Digital Transformation in Libyan Banks

Four Case Studies

Hadeel R. Elgerbi[1], Yuosre F. Badr[2]

[1] University of Tripoli, faculty of information technology
[2] School of Management, Asian Institute of Technology (AIT)
h.elgerbi@uot.edu.ly, badir@ait.asia
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Abstract. This article examines digital transformation (DT) in the Libyan banking sector, a context characterized by prolonged political instability, regulatory centralization, and economic uncertainty. Using a qualitative comparative case study approach, four Libyan banks representing different levels of DT maturity were analyzed. Data were collected through twenty face-to-face interviews with bank executives and employees, complemented by internal reports and archival documents. The findings reveal that DT adoption is shaped by six interrelated factors: (1) leadership decision-making orientation, (2) ownership structure, (3) levels of bureaucracy and formalization, (4) human resource skills and training, (5) strategic clarity regarding technological development, and (6) investment capacity. Although all banks operate under the same national conditions, the relative influence of these factors varies significantly across cases, resulting in divergent DT trajectories. Rather than pursuing DT as an innovation-driven strategy, Libyan banks primarily adopt digital technologies to ensure operational continuity, regulatory compliance, and institutional survival. This study contributes to DT literature by highlighting transformation dynamics in fragile and conflict-affected environments.

Keywords: Banking technology, Digital transformation, Libyan banks.

1 Introduction

Digital transformation (DT) has emerged as a critical strategic priority for organizations seeking to sustain competitiveness in rapidly evolving and technology-intensive environments. DT broadly refers to the integration of digital technologies into organizational processes, structures, and service offerings, whether these technologies are developed internally or acquired from external sources. Importantly, DT extends beyond the mere adoption of information technologies; it entails fundamental changes in organizational activities, infrastructures, and performance outcomes. As emphasized by [1], digital transformation reshapes how organizations operate and create value, making it essential for long-term survival in increasingly competitive markets.

Within the banking industry, the implications of digital transformation have been particularly profound. Digital technologies offer substantial benefits to customers by enhancing accessibility, convenience, and service speed. Internet and mobile banking, for example, have significantly reduced spatial and temporal constraints, enabling customers to conduct financial transactions remotely and around the clock [2]. Moreover, the rapid expansion of e-commerce, together with the availability of secure online payment systems, has intensified demand for digital banking services. DT has also enabled banks to introduce innovative products and delivery channels such as mobile applications and integrated digital platforms that would not have been feasible without advanced digital infrastructure.

Prior research provides valuable insights into the drivers and challenges of digital transformation in banking [3]. Identify lower fees, improved service quality, 24-hour access, customer involvement, and faster transaction processing as key factors influencing online banking adoption. Despite these advantages, traditional banks with large and established customer bases often face difficulties in encouraging customers to migrate from conventional channels to digital ones. Nevertheless, global trends indicate a steady increase in digital service usage and e-commerce activity [4]. Existing studies also highlight the importance of partnerships, joint ventures, and interbank collaborations in supporting the development and diffusion of digital banking services [5]. Given that online banking relies heavily on information technology and telecommunications infrastructure such as ATM networks, interbank connectivity, and web-based financial platforms the extent of a bank's internal digital capabilities plays a decisive role in shaping its ability to adopt and effectively utilize digital technologies.

More broadly, digital transformation has become indispensable for organizations operating in dynamic and uncertain markets. Research shows that the adoption of digital technologies is strongly influenced by strategic choices, which are central to enabling firms to successfully transform their operations and business models [6]. These insights underscore the importance of leadership, strategy, and organizational readiness in shaping digital transformation outcomes particularly in challenging institutional environments.

2 Banks and the Banking Industry in the Libyan Context

2.1 The Situation in Libya

Libya has experienced prolonged political and economic instability, beginning with years of international sanctions and embargoes, followed by the collapse of the Gaddafi regime in 2011 and the subsequent outbreak of civil conflict. The post-2011 period has been marked by political fragmentation, the existence of competing governments, widespread insecurity, and the deterioration of public services. As a result, economic performance has been highly volatile.

