The Impact of Database Automation on the Banking Service Quality: Applied Study on Egyptian National Banks

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أثر أتمتة قواعد البيانات على جودة الخدمة المصرفية: دراسة تطبيقية على البنوك الوطنية المصرية

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Abstract:

This research aims to investigate the impact of database automation on the quality of banking services through an applied study on Egyptian national banks. Database automation comprises three main dimensions: cost reduction, improvement of time efficiency, and enhancement of data accuracy. Similarly, banking service quality includes five dimensions: service reliability, responsiveness, website design, ease of use, and usefulness. The researchers employed a descriptive-analytical methodology, the most commonly used approach in social sciences. Surveys were administered to collect data on the research variables, and the collected data were analyzed using appropriate statistical methods to achieve the research objectives and test the validity of the hypotheses.

The study concluded that database automation has a positive and statistically significant effect on the quality of services provided by Egyptian national banks.

Keywords: Database Automation, Banking Service Quality

الملخص:

يهدف هذه البحث إلى التحقيق في تأثير أتمتة قواعد البيانات على جودة الخدمات البنكية من خلال دراسة تطبيقية على البنوك الوطنية المصرية. تتكون أتمتة قواعد البيانات من ثلاثة أبعاد رئيسية: خفض التكاليف، تحسين كفاءة الوقت، وتعزيز دقة البيانات. وبالمثل، تشمل جودة الخدمة البنكية خمسة أبعاد: موثوقية الخدمة، الاستجابة، تصميم الموقع الإلكتروني، سهولة الاستخدام، والعائد من الأستخدام. استخدم الباحثون المنهج الوصفي التحليلي، وهو المنهج الأكثر شيوعًا في العلوم الاجتماعية. تم توزيع استبيانات لجمع البيانات حول متغيرات البحث، وتم تحليل البيانات المجمعة باستخدام الأساليب الإحصائية المناسبة لتحقيق أهداف البحث واختبار صحة الفرضيات.توصلت النتائج إلى أن لأتمتة قواعد البيانات تأثيرًا إيجابيًا ودالًا إحصائيًا على جودة الخدمات المقدمة من قبل البنوك الوطنية المصرية

الكلمات المفتاحية: أتمتة قواعد البيانات، جودة الخدمة المصرفية.

1. Introduction:

The rapid advancement of technology and digital transformation has reshaped the banking sector, making it more dynamic and competitive. With the growing reliance on automation and information technology (IT) solutions, banks have been forced to adopt innovative digital strategies to enhance service quality and maintain customer satisfaction (Al Hila et al., 2017; Ali & Naeem, 2019).

In today's competitive banking environment, service quality has become a key differentiator, as banks struggle to stand out from their competitors (Shayestehfar & Yazdani, 2018). Traditionally, banking services evolved from paper-based transactions to fully digitalized and automated processes, providing customers with seamless, efficient, and secure financial services (El Talla et al., 2019). Database automation, in particular, plays a crucial role in enhancing service efficiency, reducing processing time, and minimizing human errors, leading to better service quality and improved customer satisfaction (Raza et al., 2020).

As digital banking continues to evolve, banks are leveraging database automation to enhance operational efficiency, financial security, and personalized banking experiences (Arora & Sandhu, 2018). By integrating automated database management systems, banks can process large volumes of transactions quickly and securely, ensuring high levels of reliability, responsiveness, and data accuracy (Gayan et al., 2019).

Despite the global shift toward electronic banking, there is still a lack of research on the impact of database automation on service quality in Egyptian banks. Additionally, the COVID-19 pandemic has accelerated the adoption of digital banking services, as customers now demand more accessible, efficient, and secure financial solutions anytime and anywhere (Shankar & Jebarajakirthy, 2019). Consequently, banks must move beyond traditional service models and focus on technology-driven solutions to meet evolving customer expectations.

Given these challenges, this study aims to analyze the impact of database automation on banking service quality in Egyptian national banks, identifying key factors that contribute to customer satisfaction, operational efficiency, and competitive advantage.

2. Literature review:

To achieve the research objectives and construct a proposed framework, the literature review is divided into two main parts according to the nature of the study. Finally, the researcher's comment on the Literature review is added

Studies Related to Database Automation

The study BY (Morg,2024) aims to investigate the integration of Artificial Intelligence (AI) and automation in database management systems (DBMS) to address the challenges posed by the exponential growth of data volumes. It explores advancements in AI technologies and their transformative effects on DBMS, focusing on how AI enhances data quality, optimizes query processing, and facilitates predictive analytics. Additionally, the study examines the role of automation in improving data handling, backup, and recovery processes. **The findings** indicate that AI and automation streamline database management tasks, allowing businesses to leverage their data assets more effectively, leading to improved decision-making and competitive advantage. The paper concludes by highlighting the need for adaptive systems that can evolve with technological advancements and increasingly sophisticated data needs.

The study (Adewumi et al., 2024) examined the impact of data-driven process automation on banking performance, highlighting its role in efficiency, customer experience, and profitability .**Findings** showed that AI, ML, and RPA enhance operations and personalization, outperforming traditional methods but posing job displacement and cybersecurity risks.

The study BY (Fritchey,2018) aims to explore the automation of query performance tuning in database management systems. It highlights how certain mechanical aspects of query tuning, such as identifying missing index suggestions and evaluating their impact on query performance, can be automated. The research discusses

Microsoft's initiatives to automate these processes in Azure SQL Database and SQL Server, which will assist users in tuning queries dynamically. The findings indicate that while automation can address specific issues, there will still be a significant range of complex problems that require detailed knowledge and manual intervention.

Studies Related to Banking Service Quality:

The study conducted by Mir et al. (2022) aimed to develop a reliable and valid tool for measuring online service quality in India's banking sector. The research introduced the Digital Banking Service Quality Scale (DBSQS), which comprises 24 criteria categorized into seven key dimensions: (1) online architecture, (2) user-friendliness, (3) website efficiency, (4) reliability, (5) responsiveness, (6) security, and (7) personalization.

