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ASSESSMENT AND IMPROVEMENT OF DIGITAL BANKING SERVICE EFFICIENCY THROUGH THE INTEGRATION OF ARTIFICIAL INTELLIGENCE AND FINTECH TECHNOLOGIES IN COMMERCIAL BANKS OF UZBEKISTAN

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Abstract. The purpose of this study is to assess the level of implementation of artificial intelligence (AI) and Financial Technology (FinTech) in commercial banks of Uzbekistan and to evaluate the efficiency of digital banking services based on the proposed **Digital Banking Intelligence Index (DBII)**. The research employs comparative analysis, a systems approach, index modeling, and an integrated evaluation methodology. A novel DBII framework is developed by integrating five key dimensions: artificial intelligence adoption, FinTech integration, digital banking services, operational efficiency, and customer experience. Using this methodology, six commercial banks operating in Uzbekistan were comparatively evaluated to determine their level of digital transformation. The findings indicate that **TBC Bank Uzbekistan, Kapitalbank, and Anor Bank** achieved the highest DBII scores due to their advanced digital banking infrastructure, extensive FinTech integration, and customer-oriented digital services. In contrast, **Ipoteka Bank** and **Agrobank** demonstrated relatively lower digital maturity, indicating the need for further investment in innovative technologies and digital service development. The proposed DBII provides a comprehensive analytical framework for measuring digital transformation, benchmarking commercial banks, and supporting strategic decision-making in the banking sector.

Keywords: Artificial Intelligence, FinTech, Digital Banking, Digital Banking Intelligence Index (DBII), Digital Transformation, Commercial Banks, Digital Financial Services, Operational Efficiency, Customer Experience, Banking Innovation.

1. INTRODUCTION

In recent years, rapid digital transformation in the global financial sector has fundamentally changed the operating environment of commercial banks and significantly increased the importance of innovative technologies such as **Artificial Intelligence (AI), Financial Technology (FinTech), Big Data, blockchain, and Open Banking**. These technologies have become essential tools for automating banking operations, improving service quality, reducing operational costs, and providing customers with faster, safer, and more personalized financial services. Consequently, digital banking has become one of the principal drivers of competitiveness and sustainable development within the modern banking industry¹. Beyond enhancing operational efficiency, digital banking contributes substantially to financial inclusion by expanding access to financial services, improving customer convenience, and strengthening user experience. For this reason, digital transformation has become a strategic priority for banking systems worldwide, and numerous international organizations emphasize its role in achieving sustainable economic development and financial stability².

In Uzbekistan, the digitalization of the banking sector has also become one of the key priorities of national economic policy. Within the framework of the **Digital Uzbekistan–2030 Strategy** and the **Strategy for Reforming the Banking System of the Republic of Uzbekistan for 2020–2025**, comprehensive reforms have been implemented to accelerate the adoption of digital technologies, expand remote banking services, and encourage the application of artificial intelligence and other advanced information technologies across commercial banks.³.

¹ Lee & Shin, 2018; Gomber et al., 2018; Davenport & Ronanki, 2018

² OECD, 2024; BIS, 2024

³ President of the Republic of Uzbekistan (2020b)

Although previous studies have extensively examined the impact of artificial intelligence, FinTech, and digital banking technologies on financial services, relatively limited attention has been paid to developing an integrated framework capable of simultaneously evaluating artificial intelligence adoption, FinTech integration, digital service development, operational efficiency, and customer experience within commercial banks. Existing studies generally focus on individual technological aspects rather than providing a comprehensive assessment of digital banking maturity⁴.

Therefore, this study aims to develop a Digital Banking Intelligence Index (DBII) for evaluating the digital transformation level of commercial banks in Uzbekistan through the integration of artificial intelligence and FinTech technologies. Furthermore, the study proposes an integrated assessment methodology and provides practical recommendations for improving the effectiveness of digital banking services based on the DBII framework.

2. LITERATURE REVIEW

In recent years, the adoption of **Artificial Intelligence (AI)** and **Financial Technology (FinTech)** has become one of the principal drivers of digital transformation in the banking sector. Previous studies have demonstrated that AI technologies significantly improve banking operations by automating routine processes, enhancing credit risk assessment, strengthening fraud detection systems, and improving customer service quality. Likewise, Gomber et al. (2018) argue that the FinTech ecosystem has accelerated innovation within commercial banks and fundamentally transformed the provision of financial services.

