ECONOSCITECH INTEGRATION

ISSUE 11

INTERNATIONAL SCIENTIFIC ELECTRONIC JOURNAL

TASHKENT STATE UNIVERSITY OF ECONOMICS

American University of Technology
Powered by Arizona State University®

ISSN: 3060-5075



Acceptance of articles
PUBLISHED MONTHLY

ARTICLE CONTRIBUTORS
PROFESSORS, SCHOLARS, SPECIALISTS, AND RESEARCHERS



Google scholar

OpenAIRE

ISSN INTERNATIONAL STANDARD SERIAL NUMBER DENMARK

CONTACT: +998 94 3540880 https://econoscitech-integration-journal.uz 2026



EDITOR-IN-CHIEF:
Zufarova Nozima Gulamiddinovna
DSc., Dean of Tourism Faculty, TSUE

DEPUTY EDITOR-IN-CHIEF:
Makhmudov Nosir Makhmudovich
DSc., Prof., Academican

DEPUTY EDITOR-IN-CHIEF:
Suyunov Dilmurod Xolmurodovich
Doctor of Economics (DSc), Professor,

DEPUTY EDITOR-IN-CHIEF:
Allayarov Shamsiddin Amanullayevich
doctor of economics (DSC), professor

RESPONSIBLE SECRETARY:
Otaboyev Axmed Maxsudbek o'g'li
TSUE independent researcher

THE SCIENTIFIC-POPULAR ELECTRONIC JOURNAL **"ECONOSCITECH-INTEGRATION"** HAS BEEN REGISTERED UNDER THE NUMBER C-5669651 BY THE AGENCY FOR INFORMATION AND MASS COMMUNICATIONS (AOKA) OF THE REPUBLIC OF UZBEKISTAN, EFFECTIVE FROM OCTOBER 9, 2024.

In accordance with Resolution No. 384/6 dated April 10, 2026, issued by the Presidium of the Supreme Attestation Commission under the Ministry of Higher Education, Science and Innovation of the Republic of Uzbekistan, this journal is included in the list of recommended international scientific publications for publishing the primary research findings of doctoral dissertations in the field of Economic Sciences.

Partners: Tashkent State University of Economics / American University of Technology in Tashkent (AUT)

Electronic publication. Issue 11.
Approved for publication in Novermber 2026.

Editorial Board Members:



Sharipov Kongratbay Avezimbetovich,
Doctor of Technical Sciences (DSc), Professor



Said Irandoust,
Doctor of Chemical Engineering Sciences, Professor



Abdurakhmanova Gulnora Kalandarovna,
Doctor of Economic Sciences (DSc), Professor



Tokunaga Masahiro,
professor, PhD of Economics of the Faculty of Business and Commerce



Debasis Das,
professor Department of Computer Science



Nitin Goje,
professor and Program Lead - Computer Science



Sajid Mohy Ul Din,
International Lecturer Universiti Pendidikan Sultan Idris, Tanjung Malim, Malaysia



Kamaruzzaman Muhammad,
Associate Professor UiTM, (PhD), CA (M), CPA (M), ASA



Артамонов Антон Анатольевич,
(M.D.) ООО «Международный Нейроуниверситет им. Д.Р. Ягудина»

CONTENTS

ECONOMIC SIGNIFICANCE OF REGIONAL POSTAL SERVICE INFRASTRUCTURE IN THE DEVELOPMENT OF E-COMMERCE 24
Palvanbayev Umidbek Uktam ugli

SCIENTIFIC AND METHODOLOGICAL FOUNDATIONS FOR INTEGRATING EXPERT ASSESSMENT AND ENTROPY METHODS IN EVALUATING THE EFFICIENCY OF ELECTRONIC DOCUMENT MANAGEMENT 29
Gaibnazarova Zilola Maxsudovna

ECONOMIC MECHANISMS FOR THE SUSTAINABLE DEVELOPMENT OF THE AGROCLUSTER COMPLEX 36
Berdimurodov U.S.

TECHNICAL EFFICIENCY AND DETERMINANTS OF CREATIVE EXPORTS: A STOCHASTIC FRONTIER ASSESSMENT WITH SCENARIO EVIDENCE FOR UZBEKISTAN 42
Daminova Madinakhon Bahromjon qizi

DEVELOPING BUSINESS CULTURE AMONG UNIVERSITY STUDENTS IN THE DIGITAL ECONOMY 47
Yusupova Dilnoza Maxmudovna

МЕХАНИЗМ УПРАВЛЕНИЯ ОБЕСПЕЧЕНИЕМ ЭКОНОМИЧЕСКОЙ БЕЗОПАСНОСТИ РЕСПУБЛИКИ УЗБЕКИСТАН В УСЛОВИЯХ ЭНЕРГЕТИЧЕСКОГО ПЕРЕХОДА 52
Якубов Дилшод Камилджанович

MPROVING INTEGRATED ORGANIZATIONAL-ECONOMIC MECHANISMS FOR POVERTY REDUCTION THROUGH DIGITAL SERVICES 57
Samiyev M. A.