Libya's heavy dependence on oil exports as the primary source of national income has further intensified this volatility. Fluctuations in both global oil markets and domestic production conditions have led to dramatic swings in trade volumes. For example, data reported by [7]. show an increase in trade activity from 53% in 2018 to 60.5% in 2019, followed by a sharp decline to 43.2% in 2020, and then a substantial rise to 112% in 2021. These fluctuations illustrate the fragility of the Libyan economy and its vulnerability to both internal conflict and external shocks.

These fluctuations illustrate not only the structural fragility of the Libyan economy but also its pronounced exposure to both internal conflict and external shocks. More critically, this volatility has had direct and persistent implications for liquidity and cash flow within the Libyan financial system. Sharp and unpredictable changes in oil revenues disrupt government spending patterns, foreign currency inflows, and public-sector wage payments all of which constitute primary sources of cash circulation in the economy. As a result, banks experience irregular liquidity inflows, weakened deposit bases, and heightened pressure on cash availability.

In the absence of a diversified economic structure and stable fiscal coordination, these shocks translate into systemic cash flow disruptions rather than short-term cyclical adjustments. Periods of declining oil revenues or production interruptions reduce the Central Bank's capacity to inject liquidity consistently, leading to cash shortages at the commercial bank level. Conversely, sudden revenue surges often fail to restore normal cash circulation due to institutional fragmentation, administrative bottlenecks, and precautionary cash hoarding by both firms and households.

2.2 Libyan Banks During This Period

The prolonged conflict environment has posed significant challenges for the Libyan banking sector. Political instability, security concerns, and regulatory uncertainty have constrained long-term investment decisions, including investments in digital transformation. These constraints became particularly acute around 2018, when Libyan banks experienced severe cash shortages. This crisis exposed structural weaknesses in the banking system and underscored the limitations of cash-dependent financial operations.

Within this context, digital transformation emerged not only as a strategic option but also as a practical necessity. The expansion of digital and online financial services offered a potential mechanism to reduce customers' reliance on physical bank branches, alleviate pressure on cash availability, and enhance service continuity under conditions of instability. Consequently, digital transformation in the Libyan banking sector has been shaped not only by global technological trends but also by the unique political, economic, and institutional challenges facing the country.

From a banking perspective, this environment reinforces a cash-dominated yet liquidity-constrained economy, where demand for physical cash remains high while the supply of banknotes is tightly controlled. This mismatch amplifies operational stress on banks, increases customer dependence on branch visits, and exposes the limitations of traditional banking models. Consequently, cash flow instability becomes both a symptom and a reinforcing mechanism of broader economic fragility, underscoring the urgency of digital transformation as a means to reduce reliance on physical cash and improve financial system resilience.

3 Structural Deficiencies in the Libyan Banking Sector

The performance and development of the Libyan banking sector are constrained by several persistent structural deficiencies. These challenges are institutional in nature and collectively undermine banks' capacity to modernize operations, enhance service quality, and advance digital transformation initiatives. The key deficiencies can be summarized as follows:

3.1 Regulatory and administrative constraints

State-owned banks, in particular, operate under extensive regulatory oversight imposed by government authorities, including mandatory audits conducted by the Financial Control Authority. While such oversight aims to enhance accountability and financial integrity, it often results in rigid compliance requirements that limit managerial discretion, slow innovation, and reduce the ability of banks to respond flexibly to technological and market changes.

3.2 Administrative inefficiency and bureaucratic procedures

Many Libyan banks are characterized by highly bureaucratic administrative processes that significantly delay decision-making. Layered approval structures, centralized authority, and excessive procedural formalization reduce operational efficiency and weaken organizational responsiveness. These inefficiencies are especially problematic in the context of digital transformation, which requires speed, adaptability, and cross-functional coordination.

