every particular. They come in handy as they give detailed information that is not prone to mistakes, convert it into digital data, and thus help the company in decision-making (Wilson et al., 2023). Big Data Analytics: AI-based methods along with data analytics approaches to assess how far the identified information has potential threats or room for improvement. These analytics could be helpful in process improvements, waste reduction, and cost savings (Hsu et al., 2023).

- Smart Quality Control: Implementation of smart quality control tools which involve ongoing supervision of all processes and immediate identification of deviations from predetermined norms. It greatly contributes to lowering the level of defective products and enhancing the quality (Yudin et al., 2020).
- Information Security: The safeguarding of the collected and used sensitive data and information from leaks as well as cyber breaches (Ding et al., 2023).
- Continuous Employee Training: Offering consistent training to employees who are engaged with smart systems so that they can be knowledgeable enough about the technologies they use and can make full use of them in their work (Demerouti, 2023).

2.2. Digital Business

The complexity and uncertainty of the COVID-19 pandemic had its beginning in the early 21st century. This crisis impacted all parts of society, emerged on a worldwide level, and played a part in major consequences on the economic, political, and social aspects of life (Reuschl et al., 2020). By the same token, the pandemic crisis has driven changes and enhancements in business processes and enterprise landscapes with customer-centric philosophies, infrastructure technologies, competitive orientations, and technology-driven organizational practices as major levers (Samper et al., 2022).

The shift towards digital work is a significant challenge facing leaders in modern enterprises. Managing the interaction between emerging technologies, existing organizational setups, organizational design, business processes, and overall organizational goals requires a reevaluation and adaptation of existing strategies and practices within the organization (Jonathan et al., 2023). It can be said that customer experience and operational efficiency are two key areas significantly impacted by the process of digitization and technology adoption in the banking and financial services industry, technological innovations are tracked to ensure enhanced customer satisfaction and operational effectiveness (Ortakoÿ & Özsürünç, 2019). According to Yu et al. (2022), the term "digital transformation of business models" encompasses activities that businesses engage in to improve efficiency and gain value by altering their business model. Verhoef et al. (2021) underline that this process is never-ending; it consists of a range of changes, where information, computation, communication, and connectivity technologies are the main means of organizational restructuring. It should be highlighted that digital

transformation stands as one of the most significant contributors toward multiple advantages and benefits for organizations and economies.

. It promotes competition, innovation, organizational performance, operational efficiency, economic growth, and sustainable development (George & Schillebeeckx, 2022). Furthermore, digital business processes and automation offer significant opportunities to greatly enhance customer experience. By utilizing digital technologies, artificial intelligence, and automation, companies can improve the quality of the services they provide to customers, leading to increased satisfaction and loyalty (Samper et al., 2022).

When it comes to digital transformation in banking and finance, the banking industry is undergoing a significant shift due to smart digital technologies. Traditional banks face increasing competition from emerging fintech companies that offer new and innovative products and services. To maintain their competitive edge, banks need to embrace digital transformation and adopt new technologies to ensure continuous improvement in their services, which can help attract more customers (Al-Hosani & Tariq, 2020).

Singh (2020) highlighted that information technology has not only affected the human aspect of life but has also had a significant impact on businesses. Today, every financial institution, whether public or private, is rapidly transforming itself into digital platforms to make its services more user-friendly, thus shifting its identity from traditional banking services to relationship-based banking services. This banking approach is known as "digital banking services."

Hang et al., (2021) mentioned that digital transformation has become imperative for banks worldwide, including in Vietnam, to adapt to the evolving digital economy and meet customer expectations for digital interaction and innovative services. Banks can greatly benefit from digital transformation by embracing technology and improving business processes through automation and artificial intelligence. Consequently, banks can engage in product and service delivery activities on digital platforms, effectively leverage data, and thereby enhance business problem-solving capabilities and customer engagement.

Digital transformation in banking services refers to the use of digital technologies to enhance customer experience, streamline processes, and reduce costs. This includes the use of mobile applications, online banking services, big data analytics, and artificial intelligence (Mondal, 2023). The emergence and proliferation of these digital technologies have led to a massive increase in available data, making data analytics and machine learning capabilities important competitive advantages for companies (Trischler & Li-Ying, 2023).