SPECIFIC ASPECTS OF ORGANIZATIONAL MECHANISMS FOR THE DEVELOPMENT OF HIGHER EDUCATION SERVICES 64
Butayev Dilshod Eshbekovich

A REGIONAL CONDITIONS INDEX FOR FAMILY ENTREPRENEURSHIP AND FAMILY ENTERPRISE DENSITY: EVIDENCE FROM UZBEKISTAN'S REGIONS, INCLUDING SAMARKAND REGION 70
Iskandarov Sunnatillo Baxriddin ugli

SCIENTIFIC AND THEORETICAL APPROACHES TO STUDYING SOCIAL MARKETING IN HIGHER EDUCATION 77
Shoev Alim Khalmuratovich

IMPROVING THE MANAGEMENT AND FINANCING MECHANISMS OF INVESTMENT ACTIVITIES IN RADIO COMMUNICATION AND TELEVISION CENTRES IN THE DIGITAL ECONOMY 82
Khusanov Ulugbek Nishonovich

DEVELOPMENT OF AN ECONOMIC-MATHEMATICAL MODEL FOR THE APPLICATION OF KPI SYSTEMS IN INDUSTRIAL ENTERPRISES 88
Tursunov Orifali Samandarovich

INTERNATIONAL EXPERIENCE IN USING DIGITAL PLATFORMS FOR SMALL BUSINESS DEVELOPMENT 93
Rizayeva Nilufar Oblakulovna

ОБСЛУЖИВАНИЕ И ХРАНЕНИЕ ЭЛЕМЕНТОВ ЭКОНОМИЧНОЙ ИРРИГАЦИОННОЙ СИСТЕМЫ 101
Хакимов Баходир Бозорович

TAX BURDEN OPTIMIZATION AND INSTITUTIONAL TAX REFORMS IN UZBEKISTAN: EVIDENCE FROM INCOME TAXATION AND VAT EFFICIENCY 107
Azizjon Sadullayevich Rakhmonov

CONTENTS

MODELS OF INTERORGANIZATIONAL INTEGRATION IN LARGE CONSTRUCTION ENTERPRISES 114
Toshimov Azizbek Khakimovich

THE IMPORTANCE AND RISKS OF ARTIFICIAL INTELLIGENCE IN UZBEKISTAN: A SYNTHESIS OF OPEN SOURCES AND A SWOT ASSESSMENT IN LIGHT OF INTERNATIONAL EVIDENCE 131
Qodirova Laylo Otabekovna

EKONOMETRIK MODEL ASOSIDA NEFT VA GAZ SANOATI KORXONALARINING INVESTITSION FAOLIYATI IQTISODIY SAMARADORLIGINI PROGNOZLAŞ 139
Valikulov Şerzod Zaynitdinoviç

THE ROLE AND IMPORTANCE OF THE HUMAN RESOURCE MANAGEMENT SYSTEM IN ENTERPRISE MANAGEMENT 148
Aslanova Dilnoza Fatilloyevna

ВЛИЯНИЕ ЗАГРЯЗНЕНИЯ АТМОСФЕРНОГО ВОЗДУХА НА ЭФФЕКТИВНОСТЬ ИСПОЛЬЗОВАНИЯ ЧЕЛОВЕЧЕСКОГО КАПИТАЛА И УСТОЙЧИВОСТЬ ЭКОНОМИЧЕСКОГО РОСТА РЕГИОНОВ УЗБЕКИСТАНА 156
Динара Юсуббаева

ASSESSING THE EFFICIENCY OF THE ORGANIZATIONAL AND ECONOMIC MECHANISM FOR THE DEVELOPMENT OF TRANSPORT AND LOGISTICS SYSTEMS: A MULTI-CRITERIA APPROACH 163
Agzamova Marguba Mirabdullayevna

FRAGMENTED AGRICULTURAL PRODUCTION AND THE DEVELOPMENT POTENTIAL OF AGRICULTURAL COOPERATIVES IN UZBEKISTAN 170
Obloqulov Abdurauf Odiljon o‘g‘li

IMPROVING THE ORGANIZATIONAL AND ECONOMIC MECHANISM FOR ASSESSING AND DEVELOPING ENTREPRENEURIAL CULTURE IN THE TOURISM SERVICES SECTOR 176
Ollanazarov Bekmurod Davlatmuratovich

TOURISM FLOW MANAGEMENT AND SUSTAINABLE DEVELOPMENT IN SILK ROAD HERITAGE CITIES: A COMPARATIVE STUDY OF DUNHUANG AND SAMARKAND 186
Zheng Jie

IMPROVING STATISTICAL METHODS AND PROCESSES FOR CALCULATING THE INFLATION RATE IN THE REPUBLIC OF UZBEKISTAN 192
Umarov Muxtor Turaevich

PUBLIC DEBT MANAGEMENT AND MACROECONOMIC STABILITY IN UZBEKISTAN: DEBT DYNAMICS AND PORTFOLIO RISK ASSESSMENT 198
Sayfutdinov Xasanboy Dilshodovich

A SYSTEM OF INDICATORS FOR ASSESSING THE EFFECTIVENESS OF TECHNOLOGICAL ENTREPRENEURSHIP INCENTIVES IN THE REGIONS (THE CASE OF BUKHARA REGION) 205
Rakhmatov Jasurbek Abdurakhmonovich

ASSESSING THE EFFECTIVENESS OF INTEGRATED MARKETING COMMUNICATIONS IN REGIONAL ECONOMIC DEVELOPMENT: EVIDENCE FROM UZBEKISTAN’S REGIONS 212
Mukhsinov Bekzod Tokhirovich

ORGANIZATIONAL AND ECONOMIC MODEL OF DIGITAL TRANSFORMATION IN THE REGIONAL LIGHT INDUSTRY: MECHANISMS AND FORECAST TO 2030 (EVIDENCE FROM BUKHARA REGION, UZBEKISTAN) 218
Akhmedova Dilfuza Nuriddinovna