3.3 III. Insufficient training and skills development

A substantial proportion of bank employees lack adequate training in modern banking technologies and digital systems. When training programs are available, they are often short-term, sporadic, and insufficiently aligned with current developments in the financial and technological landscape. This skills gap limits banks' ability to effectively implement, maintain, and exploit digital technologies, thereby reducing the returns on technological investments.

3.4 Weak financial incentives and limited performance-based rewards

Although a small number of private banks offer competitive financial incentives, most Libyan banks lack structured performance-based reward systems. The absence of clear links between performance and compensation undermines employee motivation, weakens accountability, and makes it difficult to attract and retain skilled professionals. Over time, this contributes to lower productivity, diminished service quality, and increased vulnerability to ethical risks.

3.5 Outdated administrative and organizational structures

Organizational practices across the Libyan banking sector remain uneven, with many banks continuing to operate under outdated administrative frameworks. These structures are often characterized by unclear job roles, ambiguous authority levels, and weak coordination mechanisms. Such organizational rigidity limits internal accountability and hampers the effective integration of new digital processes and technologies.

4 Analytical Implication

Taken together, these deficiencies reflect deep-rooted institutional and organizational challenges rather than isolated operational problems. Addressing them requires more than incremental technological upgrades; it necessitates comprehensive reforms in governance, human resource management, incentive systems, and organizational design. Without such reforms, efforts toward digital transformation in the Libyan banking sector are likely to remain fragmented, compliance-driven, and limited in impact.

5 Research Methodology

To achieve the objectives of this study and to develop a nuanced understanding of digital transformation (DT) adoption within the Libyan banking sector, a qualitative research approach was employed. Qualitative methods are particularly appropriate for investigating complex organizational and institutional phenomena, as they allow researchers to explore meanings, interpretations, and lived experiences that cannot be captured through quantitative techniques alone [8]. This approach is especially relevant in the Libyan context, where digital transformation processes are deeply embedded within bureaucratic structures, regulatory constraints, and a fragile institutional environment.

5.1 Research Design: Comparative Case Study Approach

In line with the study's exploratory and context-sensitive objectives, a comparative case study design was adopted. Comparative case studies are widely recognized as a powerful method for advancing theory in organizational change and digital transformation research, as they enable systematic comparison across multiple cases while maintaining

sensitivity to contextual variation [9]. Applying this design to the Libyan banking sector allows for a deeper understanding of how banks operating under the same national, political, and regulatory conditions differ in their digital transformation trajectories.

The comparative approach is particularly valuable in environments characterized by uncertainty and institutional instability, such as Libya, where formal rules coexist with informal practices. By examining similarities and differences across banks, the study is able to identify patterns that explain why some institutions achieve higher levels of DT adoption while others lag behind, despite facing similar external constraints.

5.2 Justification for a Qualitative Approach

The need for rich, context-specific insights further supports the use of qualitative methods. As noted by [10], qualitative research is especially effective in examining inter-organizational relationships, strategic decision-making, and international partnerships factors that play a critical role in digital transformation processes. In the Libyan banking sector, where international collaborations, regulatory oversight, and leadership practices strongly shape technological adoption, qualitative inquiry enables the capture of nuanced organizational dynamics that would otherwise remain hidden.

This methodological approach allows the study to examine how internal factors (such as leadership style, organizational structure, and human resource capabilities) interact with external constraints (including political instability, regulatory requirements, and limited international engagement) to influence DT adoption.

6 Case Selection

To gain deeper insight into the determinants of digital transformation adoption, the study selected four Libyan banks using a purposeful comparative sampling strategy. The objective was to contrast banks with relatively high levels of DT adoption against banks with low levels of DT adoption, thereby enabling analytical comparison and theory development.

Specifically, two banks characterized by advanced technological infrastructure and a broad range of digital services were selected, alongside two banks with limited technological capabilities and minimal digital service offerings. This selection strategy strengthens analytical rigor by ensuring variation across cases while maintaining contextual consistency.

