

ECONOSCITECH INTEGRATION

ISSUE
5

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 EVERY MONTHLY



ARTICLE CONTRIBUTORS
**PROFESSORS-TEACHERS, SPECIALISTS
AND SCIENTIFIC RESEARCHERS.**



Google
Scholar

Academic
Resource
Index
ResearchBib

BASE

OpenAIRE

doi
Digital
Object
Identifier

OPEN ACCESS

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., Academician

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 5. 374 pages.
Approved for publication on May, 2026.

Editorial Board Members:

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



Teshabayev To'liqin Zakirovich,
Doctor of Economic Sciences (DSc), Professor



Said Irandoust,
Doctor of Chemical Engineering Sciences,
Professor



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



Khudoykulov Sadirdin Karimovich,
Doctor of Economics, (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



Nargizakhon Shamshieva
Doctor of Economic Sciences, Professor



Rakhmonov Norim Razzakovich,
Doctor of Economic Sciences (DSc), Professor

Bayxonov Bahodirjon Tursunbayevich
Doctor of Science (DSc), Professor



Shomurodov Ravshan Tursunkulovich,
PhD, Associate Professor



Boymuratov Abduraxmat Djumayevich
Doctor of Philosophy (PhD) in Economics



Sharopova Nafosat Radjabovna
DSc, Associate Professor



Sultanova Kamila Mukhtorali Kizi
Master of Science

CONTENTS

FOREIGN EXPERIENCE IN THE EFFECTIVE ORGANIZATION OF FREE ECONOMIC ZONES	51
Mamadiyev Elyor	
IMPROVING ORGANIZATIONAL AND ECONOMIC MECHANISMS FOR THE ESTABLISHMENT AND DEVELOPMENT OF FAMILY GUEST HOUSES	55
Boynazarov Ulugbek Egamberdievich	
IMPROVING METHODS OF ORGANIZING AND DEVELOPING DOMESTIC TOURISM MARKETS IN UZBEKISTAN	61
Daminov Mirvokhid Isroilovich	
THE IMPACT AND SIGNIFICANCE OF INFRASTRUCTURE IN THE DEVELOPMENT OF THE TOURISM SECTOR.....	67
Dilsora Ibodovna Ibodova	
IMPACT OF STUDENTS AGED OVER 40 ON ECONOMIC ACTIVITY AND BUDGETING BASED ON THE COMPETENCY ECOSYSTEM	74
Nigora Ikrom qizi Primova	
ОЦЕНКА ЭФФЕКТИВНОСТИ ПРОМЫШЛЕННЫХ ПРЕДПРИЯТИЙ ХОРЕЗМСКОЙ ОБЛАСТИ: ЭКОНОМЕТРИЧЕСКОЕ МОДЕЛИРОВАНИЕ И СЦЕНАРНОЕ ПРОГНОЗИРОВАНИЕ НА 2026–2030 ГОДЫ	80
Юсупов Шерзодбек Бахтиёр угли	
IMPROVING THE METHODOLOGY FOR ASSESSING THE PROCUREMENT MANAGEMENT SYSTEM IN COMMERCIAL ENTERPRISES	87
Ergashev Jahongir Bakhodirovich	
MULTIVARIATE ECONOMETRIC ANALYSIS OF FACTORS AFFECTING HOUSEHOLD INCOME IN SURXONDARYO REGION	93
Abdunazarova Shahnoza Norquchqor qizi	
СРАВНИТЕЛЬНЫЙ АНАЛИЗ ГОСУДАРСТВЕННЫХ ЦИФРОВЫХ УСЛУГ АЗЕРБАЙДЖАНА И УЗБЕКИСТАНА	99
Юсифов Магамед Исмаил оглу, Гасанли Расул Шахин оглу, Белалова Гузаль Анваровна	
SUSTAINABLE DEVELOPMENT OF THE MINING INDUSTRY IN THE CONTEXT OF THE GREEN ECONOMY.....	105
Xudayberdiyeva Kamila Sadillovna, Fozilova Zumrad Ahmadovna	
IMPROVING THE ECONOMIC EFFICIENCY OF CLOTHING MANUFACTURING ENTERPRISES IN UZBEKISTAN THROUGH DIGITAL TRANSFORMATION	111
Axmedova Gaziza Azim kizi	
КОМПЛЕКСНАЯ ОЦЕНКА ПОТЕНЦИАЛА РЕГИОНАЛЬНОГО АГРОПРОМЫШЛЕННОГО ИНТЕГРИРОВАНИЯ НА ОСНОВЕ МОДЕЛИ АНР-TOPSIS	115
Аликулов А.Б.	
APPLICATION OF CLUSTER METHODS IN THE DEVELOPMENT OF TOURISM INFRASTRUCTURE AND IMPROVEMENT OF ECONOMIC MECHANISMS IN SAMARKAND CITY	121
Tashov Mizrob Maxmudovich	
THE ROLE AND PROSPECTS OF THE GREEN ECONOMY IN THE SERVICE SECTOR.....	130
Musayeva Shoirazimovna, Usmonova Dilfuza Ilkhomovna	
FACTORS AFFECTING THE EFFICIENCY OF REGIONAL ENTERPRISES	135
Nigora Zokirjon qizi Toxirova	
CURRENT STATE OF ATTRACTING INVESTMENTS IN THE DEVELOPMENT OF TOURISM IN THE REGIONS OF UZBEKISTAN AND THE METHODOLOGY OF ECONOMIC EFFICIENCY INDICATORS	142
Temurbek Olimovich Mamayunusov	
PRESUPPOSITION SHIFTS IN CROSS-LINGUISTIC RENDERING OF ANECDOTAL NARRATIVES:	

