



The Reality of Digital Transformation Among a Sample of Public and Private Banks in Algeria

Siham AGRANE*

Tipaza University (ALGERIA), Email: sihemagrane@gmail.com

Received: 10/02/2026

Accepted: 12/06/2026

Published: 02/07/2026

Summary:

This study aimed to analyze the reality of digital transformation in Algerian public and private banks, by assessing the level of adoption of its various dimensions and revealing statistical differences between the two types of banks. The study relied on the descriptive analytical approach, based on a questionnaire distributed to an intentional sample of (147) employees representing the study population working in a number of Algerian public and private banks. To analyze the data, SPSS software was used, employing descriptive statistics, the One Sample T-test (One Sample T-test) to measure the level of adoption of digital transformation, and the Independent Samples T-test (Independent Samples T-test) to detect differences between public and private banks. The results showed a high level of adoption of digital transformation in the banks under study, with the strategic dimension leading the way in digital transformation. They also revealed statistically significant differences between public and private banks in favor of private banks. The study recommended enhancing investment in digital infrastructure, developing the digital competencies and skills of workers, developing digital culture, modernizing regulatory frameworks, and benefiting from the successful experiences of private banks to accelerate digital transformation in the Algerian banking sector.

Keywords: digital transformation; public banks; private banks; Algerian banks.

Résumé

Cette étude visait à analyser la réalité de la transformation numérique dans les banques publiques et privées algériennes, en évaluant le niveau d'adoption de ses différentes dimensions et en révélant des différences statistiques entre les deux types de banques. L'étude s'est appuyée sur l'approche analytique descriptive, basée sur un questionnaire distribué à un échantillon intentionnel de (147) employés représentant la population étudiée travaillant dans plusieurs banques publiques et privées algériennes. Pour analyser les données, le logiciel SPSS a été utilisé, en utilisant des statistiques descriptives, le test T One Sample (One Sample T-test) pour mesurer le niveau d'adoption de la transformation numérique et le test T Independent Samples (Independent Samples T-test) pour détecter les différences entre les banques publiques et privées. Les résultats ont montré un niveau élevé d'adoption de la transformation numérique dans les banques à l'étude, avec la dimension stratégique en tête de la transformation numérique. Ils ont également révélé des différences statistiquement significatives entre les banques publiques et privées en faveur des banques privées.



L'étude a recommandé de renforcer les investissements dans l'infrastructure numérique, de développer les compétences et les qualifications numériques des travailleurs, de développer la culture numérique, de moderniser les cadres réglementaires, et bénéficier des expériences réussies des banques privées pour accélérer la transformation numérique du secteur bancaire algérien.

Mots-clés : transformation numérique ; banques publiques ; banques privées ; banques algériennes

Introduction:

In recent decades, the world has witnessed rapid transformations driven by the digital revolution and continuous advancements in information and communication technology, which have contributed to the reshaping of various economic sectors, foremost among them the banking sector. Digital transformation is no longer limited to the use of modern technologies in operational processes; rather, it has become a strategic approach aimed at redesigning business models, developing organizational structures, and improving service quality, thereby enhancing the operational efficiency and competitiveness of institutions.

The banking sector is among the sectors most affected by these transformations, given its reliance on information and digital technologies to deliver its services. The proliferation of modern financial technologies, electronic banking services, mobile applications, and electronic payment systems to a paradigm shift in the delivery of banking services by accelerating transactions, reducing costs, and improving the customer experience, making digital transformation a strategic choice to ensure the sustainability of banks and enhance their competitiveness in a changing banking environment.

In Algeria, the banking sector has witnessed growing interest in digital transformation in recent years, driven by reforms adopted by public authorities and programs to modernize the financial system. Efforts have focused on developing electronic payment methods, expanding the use of bank cards, launching digital banking applications, and strengthening banks' digital infrastructure. Despite these efforts, levels of digital transformation adoption still vary from one bank to another, particularly between public and private banks, due to differences in technical and regulatory capabilities, the level of investment in technology, and the flexibility of administrative structures. Accordingly, this study aims to analyze the reality of digital transformation in Algerian public and private banks by assessing the level of adoption of its various dimensions and identifying statistical differences in the level of digital transformation between the two types of banks, thereby contributing to a scientific understanding of the state of digitization in the Algerian banking sector and identifying areas for further development.

1. Research Plan:

Research Problem: Despite the growing trend toward digitization of the banking sector in Algeria and the expansion of electronic financial services, the adoption of digital technologies does not necessarily mean achieving the desired developmental impact, as the issue is not limited to the provision of digital services but extends to the extent of their actual use and their ability to attract



new segments to the formal financial system. Given the persistence of certain limitations in banking transactions and the dominance of cash-based transactions, the question remains:

What is the level of adoption and implementation of digital transformation in Algerian banks?

1.1 Study Hypotheses: Based on the research problem, the following hypotheses were formulated:

- **First Main Hypothesis:** There are statistically significant differences in the level of adoption and implementation of digital transformation among the Algerian banks under study.

This hypothesis includes the following two sub-hypotheses:

- There are statistically significant differences in the assessment of digital transformation indicators among Algerian banks;
- There are statistically significant differences in the level of digital transformation adoption between public and private banks in Algeria;

- **Second Main Hypothesis:** There are statistically significant differences in the level of adoption and use of digital services between public and private banks in Algeria.

This hypothesis includes the following two sub-hypotheses:

- There are statistically significant differences in the level of adoption of digital services between public and private banks in Algeria;
- There are statistically significant differences in the level of digital service usage between public and private banks in Algeria.

1.2 Significance of the Study: The significance of this study lies in the following:

- Highlighting the reality of digital transformation in Algerian banks by assessing the level of adoption of its various dimensions, thereby contributing to a comprehensive picture of the maturity level of digital transformation in the banking sector;
- Comparing public and private banks in terms of their adoption of digital transformation and identifying similarities and differences between them, thereby helping to identify strengths and areas for improvement;
- To enrich the Arabic literature on digital transformation in the banking sector, particularly given the limited number of applied studies that have addressed the reality of digital transformation in Algerian banks from a comparative perspective;
- To provide scientific findings that decision-makers and bank management can use to formulate more effective strategies for accelerating digital transformation and enhancing the efficiency of banking services;
- To provide practical and reliable indicators for the development of policies and programs aimed at developing the digital infrastructure of the Algerian banking sector and enhancing its ability to keep pace with global technological developments.