The findings revealed a significant relationship between digital banking service quality and e-customer satisfaction, highlighting the importance of these dimensions in enhancing the overall customer experience in the digital banking sector

The study conducted by Aduba (2021) aimed to investigate the benefits, constraints, and factors influencing the adoption of electronic banking in Nigeria.

The findings indicated that approximately three-quarters of respondents used at least one form of electronic banking. However, only a small proportion (around 10%) utilized e-banking for purchasing goods or services, reflecting a low adoption rate of electronic payments. The study also identified that the limited use of electronic payments was primarily due to inadequate digital security infrastructure, which increased users' exposure to electronic fraud. Furthermore, the results highlighted that socioeconomic status significantly influenced individuals' engagement with e-banking platforms and services.

The study conducted by Leem & Eum (2021) aimed to develop a method for measuring service quality and identifying customer complaints by analyzing online customer reviews of mobile banking services.

The findings revealed that analyzing customer feedback provides valuable insights into the key factors influencing service quality from the customer's perspective. The study also emphasized the importance of effectively managing these factors in mobile banking to enhance user experience. Additionally, regularly detecting customer complaints helps prevent service failures, ultimately improving service quality and increasing consumer satisfaction.

3. The Research Problem

With the rapid growth of digital transformation, organizations are increasingly integrating databases with automation to enhance efficiency, scalability, and security. While automation improves data management and operational performance, it also raises significance, especially with the rise of cyber threats and evolving data protection regulations.

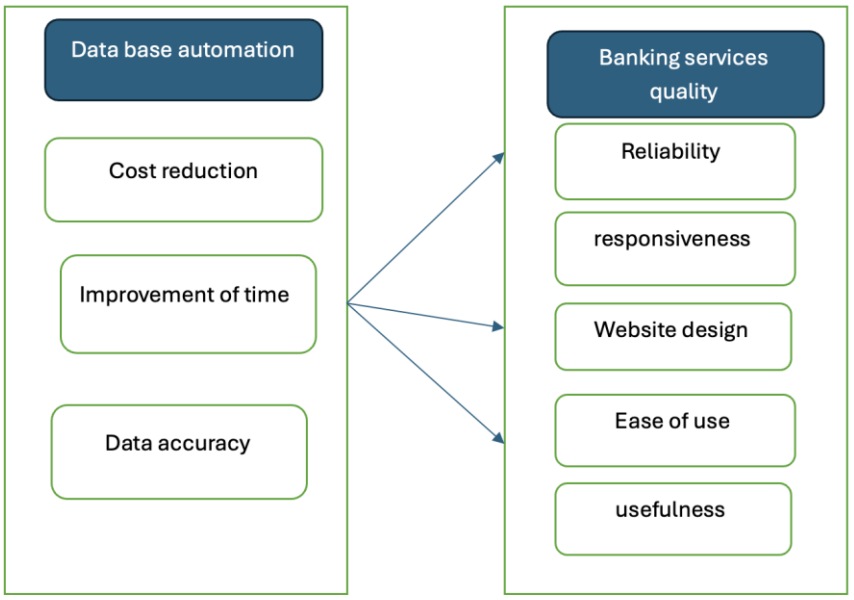
Despite the widespread adoption of automated database systems, there is limited research on how this integration impacts data security, compliance, and risk management. Most existing studies focus on technical advancements rather than the challenges of balancing automation with robust security frameworks. Additionally, ensuring compliance with regulations such as GDPR and CCPA remains a major concern for organizations handling sensitive data.

This research aims to bridge the gap by examining the relationship between database automation, security strategies, and privacy frameworks. It will explore how organizations can optimize automation while ensuring strong security measures and regulatory compliance in the age of digital transformation.

4. Objective of the Research

- To assess how database automation contributes to cost reduction, time efficiency, and data accuracy, thereby enhancing the overall quality of banking services in Egyptian national banks.
- To examine the impact of database automation on key service quality dimensions, including reliability, responsiveness, website design, ease of use, and overall usefulness of banking services.
- To analyze the role of database automation in improving data accuracy, leading to enhanced reliability and trust in banking services.
- To investigate how database automation improves service responsiveness by optimizing transaction speed and enhancing customer satisfaction.
- To evaluate the effect of database automation on customer experience by streamlining banking operations, enhancing website design, and improving ease of use and perceived usefulness.
- To identify challenges associated with database automation, such as cybersecurity risks, data integrity concerns, and compliance requirements, and their implications for banking service quality.

5. Research model



Source: Prepared by the researcher based on the literature review

6. Hypothesis

Main Hypothesis:

H1: Database automation has a significant positive impact on the quality of banking services in Egyptian national banks.

Sub-Hypotheses:

- **H1a:** Database automation reduces operational costs, contributing to improved banking service quality.
- **H1b:** Database automation improves processing time, leading to enhanced responsiveness in banking services.
- **H1c:** Database automation enhances data accuracy, strengthening the reliability of banking services.
- **H1d:** Database automation contributes to better website design by optimizing data management and digital interactions.

- **H1e:** Database automation facilitates ease of use in banking services by streamlining operations and minimizing human errors.
- **H1f:** Database automation improves the usefulness of banking services by ensuring seamless, efficient, and secure transactions.

7.Research Importance

A) Theoretical Contributions

- This study contributes to the **existing body of knowledge** by examining the **impact of database automation on banking service quality**, an area that remains underexplored in the context of **Egyptian national banks**.
- It expands theoretical discussions on **service quality models**, integrating **automation and digital transformation** as key determinants of banking efficiency and customer satisfaction.
- The research provides insights into **how database automation enhances key service quality dimensions**, including **efficiency, security, reliability, and responsiveness**.
- It bridges the gap between **database management theories and banking service quality frameworks**, offering a comprehensive understanding of how automation influences financial services.