Service quality in the banking sector is crucial for competition and profitability, especially with the industry's shift towards providing banking services through mobile apps and online channels. Therefore, most banking institutions are restructuring their roles and policies to meet these evolving needs and deliver high-quality banking services (De Leon et al., 2017; Ameen et al., 2019). Many banks and financial institutions are earnestly working to implement intelligent quality control in online banking services. By delivering smart banking services, banks can achieve success and gain customer satisfaction and loyalty (Al-Hosani & Tariq, 2020).

There are numerous benefits to digital transformation in delivering banking services. For customers, it can mean faster access and better, more convenient quality financial services. For banks, it can mean accessing vast amounts of data and information, improving efficiency, and reducing costs. The primary goal of digitization is to reduce human transactions, human error, and "getting it right the first time" (Saeed, 2023). As noted by Kraus et al. (2022), the main objective of digital transformation is to address challenges related to efficiency and effectiveness.

Based on the aforementioned literature reviews regarding the shift towards digital operations in banks and the scarcity of literature explicitly specifying the dimensions embraced by the digital business variable, as well as the nature of each bank's operations, we will identify several dimensions through interviews conducted by researchers to assess the level of impact through smart quality in the transition towards digital operations, which affects all aspects of the banking business (Ding et al., 2023; Hang et al., 2021; Mondal, 2023).

- Digital Banking Services: This dimension encompasses the deployment and development of mobile phone applications and websites that enable customers to conduct their banking transactions and interact with the bank with ease and security.
- E-commerce and Digital Payments: Modern technology enables banks and customers to carry out e-commerce and digital payment operations securely and conveniently. Customers can make online purchases and payments using credit cards and other banking services.
- Cultural and Digital Transformation: This aspect is one of the key components in achieving successful digital transformation in banking. Cultural transformation necessitates a shift in mindset and approach within the organization to embrace technology and the changes it brings.
- Cybersecurity and Biometric Technology: Banks are concerned with providing a high level of cybersecurity to protect customer data and

banking transactions. Biometric technologies such as fingerprint and facial recognition are utilized to enhance the security of verification processes. Data and sensitive information collected and used by smart systems must be safeguarded against leaks and electronic breaches.

- Automation and Digital Self-Operation: These dimensions aim to enhance operational efficiency and reduce manual processes through automation. Modern techniques like artificial intelligence, machine learning, and software robots are employed to execute repetitive and standardized tasks more quickly and accurately.

3. Methodology

3.1. Research Problem

The digital transformation is not merely confined to the shift from traditional banks to digital ones; rather, it represents a vital shift in how banks and other financial institutions engage with their customers. Understanding their digital behavior and meeting their needs, leads to fundamental changes within these institutions through the adoption of intelligent quality practices that cater to customer needs and aspirations. The research problem centers around the primary question: "Do smart quality practices play a role in the transition toward digital operations in Al-Rashid Bank?" This primary question leads to several subsidiary questions, such as:

- What is the level of interest of the responding sample in the variables of the research (Smart Quality Practices, Digital Business) at Al-Rasheed Bank?
- What is the nature of the correlation between Smart Quality Practices and Digital Business at both the partial and overall levels?
- Is there an impact of Smart Quality Practices on the transition towards Digital Business at both the partial and overall levels?

3.2. Research Importance

Digital transformation represents a significant shift in the banking and financial sector, requiring a deep understanding of customer behavior and better meeting their needs. Adopting Smart Quality Practices plays a crucial role in achieving this goal. Therefore, this research demonstrates the importance of understanding the relationship between Smart Quality Practices and the transition to digital business at Al-Rasheed Bank. By addressing the research questions, the study can provide strong evidence contributing to the development of more effective strategies for a successful digital transformation.

3.3. Research objectives

- Measure the level of interest of the responding sample in the research variables (Smart Quality Practices and Digital Business) at Al-Rasheed Bank.
- Analyze the statistical relationship between Smart Quality Practices and Digital Business at both the partial and overall levels to determine the extent of the impact of these practices on digital transformation in the bank.
- Provide practical recommendations for the management of Al-Rasheed Bank on how to improve Smart Quality Practices and enhance the transition to digital business.