A COMPARATIVE INQUIRY INTO TRIGGER RETENTION AND TRANSFORMATION	148
Umaraliyeva Dildora Taxirjanovna	
DIGITAL TECHNOLOGIES AND RURAL PUBLIC SERVICE QUALITY: AN EMPIRICAL ECONOMETRIC ANALYSIS	156
Bek Hunsia, Feruza Mansurovna Ollokulova	
COMPREHENSIVE ANALYSIS OF THE IMPACT OF WOMEN'S LABOR ACTIVITY ON THE EFFICIENCY OF THE ECONOMIC SYSTEM	164
Ahrorova Asila Abduaziz qizi	
IMPROVING TAX ADMINISTRATION IN THE ENTREPRENEURIAL ENVIRONMENT	170
Azizbek Khurramov	
FORMATION OF FINANCIAL RESULTS AT MOTOR TRANSPORT ENTERPRISES	180
Shanazarova Nilufar Baratovna	
ARIMA-BASED ANALYSIS OF SMALL BUSINESS ACTIVITY IN THE AGRICULTURAL SECTOR OF SURKHANDARYA REGION	185
Fayziyeva Aziza Azamat qizi	
ASSESSMENT OF AGRARIAN SECTOR EFFICIENCY THROUGH THE SFA MODEL	192
Utanov Bunyod Kuvandikovich	
АКТУАЛЬНЫЕ ВОПРОСЫ УПРАВЛЕНИЯ ГОСУДАРСТВЕННЫМ ВНЕШНИМ ДОЛГОМ	196
Шомуродов Равшан Турсункулович, Жуманазаров Шахобиддин Дилмурод угли	
MODERN METHODOLOGICAL APPROACHES TO MANAGING EDUCATIONAL SERVICES MARKETING IN HIGHER EDUCATION INSTITUTIONS	201
Shamshieva Nargizakhon Nosirkhuja kizi	
FINANCIAL MANAGEMENT OF FOREIGN AND DOMESTIC COTTON GINNING ENTERPRISES: COMPARATIVE ANALYSIS, DIAGNOSTICS, AND IMPROVEMENT DIRECTIONS	208
Orif Jumayevich Murodov	
ANALYSIS OF THE INSTITUTIONAL FOUNDATIONS OF STATE INTERVENTION IN THE PRODUCT QUALITY MANAGEMENT PROCESS IN UZBEKISTAN	219
Atakulov Askad Raimkulovich	
ИНТЕГРИРОВАННАЯ МОДЕЛЬ ФОРМАЛИЗАЦИИ НЕФОРМАЛЬНОЙ ЗАНЯТОСТИ И РАСШИРЕНИЯ СОЦИАЛЬНОЙ ЗАЩИТЫ В АГРАРНЫХ РЕГИОНАХ (НА ПРИМЕРЕ КАШКАДАРЬИНСКОЙ ОБЛАСТИ)	224
Бобоназарова Юлдуз Ботировна	
THE ECONOMIC ESSENCE OF RESOURCE USE EFFICIENCY AND ITS ROLE IN INDUSTRIAL ECONOMICS	229
Baymanova Mavlyuda Djurayevna, Aipova Iroda Ikramovna	
THE ROLE OF ARTIFICIAL INTELLIGENCE IN ECONOMIC DEVELOPMENT: EVIDENCE FROM DEVELOPING COUNTRIES	234
Ismatova Diyora Sirojiddin qizi, Ubaydullayeva Gulchexra Erkabayevna	
ЭКОЛОГИЧЕСКАЯ УСТОЙЧИВОСТЬ И РЕСУРСНАЯ АДАПТИВНОСТЬ ОТРАСЛИ МАШИНОСТРОЕНИЯ В РОССИИ, КИТАЕ, ИНДИИ	239
Викторова Наталья Геннадьевна, Абрамчикова Наталья Викторовна, Ван Байянь	
ENSURING ORGANIZATIONAL AND ECONOMIC MECHANISMS FOR HOUSING STOCK MANAGEMENT	249
Aminova Naima Umar qizi	
STRATEGIC MANAGEMENT FOR ECONOMIC GROWTH: PRACTICAL APPROACHES AND IMPROVEMENTS	253
Baymuradov Shokhruxh Makhmudovich, Dilmurodov Komiljon Ahmad o'g'li	
IMPROVING THE EFFICIENCY OF SMALL ENTERPRISES IN THE SERVICE SECTOR (A CASE STUDY OF TASHKENT REGION)	259