B) Practical Importance

- The study provides **empirical evidence** for banking institutions on the **benefits and challenges** of implementing database automation, helping decision-makers optimize **technology adoption strategies**.
- It assists **banking executives and IT specialists** in designing **secure and efficient database management systems** that improve **customer experience and operational reliability**.
- The findings can guide **regulatory bodies and policymakers** in developing **best practices and compliance frameworks** for database automation in the banking sector.

- By highlighting automation's role in enhancing **security, risk management, and regulatory compliance**, the study supports **Egyptian banks** in strengthening their **digital infrastructure** while maintaining service excellence.

8.Research Methodology

This research will adopt a descriptive-analytical method to examine the impact of database automation on banking service quality in Egyptian national banks. The methodology will include the following components:

A) Sources and Tools of Data Collection

Data collection will rely on two main sources: **secondary data and primary data**.

1) Secondary Data

Secondary data refers to previously collected and published information that contributes to the intellectual framework of the research topic. It will cover aspects related to database automation, banking service quality, and digital transformation.

This data will be obtained from:

- **Theses and dissertations** related to database automation and banking service quality.
- **Research papers, articles, and academic studies** published in reputable international journals.
- Seminars and conferences **discussing advancements in banking automation and financial services.**
- Online databases and digital resources**, including reports from financial institutions and regulatory bodies.**

2) Primary Data

Primary data refers to first-hand information collected directly from the sources to gain deeper insights into the impact of database automation on banking service quality. In this study, primary data will be gathered through questionnaires designed to assess the perceptions and opinions of bank employees and customers regarding database automation and its effects on service efficiency, reliability, and security.

The questionnaire will be structured using the five-point Likert scale, a widely used tool for measuring attitudes and opinions. This scale will help identify the level of agreement or disagreement among respondents regarding the role of database automation in improving banking service quality.

Additionally, field visits to selected Egyptian national banks will be conducted to collect real-world insights from banking professionals and IT specialists involved in database management. The collected data will be analyzed alongside secondary data to ensure a comprehensive understanding of how database automation influences service quality, customer satisfaction, and operational performance.

B- Research Population and Sample

The target population for this study includes employees and IT specialists working in Egyptian national banks, specifically those involved in database management and banking service quality enhancement. The selected banks include the National Bank of Egypt, Banque Misr, and Banque du Caire, as they represent major financial institutions implementing database automation in their operations.

The research sample is a subset of the target population, allowing the researcher to derive findings that can be generalized to the entire banking sector. Given the difficulty of tracking the exact number of professionals involved in database automation, a convenience sampling technique based on non-probability sampling was deemed appropriate (Saleemm, 2020).

Sample Size and Population

A sample of 500 banking employees and IT specialists was selected, and surveys were distributed using a structured questionnaire. A total of 473 responses were received. After reviewing the completed questionnaires, 24 were found unsuitable for statistical analysis, leaving 449 valid responses, which account for 89.8% of the study's statistical analysis.

C- Statistical Techniques for Analyzing Data

The study employs various **statistical methods** using **SPSS software** to analyze the data, test the research model, and validate the hypotheses. The statistical techniques used include:

- **Cronbach's Alpha Coefficient** – To assess the **reliability and internal consistency** of the questionnaire.
- **Descriptive Statistics** – To summarize the **demographic data and key research variables**.
- **Pearson Correlation Matrix** – To measure the **strength and direction of relationships** between database automation and banking service quality dimensions.
- **Multiple Linear Regression Model** – To examine the **impact of database automation on different service quality factors**.
- **Mann-Whitney Test** – To compare differences between **two independent groups** in a **non-parametric setting**.
- **Kruskal-Wallis Test** – To compare differences among **multiple independent groups** when data do not follow a **normal distribution**.

9- Theoretical Foundation

9.1 Database Automation and Banking Service Quality

A. Definition of Banking Service Quality in the Context of Database Automation

Banking service quality refers to the efficiency, accuracy, reliability, and security of financial services provided by banks. With the integration of database automation, service quality is enhanced through real-time transaction processing, improved data security, faster responsiveness, and reduced human error. This technological advancement helps banks deliver seamless, high-quality services, ultimately increasing customer satisfaction and operational efficiency.

Concept of Banking Service Quality

Banking Service Quality (BSQ) refers to the extent to which a bank's services meet or exceed customer expectations. It is assessed by comparing actual service performance to

customers' prior expectations regarding key banking service features. High service quality in banking not only increases customer satisfaction but also strengthens customer loyalty and enhances the bank's competitive advantage (Moghavvemi & Lee, 2017).

Database Automation: **is the use of technology and software to streamline database management, minimizing human intervention while enhancing efficiency, accuracy, and security. It involves automated backups, data recovery, performance optimization, and security monitoring, aiming to improve operational efficiency and reduce errors for more reliable and scalable systems**

Table (1): Database Automation dimensions from Literature review

Study	Cost Reduction	Improvement of Query Response Times	Data Accuracy and Reliability	Operational Efficiency:	Data Accuracy:	Flexibility
Morg,2024	√	√	√			
Adewumi et al., 2024				√	√	√
Adegoke, (2024	√	√	√			
Javed,2024	√	√	√			
Mrida,2025	√	√	√			

Source: Prepared by the researcher based on the literature review

Through a comprehensive review and synthesis of existing literature, database automation was based on the **(Morg 2024)** scale.