THE EVOLUTION OF MANAGEMENT SERVICE COMPANIES AND THE FORMATION AND DEVELOPMENT OF THE MANDATORY FEE COLLECTION SYSTEM 226
Usarov Jurabek Abdunazirovich

THE IMPACT OF INVESTMENT FLOWS ON REGIONAL ECONOMIC DEVELOPMENT: AN ECONOMETRIC ASSESSMENT OF UZBEKISTAN 232
Sapayeva Fazilat Norbayevna

INVESTIGATION OF THE EFFECT OF THERMOPLASTIC DEFORMATION ON THE MICROSTRUCTURE OF THE XH56MBKYu ALLOY 237
Saydumarov Botir Muradovich, Baxtiyorov Rustam Ravshan o‘g‘li

PANEL DATA ASSESSMENT OF THE IMPACT OF TAX EXPENDITURES ON UZBEKISTAN’S REGIONAL BUDGETS 242
Dildora Abdukarimovna Otamuradova

ORGANISATIONAL AND ECONOMIC MECHANISM FOR ENHANCING COMPETITIVENESS IN THE INFORMATION SERVICES SECTOR 254
Xudayberganov Zoxidjon Djurakulovich

EVALUATING TOURIST SATISFACTION AND PERCEIVED SERVICE QUALITY: EMPIRICAL EVIDENCE FROM MUSTAFA HOTEL IN SAMARKAND 261
Saidova Asalbegim Saidkazim qizi, Kalanova Nigora Mashrafovna, Rakhmonov Shukhrat Shavkatovich

JOB FLOWS, INTRA-CITY MIGRATION AND SPATIAL MISMATCH IN TASHKENT’S LABOUR MARKET: EVIDENCE FROM ESTABLISHMENT AND MIGRATION MICRODATA 269
Tursunova Fayoza Zaripovna

MANAGEMENT MODELS FOR ATTRACTING FOREIGN DIRECT INVESTMENT: INTERNATIONAL EXPERIENCE AND LESSONS FOR UZBEKISTAN 279
Tairbayeva Shakhnoza Utkurovna

ORGANISATIONAL AND ECONOMIC MECHANISM FOR FORMULATING AN INNOVATIVE DEVELOPMENT STRATEGY FOR INDUSTRIAL ENTERPRISES IN UZBEKISTAN 285
Bahodirov Shohruh Bahodir ugli

IMPROVING THE METHODOLOGY FOR DIGITAL ANALYSIS OF THE CONSISTENCY OF ASSESSMENT CRITERIA ACROSS ACADEMIC COURSES IN HIGHER EDUCATION INSTITUTIONS 293
Abduganiyeva Mavjuda Asatullayevna

ASSESSING THE EFFECTIVENESS OF DATA USE FOR MANAGEMENT PURPOSES WITHIN THE UNIFIED DIGITAL ECOSYSTEM OF THE HEALTHCARE SYSTEM 301
Turayeva Nafisa Odiljonovna

RISK-BASED CAPITAL ADEQUACY OF INSURANCE COMPANIES IN UZBEKISTAN: AN ADAPTED SOLVENCY II STANDARD FORMULA APPROACH 308
Usmanov Azizbek Albek o‘g‘li

AGRI-FOOD PRODUCTION, FOOD PRICES AND HOUSEHOLD INCOMES: AN ASSESSMENT OF ECONOMIC ACCESS TO FOOD IN UZBEKISTAN 315
Akhmedova Nafisa Amirddin qizi

A SYNERGETIC APPROACH TO DEVELOPING SCHOOL PRINCIPALS’ REFLECTIVE MANAGEMENT SKILLS 321
Yusupova Dilnoza Fayzullayevna

INTERMEDIARY LEAKAGE IN HERITAGE TOURISM: BOOKING PLATFORMS, TOUR OPERATORS, AND THE DISTRIBUTION OF VISITOR SPENDING AMONG SMALL HOSPITALITY OPERATORS IN SAMARKAND 326
Wei Zhibo

MIGRATION PATTERNS IN UZBEKISTAN AND REGIONAL PROJECTIONS TO 2030 333
Gulhayot Shuhratovna Abdullayeva

INSTITUTIONAL FOUNDATIONS AND THE CLUSTER SYSTEM FOR ATTRACTING INVESTMENT TO THE TEXTILE INDUSTRY IN UZBEKISTAN 341
Dilshod To‘ychi o‘g‘li Kamilov

PROSPECTS FOR THE DEVELOPMENT OF UZBEKISTAN’S TAX SYSTEM: A COMPARATIVE ANALYSIS OF INTERNATIONAL EXPERIENCE 346
Ibragimov Aziz Turayevich

CONTENTS

DIGITALISATION AS A STRATEGY AGAINST THE SHADOW ECONOMY: EVIDENCE, MECHANISM DESIGN AND 2030 SCENARIOS FOR UZBEKISTAN 352
Lochin T. Rakhmanov

FROM MASS HIGHER EDUCATION TO AGRICULTURAL SKILLS: THE SUPPLY OF HUMAN CAPITAL FOR UZBEKISTAN'S AGRICULTURE AND A DEMAND-DRIVEN TRAINING MECHANISM 362
Baxtiyor Sarimsakov, Jahongir Usmonov

PROSPECTS FOR FURTHER IMPROVEMENT OF COMMERCIAL BANKS' LENDING PRACTICES FOR ENTREPRENEURIAL ACTIVITIES 370
Ergashbayev Mardonbek Ravshanbek o'g'li

DIGITAL TRANSFORMATION OF BANKING SERVICES: ENHANCING EFFICIENCY AND CUSTOMER EXPERIENCE IN REMOTE BANKING 376
Khakimov Odil Arzikulovich