1.3 Objectives of the Study: This study aims to achieve the following objectives:

- **Study Methodology:** This study employed a descriptive-analytical approach alongside a statistical approach. This methodology aims to describe the current state of digital transformation in the public and private banks under study and to analyze the views of employees and digital



transformation officials regarding digital banking services and their impact on expanding the user base.

▪ **Study Population and Sample:** The study population consists of a sample of public banks (Algerian Foreign Bank, National Bank of Algeria) and private banks in Algeria (Al-Salam Bank, Algerian Gulf Bank), as they constitute the institutional framework for implementing digital transformation policies. A purposive sample was selected, comprising bank employees at the general management level across various administrative and technical categories. After obtaining approval from digital transformation unit officials, an electronic questionnaire was distributed, and 147 responses were collected from employees to ensure the accuracy and quality of the data.

Theme 1: The Theoretical Framework for Digital Transformation in the Banking Sector

Digital transformation in the banking sector reflects efforts to integrate modern technologies into banking operations to provide more efficient and flexible services and meet customer expectations in innovative ways. The following is a detailed overview of digital transformation in banks:

1. Definition of Digital Transformation in the Banking Sector

In a research paper published by the International Monetary Fund titled "Stay Competitive in the Digital Age: The Future of Banks", digital transformation in the banking sector is defined as follows: "Digital transformation is the use of new and rapidly evolving digital technologies to transform business activities, capabilities, and business models, such as computers, mobile phones, and digital tablets—that is, technologies that use information in the form of digital code. Given the widespread use of digital technology in our daily lives, the term ‘digital transformation’ is often used interchangeably with ‘technological advancement,’ as many of the most prominent new technologies rely on or are intertwined with digital platforms, such as Google’s search engine and the social media platforms of Facebook or Twitter" (Liu, 2021,p6)

- IBM^{1*} has also defined digital transformation in the banking sector as: "the process of integrating digital technologies and strategies to improve operations and enhance personal experiences across the financial services industry; this process can occur by breaking down data silos and reimagining the customer experience" (Finn, 2024) ;
- Salesforce ^{*} has defined digital transformation as: "the process of using digital technologies to improve the delivery of financial services, encompassing four key areas: customer experience, data analytics and insights, operational efficiency, and business model innovation " (Salesforce, 2025).

^{*} **IBM – International Business Machines Corporation:** Founded in 1911 in New York, IBM is a multinational technology company and one of the oldest and largest information technology companies in the world. IBM has contributed to the digital transformation of banks through artificial intelligence, cloud computing, and Blockchain solutions, enabling them to improve the customer experience, enhance security, and accelerate financial innovation.



Based on the above, digital transformation in banking can be defined as banks' use of digital technology to manage their business, services, and operations; to process and analyze their data; to facilitate interaction among their staff; and to conduct transactions entirely electronically in a fully secure digital environment, relying on protected databases. that is, the process by which banks and financial institutions adopt digital technology to improve and develop their services and products, thereby providing customers with a more efficient and faster banking experience. This transformation includes the use of modern technologies such as artificial intelligence and cloud computing, as mentioned earlier.

2. Drivers of Digital Transformation in the Banking Sector

The banking sector has moved toward digital transformation as a result of changing customer expectations, technological advancements, the emergence of Fintech companies, and regulatory changes, along with efforts to reduce costs, enhance cybersecurity, and leverage data. Adopting digital transformation is essential for banks to improve the customer experience, enhance their competitiveness, and achieve greater operational efficiency.

Digital transformation in banking encompasses a wide range of digital applications and services, such as document digitization, electronic signatures, e-learning and training, remote conferencing, trading platforms and digital stores, electronic account statements, and mobile payments, and as customers increasingly rely on these digital alternatives, new digital banking solutions continue to emerge to meet their growing needs (Loannis Giatsidis, 2021,p1) It is one of the channels through which banks deliver their services on certain platforms, including online services, They also serve as a mechanism that enables banks to provide customers with access to their accounts and the ability to conduct transactions through electronic communication channels (Ali Ardan Hatem Khudair, 2020,p3). Some researchers believe that the drivers behind digital transformation in banks stem from:

- a. **The emergence of Fintech companies:** The Fintech sector has emerged as one of the most prominent manifestations of digital transformation in financial services, shifting from a role as a technological supporter of banks to that of a direct competitor by offering innovative, more flexible, and lower cost financial services, which has contributed to improving the customer experience and increasing the efficiency of financial services;
- b. **Changing customer expectations and growing needs:** Improving the customer experience is the primary driver of digital transformation, as customers now expect fast, easy, and innovative digital services tailored to their needs and behaviors. Consequently, banks are striving to develop their digital services and offer personalized solutions that enable customers to access services more efficiently and quickly;
- c. **Increased competition among banks:** Due to intensified competition among various banks, these institutions have introduced innovative digital services and invested in modern technologies to modernize their services and products, thereby maintaining and expanding their market share in the future;



d. Digital disruption: Digital disruption refers to the radical change that emerging digital technologies bring about in markets and industries by altering behaviors, expectations, and traditional ways of working; It is considered one of the most important drivers of digital transformation in banks, as it leads to changing customer needs and increased competition with Fintech companies, prompting banks to develop their services and adopt more innovative and flexible business models (Ditshego, 2018, p19-p24) ;

e. Regulatory Environment and Government Policies: Regulatory requirements and government policies aimed at promoting financial inclusion compel financial institutions to embrace digital transformation. Consequently, the banking sector faces increasing pressure from central banks and the government to adopt digitalization, further driven by customers' desire for faster, easier, and less expensive banking services (Layash, 2014-2015, pp. 18-19)