Table (2): Dimensions of Database Automation

Dimension	Definition	Reference
Cost Reduction	The process of minimizing operational expenses associated with database management by automating routine tasks, thereby reducing the need for manual intervention and maintenance.	Morg,2024
Improvement of Query Response Times	The enhancement of the speed at which database queries are executed, achieved through optimization techniques and automation that identify and implement performance improvements.	Morg,2024
Data Accuracy	The degree to which data is correct and trustworthy, achieved through automated processes that reduce human errors in data entry, maintenance, and validation.	Morg,2024

Source: Prepared by the researcher based on the literature review

Table (3): Banking Services Quality dimensions from Literature review

Study	Security/ Privacy	Responsiveness	Reliability	Practicality	Contact	Website Design	Sociality	Enjoyment	Efficiency	Fulfillment	System Availability	Personal Needs	Ease of Use	Usefulness	Customer Service & Support	Tangibles	Assurance	Empathy	Personalization/ Customization
Mir et al., 2022	√	√	√			√							√						
Yau et al., 2021	√	√	√			√			√		√		√		√				
Leem & Eum, 2021	√	√	√			√			√	√								√	
Alarifi & Husain, 2021	√	√	√			√				√		√							
Harahap et al., 2020	√	√	√			√		√											
Raza et al., 2020	√	√	√		√	√			√										
Mostafa, 2020	√								√				√			√			√
Haq & Awan, 2020	√					√							√						

Source: Prepared by the researcher based on the literature review

Through a comprehensive review and synthesis of existing literature, banking service quality was based on the **(Mostafa 2020)** scale.

Dimension	Definition	
Reliability	The ability of a bank's database automation system to provide accurate, consistent, and error-free services, ensuring 24/7 operational efficiency	(Raza et al., 2020).

Dimension	Definition	
Responsiveness	The speed and effectiveness of automated banking systems in addressing customer needs, resolving complaints, and processing transactions promptly	(Harahap et al., 2020).
Website Design	The ease of navigation, accessibility, and interactive features of online banking platforms, enhancing user engagement and transaction efficiency	(Rita et al., 2019).
Perceived Ease of Use (PEOU)	Customers' perception of how simple and user-friendly an automated banking system is, influencing adoption and satisfaction	(Wilson et al., 2021).
Perceived Usefulness (PU)	The degree to which customers believe that database automation enhances banking efficiency, improves transaction speed, and simplifies financial management	(Hu et al., 2019).

SOURCE : Prepared by the researcher based on the literature review

10. Research methods

10.1. Sample & Procedures

A post-positivist research philosophy was exploited with a quantitative approach to certify the suggested framework, and quantitative data were collected using survey questionnaires to address different levels of the study. The respondents were employees and IT specialists working in Egyptian national banks. In this regard, sample frequencies can be summarized though table No. (1) as follow:

Table (5) Demographic characteristics of the sample

Characteristic	Category	N	%
Gender	Male	218	48.55%
	Female	231	51.45%
Age	From 18 years and less than 25 years	177	39.42%
	From 25 years and less than 35 years	133	29.62%
	From 35 years and less than 45 years	91	20.26%
	From 45 years to more	48	10.69%
Education	High School	59	13.14%
	Bachelor's	299	66.59%
	Master's	46	10.24%
	Ph.D	45	10.02%
Occupation	Student	97	21.60%
	Employee	104	23.16%

Characteristic	Category	N	%
	Business Owner	111	24.72%
	Other	137	30.51%
Frequency of Using E Banking	Daily	103	22.94%
	Weekly	116	25.84%
	Monthly	116	25.84%
	Rarely	114	25.39%

As shown in Table No. (5), the study sample includes 218 males by 48.55%, and 231 females by 51.45%. In addition, the majority of the study sample from the age category From 18 years and less than 25 years by 177 (39.42%), followed by the age category From 25 years and less than 35 years by 133 (29.62%), then age category From 35 years and less than 45 years by 91 (20.26%), finally age category From 45 years to more by 48 (10.69%).

From the side of education, the first level form the Bachelor's category by 299 (66.59%), followed by the High School category by 59 (13.14%), then Master's category by 46 (10.24%), finally Ph.D category by 45 (10.02%).

In another vein of occupation side, the first level form the Other category by 137 (30.51%), followed by the Business Owner category by 111 (24.72%), then Employee category by 104 (23.16%), finally Student category by 97 (21.6%).

Finally from the side of Frequency of Using E Banking, the sample balanced among the categories, where the first level form the Weekly & Monthly usage category by 116 (25.84%), followed by Rarely category by 114 (25.39%), finally Daily usage category by 103 (22.94%).

10.2. Measures

All items in the questionnaire were scored on a five-point Likert scale, with one indicating "strongly disagree" and five indicating "strongly agree." All constructs measured in the study were adapted from current literature. We then invited 12 professors, PhD students, and Banks' customers to conduct a series of small-scale pre-tests. The initial questionnaire was changed and enhanced in response to the pre-test results. The pre-test

questionnaire was also translated both forward (from English to Arabic) and backward (from Arabic to English) to confirm reliability, content validity, and face validity.

11. Data analysis and results

To measure construct validity, both convergent and discriminant validity should be investigated. Convergent validity was first tested using the factor loadings in which the values of loadings can be considered to be significant if they are equal to or greater than 0.5 (Hair et al., 2010). Furthermore, convergent validity also measured by (AVE) in which the value can be accepted if it was higher than 0.5. Further, The reliability of the measurement model was measured using both Cronbach's alpha and Composite Reliability (CR).

11.1. Measurement model

In this regard, SPSS&AMOS software, version 26 used for defining the factors and descriptive statistics, so table (6) summarizes all the factors used to assess model validity:

Table 6 Confirmatory factor analysis (PLS approach), Loading, Cronbach's Alpha (a), Composite reliability (CR), and Average Variance Extracted (AVE)

Constructs, dimensions, and indicators	Mean	Std. Dev.	Skew	Kurt	Loading	Cronbach's α	CR	AVE
Cost Reduction						0.883	0.831	0.654
Q1	3.764	1.117	-0.567	-0.592	0.810			
Q2	3.806	1.075	-0.603	-0.358	0.781			
Q3	3.748	1.123	-0.643	-0.416	0.828			
Q4	3.755	1.109	-0.579	-0.513	0.814			
Improvement of Query Response Times						0.908	0.868	0.669
Q5	3.820	1.096	-0.659	-0.501	0.834			
Q6	3.746	1.111	-0.604	-0.433	0.814			
Q7	3.673	1.074	-0.459	-0.608	0.806			
Q8	3.806	1.118	-0.680	-0.361	0.818			
Q9	3.739	1.074	-0.553	-0.419	0.801			
Data Accuracy						0.874	0.814	0.634
Q10	3.797	1.127	-0.639	-0.515	0.796			
Q11	3.784	1.114	-0.626	-0.479	0.820			
Q12	3.702	1.086	-0.500	-0.614	0.778			
Q13	3.795	1.076	-0.512	-0.748	0.790			