3.4. Research Hypotheses: Two hypotheses have been formulated to determine the strength of the relationship and the impact between the variables:

- H1: There is a significant correlation between Smart Quality Practices (both overall and partial) and Digital Business.
- H2: There is a significant impact of Smart Quality Practices (both overall and partial) on Digital Business.

3.5. Research Methodology

The research adopted a Case Study methodology, characterized by an in-depth and comprehensive analysis of an individual or specific case(s) within a defined context. This approach is used to understand a wide range of topics, phenomena, and issues and typically involves collecting data from multiple sources such as observations, interviews, documents, and archives.

3.6. Research Sample

A survey sample consisting of (42) employees at Al-Rasheed Bank, Abu Tamam Branch in Mosul, Iraq, was selected.

3.7. Research Instruments

A five-point Likert scale questionnaire was used for data collection, with weightings (1, 2, 3, 4, 5) representing responses ranging from "Strongly Agree," "Agree," "Somewhat Agree," "Disagree," to "Strongly Disagree." The questionnaire included two variables: the first variable encompassed Smart Quality Practices (independent variable) represented by (Smart Automation, Intelligent Sensing, Big Data Analytics, Smart Quality Monitoring, Information Security, and Continuous Employee Training), with each practice consisting of 3 questions, totaling 18 questions. The second variable

(dependent variable) represented the transition to digital business with 10 questions. To illustrate the significance of these variables and demonstrate the strength of the relationship and impact between them, statistical programming using SPSS-V:28 was employed, utilizing various statistical methods such as Cronbach's Alpha, correlation coefficient, simple regression analysis, F-test, T-test, means, and standard deviations.

3.8. Face Validity of the Questionnaire

The face validity of the questionnaire was assessed by presenting it to a panel of expert reviewers in the field of management sciences to ensure the accuracy and suitability of the questionnaire items for the research hypotheses.

3.9. Measurement of Questionnaire Reliability

To ensure the reliability of the questionnaire, the Cronbach's Alpha coefficient was used. Table 1 presents the results of this test for the research variables.

Table 1: *Results of the (Cronbach-Alpha) scale test for all research variables*

The main variables	Sub variants	Scales	Value (Cronbach -Alpha)
"Smart Quality Practices"	"Smart Automation"	(X1-X3)	0.920
	"Intelligent Sensing"	(X4-X6)	0.925
	"Big Data Analytics"	(X7-X9)	0.921
	"Smart Quality Monitoring"	(X10-X12)	0.925
	"Information Security"	(X13-X15)	0.925
	"Continuous Employee Training"	(X16-X18)	0.927
"Digital Business"		(X19-X28)	0.921
Aggregate index		(X1-X28)	0.950

Source: Prepared by the Researchers based on the statistical analysis program

4. The Practical Aspect Of The Research

This aspect presents the results, description, and analysis of the responses from the research participants, followed by a discussion. It then proceeds to present the results of hypothesis testing using the statistical software (SPSS-V:28).

Description and Diagnosis of Smart Quality Practices: Table 2 indicates that Smart Quality achieved an overall agreement rate for all practices

(79.94%), with a somewhat overall agreement rate of (14.5%), while the overall disagreement rate was 5.56%. The total mean was 4.18, which is higher than the assumed mean for the research (3), with a total standard deviation of 0.872. This suggests that the responding sample has a good level of awareness and interest in all Smart Quality Practices described by the variable of Smart Quality. This provides preliminary evidence that the bank values Smart Quality Practices as its approach and philosophy in managing its operations. One of the practices that contributed the most to the overall response rate was the Information Security practice, as it achieved the highest mean of (4.35) with a standard deviation of (0.851). This suggests that the bank's management places the highest priority on information security for the beneficiaries of its banking services. On the other hand, the practice with the lowest response rate was Big Data Analytics within the Smart Quality Practices, with the lowest mean (3.99) and a standard deviation of (0.893). This indicates that the bank's management is striving to implement intelligent tools for analyzing big data to ensure the bank's success and enhance its reputation.

Description and Diagnosis of the Digital Business Variable: Table 2 shows that this variable achieved an overall agreement rate for all its items (78.53%), with a somewhat overall agreement rate of (13.96%), while the overall disagreement rate was 7.51%. The total mean was 4.10, which is higher than the assumed mean for the research (3), with a total standard deviation of 0.881. This indicates that the surveyed individuals are well aware of the importance of the transition to digital business at Al-Rasheed Bank.