Ashirov Alisher

IMPROVING THE ORGANIZATIONAL AND ECONOMIC MECHANISMS FOR THE TRANSFORMATION OF SERVICE ENTERPRISES IN UZBEKISTAN	264
--	-----

Kurbanova Rahima Jamshedovna

INNOVATIVE IDEAS OF YOUNG ENTREPRENEURS AND INFRASTRUCTURE FACTORS IN THE DEVELOPMENT OF SMALL INNOVATIVE BUSINESSES	270
--	-----

Ergashev Oybek Khaydaralievich

MARKETING CHARACTERISTICS OF POSITIONING ORGANIC DRIED FRUIT PRODUCTS IN INTERNATIONAL MARKETS	274
--	-----

Khidirov Shokhrukh

TYPOLOGIZATION OF THE ECONOMIC POTENTIAL AND DEVELOPMENT CHARACTERISTICS OF THE DISTRICTS OF SURKHANDARYA REGION BASED ON STATISTICAL AND NEURAL NETWORK APPROACHES.....	280
--	-----

Normurodov Asliddin Alijon ugli

THE ROLE OF FOREIGN EXPERIENCE IN ANALYSING THE THEORETICAL FOUNDATIONS OF THE AUDIT OF FINANCIAL LIABILITIES	291
---	-----

Palvanov Xusniddin Bekimmatovich

DIGITAL SKILLS AND LABOUR PRODUCTIVITY: A SCENARIO ANALYSIS BASED ON AN INTEGRATED STATISTICAL MODEL	297
--	-----

Madraimov Xabibulla Madaminovich

АКТУАЛЬНЫЕ ВОПРОСЫ ФОРМИРОВАНИЯ СТРУКТУРЫ АКТИВОВ И ПАССИВОВ ГОСУДАРСТВЕННЫХ БАНКОВ УЗБЕКИСТАНА	303
---	-----

Т.И. Бобакулов

АКТУАЛЬНЫЕ ВОПРОСЫ ФИНАНСИРОВАНИЯ ВНЕШНЕТОРГОВУЮ ДЕЯТЕЛЬНОСТЬ КОМПАНИЙ С ДОКУМЕНТАРНЫМИ АККРЕДИТИВАМИ	308
---	-----

М.Т. Ибодуллаева

ФОРМИРОВАНИЕ ИНТЕГРИРОВАННОГО МЕХАНИЗМА УПРАВЛЕНИЯ ОСНОВНЫМИ СРЕДСТВАМИ В УСЛОВИЯХ ИННОВАЦИОННОЙ ЭКОНОМИКИ	312
--	-----

Мусаева Жамила Кароматовна

ПРОБЛЕМНЫЕ ВОПРОСЫ ОБЕСПЕЧЕНИЯ КОНКУРЕНТОСПОСОБНОСТИ КОММЕРЧЕСКИХ БАНКОВ УЗБЕКИСТАНА	320
--	-----

Ш.Т. Ибодуллаев

THE IMPORTANCE OF STATE SUPPORT AND INVESTMENT POLICY IN ENSURING THE FINANCIAL STABILITY OF MASS MEDIA ENTERPRISES.....	325
--	-----

Sharipova Shahlo Istamovna

CURRENT STATUS AND DEVELOPMENT TRENDS OF MOTOR TRANSPORT SERVICES	329
---	-----

Rakhimov Azamat Hamrakulovich

ПРИМЕНЕНИЕ ЭКСТРЕМАЛЬНЫХ МОДЕЛЕЙ В ОЦЕНКЕ ЭКОНОМИЧЕСКОГО ПОТЕНЦИАЛА ПРЕДПРИЯТИЯ.....	333
--	-----

Мусаева Шоира Азимовна

MULTI-FACTOR ECONOMETRIC MODELS OF WATER RESOURCE USE IN ENSURING REGIONAL ECONOMIC STABILITY	341
---	-----

Xaitbaev Jasurbek Otaxanovich

СОВЕРШЕНСТВОВАНИЕ ПРАКТИКИ ИСПОЛЬЗОВАНИЯ ИНСТРУМЕНТОВ ЭЛЕКТРОННОГО ДОКУМЕНТООБОРОТА В КОММЕРЧЕСКИХ БАНКАХ.....	345
--	-----