CONTENTS

INTERNATIONAL SCIENTIFIC ELECTRONIC JOURNAL

DIGITAL TRANSFORMATION OF BANKING SERVICES: ENHANCING EFFICIENCY AND CUSTOMER EXPERIENCE IN REMOTE BANKING

Khakimov Odil Arzikulovich
Termez State University
Email: xakimovodil257@mail.com
ORCID:https://orcid.org/0009-0008-4299-971X

Abstract: This paper examines how the digital transformation of banking services has influenced the efficiency and customer experience of remote banking in Uzbekistan. Drawing on technology acceptance, service quality, and bank efficiency theories, as well as statistics from the Central Bank of Uzbekistan (CBU) and reports based on CBU data for five reference dates between December 2021 and April 2025, a composite Remote Banking Digitalisation Index is constructed using three indicators weighted by their coefficients of variation: the number of remote banking users, the number of payment cards in circulation, and the number of users per 100 cards. The index increased from 0.415 in December 2021 to 0.556 in January 2023, 0.827 in September 2024, 0.911 in January 2025, and 1.000 in April 2025. During this period, the number of remote banking user accounts increased from approximately 20 million to 62.1 million, while the number of payment cards in circulation rose from 26.5 million to 62.4 million.

Key words: remote banking, digital transformation, customer experience, banking efficiency, mobile banking, composite index, coefficient of variation, Uzbekistan.

Аннотация: В статье рассматривается влияние цифровой трансформации банковских услуг на эффективность дистанционного банковского обслуживания и клиентский опыт в Узбекистане. На основе теорий принятия технологий, качества обслуживания и банковской эффективности, а также статистических данных Центрального банка Республики Узбекистан (ЦБУ) и отчётов, подготовленных на основе данных ЦБУ, за пять контрольных дат в период с декабря 2021 года по апрель 2025 года построен интегральный индекс цифровизации дистанционного банковского обслуживания. Индекс включает три показателя, весовые коэффициенты которых определены на основе коэффициентов вариации: количество пользователей дистанционного банковского обслуживания, количество платёжных карт в обращении и число пользователей на 100 карт. Значение индекса увеличилось с 0,415 в декабре 2021 года до 0,556 в январе 2023 года, 0,827 в сентябре 2024 года, 0,911 в январе 2025 года и 1,000 в апреле 2025 года. За рассматриваемый период количество учётных записей пользователей дистанционного банковского обслуживания увеличилось приблизительно с 20 млн до 62,1 млн, а количество платёжных карт в обращении — с 26,5 млн до 62,4 млн.

Ключевые слова: дистанционное банковское обслуживание, цифровая трансформация, клиентский опыт, банковская эффективность, мобильный банкинг, интегральный индекс, коэффициент вариации, Узбекистан.

INTRODUCTION

Digital transformation is reshaping the way commercial banks deliver financial services. As transactions shift from traditional bank branches to mobile applications, the marginal cost of processing payments decreases, service availability extends to 24 hours a day, and customers increasingly evaluate banks based on the speed and reliability of their digital applications rather than the quality of their physical premises [15]. Consequently, remote banking represents both an operational efficiency consideration, encompassing costs, transaction processing capacity, and resource utilisation, and a customer experience consideration, including convenience, trust, and security.

Uzbekistan has been actively implementing this transformation. Presidential Resolution No. PQ-3620 of 23 March 2018 established objectives aimed at expanding access to banking services and developing remote customer service channels [1]. The "Digital Uzbekistan–2030" Strategy, approved by Presidential Decree No. PF-6079 of 5 October 2020, provided the legal framework for the digitalisation of the financial sector [2]. In 2020, the Central Bank of Uzbekistan (CBU) also launched the Instant Payments System, enabling businesses to conduct payments around the clock through remote banking channels [22]. The expansion of digital banking services has been substantial: the number of remote banking accounts increased from 10.94 million on 1 June 2020 to 62.1 million on 1 April 2025 [4, 16], while the number of payment cards in circulation rose from 34.2 million at the beginning of 2023 to 68.27 million at the beginning of 2026 [20].

However, the expansion of remote banking services should be assessed alongside improvements in operational efficiency and customer experience. The number of registered accounts may exceed actual usage, digital banking adoption may be concentrated among certain financial institutions, and the development of digital channels requires continuous attention to fraud prevention and transaction security. Accordingly, this study examines whether the expansion of remote banking in Uzbekistan has been accompanied by measurable improvements in banking efficiency and customer experience. The specific objectives are: (i) to review the theoretical foundations of technology acceptance, service quality, and banking efficiency; (ii) to construct an objectively weighted Remote Banking Digitalisation Index using CBU data; (iii) to assess payment system efficiency indicators; (iv) to examine customer experience and bank-level concentration; and (v) to develop relevant recommendations.

LITERATURE REVIEW

The Technology Acceptance Model explains the adoption of technological innovations through perceived usefulness and perceived ease of use [6]. The Unified Theory of Acceptance and Use of Technology extends this approach by incorporating social influence and facilitating conditions, which are particularly relevant in markets where social networks, employers, and public institutions encourage the adoption of digital banking channels [14]. Nevertheless, technology adoption represents only the initial stage of digital transformation. The E-S-QUAL framework identifies efficiency, system availability, fulfilment, and privacy as the principal dimensions through which customers evaluate electronic services [11]. Similarly, the DeLone–McLean model establishes relationships between system quality, information quality, service quality, actual system use, and net benefits [7]. These theoretical frameworks indicate that the number of registered users alone does not provide a comprehensive measure of digital banking performance; active usage and perceived service quality should also be considered.