3. Stages of Digital Transformation in the Banking Sector

Digital transformation and the use of technology by banks have gone through six stages, which are:

a. The Entry Phase: The entry phase marked the beginning when banks began relying on technology to address back-office business issues, enlisting the help of IT specialists to find solutions to delays in preparing financial and accounting reports, without direct intervention from middle or upper management, as the focus was on addressing operational challenges related to banking;

b. The Technology Awareness Phase: The technology awareness phase refers to the period during which bank employees' understanding of modern technologies began to be enhanced through training programs that focused more on technical aspects than on traditional business knowledge;

c. The Phase of Communications Integration and Immediate Customer Service Provision: This phase was characterized by high costs; as senior management began to take an interest in technology;

d. The Cost Control Phase: This phase involved regulating investment in technology, and management sought the assistance of technology specialists and consultants to help control costs;

e. The Phase of Treating Technology as an Asset Like Any Other Bank Asset: In this phase, technology was recognized as an asset of the institution and, as such, was expected to generate returns like other assets.

This marked the beginning of technology management;

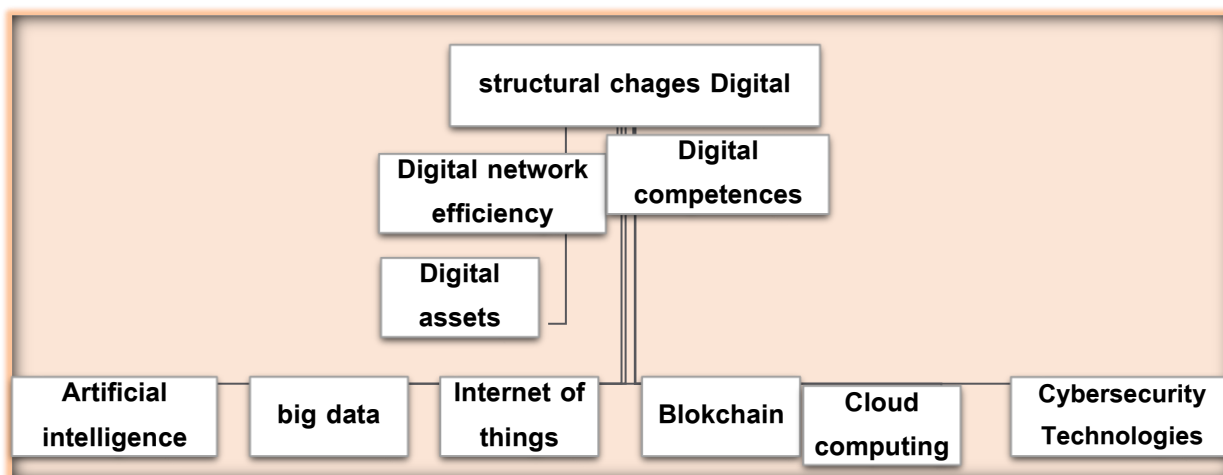
f. The journey of treating technology as a business function within the bank—total digital transformation: This is the stage at which strategic technology management began, focusing on boosting internal productivity to improve operational efficiency and marketing technology externally (Al-Abd Al-Lat, 2008, pp. 25-26).

4. Strategic Requirements for Implementing Digital Transformation in the Banking Sector

The stages of digital transformation in the banking sector rely on a set of key requirements for their effective implementation, which contribute to success and sustainability and can be summarized in the following figure:



Figure 1: Strategic Requirements for Digital Transformation in the Banking Sector



Source: Prepared by the researcher based on the reference: Husham Amen, (2022), **Digital Transformation in Banks**, (chapter from an unpublished doctoral dissertation), Benha University, Egypt, pp. 23–28.

This figure illustrates the strategic framework for digital transformation in banks through an interconnected hierarchical structure that begins with foundational technologies and culminates in organizational transformations. At the base, enabling technologies such as artificial intelligence, big data, the Internet of Things, Blockchain, cloud computing, and cybersecurity technologies the technological foundation supporting the transformation. Resting upon this foundation is the layer of digital assets—comprising data and digital systems— which are treated as a strategic resource, followed by improving the efficiency of digital networks and developing digital skills, thereby enhancing the operational and innovative capabilities of banking institutions, Ultimately, the outcomes of this journey manifest in profound structural changes and the reorganization of digital resources within the bank, ensuring digital integration, increased efficiency, and enhanced competitiveness in the modern banking environment.

5. The Wilnar Digital Readiness Assessment Model

This model consists of six dimensions, which we explain as follows:

- a. **Strategy:** Researchers believe that the success of digital transformation strategies can only be achieved through their adoption at all levels within the organization, along with the provision of adequate resources and their periodic updating. Management must also clarify the vision and support the implementation of the roadmap, in addition to adopting a proactive approach to monitoring and evaluating new trends in both technology and customer behavior;
- b. **Organizational Structure:** This dimension involves organizations' ability to adapt quickly to technological and market changes by moving away from traditional hierarchical structures and adopting more flexible ones, It is based on empowering employees and making faster decisions, as well as establishing small innovation units such as digital labs or digital factories, where



multidisciplinary teams work to rapidly develop new products and services, thereby reducing time to market and enhancing competitiveness;

- c. Digital Culture:** The success of digital transformation depends heavily on an organizational culture that encourages creativity, experimentation, and learning from mistakes, while empowering employees to make decisions flexibly. This requires a strong commitment from senior leadership to support the digital strategy, highlighting the role of digital leaders capable of managing complexity and embedding a culture of sustainable innovation within **the organization**;
- d. Technology:** The technological dimension focuses on adopting modern digital technologies and emerging technologies to enhance the organization's agility and speed by leveraging advanced infrastructures such as application programming interfaces (APIs) and cloud computing. There is also growing attention to information security, which requires strict adherence by employees to security protocols, while organizations conduct cyber threat scenario tests to ensure business continuity and data availability;
- e. The Customer:** The customer is a central focus of digital transformation, as they have opportunities to interact with organizations through both traditional and digital channels. To achieve a seamless experience, content consistency and unified customer service approaches must be ensured across all channels. This also requires the use of digital technologies to collect and analyze customer data, enabling organizations to predict customer behavior and offer personalized products and services that enhance the quality of the experience. Customers are no longer satisfied with merely having their demands met; they expect organizations to anticipate their future needs and involve them in the innovation and product development process;
- f. Employees:** This dimension focuses on the importance of the human element in digital transformation by developing employees' digital skills and their ability to solve complex problems, while adopting innovative training programs in collaboration with universities and incubators to attract talent. It also requires providing a flexible and attractive work environment through remote work and coworking spaces, thereby boosting motivation and reducing costs (Jimmy Bumann, 2019, p 26-p30).

