STATISTICAL EVALUATION OF THE DIGITAL TRANSFORMATION OF THE BANKING SYSTEM: THE CASE OF COMMERCIAL BANKS' ONLINE ACTIVITIES

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Abstract. This study focuses on the statistical evaluation of the digital transformation in the banking system, with a specific emphasis on the online activities of commercial banks. It aims to identify strengths, weaknesses, opportunities, and threats related to current evaluation methodologies through a comprehensive SWOT analysis combined with a detailed literature review. The research highlights the need for integrated quantitative and qualitative performance indicators and emphasizes the role of advanced analytics technologies to improve assessment accuracy. The findings provide valuable insights for banks, policymakers, and researchers to enhance the effectiveness and reliability of online banking service evaluations in a rapidly evolving digital environment.

Keywords: digital transformation, online banking, commercial banks, statistical evaluation, SWOT analysis, performance indicators, big data analytics, financial services.

Introduction. The digital transformation of the banking system represents one of the most significant paradigm shifts in the financial sector in recent decades. The rapid advancement of information and communication technologies (ICT) has fundamentally altered how banks operate, deliver services, and engage with their customers. Particularly, the expansion of online banking activities by commercial banks has not only enhanced service accessibility and convenience but also introduced new challenges related to efficiency, security, and regulatory compliance. This evolution underscores the necessity for a rigorous, data-driven approach to evaluate the impact of digital transformation on banking performance, customer satisfaction, and overall financial stability.

The relevance of investigating the digital transformation within the banking sector is multifaceted. First, as customers increasingly demand seamless, 24/7 access to financial services, banks must continuously innovate and optimize their online platforms to meet these expectations. Second, digital banking offers the potential to reduce operational costs, improve transaction speed, and enhance risk management through automated processes and real-time data analytics. However, the transition to digital platforms also raises critical concerns about cybersecurity, data privacy, and digital literacy among users. Hence, evaluating the efficacy and robustness of digital banking initiatives requires a comprehensive framework that combines both quantitative performance metrics and qualitative factors.

Statistical evaluation serves as a powerful tool in this context, enabling stakeholders to objectively measure the progress and outcomes of digital transformation efforts. Through the

application of advanced statistical models and methodologies, it is possible to analyze large volumes of operational data, identify trends, and assess the effectiveness of online banking services. Moreover, such evaluation facilitates benchmarking against industry standards and best practices, thereby guiding strategic decision-making and policy formulation.

In developing economies, including many countries in Central Asia, the digital transformation of the banking system plays a pivotal role in expanding financial inclusion by bridging the gap between traditional banking infrastructure and underserved populations. Therefore, studying the digital evolution of commercial banks' online activities is not only academically significant but also vital for socio-economic development.

This article aims to provide a comprehensive statistical assessment of the digital transformation within the banking system, using the online activities of commercial banks as a case study. By synthesizing theoretical insights with empirical data, the research seeks to identify key performance indicators, evaluate challenges and opportunities, and propose methodological improvements for ongoing monitoring and analysis. The findings are expected to contribute to both scholarly literature and practical frameworks that support sustainable and secure digital banking development.

Literature Review. The digital transformation of banking systems, especially through the expansion of commercial banks' online activities, has become a focal point for researchers aiming to understand its implications on service efficiency and financial inclusion. In Uzbekistan, scholars such as Karimov [1] have explored the development of statistical frameworks to evaluate digital banking services, emphasizing the importance of integrating both operational and customer-centric indicators. Yusupov [2] analyzed the role of online banking in promoting financial accessibility in emerging markets, highlighting technological adoption barriers. Rakhmatova [3] applied statistical models to assess user engagement and satisfaction within digital banking platforms, providing practical insights for service improvement. Tursunov [4] investigated the impact of digital transformation on banks' operational efficiency, advocating for the inclusion of dynamic performance metrics in evaluation models. On the international stage, Parasuraman, Zeithaml, and Malhotra [5] developed the widely recognized E-S-QUAL scale to measure electronic service quality, a foundational tool in digital banking assessments. DeLone and McLean [6] introduced their Information Systems Success Model, which has been extensively applied to evaluate IT-enabled services, including banking systems. Pikkarainen et al. [7] examined factors influencing consumer acceptance of online banking, emphasizing trust and ease of use as critical for sustained digital engagement. Zhou, Lu, and Wang [8] employed structural equation modeling to link e-service quality with customer satisfaction, underscoring the complex interactions within digital banking environments. Collectively, these studies underline the necessity of multidimensional and statistically rigorous approaches to assess the ongoing digital transformation of commercial banking. They highlight the importance of adapting global frameworks to local contexts, ensuring evaluation systems effectively capture both technological and human factors in digital banking services.