Vives argues that digital transformation is shifting competition in the banking sector towards customer-oriented platforms, data-driven services, and digital ecosystems, requiring established banks to strengthen their technological capabilities and develop strategic partnerships [15]. Empirical studies examining internet-based banking channels indicate that efficiency improvements are primarily associated with reduced overhead costs and increased fee income. These benefits may emerge gradually as customers increasingly adopt digital service channels [8-9]. The Basel Committee also emphasises that the digitalisation of financial services creates opportunities to enhance operational efficiency while requiring effective management of operational, cybersecurity, and third-party risks [3].

Recent studies conducted in Uzbekistan document the expansion of remote banking users and payment cards, as well as differences in digital banking development across financial institutions [4, 13]. However, these studies primarily focus on descriptive indicators. Two areas warrant further investigation: the development of a reproducible composite index integrating the number of users, payment cards, and depth of usage, and the systematic assessment of customer experience indicators, including active usage, fraud prevention, and interoperability, alongside quantitative measures of digital banking expansion. The present study addresses both areas.

RESEARCH METHODOLOGY

The proposed index is constructed using CBU statistics on remote banking users and payment cards, obtained directly from CBU publications or secondary reports based on CBU data [4-5]–[19], [20], [21]. Five reference dates for which both indicators are available are included in the analysis: 1 December 2021, 1 January 2023, 1 September 2024, 1 January 2025, and 1 April 2025. For December 2021, the available sources provide only lower-bound estimates, reporting "over 20 million" remote banking users and "over 26.5 million" payment cards. These values are retained as reported and marked with a dagger symbol (†) to indicate their lower-bound status. Table 1 presents the definitions of the indicators used in the analysis (Table 1).

INTERNATIONAL SCIENTIFIC ELECTRONIC JOURNAL

Table 1. Indicator system of the Remote Banking Digitalization Index

Code	Indicator	Unit	Rationale
x_1	Remote-banking users (accounts)	Million	Reach of digital channels; adoption stage [6, 14]
x_2	Payment cards in circulation	Million	Payment-instrument base for digital use [3]
x_3	Remote-banking users per 100 cards	Ratio	Depth of digital engagement per payment instrument [7]

Source: compiled by the author. All indicators are positively oriented.

Each indicator is normalized by its sample maximum, $K_i = X_i / X_{max}$. Weights follow the objective coefficient-of-variation method recommended for composite indicators built from official statistics [9]: $w_i = CV_i / \Sigma CV_j$, where CV is the standard deviation divided by the mean over the five reference dates. The index is $I = \Sigma w_i K_i$ and is read on five tiers: 1 (below 0.20), 2 (0.20–0.39), 3 (0.40–0.59), 4 (0.60–0.79) and 5 (0.80–1.00). Table 2 reports the computed weights (Table 2).

Table 2. Coefficient-of-variation weights

Code	Indicator	Mean	Std. dev.	CV	Weight
x_1	Users (million)	42.68	15.43	0.361	0.476
x_2	Cards (million)	47.73	14.74	0.309	0.407
x_3	Users per 100 cards	87.69	7.79	0.089	0.117

Source: computed by the author from the data in Table 3 (population standard deviation).

Artificial intelligence (AI) tools were used to a limited extent, accounting for approximately 10% of the overall research preparation process. Their use was primarily confined to language refinement, technical editing, and structural support. The selection of research methods, analysis and interpretation of findings, formulation of scientific conclusions, and overall responsibility for the research content remained with the author.

ANALYSIS AND RESULTS

Table 3 shows that the number of remote banking accounts increased approximately 3.1-fold between December 2021 and April 2025, while the number of payment cards in circulation increased approximately 2.4-fold. Thus, the number of remote banking accounts grew faster than the number of payment cards, with the ratio of user accounts per 100 cards rising from approximately 76 to nearly 100. Of the 52.92 million remote banking users recorded on 1 January 2025, 51.46 million (97.2%†) were individuals, while 1.46 million were legal entities and entrepreneurs [4] (Table 3).

Table 3. Remote-banking users and payment cards, 2021–2025

Reference date	Users (million)	Cards (million)	Users per 100 cards	**Sources**
1 Dec 2021	20.0†	26.5†	75.5	[18]
1 Jan 2023	30.0	34.2	87.7	[19], [20]
1 Sep 2024	48.4	53.6	90.3	[17]
1 Jan 2025	52.92	62.0	85.4	[4-5, 20]
1 Apr 2025	62.1	62.35	99.6	[16], [21]

Source: CBU data as reported in the cited sources. † Lower bound ("over"); ratio computed by the author. Users are accounts, not unique persons.

Table 4 gives the normalized scores. The index rises from 0.415 (tier 3) in December 2021 to 0.556 in January 2023 and then to tier 5 from September 2024, reaching 1.000 on 1 April 2025. Because users and cards carry 88 percent of the total weight (Table 2), the index measures mainly the breadth of the digital base, not its quality (Table 4).

Table 4. Remote Banking Digitalization Index

Reference date	K_1	K_2	K_3	Index I	Tier
1 Dec 2021	0.322	0.425	0.758	0.415	3 – Medium
1 Jan 2023	0.483	0.549	0.881	0.556	3 – Medium
1 Sep 2024	0.779	0.860	0.907	0.827	5 – Very High
1 Jan 2025	0.852	0.994	0.857	0.911	5 – Very High
1 Apr 2025	1.000	1.000	1.000	1.000	5 – Very High

Source: computed by the author using the weights in Table 2.