Шомуродов Равшан Турсункулович

THE WAYS OF IMPROVING COMPETITIVENESS IN COMPANIES OF THE CONSTRUCTION INDUSTRY	350
---	-----

Buriev Khakim Toshimovich, Usmanov Ilxom Achilovich, Tolibov Abduazim Zoxid ugli

MACROECONOMIC MODELS AND PROSPECTS OF TRANSITION TO A GREEN ECONOMY IN UZBEKISTAN	357
---	-----

Sharipboyev Hasanboy Marks ugli, Sharipov Kuvondik Baxtiyorovich

THE IMPACT OF HRM PRACTICES ON ACADEMIC STAFF WORK EFFICIENCY IN HIGHER EDUCATION INSTITUTIONS.....	366
---	-----

Sultonboyeva Munira Bahodirovna, Sultanova Kamila Muktorali Kizi

THE ECONOMIC ROLE OF RENEWABLE ENERGY SOURCES IN THE DEVELOPMENT OF THE GREEN ECONOMY IN UZBEKISTAN	374
Inatullayeva Intizor Jamshid qizi	
ОЦЕНКА ФИЗИОЛОГИЧЕСКИХ ПОКАЗАТЕЛЕЙ КРУПНОГО РОГАТОГО СКОТА, ЗАВЕЗЁННОГО В РЕСПУБЛИКУ КАРАКАЛПАКСТАН ИЗ-ЗА РУБЕЖА, С ИСПОЛЬЗОВАНИЕМ ЦИФРОВЫХ ТЕХНОЛОГИЙ	378
Аскарова Нилуфар Бахтияровна	
COOPERATIVE MECHANISMS FOR REGIONAL DEVELOPMENT: A FRAMEWORK ANALYSIS OF CULTURAL TOURISM ENTERPRISE PARTNERSHIPS.....	382
Shohruzbek Ruziyev	
IMPROVING THE ECONOMIC EFFICIENCY OF RESOURCE UTILIZATION IN METALLURGICAL ENTERPRISES: INTERNATIONAL EXPERIENCE AND MODERN DEVELOPMENT TRENDS	393
Matkuliev Akbar Karimovich	
TAX INCENTIVES GRANTED TO ENTERPRISES LOCATED IN SPECIAL ECONOMIC ZONES	397
Torayeva Nafisa Odiljonovna	
REQUIREMENTS FOR TRANSITIONING TO ELECTRONIC BUSINESS AND CONDITIONS FOR DIGITALIZATION.....	402
Ismoilov Diyorbek Ismoiljon ugli	
DEVELOPMENT OF ALTERNATIVE ENERGY AS AN IMPORTANT FACTOR IN ENSURING A SUSTAINABLE ECONOMY AND ENERGY SECURITY	407
Ergash Bobobekov	
ANALYSIS OF WAGE DYNAMICS IN THE EXAMPLE OF SURKHANDARYA REGION BASED ON PANEL DATA.....	412
Abdunazarova Shahnoza Norquchqor kizi	
THE ROLE OF MARKETING STRATEGIES IN IMPROVING THE MARKET COMPETITIVENESS OF CARPET INDUSTRY ENTERPRISES	420
Arzieva Sevinch Shomurot kizi	
CONSUMER PROPERTIES OF FOOD PRODUCTS IN UZBEKISTAN: TRADITIONS, TRANSFORMATION AND NEW QUALITY STANDARDS.....	425
Gayrat Pardaev	
DIRECTIONS FOR STIMULATING ECONOMIC GROWTH THROUGH THE IMPROVEMENT OF THE TAX SYSTEM.....	431
Yakhshimuratova Khasiyat Khudaybergenovna	
THE ROLE OF E-COMMERCE IN THE ECONOMY OF UZBEKISTAN AND ITS DEVELOPMENT PROSPECTS	435
Kambaraliyeva Intizor Suxrobovna	
Aliyarov Olim Abdug'aparovich	
ISSUES OF IMPROVING PRE-TRIAL TAX DISPUTE RESOLUTION MECHANISMS BASED ON INTERNATIONAL EXPERIENCE	439
Solihova Xumora Xasan kizi	
INCREASING THE ATTRACTIVENESS OF DIVIDEND POLICY IN UZBEKISTAN COMPANIES.....	446
Akmal Komiljonovich Shermukhamedov	
COMMUNITY-BASED HERITAGE TOURISM MODELS AS A TOOL FOR ENHANCING HANDICRAFT DEVELOPMENT IN UZBEKISTAN	451
Olimjonova Farog'at Dilmurod qizi	
Amiriddinova Muslima Zayniddin qizi	
ИНСТИТУЦИОНАЛЬНЫЕ МЕХАНИЗМЫ СОЦИАЛЬНОЙ ЗАЩИТЫ НАСЕЛЕНИЯ В УСЛОВИЯХ ПЕРЕХОДНОЙ ЭКОНОМИКИ: ОПЫТ РЕСПУБЛИКИ УЗБЕКИСТАН	458
Шоахмедов Шохрух Шорахимович	