Table 2: *Describes and Diagnoses the Research Variables (N = 42)*

(The Independent Variable	Response Rates %			Mean	S. D	Ranking
Smart Quality Practices	SA,A	SA	SD,D			
Smart Automation (X1-X3)	81.55	12.05	6.4	4.21	0.870	Third
Intelligent Sensing (X4-X6)	77.06	18.2	4.74	4.11	0.873	Fifth
Big Data Analytics (X7-X9)	75.7	17.5	6.8	3.99	0.893	Sixth
Smart Quality Monitoring (X10- X12)	78.90	14.80	6.3	4.17	0.884	Fourth
Information Security (X13- X15)	84.1	10.6	5.3	4.35	0.851	First
Continuous Employee (X16- X18) Training	82.35	13.85	3.8	4.25	0.861	Second

Overall Index (X1- X18)	79.94	14.5	5.56	4.18	0.872	—
(DV Digital Business)						
(X19- X28) Overall Index	78.53	13.96	7.51	4.10	0.881	

Results of the correlation hypothesis test H1: The results presented in Table 3 indicate a significant positive correlation at an overall level between the variables of smart quality practices and digital business in the bank, with a correlation coefficient value of (0.839**), and a significance level of (0.000). Based on these results, it is evident that there are strong statistically significant levels of positive synergy between the studied variables. The findings suggest that an increased emphasis on these practices positively reflects on achieving high-quality digital service. At a partial level, the results reveal a significant correlation between each smart quality practice and digital business. The correlation coefficient value between the practice of "smart automation" and digital business is (0.716**), between "smart sensing" and digital business is (0.701**), and for "big data analytics," it is (0.725**). The practice of "smart quality monitoring" achieved a correlation value of (0.733**), while the correlation for "information security" was (0.773**), and finally, the practice of "continuous employee training" achieved a correlation value of (0.820**). All these correlations were statistically significant at a level of (0.000). This underscores the active role these practices play in the transition towards digital business at Al-Rasheed Bank.

Table 3*: Total and Partial Correlation Coefficients Statistic.*

Individual Smart Quality " "Practices	"Aggregated Digital Business Correlation " ".Coefficient	".Significance Level
Smart Automation	0.716**	0.000
Smart Sensing	0.701**	0.000
Big Data Analytics	0.725**	0.000
Smart Quality Monitoring	0.733**	0.000
Information Security	0.773**	0.000
Continuous Employee Training	0.820**	0.000
Aggregated Smart Quality " ".Practices	0.839**	0.000

Source: Compiled by the researchers based on the results of statistical analysis (N=42, $P \leq 0.05$).

Based on the results of testing the correlation hypothesis H1 at both the overall and partial levels of the research variables, the hypothesis asserting the

existence of a significant positive correlation between smart quality practices and the transition toward digital business at Al-Rasheed Bank is accepted.