 **Example:** A global bank implemented the Willnar Digital Readiness Model across six dimensions: digital strategy, agile organizational structure, culture of innovation, advanced technology, customer focus, and employee capability development. This implementation contributed to improved service efficiency and increased customer use of digital services, ultimately enhancing the bank's digital readiness and customer satisfaction. It is likely that Singapore's DBS Bank has implemented the Wilnar Digital Readiness Model, though without explicitly stating so. Its digital transformation has been documented in prestigious academic case studies; In 2023, Harvard Business School published a case study on the bank's digital transformation journey, which Professor Ranjay Ghulati described as a model taught to Executive MBA students. Ghulati noted that the digital transformation at DBS was not merely a technical



upgrade, but rather a strategic cultural transformation that encompassed all levels of the organization, with a focus on innovation and organizational agility (DBS, 2023)..

Second Focus Area: The Reality of Digital Transformation in a Sample of Public and Private Banks in Algeria

The study population consists of the public and private Algerian banks under study. A number of electronic questionnaires were sent out, as shown in the following table:

Table 1: Number and Percentage of Questionnaires Sent and Valid for Analysis

Data	Online Questionnaire Responses	Electronic Surveys Received	Cancelled questionnaires	Valid questionnaires For Analysis
Number of Surveys Sent to Employees	147	147	0	147
Percentage	100%	100%	0%	100%

Source: Prepared by the researcher based on the questionnaires.

1. Determining the Data Distribution and Selecting Statistical Analysis Methods

The data were processed and statistically analyzed using the Statistical Package for the Social Sciences (SPSS V26), relying on a set of statistical methods provided by the software that were appropriate for the nature and objectives of the study. The arithmetic mean of the items for each dimension of the questionnaire was also used to construct the study variables. This was achieved by combining the responses to the items within each dimension into a single quantitative value representing the response level of the sample participants, which facilitated the statistical analysis and allowed for a more accurate and objective testing of the study's hypotheses.

a. Determining the Type of Data Distribution

- **Testing Skewness and Kurtosis:** To verify the extent to which the data follows a normal distribution, statisticians examine the skewness and kurtosis coefficients. They indicate that the data is considered close to a normal distribution if the skewness coefficient lies between (-1) and (+1), while the kurtosis coefficient must fall within the range of (-3) to (+3). Adherence to these limits is an indicator of a moderate data distribution free from extreme deviations or excessive concentration around the mean. The following table shows the calculated values of the skewness and kurtosis coefficients for the study variables, allowing for an assessment of the nature of the sample data distribution and its suitability for the use of parametric statistical tests;
- **Kolmogorov–Smirnov Test, Shapiro–Wilk Test:** When analyzing the type of data distribution using SPSS, the Test of Normality provides the results of both the Kolmogorov–Smirnov test and the Shapiro–Wilk test within the same results table. The Kolmogorov–Smirnov test is typically used when the sample size is greater than or equal to 50 cases, while the Shapiro–Wilk test is used if the sample size is less than 50 cases.

**Table 2: Results of the Skewness and Kurtosis Tests for the Employee Questionnaire Data**

Variables	Kurtosis	Skewness			Result
Digital Transformation Variable Data	Statistic	Base	Statistic	Rule	Normal Distribution
	-0.368	The values of the skewness coefficient must range between { 1, +1 }	1.282	The values of the skewness coefficient must range between { 3, +3 }	

Source: Prepared by the researcher based on the questionnaires.

Table No. shows the nature of the study data distribution based on the skewness and kurtosis coefficients for the digital transformation variable. The skewness value was (-0.368), which falls within the acceptable range for a normal distribution (± 1), indicating relative symmetry in the data with a slight skew toward higher values. Kurtosis was recorded as 1,282, which is also within the acceptable range (± 3), indicating that the data distribution is moderate and lacks extreme outliers; therefore, the data for this variable can be considered close to a normal distribution, to determine the extent to which the study variable approximates a normal distribution before applying statistical analyses, the following table shows the results of the test of normality for the employee response data.

Table 3: Results of the "Test of Normality" for the respondents' data

Variable	Shapiro-Wilk Sig			Kolmogorov-Smirnov Sig			Distribution Follows a
	sig	df	Statistic	sig	df	Statistic	
Digital Transformation	0,160	147	0,885	0,200	147	0,160	normal distribution

Source: Prepared by the researcher based on the questionnaires

The table shows that the Kolmogorov-Smirnov test yielded a value of (Sig = 0.200) and the Shapiro-Wilk test a value of (Sig = 0.160), both of which are greater than the significance level of 0.05, indicating that the data for this variable follow a normal distribution. This allows for the use of parametric statistical tests to analyze the level of digital transformation and test the study's hypotheses with confidence and accuracy.

b. Statistical Methods Used in the Study: The data in this study were analyzed using



Statistical Package for the Social Sciences (SPSS), Version 26, employing a set of statistical methods, which are summarized below:

- Frequencies and percentages;
- Arithmetic mean;
- Standard deviation;
- Cronbach's Alpha;
- Test of normality;
- Multiple Linear Regression Model;

This study will focus on the statistical indicators that serve to analyze the relationship of the phenomenon under study in our research, namely: Pearson's correlation coefficient to measure the strength and direction of the relationship between the two variables, and the coefficient of determination R^2 , which measures the extent to which the dependent variable is explained by the independent variable and reveals the proportion to which the independent variable influences the dependent variable; the larger this proportion, the greater the contribution. The remaining proportion is attributed to other variables outside the study as well as to random error, with its value ranging between 0 and 1; The non-standardized regression coefficient (the actual effect size) B, which represents the amount by which the dependent variable increases when the value of the independent variable is increased by one unit;

- One-Sample T-Test;
- One-Way ANOVA;
- Significance level (α); - Decision rule.
- **Instrument Reliability:** The reliability of the dimensions and factors of the questionnaire used in this study was verified using Cronbach's alpha, which is one of the most commonly used measures of reliability among researchers. This measure aims to ensure that the instrument can produce the same results or conclusions if it is reapplied under similar conditions or to different samples.