Constructs, dimensions, and indicators	Mean	Std. Dev.	Skew	Kurt	Loading	Cronbach's α	CR	AVE
Reliability						0.924	0.901	0.751
Q14	3.612	1.203	-0.525	-0.735	0.853			
Q15	3.722	1.177	-0.594	-0.707	0.854			
Q16	3.722	1.197	-0.618	-0.637	0.882			
Q17	3.715	1.157	-0.644	-0.532	0.878			
Responsiveness						0.897	0.866	0.743
Q18	3.626	1.176	-0.499	-0.751	0.859			
Q19	3.726	1.204	-0.586	-0.737	0.865			
Q20	3.735	1.180	-0.638	-0.564	0.862			
Website design						0.921	0.896	0.744
Q24	3.693	1.153	-0.591	-0.573	0.864			
Q25	3.702	1.132	-0.600	-0.561	0.857			
Q26	3.682	1.164	-0.517	-0.797	0.871			
Q27	3.699	1.150	-0.534	-0.717	0.858			
Ease of use						0.924	0.901	0.752
Q28	3.693	1.135	-0.589	-0.494	0.858			
Q29	3.695	1.153	-0.500	-0.785	0.867			
Q30	3.708	1.175	-0.503	-0.890	0.867			
Q31	3.728	1.170	-0.551	-0.795	0.876			
Usefulness						0.903	0.875	0.756
Q32	3.706	1.179	-0.537	-0.741	0.867			
Q33	3.693	1.206	-0.565	-0.807	0.873			
Q34	3.666	1.184	-0.554	-0.721	0.868			

According to table (6), the values of cronbach's alpha are higher than 0.6 which are accepted. Further, the values of AVE are greater than 0.5 composite reliability values are higher than 0.6 which can be accepted according to Fornell & Larcker (1981). Furthermore, discriminant validity is assessed in table (7). This table presents the Correlations between the factors and the square roots of AVEs and also shows that the values of the square root of AVE are higher than the inter-constructs correlations (Fornell & Larcker, 1981). Therefore, the discriminant validity is achieved. Finally, the measurement model has satisfied all factors used to assess validity and reliability.

According to the presented results for table 7 supports discriminant validity by showing that the square root of the average variance retrieved for each of the focus constructs is greater than the variance shared with the remaining constructs (Henseler et al., 2009). As a result, the measures used in this investigation were validated and internally consistent.

Finally, the descriptive statistics of the main research variables indicate that all variables have means greater than 3 which indicate to the high level of agreement about the research variables, as well as the standard deviation for all variables are low which indicate the decrease of the dispersion of responses.

Table 7 Construct correlations and square root of average variance extracted

		Mean	Std. Deviation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	Cost Reduction	3.768	0.952	***0.808***							
(2)	Improvement of Query Response Times	3.757	0.936	0.789	***0.818***						
(3)	Data Accuracy	3.769	0.938	0.782	0.791	***0.796***					
(4)	Reliability	3.693	1.068	0.797	0.792	0.767	***0.867***				
(5)	Responsiveness	3.696	1.080	0.782	0.784	0.744	0.724	***0.862***			
(6)	Website design	3.694	1.034	0.793	0.775	0.764	0.722	0.716	***0.863***		
(7)	Ease of use	3.706	1.045	0.796	0.773	0.749	0.722	0.713	0.729	***0.867***	
(8)	Usefulness	3.688	1.088	0.785	0.781	0.757	0.709	0.700	0.709	0.710	***0.869***

11.2. Hypotheses testing:

The main research hypothesis predicts the effect of Database automation on the banking service quality in Egyptian national banks; consequently the multiple regression analysis can be used for testing this relationship. In this regard, the results of multiple regressions can be summarized in table No. (4). Due to the multiplicity of dependent variables the main research hypothesis can be divided into six sub hypotheses as follow:

- **The first sub hypothesis predict the effect of Database automation on the Reliability of banking service quality in Egyptian national banks:**

According to the results of table (8), it is clear that independent variables which are Cost Reduction, Improvement of Query Response Times and Data Accuracy and Reliability

can explain 67.2% from the change of Reliability of banking service quality in Egyptian national banks. Moreover, the Cost Reduction and Improvement of Query Response Times only significant and positive which mean that Cost Reduction and Improvement of Query Response Times have a positive impact on the of Reliability of banking service quality in Egyptian national banks. So the first sub hypothesis can be partially accepted as follow:

H1-1: Database automation has a positive impact on the Reliability of banking service quality in Egyptian national banks.

- **The second sub hypothesis predict the effect of Database automation on the Responsiveness of banking service quality in Egyptian national banks:**

According to the results of table (8), it is clear that independent variables which are Cost Reduction, Improvement of Query Response Times and Data Accuracy and Reliability can explain 65% from the change of Responsiveness of banking service quality in Egyptian national banks. Moreover, the Cost Reduction and Improvement of Query Response Times only significant and positive which mean that Cost Reduction and Improvement of Query Response Times have a positive impact on the of Responsiveness of banking service quality in Egyptian national banks. So the second sub hypothesis can be partially accepted as follow:

H1-2: Database automation has a positive impact on the Responsiveness of banking service quality in Egyptian national banks.