Results of Hypothesis Testing H2: The results in Table 4 indicate a positive and significant impact (at an overall level) of the smart quality variable on the transition towards digital business at Al-Rasheed Bank. This is evident from the calculated F-value of 250.868, surpassing the critical value of 4.073 with degrees of freedom (40.1). The impact is further affirmed by the calculated T-value of 15.839, exceeding its critical counterpart of 2.021. Additionally, the significance level (Sig) is 0.000, which is lower than the assumed significance level of 0.05. The coefficient value (β1) is 1.581, and the determination coefficient (R2) is 0.789, indicating that 78.9% of the variation in digital business can be attributed to smart quality practices, emphasizing their significant and effective influence. In the same context, the results in Table (4) show a positive and significant impact of each smart quality practice on digital business at Al-Rasheed Bank. The calculated F-value for "Smart Automation" is 74.608, with a corresponding T-value of 8.638, both exceeding their critical values. The significance level is 0.000, and the coefficient value (β1) is 2.674. The determination coefficient (R2) is 0.527, indicating that 52.7% of the impact on digital business is attributed to smart automation. Similarly, the calculated F-value for "Smart Sensing" is 64.667, with a T-value of 8.042, both surpassing their critical values. The significance level is 0.000, and the coefficient value (β1) is 2.802. The determination coefficient (R2) is 0.527, indicating that 52.7% of the impact on digital business is attributed to smart sensing. For "Big Data Analytics," the calculated F-value is 74.085, with a T-value of 8.607, both exceeding their critical values. The significance level is 0.000, and the coefficient value (β1) is 2.673. The determination coefficient (R2) is 0.525, indicating that 52.5% of the impact on digital business is attributed to big data analytics. The calculated F-value for "Smart Quality Monitoring" is 82.630, with a T-value of 9.090, both exceeding their critical values. The significance level is 0.000, and the coefficient value (β1) is 2.602. The determination coefficient (R2) is 0.552, indicating that 55.2% of the impact on digital business is attributed to smart quality monitoring. For "Information Security," the calculated F-value is 99.685, with a T-value of 9.984, both surpassing their critical values. The significance level is 0.000, and the coefficient value (β1) is 2.093. The determination coefficient (R2) is 0.598, indicating that 59.8% of the impact on digital business is attributed to information security. Finally, the calculated F-value for "Continuous Employee Training" is 137.853, with a T-value of 11.741, both exceeding their critical values. The significance level is 0.000, and the coefficient value (β1) is 2.345. The determination coefficient (R2) is

0.673, indicating that 67.3% of the impact on digital business is attributed to continuous employee training.

Table 4*: Overall and Partial Test Results for the Impact of Smart Quality Practices on Digital Business*

"Aggregated Digital Business							
"Individual Smart Quality Practices"	β1	Sig	F Statistics		T Statistics		(R^2)
			Calculated Value	Tabular Value	Calculated Value	Tabular Value	
Smart Autn.	2.674	(0.000)	74.608	4.073	8.638	2.021	0.527
Smart Sensing	2.802	(0.000)	64.667	4.073	8.042	2.021	0.491
Big Data Analytics	2.673	(0.000)	74.085	4.073	8.607	2.021	0.525
Smart Quality Monitoring	2.602	(0.000)	82.630	4.073	9.090	2.021	0.552
Information Security	2.093	(0.000)	99.685	4.073	9.984	2.021	0.598
Continuous Employee Training	2.345	(0.000)	137.853	4.073	11.741	2.021	0.673
Aggregated Smart Quality Practices".	1.581	(0.000)	250.868	4.073	15.839	2.021	0.789

Based on the results of the hypothesis test H2, both at the overall and partial levels for the research variables, is accepted.

5. Conclusions

The variable of smart quality practices achieved a high level of endorsement from respondents, receiving strong support at 79.94%, with the practice of "Information Security" outperforming at 84.1%. There is a need for improvement in the bank's interaction with the "Big Data Analysis" practice, which received 75.7% support. The digital business variable achieved a support rate of 78.53%, indicating the importance of transitioning to digital business. Opportunities exist to enhance support and interaction in certain areas, especially regarding "Big Data Analysis." Hypothesis H1: There is a positive and significant correlation between "Smart Quality Practices" and "Digital Business" at both overall and partial levels. This suggests that an increased focus on smart quality practices will enhance the delivery of high-quality digital services in the bank. Hypothesis H2: There are positive and significant effects overall for smart quality in the bank's transition to digital business. The determination coefficient values (R2) indicate that 78.9% of the impact on digital business is attributed to smart quality practices. The impact

ranges from 52.5% to 67.3% on a partial level, depending on the type of practice. These results affirm a strong and positive impact of smart quality practices in promoting the bank's digital transformation and enhancing the delivery of high-quality services to customers and beneficiaries. Based on these conclusions, we recommend that the bank reinforces its digital transformation by adopting smart quality practices (artificial intelligence tools) based on the development of a comprehensive strategy. Additionally, the bank should enhance employee capabilities through continuous training, and monitoring technologies, foster innovation, improve interaction with big data analysis, and strengthen information security. Increasing employee awareness of digital business, measuring progress using performance indicators, encouraging research and innovation, collaborating with governmental entities and private sectors, and establishing partnerships for knowledge exchange in the digital transformation field are also essential aspects to focus on.