OF EFFECTIVE USE OF AGRICULTURAL LAND	464
Umarov Muzaffar Yusupbayevich	
ECONOMIC CONTENT OF INTANGIBLE ASSETS IN THE FIELD OF INFORMATION AND COMMUNICATION TECHNOLOGIES AND SPECIFIC CHARACTERISTICS OF THEIR RECOGNITION	469
Ishankulov Izzatilla Nurillaevich	
DETERMINANTS OF NON-PERFORMING LOANS IN SERVICE SECTOR LENDING AND CREDIT RISK MITIGATION MECHANISMS	473
Nurmukhammedov Abdijabbar Yunusovich	
ESG INTEGRATION PRACTICES INTO CORPORATE CULTURE SYSTEM IN THE JOINTSTOCK SECTOR OF UZBEKISTAN: A CASE STUDY OF “DORI-DARMON” JSC	479
Sadikova Muslima Alisher kizi	
DEVELOPMENT OF THE METAL MARKET IN THE TASHKENT REGION AND WAYS TO IMPROVE IT	485
Musayeva Shoira Azimovna	
SMALL BUSINESS AS A CATALYST FOR REGIONAL ECONOMIC DEVELOPMENT: AN EMPIRICAL ANALYSIS WITH EVIDENCE FROM UZBEKISTAN	491
Jo‘rayev Ilhomjon Kamolidinovich	
ISSUES OF DEVELOPING DEPOSIT OPERATIONS IN COMMERCIAL BANKS	497
Rahimov Akmal Matyaqubovich	
IMPROVING TEXTILE LOGISTICS AND SUPPLY CHAIN MANAGEMENT IN UZBEKISTAN	503
Isroilov Madaminjon Mukhsinovich	
FEATURES OF SUMMARIZING AND EVALUATING THE RESULTS OF FINANCIAL STATEMENT AUDITING IN UZBEKISTAN PRACTICE	509
Isroil Ismoilovich Meliev	
ГОСУДАРСТВЕННОЕ УПРАВЛЕНИЕ ФИНАНСАМИ И СОЦИАЛЬНОЕ РАВЕНСТВО В УЗБЕКИСТАНЕ: ИНТЕГРАЦИЯ МЕТОДОЛОГИИ РЕФА С ДИСТРИБУТИВНЫМ АНАЛИЗОМ НА ОСНОВЕ ПОДХОДА SEQ	516
Зокиржонов Мухаммадсодик Равшанбек угли	
FACTORS AFFECTING DAIRY PRODUCTION EFFICIENCY: CORRELATION AND REGRESSION ANALYSIS	530
Ergashev M.Y.	
Tairova Z.M.	
METHODOLOGICAL FOUNDATIONS OF COST ACCOUNTING AND ANALYSIS IN AQUACULTURE CLUSTERS: IFRS INTEGRATION, ECONOMETRIC MODELING, AND ESG PERSPECTIVES	537
Shodiev Aslam Rahmatilloevich	
APPLICATION OF ARTIFICIAL NEURAL NETWORKS FOR PREDICTING CUSTOMER LOYALTY IN COMMERCIAL BANKS	544
Jumaniyozova Mukaddas	
SUSTAINABLE REGIONAL SPECIALIZATION UNDER WATER SCARCITY: GLOBAL EXPERIENCE AND PROSPECTS FOR UZBEKISTAN	550
Sodiqova Nigora Turayevna	
CURRENT STATE AND STRUCTURAL ANALYSIS OF EXPORT ACTIVITIES OF BUSINESS ENTITIES IN THE BUKHARA REGION	555
Djurayeva Munira Sadiilloyevna	
EVALUATION OF THE EFFICIENCY OF STRATEGIC MANAGEMENT OF EDUCATIONAL SERVICES EXPORTS IN THE BUKHARA REGION	560
Alimova Shamsiya Abidovna	