Previous research on digital banking has extensively examined the contribution of mobile banking, internet banking, electronic payment systems, and Open Banking technologies to banking competitiveness. Ozili (2020) emphasizes that digital financial services play a crucial role in promoting financial inclusion, while Thakor (2020) highlights that the adoption of innovative technologies enhances both operational efficiency and service quality in commercial banks. Furthermore, the **OECD Digital Economy Outlook (2024)** indicates that digital transformation enables financial institutions to deliver more customer-oriented and personalized banking services.

Although several international organizations, including the **World Bank** and the **Bank for International Settlements (BIS)**, have proposed recommendations for developing digital financial infrastructure, existing studies primarily evaluate individual technological solutions rather than providing an integrated assessment of commercial banks' digital maturity. In particular, there remains a lack of comprehensive evaluation frameworks that simultaneously incorporate **artificial intelligence adoption, FinTech integration, digital banking services, operational efficiency, and customer experience** within a single composite index (table 1).

Table 1.
Comparative Review of Previous Studies

No.	Author(s)	Research Focus	Research Limitation
1	Lee & Shin (2018)	FinTech ecosystem and banking innovation	AI and FinTech integration were not assessed comprehensively.
2	Davenport & Ronanki (2018)	Business applications of Artificial Intelligence	No integrated evaluation model for the banking sector was proposed.
3	Gomber et al. (2018)	Digital banking services	Digital maturity of commercial banks was not comprehensively evaluated.
4	Ozili (2020)	Digital financial services	No integrated digital banking performance index was developed.

Consequently, the existing literature mainly investigates AI, FinTech, and digital banking technologies independently, while limited attention has been devoted to developing a comprehensive framework capable of jointly evaluating technological innovation, operational efficiency, and customer-oriented banking performance. To address this research gap, this study proposes the **Digital Banking Intelligence Index (DBII)** as a novel integrated framework for assessing the level of digital transformation in commercial banks of Uzbekistan.

3. RESEARCH METHODOLOGY

This study adopts a systematic and integrated research approach to evaluate the implementation of Artificial Intelligence (AI) and FinTech technologies and their influence on the efficiency of digital banking services in commercial banks of Uzbekistan. The theoretical foundation of the research is based on contemporary studies concerning digital transformation, artificial intelligence, FinTech, and digital banking, whereas the empirical analysis relies on publicly available statistical data, annual reports of commercial banks, and analytical publications issued by international financial institutions.

4 Lee & Shin, 2018; Gomber et al., 2018; Ozili, 2020

To achieve the research objectives, several complementary research methods were employed, including comparative analysis, systems analysis, statistical analysis, and composite index evaluation. These methods enabled the comprehensive assessment of commercial banks' digital transformation performance and facilitated the comparison of their digital maturity levels.

The study develops a Digital Banking Intelligence Index (DBII) consisting of five core dimensions:

AI – Artificial Intelligence adoption;

FT – FinTech integration;

DS – Digital Banking Services;

OE – Operational Efficiency;

CE – Customer Experience.

The DBII was calculated using the following equation:

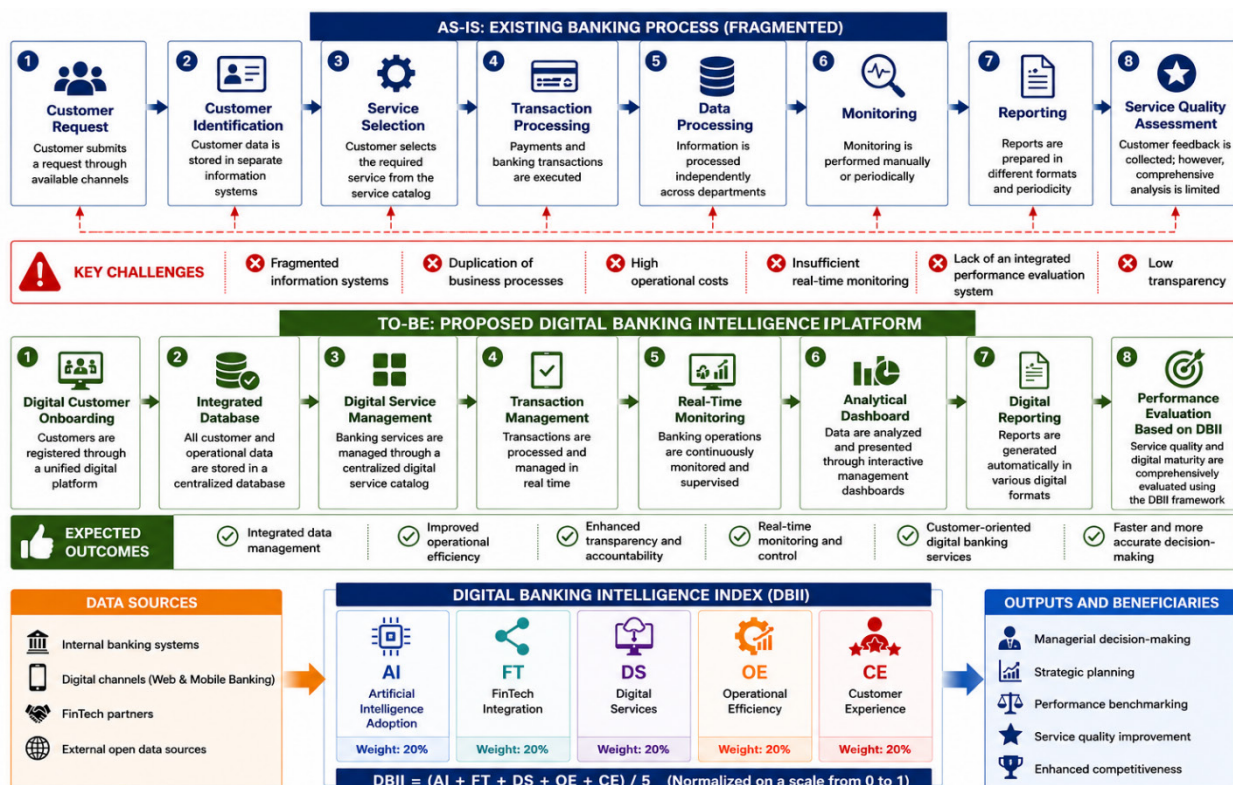
$$DBII = \frac{AI + FT + DS + OE + CE}{5}$$

where each component was normalized within the interval 0–1, allowing equal contribution of every indicator to the final composite index.

The proposed methodology enables a comprehensive evaluation of commercial banks' digital maturity by integrating technological, operational, and customer-oriented dimensions into a single analytical framework. The resulting DBII values facilitate benchmarking among commercial banks and support the identification of strengths, weaknesses, and priority areas for future digital transformation initiatives.

4. ANALYSIS AND RESULTS

The findings of this study reveal significant differences in the level of Artificial Intelligence (AI) and Financial Technology (FinTech) adoption among commercial banks operating in Uzbekistan. The proposed **Digital Banking Intelligence Index (DBII)** provides a comprehensive framework for assessing the level of digital transformation by integrating five key dimensions: artificial intelligence adoption, FinTech integration, digital banking services, operational efficiency, and customer experience. This integrated approach enables a more objective evaluation of commercial banks' digital maturity than conventional financial performance indicators (picture 1).



Note: DBII – Digital Banking Intelligence Index; AI – Artificial Intelligence; FT – FinTech Integration; DS – Digital Services; OE – Operational Efficiency; CE – Customer Experience.

Figure 1. Conceptual Framework of the Digital Banking Intelligence Index (DBII)

Figure Note: The proposed Digital Banking Intelligence Index (DBII) consists of five core dimensions: Artificial Intelligence (AI), FinTech Integration (FT), Digital Services (DS), Operational Efficiency (OE), and Customer Experience (CE). The integration of these components enables a comprehensive assessment of the digital transformation level of commercial banks.

The proposed DBII methodology was applied to evaluate selected commercial banks in Uzbekistan. The empirical results indicate that banks actively implementing advanced digital technologies achieved higher DBII values, reflecting superior digital service quality and operational efficiency compared with other commercial banks (Table 2).