References

Al-Hosani, O. M., & Tariq, M. U. (2020). Reduction in recruitment time in the mechanical department at the automotive industry using lean six sigma methodology for improving production: A case study. *Journal of Advanced Research in Dynamical and Control Systems*, *12*(5 Sp. Issue), 1386–1397.

Ameen, A., Alfalasi, K., Gazem, N. A., & Isaac, O. (2019). Impact of System Quality, Information Quality, and Service Quality on Actual Usage of Smart Government. *1st International Conference of Intelligent Computing and Engineering: Toward Intelligent Solutions for Developing and Empowering Our Societies, ICOICE 2019, December*. https://doi.org/10.1109/ICOICE48418.2019.9035144

Bajic, B., Suzic, N., Moraca, S., Stefanović, M., Jovicic, M., & Rikalovic, A. (2023). Edge computing data optimization for smart quality management: industry 5.0 perspective. *Sustainability (Switzerland)*, *15*(7), 1–19.

Chesalin, A. N., Grodzenskiy, S. Y., Nilov, M. Y., & Pham, V. T. (2020). Intelligent quality management tools for digital production and knowledge management systems for their application. *IOP Conference Series: Materials Science and Engineering*, *862*(4).

De Leon, D. C., Bhandari, V. A., Jillepalli, A., & Sheldon, F. T. (2017). Using a knowledge-based security orchestration tool to reduce the risk of browser compromise. In *2016 IEEE Symposium Series on Computational Intelligence, SSCI 2016*.

Demerouti, E. (2023). Effective employee strategies for remote working: An online self-training intervention. *Journal of Vocational Behavior*, *142*(March 2022),

Ding, D., Shen, Y., Jiang, J., Yuan, Q., Xiu, T., Ni, K., & Liu, C. (2023). Data collection and information security analysis in sports teaching systems based on intelligent sensors. *Measurement: Sensors*, *28*(June), 100854.

George, G., & Schillebeeckx, S. J. D. (2022). Digital transformation, sustainability, and purpose in the multinational enterprise. *Journal of World Business*, *57*(3).

Hang, N. T., Huy, D. T. N., Hien, D. T., & Nam, V. Q. (2021). IoT impacts and digital transformation at listed Vietnam Banks. Webology, 18(Special Issue), 773–784.

Hsu, H. C., Pan, C. Y., Wu, I. C., Liu, C. C., & Zhuang, Z. Y. (2023). Using the big data analysis and basic information from lecture Halls to predict air change rate. *Journal of Building Engineering*, *66*(October 2022), 105817.

Jabrane, K., & Bousmah, M. (2021). A new approach for training cobots from small amount of data in industry 5.0. *International Journal of Advanced Computer Science and Applications*, *12*(10), 634–646.

Jonathan, G. M., Yalew, S. D., Gebremeskel, B. K., Rusu, L., & Perjons, E. (2023). IT alignment: a path towards digital transformation success. *Procedia Computer Science*, *219*, 471–478.

Kim, S., & Ryu, K. (2020). Intelligent process quality management for supporting collaboration of mold manufacturing SMEs. *Procedia Manufacturing*, *51*(2019), 381–387.

Kraus, S., Durst, S., Ferreira, J. J., Veiga, P., Kailer, N., & Weinmann, A. (2022). Digital transformation in business and management research: An overview of the current status quo. *International Journal of Information Management*, *63*(August 2020).

Leader, T., & Corporation, K. D. (2020). *3d스캐닝을 이용한 건설공사 스마트 품질점검 방안에 관한 연구*. *20*(2), 191–198.

Mariani, M. M., Machado, I., & Nambisan, S. (2023). Types of innovation and artificial intelligence: A systematic quantitative literature review and research agenda. *Journal of Business Research*, *155*(PB), 113364.

Mondal, Goutam. (2023) Digital Transformation in Banking: The Future of Finance. *Vice President @ Citi* Group | *SAFe® 6 Agilist* | *PRINCE2 Agile* | ITIL | Azure Solutions Architect Expert | Lean.

Müller, J. (2020). Enabling technologies for industry 5.0: results of a workshop with europe's technology leaders. *European Commission, September*, 19. https://doi.org/10.2777/082634

Ortakoÿ, S., & Özsürünç, Z. (2019). The effect of digital channel migration, automation and centralization on the efficiency of operational staff of bank branches. *Procedia Computer Science*, *158*, 938–946.