6.1 Step One: Development of DT Adoption Criteria

Drawing on the existing literature on banking digital transformation, a set of criteria was developed to distinguish between higher and lower levels of DT adoption. A bank

was classified as exhibiting a high level of DT adoption if it had implemented all or most of the following nine elements:

1. Network integration
2. Backup systems
3. Automated Teller Machines (ATMs)
4. Domestic debit cards
5. International debit cards
6. Web-based banking services
7. Security systems
8. Cloud technology
9. Blockchain technology

These elements collectively capture both operational digital capabilities and strategic technological readine**ss**, reflecting different dimensions of digital transformation maturity.

6.2 Step Two: Classification and Cross-Case Comparison

Based on the criteria established in Step One, the four banks were classified into two groups:

- Two banks with relatively high DT adoption, and
- Two banks with relatively low DT adoption.

This classification enabled systematic comparison between the two groups, facilitating the identification of factors associated with advanced versus limited digital transformation. The comparative analysis focused on uncovering patterns across cases, highlighting shared characteristics among high-DT banks as well as common constraints faced by low-DT banks.

Table 1 presents a detailed comparison of the four banks across the nine DT adoption criteria, providing an empirical foundation for the subsequent analysis and discussion.

Table 1. Comparison of Digital Transformation (DT) Adoption Across the Four Case-Study

Dimension	Bank 1	Bank 2	Bank 3	Bank 4
Number of branches	53	20	5	7
Headquarters location	Benghazi	Benghazi	Benghazi	Misrata
Profitability over the last three years	Increased	Financial losses	Slightly increased	Slightly decreased
Bank network infrastructure	Secure private network connecting headquarters and branches	No private network	Network connecting headquarters and branches	Private network connecting headquarters and branches
Backup systems	Advanced backup system supported by an external service provider; real-time backup for all operations	Local backup computer storing transactions at branch level only	Local backup computer in each branch, not connected to other branches	Online backup system for each operation
ATM availability	Large number of ATMs	No ATMs	Limited number of ATMs	ATMs available in all branches
Domestic debit cards (Libya)	Available	Not available	Not available	Tadawul debit card available
International debit cards	Available	Available	Available	Available
Web-based services	Comprehensive web services for customers	Website with no online services	Web services with limited functionality	Web services offering multiple customer services
Security systems	Multiple security layers, including advanced firewalls	Firewall and antivirus systems	Firewalls and antivirus systems	Firewall and additional security systems
Cloud technology	Not implemented	Not implemented	Not implemented	Cloud system provided by Microsoft
Blockchain technology	Not implemented	Not implemented	Not implemented	Planned for future implementation

According to the Central Bank of Libya [11], Libyan banks are classified into two main categories: large commercial banks, in which the Central Bank of Libya retains a significant ownership stake, and private banks, where the majority of shares are held by the private sector. In each bank, digital transformation technology studied for further detailed investigation.

Table 2. The four case-study banks

Bank	Year Established	Public Sector Contribution (%)	Private Sector Contribution (%)	Strategic International Contribution (%)
BANK1	1995	17	34	49
BANK2	2004	0	100	0
BANK3	2006	0	100	0
BANK4	2007	0	100	0

7 Data Collection and Analysis

Analyzing case study research requires the examination of multiple sources of primary data in order to support theory development [12]. In this study, the primary source of data consisted of semi-structured interviews with bank managers and employees, supplemented by extensive archival materials drawn from four bank case studies. Additional qualitative data were also collected by the researcher, following established qualitative research practices [10]. Data collection was conducted in two main stages.

7.1 Step 1: Semi-Structured Interviews

A total of twenty face-to-face interviews were conducted in two rounds. All interviews were carried out by one researcher and subsequently discussed with a co-researcher to enhance analytical rigor.