Table 4: Reliability and Validity Coefficients for the Study's Dimensions (Employee Questionnaire) Using Cronbach's Alpha

	Number of phrases	Cronbach's Alpha	Self-validity coefficient
Digital Transformation	21	0,924	0,970

Source: Prepared by the researcher based on the questionnaires

The results in the table indicate that the study's instrument exhibits a high degree of reliability and validity, confirming its suitability for statistical analysis. The digital transformation dimension recorded a Cronbach's alpha coefficient of 0.924 and an internal consistency reliability coefficient



of 0.970, reflecting strong internal consistency and confirming that the questionnaire results can be relied upon to test the study's hypotheses with scientific confidence.

2. Descriptive Analysis of the Study Variable (Digital Transformation): which we will divide into:

- a. **Descriptive analysis of personal variables:** The demographic characteristics of the study sample included a set of variables, as shown in the following table:

Table 5: Descriptive Analysis of Demographic Variables from the Employee Questionnaire

Variable	Description	Frequency	Percentage
Gender	Male	84	57,1
	Female	63	42,9
	Total	147	100
Age	Under 30 years old	23	15,6
	30 to under 40 years old	48	32,7
	40 to under 50 years old	53	36,1
	Over 50 years old	23	15,6
	Total	147	100
Educational Qualification	High school	02	1,4
	College	55	37,4
	Graduate Studies (Master's, Ph.D.)	89	60,5
	Other	01	0,7
	Total	147	100
Current Position	Central Director	4	2,7
	Branch Manager	13	8,8
	Deputy Director	5	3,4
	Executive Director	3	2
	Head of the Digital Transformation Unit	4	2,7
	Banking Executive	44	29,9
	Finance Representative	4	2,7
	Administrative Staff	17	11,6
	Head of a Division at DCR within BEA	1	0,7
	Head of the Information Technology Department	1	0,7
	Senior Information Technology Specialist	2	1,4
	Banking Transactions Processing Officer	2	1,4
	Engineering and Roads Standards Department Employee	1	0,7



	Head of Studies		3	2
	Head of Division		1	0,7
	Mid-level Manager		20	13,6
	Responsible		15	10,2
	Department Head		6	4,1
	Senior Director of Studies		1	0,7
	Total		147	100
Years of Service	Less than 5 years		13	8,8
	5 to 10 years		60	40,8
	11 to 20 years		56	38,1
	Over 40 years old		18	12,2
	Total		147	100
Financial Authority	Public Bank	Algerian Foreign Bank	42	28,6
		National Bank of Algeria	33	22,4
	Private Bank	Al-Salam Bank	41	27,9
		Gulf Bank	31	21,1
	Total		147	100

Source: Prepared by the researcher based on the questionnaires

The table shows that the study sample is characterized by demographic and occupational diversity, which enhances the reliability of the results. Males constituted the majority (57.1%) compared to females (42.9%). and the majority of respondents were in the 30–50 age group, reflecting their possession of appropriate professional experience. The sample is also characterized by a high level of education, as most members hold university degrees and postgraduate degrees, The sample also included various job positions in the banking sector, with a predominance of banking executives, and the majority of respondents had professional seniority ranging from 5 to 20 years. The similar distribution between public and private banks demonstrates a balanced representation of the study environment, thereby supporting the reliability of the results and their usefulness in analyzing the subject of the study.

- b. **Analysis of the Current State of Digital Transformation in the Banks Under Study:** This is based on a statistical analysis of the average responses from employees regarding the range of digital products and services offered by each bank, whether public or private, which we will summarize below:

**Table 6: Range of Digital Products and Services Offered by Public and Private Banks**

Range of digital services and products offered by the bank	Public Banks			Private Banks		
	Frequency (Yes responses)	Percentage	Rank	Frequency (Answer: Yes)	Percentage	Rank
The bank offers electronic payment and transfer services	71	50	1	71	50	6
The bank offers a variety of debit cards	71	50	1	71	50	6
The bank has a social media presence	69	48,9	4	72	51,1	3
The bank uses electronic signatures	63	49,2	3	65	50,8	4
The bank uses fingerprint or facial recognition technology	61	49,6	2	62	50,4	5
The bank's digital banking app allows customers to perform and manage all banking transactions remotely	68	48,9	4	71	51,1	3
The bank offers personal loans to customers online	60	47,2	6	67	52,8	1
The bank opens investment accounts and provides financial advice online	60	48,8	5	63	51,2	2
The bank issues credit cards online	01	1.38	7	02	2.85	7
The bank provides e-banking services to its customers seven days a week	71	50	1	71	50	6

Source: Prepared by the researcher based on the questionnaires

- c. **Descriptive Analysis of the Study Variable:** This section aims to present and analyze the sample participants' responses to the statements related to the digital transformation variable, using various statistical indicators such as arithmetic means, relative weights, and importance ratios, thereby enabling an assessment of the level of financial inclusion within the banks under study and the identification of their strengths and weaknesses.