Oztemel, E. (2021). Introduction to Intelligent Quality Management. In *Quality Control - Intelligent Manufacturing, Robust Design and Charts*. https://doi.org/10.5772/intechopen.94971

Rajeshkumar, G., Braveen, M., Venkatesh, R., Josephin Shermila, P., Ganesh Prabu, B., Veerasamy, B., Bharathi, B., & Jeyam, A. (2023). Smart office automation via faster R-CNN-based face recognition and the Internet of Things. *Measurement: Sensors*, *27*(November 2022), 100719.

Reuschl, A. J., Deist, M. K., & Maalaoui, A. (2020). *Since January 2020 Elsevier has created a COVID-19 resource center with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource center is hosted on Elsevier Connect, the company's public news, and information*. *January*.

Samper, M. G., Sukier, H. B., Palencia, D. B., Molina, R. I. R., Alfaro, K. B., Sánchez, Y. S., & Sarmiento, A. C. F. (2022). Digital transformation of business models: influence of operation and trade variables. *Procedia Computer Science*, *203*, 565–569.

Singh*, D. K. (2020). Financial Transactions in the banking industry- various digital initiatives at Axis Bank. *International Journal of Recent Technology and Engineering (IJRTE)*, *8*(6), 2414–2417.

Somasundaram, M., Mohamed Junaid, K. A., & Mangadu, S. (2020). Artificial intelligence (AI) enabled intelligent quality management systems (IQMS) for personalized learning paths. *Procedia Computer Science*, *172*(2019), 438–442.

Sundaram, S., & Zeid, A. (2023). Artificial Intelligence-Based Smart Quality Inspection for Manufacturing. *Micromachines*, *14*(3).

Trischler, M. F. G., & Li-Ying, J. (2023). Digital business model innovation: toward constructing clarity and future research directions. In *Review of Managerial Science*, *17*(1), 3–32.

Verganti, R., Vendraminelli, L., & Iansiti, M. (2020). Innovation and design in the age of artificial intelligence. *Journal of Product Innovation Management*, *37*(3), 212–227.

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Qi Dong, J., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, *122*(July 2018), 889–901.

Wamba-Taguimdje, S. L., Fosso Wamba, S., Kala Kamdjoug, J. R., & Tchatchouang Wanko, C. E. (2020). Influence of artificial intelligence (AI) on firm performance: the business value of AI-based transformation projects. *Business Process Management Journal*, *26*(7), 1893–1924.

Wang, J., Fu, P., & Gao, R. X. (2019). Machine vision intelligence for product defect inspection based on deep learning and Hough transform. *Journal of Manufacturing Systems*, *51*(December 2018), 52–60.

Wilson, M., Fritz, R., Finlay, M., & Cook, D. J. (2023). Piloting Smart home sensors to detect overnight respiratory and withdrawal symptoms in adults prescribed opioids: smart home detection of respiratory and withdrawal. *Pain Management Nursing*, *24*(1), 4–11.

Xu, Z., Dang, Y., & Munro, P. (2018). Knowledge-driven intelligent quality problem-solving system in the automotive industry. *Advanced Engineering Informatics*, *38*(August), 441–457.

Yang, C., Jou, Y., Lin, M., & Silitonga, R. M. (2023). *The Development Model of Design for Smart Quality*. *The Development Model of Design for Smart Quality* . *30*(July). https://doi.org/10.6220/joq.202306

Yazici, İ., Shayea, I., & Din, J. (2023). A survey of applications of artificial intelligence and machine learning in future mobile networks-enabled systems. *Engineering Science and Technology, an International Journal*, *44*.

Yu, H., Fletcher, M., & Buck, T. (2022). Managing digital transformation during re-internationalization: Trajectories and implications for performance. *Journal of International Management*, *28*(4), 100947.

Yudin, I. A., Tokarev, A. N., & Bozhko, Y. V. (2020). Automated smart quality control of commercially manufactured peltier elements. *IOP Conference Series: Materials Science and Engineering*, *709*(4).

Zizic, M. C., Mladineo, M., Gjeldum, N., & Celent, L. (2022). A Paradigm shift for the people, organization and technology. *Energies*.