- **Round 1:** Thirteen semi-structured interviews were conducted with bank managers and heads of departments. Each interview lasted approximately one hour. The interviews were conducted on a one-on-one basis, face-to-face, recorded, and carried out in Arabic. The objective of this round was to gain an in-depth understanding of the digital technologies used by each bank and to identify key organizational factors influencing the effectiveness of digital transformation (DT) adoption.
- **Round 2:** Seven semi-structured interviews were conducted with bank employees to capture their experiences with digital transformation, including perceived challenges and obstacles. In the two banks with higher levels of DT adoption, employees were asked to identify the factors contributing to successful implementation. In contrast, interviews in the two banks with lower DT adoption focused on barriers and constraints. Digital transformation was explored by examining technologies used in

routine operations, while bank performance was assessed in terms of transaction speed and accuracy.

7.2 Step 2: Archival Data

Archival data were used to validate and complement the interview findings, particularly with respect to bank database systems over a six-month period. One researcher reviewed interview transcripts alongside internal bank reports, and the findings were subsequently discussed with the co-researcher. The archival analysis focused on service delivery processes, technologies employed, system accuracy, transaction processing speed, and security mechanisms.

8 Data Analysis

Data analysis followed established qualitative analytical approaches [13]. First, each case study was analyzed at two analytical levels:

- **Service level:** services provided to customers through both in-branch and online channels.
- **Bank level:** organizational structure, management rules, organizational culture, authentication

Procedures, and security practices.
Subsequently, within-case and cross-case analyses were conducted to identify similarities and differences across the four banks [8]. Interview transcripts were systematically reviewed by the interviewer and co-author, and emerging themes were discussed and refined. This process resulted in a comprehensive set of key themes and analytical categories.
Finally, patterns across all case studies were compared to ensure a close alignment between empirical evidence and theoretical interpretation. Achieving a strong fit between data and theory was essential for generating robust insights into digital transformation in the Libyan banking sector.

9 Findings

Interviews with bank managers and employees indicate that leadership plays a central role in shaping the level of technology adoption across Libyan banks, whether basic or advanced. However, the ability of leaders to pursue digital initiatives has been constrained by Libya's prolonged political instability, which has negatively affected the economy in general and the banking sector in particular. As a result, many international partnerships that previously supported technological development in Libyan banks were terminated after 2011. Ownership structure also influences decision-making re-

lated to digital transformation, particularly given the high costs associated with advanced digital technologies. Consequently, the strategic direction of each bank reflects the vision, priorities, and risk perceptions of top management.

The analysis identifies six key factors that shape digital transformation outcomes in the four banks: (1) Leadership: the role of change pioneers in adopting new technologies; (2) Ownership: shareholders' influence on decisions despite limited direct involvement; (3) Bureaucracy and formalization: the extent to which rules and procedures regulate activities and delay decision-making; (4) Human resources: employees' skills and the availability of training budgets; (5) Strategy: clarity of direction regarding technological development; and (6) Investment: diversification beyond core banking activities, which enhances organizational knowledge and experience.

Although all six factors are present across the four banks, their relative importance, configuration, and impact differ significantly from one institution to another, leading to varying levels of digital transformation maturity.

9.1 Leadership

Leadership plays a decisive role in determining the extent of DT adoption across the four banks. In Bank 1, digital initiatives are driven by a highly centralized leadership style in which key decisions are made at the top. This approach has enabled the bank to introduce advanced digital services relatively early compared to its peers, reflecting strong managerial commitment to modernization. However, the concentration of decision-making authority limits the involvement of middle management and reduces organizational learning.

Bank 4 also follows a top-down leadership model but differs in its strong reliance on IT expertise and consultation with technical departments. Senior management explicitly views digital transformation as critical for long-term survival, resulting in more systematic investment in digital infrastructure and services. In contrast, Bank 2 suffers from frequent changes in top management, which has disrupted decision-making continuity and weakened accountability. This instability has slowed digital development and contributed to regulatory and financial difficulties. Bank 3 occupies an intermediate position, with stable leadership but cautious digital ambitions. Digital decisions are centralized and implemented gradually, reflecting a risk-averse response to political and economic uncertainty.

9.2 Ownership

Across all four banks, shareholders exert influence over strategic decisions without engaging directly in day-to-day digital initiatives. In Bank 1 and Bank 4, ownership structures support long-term investment in digital technologies, providing management with

greater financial flexibility. Although shareholders do not actively participate in DT planning, their approval of management decisions enables sustained digital investment.