Table 7: Results of the Analysis of Sample Respondents' Answers on the Dimensions of Digital Transformation

Dimension	Paragraph	Descriptive Analysis					Public Banks		Private banks	
		Arithmetic Mean	Relative weight of the	Standard Deviation	Importance Ratio (%)	Rank	Relative importance %	Rank	Relative Importance %	Rank
Digital Strategy	The bank has a strategic plan and a clear vision to enhance the chances of success in digital transformation and achieve its goals more effectively	4,46	89,2	0,695	92,5	1	98,63		95,83	4
	The Bank has all the resources to implement a strategic digital transformation plan (financial-technical-human)	4,48	89,6	0,770	92,5	5	91,87		95,83	4
	The Bank relies on key performance indicators to monitor progress towards achieving objectives and evaluate the results achieved	4,52	90,4	0,634	96,6	2	98,61		97,22	3
	The bank is constantly updating software, encouraging innovation, and adapting the business environment to rapid changes in technology and the market	4,47	89,4	0,665	96,6	2	98,63		97,22	3
	Total for dimension	4,4813	89,63	0,61243	-	-	-	-		
Organizational Structure	The bank is working to build digital partnerships with key external stakeholders (banks, customs, universities, business incubators, companies, etc.)	3,84	76,8	1,275	74,8	13	57,53	14	93,05	7
	The bank has a strong infrastructure that helps it respond to technological changes	4,39	87,8	0,677	93,9	3	94,52	3	95,83	4



	in order to remain competitive in the market									
	The bank encourages joint meetings between employees of different experience levels and specializations to promote digital transformation	4,46	89,2	0,685	93,9	3	93,15	4	95,83	4
	The bank allocates a dedicated budget for digital transformation to create new roles within the organizational structure specifically related to digitization (Digital Officer, Digitization Engineer, etc.)	4,39	87,8	0,727	93,2	4	91,66	6	94,36	6
	Total for dimension	4,27	85,41	0,57525	-	-				
Digital Culture	The bank has a plan to engage and train a specific number of community members in financial and digital literacy programs, in partnership with other institutions across various sectors	3,10	62	1,103	34,7	15	50,68	15	18,08	10
	Bank employees play an important role in promoting and encouraging a culture of digitalization among customers	4,34	86,8	0,864	89,8	10	89,04	8	93,05	7
	The bank diversifies its activities and awareness programs and uses various media channels to ensure that its message reaches as many customers and members of the community as possible	4,48	89,6	0,528	98,6	1	98,63	1	100	1
	Total for dimension	3,9728	79,46	0,59233	-	-				
Technology	The bank uses modern digital technologies such as the Internet of Things, Blockchain, big data, digital interfaces, and cloud computing	3,68	73,6	1,116	70,1	14	50	16	90,14	9
	The bank develops technology and integrates the latest technologies with key partners	4,20	84,0	0,896	86,4	12	79,45	13	95,83	3



	The bank strictly adheres to IT security rules and has the ability to anticipate cybercrime threats and other risks	4,33	86,6	0,804	92,5	5	89,04	8	95,83	3
	Total for dimension	4,068	81,36	0,77826	-	-				
Customers	The bank provides interactive digital communication channels with customers, such as social media, email, phone calls, text messages...	4,38	87,6	0,805	91,8	6	86,30	11	98,61	2
	The bank uses digital technologies to collect customer data	4,29	85,8	0,760	90,5	8	87,67	9	95,83	4
	The bank can predict customer behavior and respond to their future needs within the customer's digital experience	4,27	85,4	0,909	87,1	11	86,11	12	91,42	8
	Total for dimension	4,3129	86,26	0,70465	-	-				
Staff	The bank offers ongoing training courses to develop employees' digital skills	4,29	85,8	0,870	91,2	7	87,5	10	94,36	6
	Digital training programs help develop employees' digital acumen (identifying digital gaps and creating digital solutions)	4,12	82,4	0,815	89,8	9	86,30	11	94,44	5
	The bank offers employees the option to work remotely using video conferencing technology and to submit work via email, for example	4,29	85,8	0,846	91,8	6	90,41	7	94,44	5
	Bank employees' ability to provide support to customers and help them use digital services	4,26	85,2	0,786	91,2	7	89,04	8	94,44	5
	Total for dimension	4,2398	84,80	0,69605	-	-				

Source: Prepared by the researcher based on the questionnaires

The table shows a high level of interest in digital transformation among both types of banks, with relative variations in the degree of focus on certain dimensions. With regard to the strategic dimension, public banks recorded very high importance rates ranging from 91.66% to 98.63%, indicating that they possess a clear strategic vision and rely on performance indicators and continuous software updates, while private banks also achieved high scores ranging from 95.83% to 97.22%, reflecting a strong awareness of the importance of strategic planning for digital transformation in both sectors.



In terms of organizational structure, private banks showed relative superiority compared to public banks, with importance rates ranging from 93.05% to 95.83%, whereas public banks showed clear variation, particularly in the area of building digital cooperation relationships with external partners, which recorded a relatively low percentage of 57,53%. This may indicate limited openness to external digital partnerships compared to private banks, which demonstrated a higher level of digital organizational integration. Regarding the digital culture dimension, a clear disparity emerged between the two types of banks: public banks recorded a medium-to-high level in fostering a digital culture among employees and customers, while private banks recorded a very low rate (18,08%) in the area of community engagement in financial and digital literacy programs, which may reflect the weakness of their digital community initiatives, despite their achieving the highest importance rating (100%) in diversifying awareness activities and programs and using digital media. As for technology, private banks demonstrated an advanced level in adopting and developing modern digital technologies and adhering to information security, with rates ranging from 90,14% to 95,83%, whereas public banks showed significant variation, particularly in the use of modern technologies, which stood at a low rate of 50%, reflecting a relative technological gap between the two sectors in favor of private banks. In terms of the customer dimension, private banks achieved very high importance ratings reaching 98,61% regarding the provision of digital communication channels, and they also excelled in the use of digital data and predicting customer behavior, while public banks recorded high rates as well, though relatively lower, indicating a greater focus by private banks on enhancing the digital customer experience. Regarding the employee dimension, the results showed a clear convergence between public and private banks, with a slight edge for private banks. They recorded high scores in digital training, digital skills development, and the availability of remote work, reflecting both sectors' focus on developing human capital as a fundamental pillar of successful digital transformation.