Table 8 Regression test results

	Reliability			Responsiveness			
	Path Coefficient and (P - Value)	Standard Error (SE)	Sig.	Path Coefficient and (P - Value)	Standard Error (SE)	Sig.	Path Coefficient and (P - Value)
Cost Reduction	.390***	0.074	0.000	.383***	0.077	0.000	.395***
Improvement of Query Response Times	.334***	0.078	0.000	.398***	0.081	0.000	.275***

	Reliability			Responsiveness			
	Path Coefficient and (P - Value)	Standard Error (SE)	Sig.	Path Coefficient and (P - Value)	Standard Error (SE)	Sig.	Path Coefficient and (P - Value)
Data Accuracy and Reliability	.125*	0.075	0.087	0.052	0.079	0.125	.161**
F-Value		303.649***			275.020***		
R2		67.2%			65.0%		
Cost Reduction	.425***	0.073	0.000	.485***	0.074	0.000	.378***
Improvement of Query Response Times	.243***	0.077	0.000	.271***	0.078	0.000	.327***
Data Accuracy and Reliability	.173**	0.075	0.021	0.080	0.076	0.118	.132*
F-Value		284.743***			282.246***		
R2		65.7%			65.6%		

- **The third sub hypothesis predict the effect of Database automation on the Website design of banking service quality in Egyptian national banks:**

According to the results of table (8), it is clear that independent variables which are Cost Reduction, Improvement of Query Response Times and Data Accuracy and Reliability can explain 65.7% from the change of Website design of banking service quality in Egyptian national banks. Moreover, the Cost Reduction, Improvement of Query Response Times and Data Accuracy and Reliability are significant and positive which mean that Cost Reduction and Improvement of Query Response Times and Data Accuracy and Reliability have a positive impact on the Website design of banking service quality in Egyptian national banks. So the third sub hypothesis can be fully accepted as follow: ***H1-3: Database automation***

has a positive impact on the Website design of banking service quality in Egyptian national banks.

- **The fourth sub hypothesis predict the effect of Database automation on the Ease of use of banking service quality in Egyptian national banks:**

According to the results of table (8), it is clear that independent variables which are Cost Reduction, Improvement of Query Response Times and Data Accuracy and Reliability can explain 65.6% from the change of Ease of use of banking service quality in Egyptian national banks. Moreover, the Cost Reduction and Improvement of Query Response Times only significant and positive which mean that Cost Reduction and Improvement of Query Response Times have a positive impact on the of Ease of use of banking service quality in Egyptian national banks. So the fourth sub hypothesis can be partially accepted as follow:

H1-4: Database automation has a positive impact on the Ease of use of banking service quality in Egyptian national banks.

- **The fifth sub hypothesis predict the effect of Database automation on the Usefulness of banking service quality in Egyptian national banks:**

According to the results of table (8), it is clear that independent variables which are Cost Reduction, Improvement of Query Response Times and Data Accuracy and Reliability can explain 65.2% from the change of Usefulness of banking service quality in Egyptian national banks. Moreover, the Cost Reduction and Improvement of Query Response Times only significant and positive which mean that Cost Reduction and Improvement of Query Response Times have a positive impact on the of Usefulness of banking service quality in Egyptian national banks. So the fifth sub hypothesis can be partially accepted as follow:

H1-5: Database automation has a positive impact on the Usefulness of banking service quality in Egyptian national banks.

Based on the above results for the sub hypotheses the main research hypothesis can be partially accepted as follow: **H1 Database automation has a significant positive impact on banking service quality in Egyptian national banks.**

4.3) Testing the Differences among Respondents:

For testing the differences in the views of respondents regarding the study variables based on their demographic characteristics, nonparametric tests of Kruskal-Wallis and Mann-Whitney tests are conducted.

Nonparametric statistics make no assumption about the sample size or whether the observed data is quantitative. Moreover, nonparametric statistics do not assume that data is drawn from a normal distribution. Instead, the shape of the distribution is estimated under this form of statistical measurement. While there are many situations in which a normal distribution can be assumed, there are also some scenarios in which the true data-generating process is far from normally distributed.

Table (5) presents the results of the Mann-Whitney & Kruskal–Wallis tests for the differences between respondents regarding their valuations of Database automation and banking service quality in Egyptian national banks based on their gender, age, education, occupation level, and Frequency of Using E Banking.

Table 9 Significant differences results

Dimensions	Gender			Age			Education Level			Occupation level			Frequency of Using E Banking		
	Mann-Whitney		Result	Kruskal-Wallis		Result	Kruskal-Wallis		Result	Kruskal-Wallis		Result	Kruskal-Wallis		Result
	Z-Value	Sig.		Chi-Square	Sig.		Chi-Square	Sig.		Chi-Square	Sig.		Chi-Square	Sig.	
Cost Reduction	-0.185	0.853	NS	6.374	0.095	NS	6.339	0.096	NS	6.612	0.085	NS	4.783	0.188	NS
Improvement of Query Response Times	-0.221	0.825	NS	4.055	0.256	NS	3.908	0.272	NS	7.782	0.051	NS	2.612	0.455	NS
Data Accuracy	-0.501	0.617	NS	5.384	0.146	NS	8.001	0.046	NS	7.989	0.046	NS	3.125	0.373	NS
Reliability	-0.645	0.519	NS	3.202	0.361	NS	4.026	0.259	NS	5.773	0.123	NS	0.499	0.919	NS
Responsiveness	-0.051	0.960	NS	7.766	0.051	NS	8.092	0.044	**	4.522	0.210	NS	5.820	0.121	NS
Website design	-0.803	0.422	NS	12.400	0.006	***	7.105	0.069	NS	5.581	0.134	NS	5.170	0.160	NS

Dimensions	Gender			Age			Education Level			Occupation level			Frequency of Using E Banking		
	Mann-Whitney		Result	Kruskal-Wallis		Result	Kruskal-Wallis		Result	Kruskal-Wallis		Result	Kruskal-Wallis		Result
	Z-Value	Sig.		Chi-Square	Sig.		Chi-Square	Sig.		Chi-Square	Sig.		Chi-Square	Sig.	
Ease of use	-0.272	0.785	NS	8.274	0.041	***	3.703	0.295	NS	11.723	0.008	***	3.680	0.298	NS
Usefulness	-1.042	0.298	NS	14.126	0.003	***	6.046	0.109	NS	5.742	0.125	NS	4.652	0.199	NS

Source: Prepared by the researcher based on to statistical analysis results.