In contrast, Banks 2 and 3 operate with more limited financial buffers, constraining their ability to pursue advanced digital initiatives. This finding suggests that ownership influences DT adoption indirectly by shaping resource availability and managerial risk tolerance rather than through active governance involvement.

9.3 Bureaucracy and Formalization

Bureaucracy and formalization significantly affect DT implementation, though their impact varies across banks. Bank 1 demonstrates relatively low internal bureaucracy, allowing branch managers some autonomy in daily operations. This flexibility facilitates faster digital service delivery while maintaining regulatory compliance. Similarly, Bank 4 benefits from delegated authority structures that enable quicker internal decisions, particularly in technology-related matters.

By contrast, Bank 2 experiences excessive bureaucracy combined with weak regulatory compliance, creating operational inefficiencies and repeated interventions by the Central Bank of Libya. Bank 3 reflects a more traditional bureaucratic structure influenced by managers' prior experience in public-sector banks. While this approach enhances control and stability, it also slows innovation and reinforces centralized decision-making. Overall, bureaucracy in the Libyan banking sector functions as a double-edged sword, supporting risk control while constraining digital agility.

9.4 Human Resources (HR)

Human resource capabilities strongly differentiate banks with higher and lower levels of DT adoption. Bank 1 and Bank 4 invest consistently in employee training, recognizing that digital systems are only effective when supported by skilled personnel. These banks allocate formal budgets for training and expose employees to multiple functional areas, enhancing operational efficiency and digital competence.

In contrast, Banks 2 and 3 provide minimal training opportunities, resulting in limited digital skills among employees. This gap reduces productivity and undermines the effective use of existing technologies. The findings indicate that digital transformation in the Libyan banking sector is constrained not only by financial and political factors but also by organizational learning limitations.

9.5 Strategy

Strategic clarity plays a critical role in shaping DT outcomes. Bank 1 has articulated a clear vision for digital expansion, including plans for fully electronic branches, reflecting a proactive approach to technological development. Bank 4 demonstrates the most

explicit digital strategy, supported by international IT partnerships and a long-term technological roadmap.

In contrast, Bank 2 lacks a coherent digital strategy, resulting in reactive and fragmented digital initiatives. Bank 3 also lacks a formal long-term plan, focusing instead on short-term operational stability and potential merger opportunities. Political instability further reinforces short-term strategic thinking across all banks, but those with clearer digital visions are better positioned to sustain progress despite uncertainty.

9.6 **Investments**

Bank 1 demonstrates a diversified investment strategy spanning multiple non-banking sectors, including aviation, land transportation, construction, and real estate. These investments serve not only as alternative revenue streams but also as platforms for organizational learning and digital capability development. By engaging in industries that rely heavily on digital systems such as airline and transportation management Bank 1 gains exposure to advanced operational technologies that can be transferred to its internal banking processes. As noted by the Assistant Bank Manager, Bank 1 holds equity stakes in four companies: (i) BARNIQ Airline Company, (ii) WASEL Land Transportation Company, (iii) a construction company, and (iv) a real estate company. This cross-sector investment portfolio enhances the bank's capacity to experiment with digital tools beyond traditional banking boundaries, thereby strengthening its overall digital readiness.

Bank 4 follows a more focused investment approach, holding a 10% ownership stake in Tadawal Company and a smaller share in Elmawashi Company, both of which represent long-standing strategic investments. According to the Head of Marketing and Communication, these investments particularly in Tadawal provide Bank 4 with partial access to digital payment infrastructures and market-oriented technological practices. Although narrower in scope than Bank 1's portfolio, Bank 4's investments still contribute to its understanding of technology-enabled financial services and support its broader digital transformation strategy.