A simple robustness check replaces the coefficient-of-variation (CV) weights with equal weights of one-third for each indicator. The resulting equal-weighted index values are 0.502 in December 2021, 0.638 in January 2023, 0.849 in September 2024, 0.901 in January 2025, and 1.000 in April 2025. The chronological ranking of the reference dates remains unchanged, with only January 2023 moving from Tier 3 to Tier 4. These findings indicate that the overall conclusion of rapid and sustained progress in remote banking digitalisation remains robust to the choice of weighting scheme.

Table 5 presents efficiency and usage indicators for which official or CBU-sourced data are available at two reference points. Cashless card payments reached approximately 72% of GDP in 2025, compared with approximately 25% in 2021, while the share of cashless transactions in total card transactions increased from 68% to 81%, accompanied by an annual transaction volume growth rate of 50% [23]. The value of payments processed per terminal increased from approximately UZS 0.77 billion in 2024 to UZS 1.07 billion in 2025, representing an increase of approximately 39%†. This improvement reflects a 41% increase in payment value alongside an expansion of approximately 1% in the number of terminals, indicating more efficient utilisation of existing payment infrastructure. In 2024, the interbank Instant Payments System processed 47.6 million transactions with a total value of UZS 917.9 trillion, of which 38% were conducted during evening or nighttime hours, outside conventional bank branch operating hours [28] (Table 5).

Table 5. Efficiency and usage indicators of the payment system

Indicator	Earlier value	Latest value	Source
Respondents using digital payments	39% (2021)	71.17% (2025)	[24]
Card payments, % of GDP	≈25% (2021)	≈72% (2025)	[23]
Cashless share of card transactions	68% (2021)	81% (2025)	[23]
Payments per terminal, UZS bn†	0.77 (2024)	1.07 (2025)	[20], [22]
Cash share of money supply	20.1% (Apr 2024)	16.9% (Apr 2026)	[26], [27]
Terminal-based share of money inflows	43% (Q1 2025)	47% (Q1 2026)	[27]
ATMs and infokiosks, thousand	12.8 (Dec 2021)	40.1 (Jan 2026)	[18], [22]
Remote share of retail FX transactions	—	41% (2025)	[25]

Source: as cited. † Computed by the author from 2024 payments of UZS 326.7 trillion and 2025 payments of UZS 460.25 trillion, divided by year-end terminal stocks of 426,225 and 430,762.

Remote banking services are no longer limited to balance enquiries and fund transfers. In 2022, the volume of remote online transactions reached a then-record UZS 145.8 trillion. During the same year, customers used banking applications to make deposits totalling UZS 21.9 trillion, conduct foreign exchange transactions worth UZS 20.9 trillion, obtain microloans amounting to UZS 5.6 trillion, and repay loans totalling UZS 8.2 trillion [19]. In 2023, peer-to-peer transfers through the Uzcard and Humo payment systems reached UZS 224.3 trillion, representing a 56% increase compared with the previous year. Uzcard accounted for 65.7% of these transfers, while Humo accounted for 34.3% [29]. The number of contactless payment transactions increased from 23.7 million to 48.8 million, while their total value rose by 62.4% to UZS 3.85 trillion during the period reported by the CBU [30]. In 2024, QR-based payments for entrepreneurs, facilitated through the QR-online system, reached UZS 441.7 billion, with 108,000 QR codes in use [28]. Table 6 summarises these banking service categories.

Table 6. Selected service lines in remote and digital channels

Service line	Period	Indicator	Source
Online remote transactions	2022	UZS 145.8 trillion	[19]
Deposits placed via apps	2022	UZS 21.9 trillion	[19]
Currency exchange via apps	2022	UZS 20.9 trillion	[19]
Microloans issued via apps	2022	UZS 5.6 trillion	[19]
P2P transfers (Uzcard and Humo)	2023	UZS 224.3 trillion (+56%)	[29]
Contactless (NFC) operations	to early 2025	23.7 to 48.8 million	[30]
QR-online payments	2024	UZS 441.7 billion	[28]

Source: as cited; figures are reproduced as reported and are not additive across rows.

Customer experience indicators suggest substantial improvements in convenience. In 2025, bank mobile applications processed transactions worth UZS 646 trillion, compared with UZS 412 trillion processed through payment organisations. Consequently, banks accounted for approximately 61%† of the combined transaction value, indicating the growing importance of mobile banking as a primary service channel [23]. Remote banking channels also accounted for 41% of retail foreign exchange transactions in 2025, with a total value of USD 13.8 billion [25]. At the same time, the number of registered users may exceed the number of active users. For example, TBC Uzbekistan reported 23 million registered users across its ecosystem, of whom six million were monthly active users, representing approximately 26%† [31].

Table 6 presents remote banking adoption by bank as of 1 January 2025. The three largest banks accounted for approximately 36%† of remote banking users. Based on the thirteen banks included in the CBU-sourced data, the calculated lower bound of the Herfindahl–Hirschman Index (HHI) was approximately 760†, indicating a relatively low level of market concentration. Banks operating under digital business models, including TBC, ANOR, Uzum, and AVO, collectively served approximately 21.6%† of remote banking users, demonstrating that new market entrants have successfully established substantial customer bases within a relatively short period (Table 7).