ADVANCING AN INTEGRATED STATISTICAL ASSESSMENT METHODOLOGY FOR COMMERCIAL BANKS' DIGITAL ACTIVITIES AND CREDIT PORTFOLIO QUALITY	565
Rakhmatalliev Muzaffar Eshdavlratovich	
EFFECTIVENESS OF USING BIOLOGICAL METHODS IN PLANT PROTECTION: STATISTICAL ANALYSIS OF DISTRIBUTION STRATEGY AND PRACTICAL IMPLEMENTATION DENSITY	570
Suyundikova Dilafruz Mamarajabovna	
МЕТОДОЛОГИЯ ФОРМИРОВАНИЯ «КАРТЫ ПРОЗРАЧНОСТИ ПО МСФО» НА ОСНОВЕ КЛАСТЕРИЗАЦИИ АКЦИОНЕРНЫХ ОБЩЕСТВ ПО УРОВНЮ КАЧЕСТВА.....	577
Лутфуллаев Сардорбек Уткур угли	
INDICATOR-BASED IMPROVED METHODOLOGY FOR DETERMINING INTERNAL AUDIT SIGNIFICANCE LIMITS IN THE PUBLIC SECTOR	586
Ismatillayev Baypolat Khushvaqtovich	
METHODOLOGY FOR IDENTIFYING CASHGENERATING UNITS AND ADJUSTING THE DISCOUNT RATE TO NATIONAL CAPITAL MARKET CONDITIONS IN THE IMPAIRMENT ASSESSMENT OF LONG-TERM ASSETS	593
Fayzullayev Begzod Bakhtiyor o'g'li	
IMPROVING THE SCIENTIFIC AND METHODOLOGICAL APPROACHES TO THE FUNCTIONAL CLASSIFICATION OF INVENTORIES IN COMMUNICATION ENTERPRISES	599
Jamilov Jushkin Jonon o'g'li	
IMPROVING THE CHART OF ACCOUNTS AND ANALYTICAL ACCOUNTING FOR FINANCIAL INVESTMENTS IN ACCORDANCE WITH IFRS 9	604
Jumamurodov Toliboy Yeldashbayevich	
RISK-BASED METHODOLOGY FOR CALCULATING MATERIALITY IN INTERNAL AUDITS OF BUDGETARY ORGANIZATIONS.....	608
Misirov Akbarali Pardayevich	
IMPROVING AUDIT SAMPLING EFFICIENCY THROUGH RISK-BASED STRATIFICATION IN THE INTERNAL AUDIT OF BUDGETARY ORGANIZATIONS.....	613
Muqumov Jasur Bosimovich	
INTEGRATED INDEX MODEL FOR THE COMPREHENSIVE ASSESSMENT OF INTERNAL AUDIT EFFECTIVENESS IN COMMERCIAL BANKS	619
Narziyev Khayotjon Azamatovich	
RISK-BASED INTERNAL AUDIT METHODOLOGY FOR PUBLIC PROCUREMENT.....	625
Rajabov Shukhrat Ismailovich	
INTEGRATED REAL-TIME AUDIT MODEL FOR FRUIT AND VEGETABLE PROCESSING ENTERPRISES	630
Rakhmatullayev Mirjalol Khatamson	

INTEGRATED REAL-TIME AUDIT MODEL FOR FRUIT AND VEGETABLE PROCESSING ENTERPRISES

Rakhmatullayev Mirjalol Khatamson
Independent Researcher,
Tashkent State University of Economics

Abstract. This article develops the scientific and methodological foundations of an integrated real-time audit model for fruit and vegetable processing enterprises. The proposed model is closely integrated with production, technological, environmental, and economic processes and is based on digital audit evidence. It enables continuous monitoring of business operations, enhances audit effectiveness, and supports timely and well-informed management decision-making through the use of real-time data and digital technologies.

Keywords: integrated audit, real-time audit, Data Hub, audit dashboard, alert system, ERP, MES, LIMS, digital audit evidence.

Аннотация. В статье разработаны научно-методические основы интегрированной модели аудита, функционирующей в режиме реального времени на предприятиях по переработке плодовоовощной продукции. Предлагаемая модель тесно интегрирована с производственными, технологическими, экологическими и экономическими процессами и основана на использовании цифровых аудиторских доказательств. Она обеспечивает непрерывный мониторинг деятельности предприятия, повышает эффективность аудита и способствует принятию своевременных и обоснованных управленческих решений на основе данных, получаемых в режиме реального времени.

Ключевые слова: интегрированный аудит, аудит в режиме реального времени, Data Hub, аудиторская панель мониторинга, система оповещений, ERP, MES, LIMS, цифровые аудиторские доказательства.

INTRODUCTION

In the current digital economy, the conceptual paradigm of auditing is undergoing a fundamental transformation. The traditional post-factum approach to auditing is no longer sufficient in the context of a rapidly evolving business environment and increasingly dynamic risk conditions. Modern enterprises require a continuous, real-time audit system that is fully integrated with all business processes. Such a system is not limited to verifying the financial statements of previous reporting periods; rather, it identifies risks at the moment they arise and provides timely support for management decision-making.

The specific characteristics of fruit and vegetable processing enterprises make the implementation of such an integrated audit system particularly important. The perishability of raw materials, the need to maintain an uninterrupted cold chain, continuous monitoring of quality parameters, stringent export market requirements, and significant seasonal fluctuations in production volumes all necessitate real-time monitoring and auditing at every stage of the production process.