In contrast, Banks 2 and 3 do not maintain investments outside their core banking activities. The absence of cross-sector investments limits their exposure to digital practices developed in other industries and reduces opportunities for knowledge spillovers. As a result, these banks remain more dependent on internally developed capabilities and regulatory-driven digital initiatives. This inward-looking investment posture constrains their ability to leverage external technological experience, contributing to more conservative and incremental approaches to digital transformation.

Overall, the comparison suggests that investment diversification functions as an indirect but important enabler of digital transformation. Banks with external investments benefit not only from additional financial resources but also from experiential learning

and technological exposure, which enhance their ability to adopt and adapt digital innovations. Conversely, banks without such investments face structural limitations that reinforce digital inertia and restrict long-term digital development.

10 Cross Case Interpretation

Taken together, the four banks illustrate that digital transformation in the Libyan banking sector follows a cautious, centralized, and uneven trajectory. Bank 1 and Bank 4 demonstrate higher levels of DT adoption due to stronger leadership commitment, clearer strategies, greater investment capacity, and sustained human capital development. In contrast, Bank 2 and Bank 3 remain constrained by leadership instability, limited training, bureaucratic rigidity, and weak strategic orientation. These findings highlight that while external instability shapes the operating environment, organizational choices ultimately determine the depth and effectiveness of digital transformation.

11 Discussion:

The findings of this study are consistent with [14] view of leaders as "practically constrained decision makers," whose cognitive orientations and personal characteristics shape organizational outcomes. In the context of digital transformation, leadership capability extends beyond formal authority to include technological awareness and the ability to interpret emerging digital opportunities under uncertainty. The results indicate that executives' age and educational background influence digital decision-making, as younger and more recently educated managers are often better positioned to champion contemporary digital technologies. This highlights managerial human capital as a critical enabler of digital transformation, particularly in weak institutional environments.

The study also aligns with [5], who define innovation as the adoption of internally or externally developed ideas, processes, or technologies. In the Libyan banking sector, digital transformation relies heavily on externally sourced technologies due to limited domestic capabilities and a disrupted innovation ecosystem. Banks with stronger external partnerships demonstrate greater access to digital knowledge, reduced uncertainty, and faster adoption, underscoring the importance of inter-organizational networks in institutionally constrained markets.

Consistent with [6], the findings show that open innovation serves as a practical mechanism for addressing digital transformation deficits in resource-constrained organizations. Libyan banks face financial constraints, limited access to advanced technologies, and low awareness of digital solutions, which weaken internal innovation capacity and increase dependence on external resources. Banks that selectively engage with external IT providers exhibit higher digital readiness and adaptability, suggesting that open innovation is not optional but structurally necessary in this context.

However, digital transformation is further constrained by Libya's macroeconomic instability. Persistent political uncertainty has contributed to inflation and depreciation of the Libyan dinar, significantly increasing the cost of digital infrastructure, particularly cybersecurity. While the Central Bank of Libya's stringent cybersecurity regulations enhance financial stability, they often require engagement with international vendors, making compliance costly and risky under conditions of exchange-rate volatility and limited foreign currency access. This creates a structural dilemma in which regulatory pressure to advance digital security conflicts with banks limited financial capacity, reinforcing a cautious, incremental approach to digital transformation where compliance and risk avoidance take precedence over speed and experimentation.

12 Conclusions

This study demonstrates that digital transformation in the Libyan banking sector is not a linear technological upgrade but a contextually embedded process shaped by political instability, regulatory centralization, and institutional fragility. Rather than being driven primarily by competitiveness or innovation, digital transformation in Libyan banks has largely functioned as a mechanism for operational continuity, risk mitigation, and institutional survival. This perspective extends existing digital transformation literature by highlighting how transformation processes are reoriented in conflict-affected and high-uncertainty environments.

The findings further reveal that, despite operating under the same national conditions, banks exhibit markedly different digital transformation trajectories. These differences are explained by variations in leadership orientation, governance structures, investment in human capital, strategic clarity, and financial capacity. Centralized decision-making dominates across cases, reflecting both historical administrative legacies and risk-management imperatives under instability. While such centralization enhances control and regulatory compliance, it simultaneously constrains organizational learning, limits middle-management engagement, and weakens bottom-up innovation—capabilities that are essential for sustaining long-term digital transformation.