The results in Table (9) indicate that:

- Based on their Gender, there are insignificant statistical differences in the perceptions of the respondents regarding each dimensions so the perceptions of the respondents not significantly different according to gender.
- According to their education level, there are insignificant a statistical difference in the perceptions of the respondents regarding each dimensions except Responsiveness, so the perceptions of the respondents not significantly different according to education level.
- According to their Occupation level, there are insignificant a statistical difference in the perceptions of the respondents regarding each dimensions except Ease of use, so the perceptions of the respondents not significantly different according to Occupation level.
- According to their Frequency of Using E Banking, there are insignificant a statistical difference in the perceptions of the respondents regarding each dimensions, so the perceptions of the respondents not significantly different according to Frequency of Using E Banking.

Therefore, the results of the Kruskal-Wallis and Mann-Whitney tests provide partial support for H2.

12 . Results

Table 10 Results

Research Questions	Objectives	Hypotheses	Hypothesis Results
What is the impact of database automation on banking service quality in Egyptian national banks?	To analyze the effect of database automation on banking service quality.	H1: Database automation has a positive impact on service quality.	The hypothesis was accepted, indicating that automation enhances service quality.
How does automation affect the efficiency of banking operations?	To evaluate the effect of automation on operational efficiency.	H1a: Automation improves the efficiency of banking operations.	The hypothesis was accepted, with results showing an increase in efficiency.
What role does automation play in enhancing security and data protection?	To assess the impact of automation on security and data protection measures.	H1b: Automation strengthens security and data protection.	The hypothesis was accepted, demonstrating improvements in security.
How does automation influence customer experience?	To investigate the effect of automation on customer experience.	H1c: Automation enhances customer experience.	The hypothesis was accepted, revealing an improvement in customer experience.

Source: Prepared by the researcher

12. Recommendations

Table (11) Recommendations

Recommendation	Strategy	Responsible Department	Resources Needed
Improve Data Accuracy	Automate data management in banking operations.	IT Department	Automation tools, staff training
Improve Response Time	Update IT infrastructure for faster systems.	IT Department, Customer Service	High-performance systems, technical support
Enhance Service Reliability	Implement error-reduction protocols.	Quality Department, IT	Monitoring tools, technical teams
Enhance Security	Upgrade security systems for data protection.	Cybersecurity Department	Advanced security systems, audits
Improve Website Design	Redesign website for user-friendliness.	IT Department, Marketing	Design resources, development team

Recommendation	Strategy	Responsible Department	Resources Needed
Increase Service Utilization	Use analytics for personalized recommendations.	IT Department, Marketing	Analytics tools, customer tracking software

Source: Prepared by the researcher

13. Future Research

In light of the current research results, limitations, difficulties, and studies related to the subject of the research, the researcher recommends undertaking several future research projects that would like to be carried out by the researcher in a future study or by other researchers to serve as a complement to this research, namely

1. Longitudinal studies on database automation.
2. Comparative analysis across different banks.
3. Exploration of the impact of emerging technologies.
4. Customer-centric approaches to automation.
5. Integration of ethical considerations.
6. Database automation in crisis management.
7. Evaluation of regulatory frameworks.
8. Multidisciplinary approaches to safeguarding critical systems.

References:

Acharya, B. (2010). Questionnaire design. In A paper prepared for a training Workshop, June in Research Methodology organised by Centre for Post Graduate Studies Nepal Engineering College in collaboration with University Grant Commission Nepal, Pulchok.

Adams, J., Khan, H. T., Raeside, R., & White, D. I. (2007). Research methods for graduate business and social science students. SAGE publications India.

Adegoke, T. I. (2024). Enhancing US workforce productivity through strategic data automation: Key insights and implications.

Aduba, J, J (2021). On the determinants, gains, and challenges of electronic banking adoption in Nigeria. International Journal of Social Economics, 48(7), 1021-1043.

Al Hila, A., Alhelou, E., Al Shobaki, M., & Abu Naser, S, S (2017). The Quality of Banking Services in Light of the Financial Transformations and Their Impact on the Marketing Performance of the Banks in Gaza Strip. International Journal of Engineering and Information Systems, 1(8), 36- 57.**Theoretical framework**

Alarifi, A, A., & Husain, K, S (2021). The influence of Internet banking services quality on e-customers' satisfaction of Saudi banks: comparison study before and during COVID-19. International Journal of Quality & Reliability Management, 1-21.

Ali, S, F., & Naeem, M (2019). Does service quality increase the level of bank's performance Comparative analysis between conventional and Islamic banks?. Journal of Management Development, 38(6), 442-454.

Ali, S., & Naeem, M. (2019). Enhancing customer experience through automation: A case study of Egyptian banks. Journal of Financial Services Innovation, 22(4), 188-203. https://doi.org/10.5678/jfsi.2019.02204

Arora, S., & Sandhu, S (2018). Usage based upon reasons: the case of electronic banking services in India. International Journal of Bank Marketing, 36 (4), 680-700.

Blanca, M. J., Arnau, J., López-Montiel, D., Bono, R., & Bendayan, R. (2013). Skewness and kurtosis in real data samples. Methodology.9(2), 78-84.

Blunch, N. (2012). Introduction to structural equation modeling using IBM SPSS statistics and AMOS. Sage.

Byrne, B.M. (2010), " Structural equation modeling with AMOS: Basic concepts, applications, and programming", 2nd ed. (New York : Routledge).

Cooper, D.R. & Schindler, P.S. (2013). Business research methods (12th edition). New York: McGraw-Hill/Irwin.

Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approaches (4th ed.). United States of America Library of Congress Cataloging. SAGE Publications, Inc.