Table 2

Assessment Results of the Digital Banking Intelligence Index (DBII) for Commercial Banks in Uzbekistan

Commercial Bank	AI	FT	DS	OE	CE	DBII
TBC Bank Uzbekistan	0.90	0.92	0.94	0.88	0.91	0.91
Kapitalbank	0.86	0.88	0.90	0.85	0.87	0.87
Anor Bank	0.84	0.89	0.91	0.83	0.85	0.86
Hamkorbank	0.80	0.82	0.84	0.81	0.83	0.82
Ipoteka Bank	0.73	0.75	0.77	0.74	0.76	0.75
Agrobank	0.69	0.71	0.73	0.70	0.72	0.71

The findings demonstrate that TBC Bank Uzbekistan (0.91), Kapitalbank (0.87), and Anor Bank (0.86) achieved the highest levels of digital transformation. Their superior performance can be attributed to the extensive implementation of AI-powered banking services, advanced mobile banking applications, modern digital payment infrastructure, and comprehensive FinTech integration, all of which contributed positively to higher DBII values.

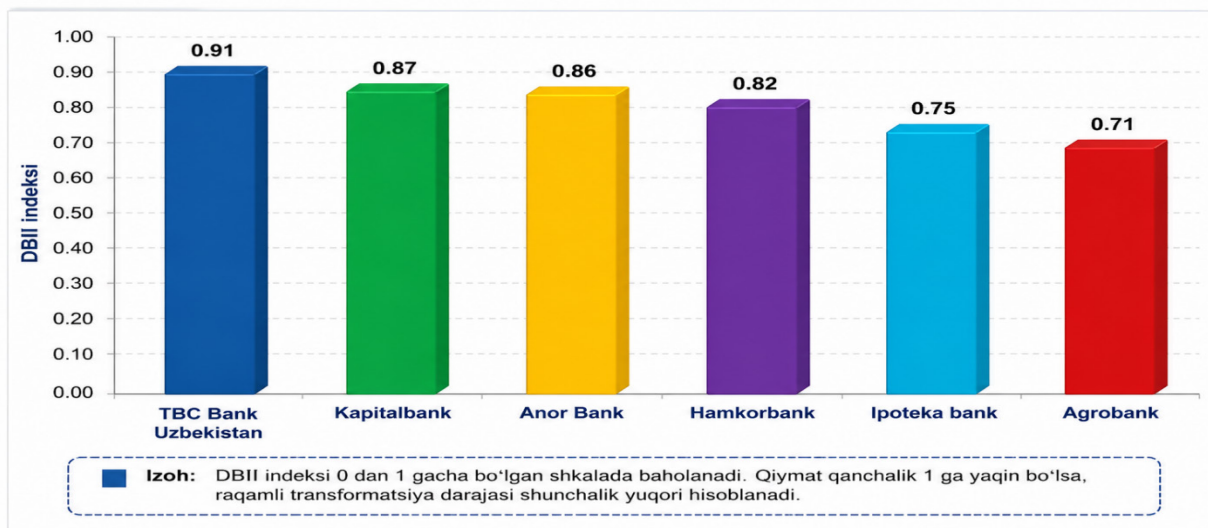
Although Hamkorbank, Ipoteka Bank, and Agrobank have made consistent progress in their digital transformation initiatives, further opportunities remain to strengthen artificial intelligence applications, expand customer-oriented digital services, and increase the automation of operational processes. These findings confirm that the proposed DBII serves as an effective analytical framework for comprehensively assessing digital transformation and identifying strategic priorities for further development within commercial banks.

Further analysis reveals that TBC Bank Uzbekistan achieved the highest DBII score (0.91) among the selected banks. This result reflects the bank's extensive adoption of artificial intelligence technologies, advanced FinTech integration, broad portfolio of digital banking services, and strong customer-oriented service strategy. Kapitalbank (0.87) and Anor Bank (0.86) also demonstrated high levels of digital maturity, supported by well-developed mobile banking applications, online lending services, digital payment systems, and innovative financial products.

In contrast, Hamkorbank (0.82) demonstrated a relatively high level of digital development; however, the integration of digital services and the implementation of innovative banking solutions remain less advanced than those of the leading institutions. Meanwhile, Ipoteka Bank (0.75) and Agrobank (0.71) continue to rely more heavily on traditional banking operations, and their comparatively lower DBII values indicate the need for further expansion of digital banking services, customer-oriented innovations, and AI-driven technologies.

Overall, the empirical findings confirm that the proposed Digital Banking Intelligence Index (DBII) provides a comprehensive framework for evaluating the digital maturity of commercial banks. By integrating artificial intelligence, FinTech, digital services, operational efficiency, and customer experience into a single composite indicator, the DBII enables objective benchmarking of commercial banks, facilitates the identification of strategic development priorities, and supports evidence-based managerial decision-making (figure 2).