A key contribution of this research lies in elucidating the dual role of the Central Bank of Libya (CBL) as a central institutional architect of digital transformation. Through the enforcement of regulatory standards related to digital banking, cybersecurity, and compliance, the CBL has strengthened sector-wide stability, security awareness, and minimum technological thresholds. At the same time, this regulatory framework has reinforced a compliance-oriented and risk-averse model of digital transformation, thereby limiting experimentation and strategic flexibility at the bank level. This duality illustrates how regulatory institutions in fragile states can simultaneously enable and constrain digital innovation.

Importantly, this study extends analysis beyond current technological adoption by incorporating strategic readiness for advanced digital technologies such as blockchain.

Although blockchain is not yet implemented in Libyan banks, its inclusion captures banks' forward-looking digital orientation and preparedness for next-generation infrastructures. In a context characterized by low institutional trust, complex verification requirements, and heavy regulatory oversight, blockchain represents a potential future mechanism for enhancing transparency, governance, regulatory supervision, and transaction efficiency. Its analytical relevance lies not in immediate implementation, but in signaling a shift toward more resilient and trust-enhancing digital architectures.

Overall, this research contributes to the digital transformation literature by demonstrating how transformation pathways are reconfigured under conditions of political instability and strong regulatory centralization. It shows that in such contexts, digital transformation tends to follow a cautious, incremental, and institutionally constrained trajectory in which stability and compliance take precedence over speed and radical innovation. For policymakers, regulators, and bank executives, the findings underscore the need to balance regulatory control with greater organizational autonomy, sustained investment in human capital, and selective engagement with advanced digital technologies that are aligned with national institutional realities.

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التحول الرقمي في المصارف الليبية

أربع دراسات حالة

هديل ر. الجربي[1]، يسرى ف. بدر[2]

[1] كلية تقنية المعلومات، جامعة طرابلس، [2] كلية الإدارة، المعهد الآسيوي للتقنية

h.elgerbi@uot.edu.ly
badir@ait.asia
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الملخص. تتناول هذه المقالة التحول الرقمي (DT) في القطاع المصرفي الليبي، وهو سياق يتسم بعدم الاستقرار السياسي المطوّل، والمركزية التنظيمية، وعدم اليقين الاقتصادي. وباستخدام منهج دراسة حالة مقارنة نوعية، تم تحليل أربعة مصارف ليبية تمثل مستويات مختلفة من نضج التحول الرقمي. جُمعت البيانات من خلال عشرين مقابلة مباشرة مع قيادات وموظفي المصارف، إلى جانب تقارير داخلية ووثائق أرشيفية. وتُظهر النتائج أن تبنّي التحول الرقمي يتشكل بفعل ستة عوامل مترابطة هي: (1) توجهات القيادة في اتخاذ القرار، (2) هيكل الملكية، (3) مستويات البيروقراطية والرسميات، (4) مهارات الموارد البشرية والتدريب، (5) الوضوح الاستراتيجي فيما يتعلق بالتطور التكنولوجي، و (6) القدرة على الاستثمار. وعلى الرغم من أن جميع المصارف تعمل في ظل الظروف الوطنية نفسها، فإن التأثير النسبي لهذه العوامل يختلف بشكل ملحوظ بين الحالات، مما يؤدي إلى مسارات متباينة للتحول الرقمي. وبدلاً من تبنّي التحول الرقمي بوصفه استراتيجية قائمة على الابتكار، تعتمد المصارف الليبية التقنيات الرقمية أساسًا لضمان استمرارية العمليات، والامتثال التنظيمي، والبقاء المؤسسي. وتُسهم هذه الدراسة في أدبيات التحول الرقمي من خلال إبراز ديناميكيات التحول في البيئات الهشّة والمتأثرة بالنزاعات.

الكلمات المفتاحية. التكنولوجيا المصرفية، التحول الرقمي، المصارف الليبية.