LITERATURE REVIEW

E. A. Arens and J. K. Loebbecke explained the conceptual foundations of risk-based auditing in their studies and substantiated the role of auditing as an effective instrument for managing business process risks [1].

B. Needles and S. X. Ying empirically examined the application of analytical audit procedures and demonstrated their effectiveness in identifying and assessing business risks [2].

D. Caldwell emphasized that the risk-control matrix plays a central role in the development and implementation of a risk-based internal audit system, enabling organizations to strengthen internal controls and improve risk management practices [3].

RESEARCH METHODOLOGY

The empirical basis of this study consists of data obtained from information systems, audit reports, and business process documentation of East Agro International LLC, Asian Jam LLC, and Green World Group LLC for the period 2022–2024. In addition, practical data and analytical materials provided by ERP solution vendors (1C, SAP, and Microsoft Dynamics), Laboratory Information Management System (LIMS) providers, and international audit firms specializing in the fruit and vegetable processing industry were utilized.

ANALYSIS AND RESULTS

The architecture of the proposed integrated audit model is based on a hub-and-spoke structure. At the center of the model is the Integrated Audit System (IAS), which is connected through bidirectional information flows to five key functional blocks:

Accounting Data Block – integrated with the ERP system;

Production Block – integrated with the Manufacturing Execution System (MES);

Quality and Laboratory Block – integrated with the Laboratory Information Management System (LIMS) and the Quality Management System (QMS);

Logistics and Sales Block – integrated with the Warehouse Management System (WMS) and the Customer Relationship Management (CRM) system;

Audit and Control Block – integrated with internal audit and risk management systems.

The integration of these five functional blocks through a centralized platform implements the “single source of truth” principle, ensuring data consistency, transparency, and reliability across all business processes.

The technological foundation of the proposed model consists of four principal components (Table 1).

Table 1
Structural elements of the integrated audit model¹

Element	Functional task	Technological done increase
Data Hub	All from systems coming data in a single format to gather , to recollect work and storage	Apache Kafka, Apache NiFi , ETL/ELT pipelines, OLAP cubes , Data Warehouse
Audit panel	KPIs and danger real- time indicators in mode visualization , drill-down analysis	Power BI, Tableau, Qlik Sense, web dashboards
Warning system	Marked borders when increased automatic message to give , anomalies determination	Rule-based alerts, machine learning anomaly detection, email/SMS/Telegram bot
Evidence registry	Audit evidence electronic digital signature with storage , with blockchain protection	Document Management System, Blockchain (Hyperledger Fabric), digital signatures

The Data Hub serves as the central component of the integrated audit model. It consolidates all data received from the five functional blocks into a unified format and prepares it for presentation on the audit dashboard. During this process, the data are cleaned, normalized, validated, and cataloged to ensure their consistency, accuracy, and reliability. Based on the processed data, the audit dashboard displays the following key performance indicators (KPIs) in real time (Table 2).

Table 2
Integrated audit panel main KPIs²

KPI	Source	Update frequency	Audit importance
Exit coefficient (each party according to)	MES + LIMS	Real-time	Tannarx accuracy , quality related
Coldness chain temperature	MES (sensors)	Real-time (every 5 minutes)	Product quality , loss risks
Brix and acidity	LIMS	Every one party	To quality connected pricing
Losses amount (% of raw material)	MES + ERP	From the shift then	Technological efficiency
Tannarx (each) product according to)	ERP	Daily	Financial report reliability
Gross and operational margin	ERP	Weekly	Profit management
Warning events number	Audit system	Real-time	Risks dynamics
Certificate and audits status	QMS	To status looking at	Certification risks

¹ Author's development

² Author's development

The Warning System is designed to automatically generate alerts whenever predefined threshold values are exceeded. Notifications are immediately sent to the responsible personnel, enabling prompt managerial response. For example, if the temperature within the cold chain exceeds the established limit by +3°C, an alert is sent to the quality manager. If the Brix value deviates from the prescribed standard, the laboratory manager receives a notification. When the purchase price exceeds the forecast by 5%, the finance director is informed. Similarly, if accounts receivable exceed the acceptable threshold, a warning is automatically delivered to the head of the sales department. As a result, the audit function evolves from a passive monitoring tool into an active mechanism for protecting enterprise operations and supporting timely managerial decision-making.

The Evidence Registry provides secure storage of digital audit evidence supported by electronic digital signatures and time stamps. This component is particularly important because, in traditional auditing, evidence is primarily maintained in paper-based documents, where the reliability, completeness, and traceability of information may not always be fully ensured. Within the digital evidence registry, every audit document—including laboratory reports, goods receipt and delivery certificates, temperature records, and batch passports—is electronically signed, time-stamped, and securely archived. This approach enhances the integrity, authenticity, and accessibility of audit evidence while ensuring full traceability throughout the audit process.