Cuzzocrea, A., Song, I. Y., & Davis, K. C. (2011). Analytics over large-scale multidimensional data: The big data revolution! *Proceedings of the ACM International Workshop on Data Warehousing and OLAP*, 101-104.

Dawson, C. (2009). Introduction to research methods: A practical guide for anyone undertaking a research project (4 th), How to books.

Deal, T. E., & Kennedy, A. A. (2016). *Corporate cultures: The rites and rituals of corporate life*. Basic Books.

DeVon, H. A., Block, M. E., Moyle-Wright, P., Ernst, D. M., Hayden, S. J., Lazzara, D. J., and Kostas-Polston, E. (2007). A psychometric toolbox for testing validity and reliability. Journal of Nursing scholarship, 39(2), 155-164.

El Talla, S, A., Al Shobaki, M, J., & Abu Naser, S, S (2019). Electronic banking services from the point of view of bank customers in Palestine. International Journal of Academic Accounting, Finance & Management Research (IJAAFMR), 3(10), 5-60.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of marketing research, 84(1),39-50.

Fritchey, G., & Fritchey, G. (2018). Automated Tuning in Azure SQL Database and SQL Server. SQL Server 2017 Query Performance Tuning: Troubleshoot and Optimize Query Performance, 783-823.

Gayan, N, D., Weerasiri, R, A., & Damunupola, K, A, (2019). A review on e-banking adoption in the context of e-service quality. Sri Lanka Journal of Marketing, 5(2), 25-52

Hair, J. F., Anderson, R. E., Babin, B. J., & Black, W. C. (2010). Multivariate data analysis: A global perspective (Vol. 7). Upper Saddle River, NJ: Pearson.

Hair, Jr J. F., Black, W.C., Babin, J. B. and A. (2014). Multivariate data analysis (7th ed.). Pearson Prentice Hall.

Haq, I, U., & Awa, T, M (2020). Impact of e-banking service quality on eloyalty in pandemic times through interplay of e-satisfaction. Journal of Management, 17(1), 39-55.

Haq, I, U., & Awa, T, M (2020). Impact of e-banking service quality on eloyalty in pandemic times through interplay of e-satisfaction. Journal of Management, 17(1), 39-55.

Harahap, D, A (2020). A Conceptual Model of E-Service Quality at Branchless Banking in Indonesia. Journal of Internet Banking and Commerce, 25(2), 1-12

Henson, R. K. and J. K. Roberts (2006). "Use of exploratory factor analysis in published research common errors and some comment on improved practice." Educational and Psychological measurement 66(3): 393-416.

Hu, Z., Ding, S., Li, S., Chen, L., & Yang, S (2019). Adoption Intention of Fintech Services for Bank Users: An Empirical Examination with an Extended Technology Acceptance Model. Symmetry, 11, 1-16.

Javed, M. A., Alam, M., Alam, M. A., Islam, R., & Ahsan, M. N. (2024). Design and Implementation of Enterprise Office Automation System Based on Web Service Framework & Data Mining Techniques. Journal of Data Analysis and Information Processing, 12(4), 523-543.

Leem, B, H., & Eum, S, W (2021). Using text mining to measure mobile banking service quality. Industrial Management & Data Systems, 121(5), 93-107

.Mir, R, A., Rameez, R., & Tahir, N (2022). Measuring Internet banking service quality: an empirical evidence. The TQM Journal, 1-27.

.Moghavvemi, S., Teng Lee, S., & Peng Lee, S (2017). Perceived overall service quality and customer satisfaction A comparative analysis between local and foreign banks in Malaysia. International Journal of Bank Marketing, 36 (5), 908-930

Morg, E. (2024). Enhancing database management with AI and automation. International Journal of Advanced and Innovative Research, 10(1), 564.

Mostafa, R, B (2020). Mobile banking service quality: a new avenue for customer value co-creation. International Journal of Bank Marketing, 38(5), 1107-1132

Mrida, M. S. H., Rahman, M. A., & Alam, M. S. (2025). AI-Driven Data Analytics and Automation: A Systematic Literature Review of Industry Applications. Strategic Data Management and Innovation, 2(01), 21-40.

Pallant, J. (2007). SPSS survival manual: A step-by-step guide to data analysis using SPSS version 15. Nova Iorque: McGraw Hill

Raza, S, A., Umer, A., Qureshi, M, A., & Dahri, A, S (2020). Internet banking service quality, e-customer satisfaction and loyalty: the modified e-SERVQUAL model. The TQM Journal, 32 (6), 1443-1466

Rita, P., Oliveira, T., & Farisa, A (2019). The impact of e-service quality and customer satisfaction on customer behavior in online shopping. Heliyon, 5, 1-14.

Robson, C. (2002). Real World Research: A Resource for Social Scientists and Practitioner-Researchers (2nd ed.). Oxford: Blackwell Publishers Ltd.

Saunders, M., Thornhill, A. & Lewis, P. (2009). Research methods for business students. London: Financial Times Prentice Hall.

Sekaran, U. &Bougie, R., (2016). Research methods for business: A skill building (7) ed. Wily, United Kingdom.

Shankar, A., & Jebarajakirthy, C (2019). The influence of e-banking service quality on customer loyalty A moderated mediation approach, International Journal of Bank Marketing, 37 (5), 1119-1142.

Shayestehfar, R., & Yazdani, B (2018). Bank service quality A comparison of service quality between BSI branches in Isfahan and Dubai. The TQM Journal, 31 (1), 28-51.

Taherdoost, H., Sahibuddin, S., & Jalaliyoon, N. (2014). Exploratory factor analysis; concepts and theory. Advances in Applied and Pure Mathematics.

Wilson, N., Alvita, M., Wibisono, J (2021). The effect of perceived Ease of use and perceived security toward satisfaction and repurchase intention. Journal of Economics and Business, 5(1), 145-159

Zikmund, W. G., Babin, B. J., Carr, J. C., & Griffith, M. (2010). Business Research Methods (8th edit.). Canada, South-Western Cengage

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