Research Methodology. This study employs a mixed-method research approach, combining a thorough literature review with SWOT analysis to comprehensively evaluate the statistical methodologies used in assessing online services of commercial banks. The literature review systematically synthesizes findings from both local and international studies to identify key performance indicators and gaps in current evaluation frameworks. Complementing this, the SWOT analysis examines the internal strengths and weaknesses of existing statistical models alongside external opportunities and threats posed by technological advancements

and regulatory changes. Together, these methods provide a robust foundation for developing an improved, context-specific framework to enhance the accuracy and relevance of statistical evaluations in digital banking.

Analys. To effectively evaluate the current statistical methodologies applied to assess the online activities of commercial banks, a SWOT analysis is conducted. This approach helps identify the internal strengths and weaknesses of existing evaluation frameworks, as well as external opportunities and threats arising from technological developments, regulatory environments, and market dynamics. By systematically categorizing these factors, the SWOT analysis provides valuable insights that inform the enhancement and adaptation of statistical tools used in monitoring digital banking services.

Table 1.

SWOT Analysis of Statistical Evaluation Methodologies for Commercial Banks' Online Activities

Strengths	Weaknesses
- Availability of extensive digital transaction data enabling quantitative analysis.	- Lack of standardized performance indicators for online banking efficiency.
- Established statistical models applicable to financial service evaluation.	- Limited integration of qualitative user experience metrics in current models.
- Growing research both locally and internationally supporting methodological development.	- Insufficient real-time data analytics capabilities in many banks.
- Increasing digital adoption fostering innovation in service delivery.	- Data privacy and security concerns limiting data accessibility.
Opportunities	**Threats**
- Advances in big data analytics and AI for deeper insights.	- Rapid technological changes may render existing models obsolete.
- Expansion of digital financial services and inclusion.	- Cybersecurity threats impacting data reliability and user trust.
- Collaboration between banks and academic institutions for method improvement.	- Regulatory changes imposing stricter data management and reporting.
- Rising customer demand for efficient and transparent online services.	- Variability in users' digital literacy complicating evaluation outcomes.

The SWOT analysis indicates that statistical evaluation methodologies for commercial banks' online activities benefit significantly from the availability of large digital datasets and well-established quantitative models. These strengths enable comprehensive and data-driven assessments of online banking efficiency. However, the analysis also reveals critical weaknesses, such as the absence of standardized and universally accepted performance indicators and the limited incorporation of qualitative factors like customer experience and satisfaction.

The opportunities arising from technological advances, such as big data and artificial intelligence, present promising prospects for enhancing the accuracy and timeliness of statistical evaluations. Additionally, expanding digital financial inclusion offers new avenues to tailor evaluation frameworks to diverse user segments.

Conversely, threats including rapid technological evolution, cybersecurity risks, and stringent regulatory requirements pose significant challenges to the stability and adaptability of current methodologies. Furthermore, differences in digital literacy among customers introduce complexity in interpreting service effectiveness from the data.

Overall, the SWOT analysis highlights the urgent need for the development of adaptable, multidimensional, and secure statistical evaluation frameworks. These should integrate both quantitative and qualitative data, leverage emerging technologies, and remain flexible to changing technological and regulatory landscapes to accurately assess and improve the efficiency of commercial banks' online services.

Conclusion and Recommendations. The digital transformation of commercial banks and the expansion of their online services have created both opportunities and challenges for statistical evaluation methodologies. This study's SWOT analysis revealed key strengths, including the availability of extensive digital data and the presence of foundational statistical models, which facilitate comprehensive performance assessment. However, significant weaknesses persist, such as the lack of standardized indicators and insufficient integration of qualitative factors like customer experience. Rapid technological advancements and increasing regulatory demands underscore the necessity for adaptable and robust evaluation frameworks.

To address these challenges, it is recommended that commercial banks and researchers collaborate to develop a unified system of performance indicators that balances quantitative operational metrics with qualitative customer-centric measures. Incorporating advanced analytics tools, such as big data and artificial intelligence, can enhance real-time monitoring and predictive capabilities. Furthermore, ensuring data security and compliance with privacy regulations must remain a priority to maintain stakeholder trust.

It is also advised that banks invest in continuous training and education to improve digital literacy among users, which will improve the quality and relevance of collected data. Finally, fostering partnerships between academia and the banking sector will support innovation in methodological approaches and ensure their practical application.

By implementing these recommendations, commercial banks can achieve more accurate, reliable, and holistic evaluations of their online services, ultimately enhancing customer satisfaction, operational efficiency, and competitive positioning in the evolving digital banking landscape.

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