Overall, it can be said that private banks appear to be more advanced in technological aspects, customer-related areas, and digital partnerships, while public banks excel in strategic and organizational aspects, reflecting differing priorities and approaches to digital transformation between the two sectors, despite a high overall level of adoption of digital transformation practices in the banking sector.

3. Testing the Study's Hypotheses

The study aims to analyze the reality of digital transformation in Algerian public and private banks. To achieve this, the hypotheses were tested using descriptive analysis, a one-sample t-test, and a two-sample t-test.

First Main Hypothesis: The level of digital transformation adoption in the Algerian public and private banks under study is high.

- **H₀:** The level of digital transformation adoption in the Algerian banks under study does not differ from the mean level (3) on the Likert scale;



- **H₁:** The level of digital transformation adoption in the Algerian banks under study differs from the mean level (3) on the Likert scale, and this level is high.

To test this hypothesis, a one-sample t-test was used by comparing the overall arithmetic mean of digital transformation to the neutral value (3) on the five-point Likert scale.

Table 8: Testing the Level of Digital Transformation Adoption in the Algerian Banks Under Study

Variable	Sample Size	Arithmetic Mean	Standard Deviation	T-value	Degrees Of freedom	Significance Level
Digital Transformation	147	4,1727	0,50077	32,384	146	0,000

Source: Prepared by the researcher based on the questionnaires

The results in the table show that the arithmetic mean for digital transformation was (4,1727), which is higher than the neutral value (3), The calculated T-value was (32,384) with a significance level of (0,000), which is lower than the accepted significance level (0,05). Consequently, there are statistically significant differences between the calculated mean and the neutral value, with the mean indicating a high level of adoption.

This result indicates that the Algerian banks under study have made significant strides in their digital transformation journey by adopting digital strategies, developing technological infrastructure, and expanding the use of digital solutions in the delivery of banking services.

To assess the current state of digital transformation adoption, arithmetic means and standard deviations were calculated for its various dimensions.

Table 9: Ranking of Digital Transformation Dimensions by Adoption Level

Dimensions of Digital Transformation	Arithmetic Mean	Standard Deviation	Rank
Digital Strategy	4.4813	0,6124	1
Customers	4.3129	0,7047	2
Staff	4.2704	0,5753	3
Organizational Structure	4.2398	0,6961	4
Technology	4.0680	0,7783	5
Digital Culture	3.9728	0,5923	6
Overall Average for Transformation	4.1727	0,5008	-

Source: Prepared by the researcher based on the questionnaires



The results show that all dimensions of digital transformation fell within the high range, with all averages exceeding the neutral value (3). The strategic dimension ranked first with an arithmetic mean of (4.4813), reflecting banks' focus on developing clear plans and visions for digital transformation and providing the necessary resources for its implementation. The customer dimension ranked second, indicating banks' commitment to improving communication with customers and developing digital services tailored to their needs. Meanwhile, the digital culture dimension recorded the lowest average (3.9728), although it remained at a high level, indicating the importance of promoting digital awareness and fostering a culture of digital transformation within the banking environment.

Based on these results, the null hypothesis H_0 was rejected and the alternative hypothesis H_1 was accepted, meaning that the level of digital transformation adoption among the banks under study is high and statistically significant. **Second Main Hypothesis:** There are statistically significant differences in the

level of digital transformation adoption between the Algerian public and private banks under study.

– H_0 : There are no statistically significant differences in the level of digital transformation adoption between the Algerian public and private banks under study;

– H_1 : There are statistically significant differences in the level of digital transformation adoption between the Algerian public and private banks under study.

To test this hypothesis, an independent samples t-test was used to compare the means of public and private banks.

Table 9: Testing for Differences in the Level of Digital Transformation by Bank Type

Bank Type	Sample Size	Arithmetic Mean	Standard Deviation	T-value	Degrees of freedom	Significance Level
Public banks	75	4.0743	0.46183	4.078-	145	0.000
Private banks	72	4.4114	0.53871	-	-	-

Source: Prepared by the researcher based on the questionnaires

The results of the t-test indicate the existence of statistically significant differences in the level of digital transformation adoption between public and private banks, as the p-value was 0.000, which is less than the significance level of 0.05, leading to the rejection of the null hypothesis and the acceptance of the alternative hypothesis. It is also evident that the mean for private banks was (4.4114), which is higher than the mean for public banks of (4.0743), indicating that the private banks under study achieve a relatively higher level of digital transformation adoption, this can be explained by the flexibility of private banks' organizational structures, their speed of decision-making, and their ability to invest in modern technologies, compared to the regulatory and procedural challenges that public banks may face.

Based on these results, the alternative hypothesis H_1 was accepted and the null hypothesis H_0 was rejected, indicating that the level of digital transformation adoption differs by bank type.



Conclusion

This study aimed to analyze the reality of digital transformation in Algerian public and private banks by assessing the level of adoption of its various dimensions and identifying differences in the level of digital transformation between public and private banks. Based on descriptive analysis and statistical tests, the results showed that digital transformation has become a strategic choice adopted by Algerian banks to varying degrees, reflecting a growing awareness of the importance of digitization in developing banking activities, improving service quality, and enhancing competitiveness.

The results of the first hypothesis test also showed a high level of digital transformation adoption among the banks under study, with an overall arithmetic mean of (4.1727), with statistically significant differences from the null hypothesis mean. This reflects that Algerian banks no longer view digital transformation merely as a technical project; rather, it has become part of their strategic approach aimed at modernizing business systems, improving operational efficiency, and developing banking services. From an economic perspective, this high level indicates growing investments in digital infrastructure, information systems, and electronic service delivery channels, which contribute to reducing transaction costs, accelerating the completion of operations, and improving resource utilization, thereby enhancing banks' productivity and competitiveness.

The results of the descriptive analysis of the dimensions of digital transformation showed that the digital strategy dimension ranked first, indicating that bank management has become more aware of the importance of integrating digital transformation into its future vision and development plans. In contrast, the digital culture dimension ranked last despite maintaining a relatively high level, reflecting that the success of digital transformation is not solely linked to the provision of technologies but also requires fostering a digital culture among employees and customers, developing digital skills, and managing organizational change to ensure optimal use of emerging technologies.