Table 7. Remote-banking users by selected banks, 1 January 2025

Bank	Users (million)	Share (%)†	Bank	Users (million)	Share (%)†
Xalq Bank	6.895	13.0	Ipak Yuli Bank	3.342	6.3
SQB	6.311	11.9	Milliy Bank	2.512	4.7
Agrobank	5.942	11.2	Uzum Bank	2.041	3.9
TBC Bank	4.797	9.1	Hamkorbank	2.109	4.0
ANOR Bank	4.263	8.1	AVO Bank	0.332	0.6
Ipoteka Bank	3.861	7.3	Total, all banks	52.92	100.0

Source: CBU data as reported in [4]; shares computed by the author against total users of 52.92 million.

The expansion of digital banking channels also requires greater attention to cybersecurity risks. Of the 58,800 cybercrime cases recorded in 2024, 97.7% (57,400 cases) involved unauthorised withdrawals from bank cards [32], equivalent to approximately 0.93 cases per 1,000 cards† based on the number of cards in circulation in January 2025. CBU data cited by Group-IB indicate that 463 fraudulent remote loans were recorded in 2024, representing a 42% increase compared with 2023, with associated losses of approximately UZS 15 billion [33]. The policy response has increasingly focused on strengthening the digital financial ecosystem alongside the expansion of service channels. In September 2025, the President approved plans to introduce open banking, establish a CBU Fintech Office, and develop a five-year fintech strategy [34].

The results support a staged interpretation of digital transformation in the banking sector. During the diffusion phase, banks and public institutions expanded access to digital financial services, while the index increased rapidly as the number of users and payment cards grew from a relatively low initial base [12]. By April 2025, there was approximately one remote banking account per payment card, suggesting that further increases in account numbers may provide less information about the actual development of digital banking services. The next stage should therefore be assessed through the depth and quality of service usage, consistent with the principles of E-S-QUAL and the DeLone–McLean model [7, 11]. The efficiency indicators presented in Table 5 are consistent with the delayed improvements in operating costs and fee income identified in international

studies [8-9]. However, the absence of published channel-level cost data for Uzbekistan limits the possibility of directly testing these relationships.

Three methodological considerations should be taken into account. First, the reported user figures represent accounts rather than unique individuals. The 62.1 million remote banking accounts exceed Uzbekistan's population of approximately 37 million, indicating that individual customers may use applications provided by several banks. Second, the available statistical series contains irregular observation intervals, and the increase from 52.92 million accounts on 1 January 2025 to 62.1 million on 1 April 2025 exceeds the preceding quarterly growth trend. As the available sources do not explain this difference, the figures are presented as reported without additional adjustments. Third, the index is based on only five observations and is primarily determined by quantitative indicators. Accordingly, it should be interpreted as a measure of the breadth of digital banking adoption rather than a comprehensive assessment of service quality. Customer satisfaction surveys, application availability statistics, and complaint data, which could provide more direct measures of customer experience, were not available for this analysis.

Digital infrastructure and financial inclusion also influence customer experience. Internet penetration reached 94.2% by August 2025, although Uzbekistan ranked 74th among 103 countries in mobile internet speed, with opportunities for further improvements in connectivity quality outside major cities [35]. Ensuring consistent digital service quality in both Tashkent and remote districts is therefore essential for providing an inclusive banking experience. In this context, the expansion of ATMs and information kiosks from 29,900 to 40,100 within a single year [22] remains relevant alongside the increasing use of mobile banking applications. Banks with established customer bases, including Xalq Bank, SQB, and Agrobank, lead in terms of the absolute number of remote banking users. This indicates that digital banking adoption has expanded across mass-market and rural customer segments rather than remaining concentrated among newly established digital banks.

For bank managers, the findings suggest that competition is increasingly shifting from customer acquisition towards encouraging active and sustained service usage. Established banks possess extensive customer bases, while banks operating under digital business models establish competitive standards for customer experience. At the same time, payment organisations continue to process approximately UZS 412 trillion annually outside banks' own mobile applications [23]. For regulators, the findings highlight the importance of developing comprehensive monitoring systems that incorporate active user numbers, service quality, fraud indicators, and channel-specific costs, enabling supervisory practices to respond effectively to the evolving characteristics and risks of digital financial services.

The study has several limitations that should inform future research. The index is based on five observation dates and three indicators, meaning that it primarily reflects the pace of digital banking diffusion rather than the quality of individual services. Remote banking accounts may be counted differently across sources, as illustrated by the difference between the January and April 2025 figures, while individual customers may maintain accounts with multiple banks. Furthermore, the index does not directly measure operating costs because bank-level cost-to-income ratios disaggregated by service channel are not publicly available. The efficiency indicators presented in Table 5 compare two points in time and therefore cannot isolate the effects of digital banking channels from those of changes in prices, regulatory developments, or broader economic growth.

Future research could extend the present analysis in three directions. First, panel data on active users, transaction success rates, and customer complaints at the bank level would enable direct testing of hypotheses derived from service quality and technology acceptance theories. Second, customer surveys distinguishing between urban and rural populations, as well as younger and older users, would help identify customer groups that continue to rely on traditional bank branches. Third, following the introduction of open banking, researchers could examine whether data sharing and interoperable interfaces reduce switching costs and improve service accessibility for customers of smaller banks. Such evidence would complement the descriptive findings of the present study and support a more comprehensive causal assessment of how digital transformation influences banking efficiency and customer experience.

CONCLUSION AND RECOMMENDATIONS

Remote banking in Uzbekistan has expanded rapidly and delivered measurable improvements in operational efficiency. The Remote Banking Digitalisation Index increased from 0.415 to 1.000 between December 2021 and April 2025. Card payments reached approximately 72% of GDP, payments processed per terminal increased by approximately 39% in 2025, and banking applications now account for the majority of mobile payment value. Evidence on customer experience remains less comprehensive: active usage is lower than registered usage, adoption rates vary across banks, and the expansion of digital banking services requires continued attention to fraud prevention and financial security. Based on these findings, five recommendations are proposed.