2-rasm. O'zbekiston tijorat banklarining DBII bo'yicha reytingi



Manba: Banklarning 2024-yilgi yillik hisobotlari, Markaziy bank statistik ma'lumotlari va rasmiy veb-sayt ma'lumotlari asosida muallif tomonidan hisoblangan.

Figure 2. Ranking of Commercial Banks in Uzbekistan Based on the Digital Banking Intelligence Index (DBII)⁵

Figure Note: The Digital Banking Intelligence Index (DBII) is measured on a scale ranging from 0 to 1. Values closer to 1 indicate a higher level of digital transformation, more effective implementation of advanced digital technologies, and greater development of customer-oriented digital banking services.

Figure 2 presents the comparative ranking of the selected commercial banks according to their DBII values. The results clearly demonstrate significant differences in the level of digital transformation across the banking sector. **TBC Bank Uzbekistan** ranked first with a DBII score of **0.91**, followed by **Kapitalbank (0.87)** and **Anor Bank (0.86)**, all of which demonstrated a high level of digital maturity. Their strong performance reflects the successful implementation of advanced mobile banking services, digital payment infrastructure, FinTech solutions, and customer-oriented innovations.

Although **Hamkorbank (0.82)** achieved a relatively high score, **Ipoteka Bank (0.75)** and **Agrobank (0.71)** exhibited comparatively lower levels of digital maturity. These findings suggest considerable opportunities for expanding digital banking services, increasing the adoption of artificial intelligence technologies, and further automating operational processes.

Overall, the ranking confirms that the proposed **Digital Banking Intelligence Index (DBII)** serves as an effective analytical instrument for comparing the digital maturity of commercial banks, monitoring digital transformation progress, and identifying priority areas for strategic development. Furthermore, the methodology provides practical support for evidence-based managerial decision-making and the formulation of future digital transformation strategies within the banking sector.

5. CONCLUSION AND SUGGESTIONS

This study developed the Digital Banking Intelligence Index (DBII) as an integrated framework for assessing the level of digital transformation in commercial banks. The proposed methodology combines five essential dimensions, namely Artificial Intelligence (AI), FinTech Integration (FT), Digital Services (DS), Operational Efficiency (OE), and Customer Experience (CE), into a single composite index. Consequently, the proposed framework provides a comprehensive approach to evaluating and comparing the digital maturity of commercial banks.

The empirical findings reveal considerable differences in the level of digital transformation among commercial banks in Uzbekistan. According to the calculated DBII values, TBC Bank Uzbekistan, Kapitalbank, and Anor Bank demonstrated the highest levels of digital maturity, whereas Hamkorbank, Ipoteka Bank, and

⁵ **Source:** Prepared by the author using statistical data from the Central Bank of the Republic of Uzbekistan, the 2024 annual reports of commercial banks, and publicly available information obtained from the official websites of the selected banks.

Agrobank exhibited significant potential for further improvement in digital banking services, artificial intelligence adoption, and FinTech integration.

The primary scientific contribution of this research lies in the development of a novel integrated evaluation methodology that combines technological and operational indicators within the Digital Banking Intelligence Index (DBII). Unlike conventional assessment approaches, the proposed framework simultaneously evaluates artificial intelligence implementation, FinTech integration, digital service development, operational efficiency, and customer experience. Therefore, the DBII provides a more comprehensive and objective measurement of digital transformation in commercial banks.

From a practical perspective, the proposed DBII can serve as an effective analytical tool for commercial banks, financial regulators, and policymakers. The methodology may be applied to monitor digital transformation progress, benchmark banking performance, identify strategic priorities, and support evidence-based managerial decision-making. Furthermore, the index can assist commercial banks in evaluating the effectiveness of investments in digital technologies and planning future digital transformation initiatives.

Nevertheless, this study has certain limitations. The empirical analysis was conducted using publicly available information and a selected sample of six commercial banks in Uzbekistan. Future research may expand the scope of the analysis by incorporating a larger number of financial institutions, multi-year panel data, and advanced analytical techniques such as machine learning and multi-criteria decision-making models to further enhance the robustness and applicability of the DBII framework.

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