The results of the second hypothesis test also revealed statistically significant differences in the level of digital transformation adoption between public and private banks, with these differences favoring private banks. This result can be explained economically by the fact that private banks enjoy greater managerial flexibility and faster decision-making, in addition to their greater ability to allocate financial resources to invest in technology and modernize operational systems, as well as their reliance on competitive strategies focused on innovation and improving the customer experience. In contrast, public banks may face challenges related to regulatory procedures, the nature of their administrative structures, and lengthy decision-making cycles, which may limit the speed of implementing digital transformation projects despite the efforts made in this area.

These findings confirm that the success of digital transformation in the Algerian banking sector does not depend solely on the acquisition of modern technologies, but rather requires integration between strategic vision, technological infrastructure, human resources, and organizational culture, thereby ensuring a sustainable digital transformation capable of improving banking



performance and enhancing banks' competitiveness amid the rapid changes taking place in the financial sector.

In light of these findings, the study recommends the following:

- Increase investment in digital infrastructure and modernize banking systems in line with global technological developments.
- Developing continuous training programs for employees to enhance digital competencies and skills and foster a digital culture within banks.
- Leverage the successful experiences of private banks in the areas of digital innovation, while taking into account the specific characteristics of public banks.
- Support partnerships with financial technology (Fintech) companies to develop more innovative and efficient banking services.
- Adopt more flexible regulatory policies that help accelerate the implementation of digital transformation projects, particularly within public banks.

Discussion of the Results

The results reveal that digital transformation in the Algerian banking sector has entered the implementation phase and is no longer merely a future trend or a circumstantial response to technological developments. This can be explained by the fact that the banking environment has become more competitive, prompting banks to rethink their traditional business models and shift toward digital-based models to improve operational efficiency and enhance service quality. This transformation underscores that investment in technology is now an investment in a bank's competitiveness rather than merely an investment in technical equipment.

From an economic perspective, the results reflect banks' recognition of the importance of digital transformation in reducing operating costs over the long term, as digital services reduce reliance on paper-based transactions, optimize the use of human resources, and accelerate the completion of operations—all of which positively impact banks' productivity and profitability. Furthermore, the expanded use of digital channels helps improve the customer experience and increases customers' ability to access banking services without the constraints of time and place, thereby strengthening the banking institution's competitive position.

As for private banks' lead in the adoption of digital transformation, this can be explained by the nature of the competitive environment in which they operate, where their ability to grow and maintain their market share is linked to how quickly they respond to technological changes and customer demands. Consequently, these banks tend to allocate greater resources to investment in technology and innovation and adopt more flexible organizational structures that allow for decision-making and the implementation of digital projects in shorter time frames.

Conversely, the relatively lower level of engagement among public banks does not indicate a lack of commitment to digital transformation; rather, it reflects the unique nature of their operations as institutions that, in addition to their economic role, fulfill developmental and social roles. This makes the implementation of digital transformation projects more complex, given their association



with stricter regulatory and supervisory procedures, as well as a larger number of branches, human resources, and systems that require gradual modernization.

The findings also indicate that the success of digital transformation does not depend solely on possessing modern technologies, but is linked to a bank's ability to manage organizational change, develop the competencies of its human resources, and foster a corporate culture that supports innovation. Therefore, the gap between banks is no longer measured solely by the size of their technological investments, but by their ability to integrate technology into their corporate strategy and transform it into added value that is reflected in performance, service quality, and the sustainability of their competitive advantage.

These findings are consistent with economic literature that views digital transformation as a comprehensive organizational transformation process, whose success depends more on the integration of strategy, human resources, organizational structure, and technology than on the acquisition of modern technologies alone.

Bibliography List :

1. Books

Al-Lat, N. M.-S. (2008). Electronic banking (tools, applications and expansion methods. Amman, Jordan:Wael Publishing House.

2.Theses:

a) Ditshego, K. J. (2018). Assessing the influence of digital transformation on digital maturity within a large corporate bank.

b) Layash, M. (2014-2015). The impact of the electronic formula on monetary policy, a comparative study, Algeria - France, doctoral thesis in economic sciences. In Dedicate the economics of money, banking, and financial markets. University of Biskra.

3.Journal article :

a) Ali Ardan Hatem Khudair, S. H. (2020). Digital transformation of banking operations as a tool for developing the strategic financial performance of Baghdad Bank as a model, Journal of Management and Economics. (126).

b) Liu, E. X. (2021). Stay Competitive in the Digital Age: The Future of Banks. . IMF Working Paper, ,issue 46. Retrieved consulted on 09/09/2025, at 16:26h. from available on <file:///C:/Users/DELL/Downloads/null-001.2021.issue-046-en.pdf> ,

c) Loannis Giatsidis, M. K. (2021). Digital Transformation and Strategy in the Banking Sector: Evaluating the Acceptance Rate of E-Services . ,Open Innovation Technology Market and Complexity, v 7,N 204.

4. Reports:

a) Jimmy Bumann, M. K. (2019). Action Fields of Digital Transformation -A Review and Comparative, Analysis of Digital Transformation maturity Models and Frameworks, Innovation Und Unternehmertum. Band2 gdition esowip ,.

Websites



b) DBS. (2023). DBS. DBS continues to be studied as a model for digital transformation.

Retrieved consulted on 09/09/2025, at: 16:05h. from available on:

<https://economicfreshman.wordpress.com/2012/07/28/pillars-of-financial-inclusion/>

c) Finn, T. (2024). Teqqqne Finn, What is digital transformation in banking and financial services? Retrieved consulted on 10/09/2025, at: 13:23h from IBM Consulting: , available on:

<https://www.ibm.com/think/topics/digital-transformation-banking>

d) Salesforce. (2025). What Is Digital Transformation in Banking? Retrieved consulted on 10/09/2025, at: 13: 40h. from available on: <https://www.salesforce.com>