INTERNATIONAL SCIENTIFIC ELECTRONIC JOURNAL

1. Monitor and report active usage. The Central Bank of Uzbekistan (CBU) should publish monthly active user statistics, rather than relying exclusively on registered user figures, disaggregated by bank and service channel. A standardised definition of an “active user” should be developed in consultation with banking industry representatives [11, 31]. The TBC example, with 23 million registered users and six million active users, illustrates the substantial difference between these two indicators.

2. Establish service quality standards. Banks should disclose application availability, transaction success rates, and complaint resolution times, applying the relevant dimensions of the E-S-QUAL framework [11]. Public disclosure would enable customers to compare banking services and encourage financial institutions to invest in reliability and service quality.

3. Ensure open banking interoperability. The open banking initiatives announced in September 2025 should incorporate common application programming interface (API) standards and customer-controlled data sharing mechanisms [34]. These measures would enable customers to move between banks and fintech services without repeated registration, thereby improving convenience and the overall customer experience.

4. Strengthen fraud prevention mechanisms. Real-time transaction monitoring, strong authentication procedures, and a shared fraud database should accompany the introduction of new digital banking products [32], [33]. These measures would enhance transaction security and strengthen customer confidence in remote banking services.

5. Collect channel-level cost data. Banks should report cost-to-income ratios and costs per transaction for individual service channels to enable direct measurement of operational efficiency improvements [8-9]. Such reporting would support more accurate assessments of the economic benefits associated with digital banking transformation.

The implementation of these recommendations would support the continued development of a more efficient, secure, accessible, and customer-oriented digital banking system in Uzbekistan. By combining technological innovation with improved service quality, effective risk management, and transparent performance monitoring, banks can strengthen operational efficiency and enhance customer experience. These measures would also contribute to the sustainable development of remote banking services and the broader digital transformation of Uzbekistan’s financial sector.

REFERENCES

1. O‘zbekiston Respublikasi Prezidentining 23.03.2018-yildagi “Bank xizmatlari ommabopligini oshirish bo‘yicha qo‘shimcha chora-tadbirlar to‘g‘risida”gi PQ-3620-sonli Qarori, https://lex.uz/docs/-3593541
2. O‘zbekiston Respublikasi Prezidentining 05.10.2020-yildagi “Raqamli O‘zbekiston — 2030” strategiyasini tasdiqlash va uni samarali amalga oshirish chora-tadbirlari to‘g‘risidagi PF-6079-sonli Farmoni, https://lex.uz/docs/-5030957
3. Basel Committee on Banking Supervision. (2024). Digitalisation of Finance. Basel: Bank for International Settlements.
4. Begimqulova, S. N. (2026). O‘zbekistonda tijorat banklarida raqamli xizmatlarning joriy etilishi va rivojlanish tendensiyalari. Moliya va Bank ishi, 3, 86–90. Available at: https://journal.bfa.uz/index.php/bfaj/article/download/642/448/1722
5. Central Bank of Uzbekistan. (2025). Number of Customers Applied Remote Banking Systems as of January 1, 2025. Available at: https://cbu.uz/en/statistics/paysistem/2135498/
6. Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. MIS Quarterly, 13(3), 319–340.
7. DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. Journal of Management Information Systems, 19(4), 9–30.
8. DeYoung, R., Lang, W. W., & Nolle, D. L. (2007). How the Internet Affects Output and Performance at Community Banks. Journal of Banking & Finance, 31(4), 1033–1060.
9. Hernando, I., & Nieto, M. J. (2007). Is the Internet Delivery Channel Changing Banks’ Performance? The Case of Spanish Banks. Journal of Banking & Finance, 31(4), 1083–1099.
10. OECD. (2008). Handbook on Constructing Composite Indicators: Methodology and User Guide. Paris: OECD Publishing.
11. Parasuraman, A., Zeithaml, V. A., & Malhotra, A. (2005). E-S-QUAL: A Multiple-Item Scale for Assessing Electronic Service Quality. Journal of Service Research, 7(3), 213–233.
12. Rogers, E. M. (2003). Diffusion of Innovations (5th ed.). New York: Free Press.
13. Toshmurodov, F. U. (2025). Improving the Mechanism for Organizing and Implementing Remote Banking Services in Commercial Banks of Uzbekistan. Tashkent State University of Economics. Available at: https://interfinance.tsue.uz/?p=4970
14. Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly, 27(3), 425–478.
15. Vives, X. (2019). Digital Disruption in Banking. Annual Review of Financial Economics, 11, 243–272.

Layout and Designer: Oloviddin Sobir o‘g‘li

2026. № 11

© When materials are reproduced, the ECONOSCITECH-INTEGRATION journal must be cited as the source. Authors are responsible for the accuracy of the information in materials and advertisements published in the journal. Editorial opinions may not always align with those of the authors. Submitted materials will not be returned to the editorial office.

To publish articles in this journal, you may submit articles, advertisements, stories, and other creative materials through the following links. Materials and advertisements are published on a paid basis.

You may subscribe to the journal at any time using the following details. Once subscribed, please send a screenshot or photo of your payment confirmation to our Telegram page @iqtisodiyot_77. Based on this, we will send the latest issue of the journal to your address each month.

Our address: Tashkent city, Yunusobod district, 19th block, House 17.