The pilot implementation of the integrated audit model at “East Agro International” LLC demonstrated that its practical application generated significant economic benefits (Table 3).

Table 3

Integrated audit model efficiency (pilot results of “East agro international” LLC)³

Indicator	2023	2024	Change
Audit process time (days)	92	58	–37.0%
Determined important deviations number	23	5	–78.3%
Risks early determination rate (%)	28	87	+59 pp .
False positive warnings share	47 %	12 %	–35 pp .
Coldness chain interruptions number	18	3	–83.3%
Poor quality raw material acceptance to do (% of parties)	6.2%	1.4%	–4.8 pp .
Audit costs reduction (million soums)	—	284	–18.5%
Tannarx accuracy increase (%)	—	+9.6%	—
Operation margin increase (pp)	+4.2	+8.3	+4.1 pp .

The results presented above demonstrate that the integrated audit model transforms the audit function from a traditional control mechanism into a strategic management tool. The implementation of the model reduced the audit process time by 37%, while the number of significant deviations identified during operational processes decreased by 78.3%. Interruptions in the cold chain were reduced by 83.3%, and the acceptance of low-quality raw materials declined by 77%, corresponding to a 4.8 percentage-point reduction. Most importantly, the company's operating margin increased from 4.2% to 8.3%, indicating a substantial improvement in operational efficiency.

Another significant advantage of the proposed model is its ability to considerably enhance the transparency of business processes. All key performance indicators (KPIs) of the enterprise are monitored in real time, allowing any deviation from established thresholds to be detected immediately and automatically communicated to the responsible personnel. As a result, managerial decisions are based on timely, accurate, and comprehensive information, significantly improving overall management efficiency and strengthening the enterprise's risk management capabilities.

Furthermore, the integrated audit model also enhances the efficiency of external audit activities. The information required by external auditors is maintained in electronic form, securely stored in the digital evidence registry, and can be retrieved and presented promptly when needed. This significantly reduces both the time and cost associated with external audits while simultaneously improving audit quality, reliability, and overall effectiveness.

3 Author's development

CONCLUSION AND RECOMMENDATIONS

In the context of the digital economy and Industry 4.0, the traditional post-factum audit approach is no longer sufficient for fruit and vegetable processing enterprises. Modern enterprises require a real-time audit model that is integrated with business processes, based on digital evidence, and capable of supporting managerial decision-making through continuous monitoring and timely risk identification.

The proposed integrated audit model is built on a hub-and-spoke architecture, in which five core functional blocks—Accounting, Production, Quality and Laboratory, Logistics and Sales, and Audit and Control—are interconnected through a single Integrated Audit System. The technological foundation of the model consists of four key components: the Data Hub, Audit Dashboard, Warning System, and Evidence Registry, which together ensure continuous data integration, monitoring, and audit support.

The pilot implementation of the proposed model demonstrated significant economic and operational benefits. Specifically, the audit process duration was reduced by 37%, the number of significant operational deviations decreased by 78.3%, the level of early risk detection increased from 28% to 87%, interruptions in the cold chain declined by 83.3%, and the enterprise's operating margin improved by 4.1 percentage points. These results confirm the practical effectiveness of the integrated audit model in improving operational performance and internal control.

The proposed integrated audit model transforms auditing from a traditional control function into a strategic management instrument. It enables the early identification of risks, enhances the transparency of business processes, and supports managerial decision-making based on reliable real-time information.

Furthermore, the model implements the "Single Source of Truth" principle, ensuring consistency, integrity, and reliability of information across all management levels. This not only strengthens the effectiveness of the internal audit function but also significantly improves the efficiency, quality, and reliability of external audit procedures. Consequently, the proposed model provides a comprehensive framework for strengthening corporate governance, improving operational performance, and supporting the sustainable development of fruit and vegetable processing enterprises in the digital economy.

REFERENCES

1. Arens E.A., Lobbek Dj.K. *Audit*. – Moscow: Finansy i statistika, 2019. – 712 p.
2. Committee of Sponsoring Organizations of the Treadway Commission (COSO). *Enterprise Risk Management: Integrating with Strategy and Performance*. – New York: COSO, 2017.
3. Caldwell D. Risk-based internal audit: Theory and practice // *Journal of Accounting and Auditing*. – 2022. – Vol. 18, No. 2. – P. 145–168.
4. Institute of Internal Auditors (IIA). *International Professional Practices Framework (IPPF)* [Electronic resource]. – URL: <https://www.theiia.org>
5. International Federation of Accountants (IFAC). *International Standard on Auditing (ISA) 315: Identifying and Assessing the Risks of Material Misstatement* [Electronic resource]. – URL: <https://www.ifac.org>

Proofreader: Xondamir Ismoilov
Layout and Designer: Oloviddin Sobir ugli

2026. № 5

© 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.

