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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

TYPOLGIZATION 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 Sadilloyevna	
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
Rakhmataliev Muzaffar Eshdavlatovich	
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	

RISK-BASED INTERNAL AUDIT METHODOLOGY FOR PUBLIC PROCUREMENT

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Abstract. This article develops a risk-based methodology for the internal audit of public procurement. The author proposes a five-stage methodology based on assessing audit risk as the product of its probability (P) and impact (I), expressed as $R = P \times I$. The methodology also involves distributing audit objects into three risk zones using a risk matrix, or heat map, and maintaining a risk register.

The proposed approach makes it possible to direct audit resources toward high-risk procurements, reduce subjectivity in the selection of audit objects, and focus audit procedures on the most significant areas. The research results contribute to improving the effectiveness of public procurement audits and ensuring their scientifically grounded organization.

Keywords: public procurement, internal audit, risk-based audit, audit risk, risk matrix, probability, impact, risk register, materiality, budgetary organizations.

Аннотация. В статье разработана риск-ориентированная методология внутреннего аудита государственных закупок. Автор предлагает пятиэтапную методологию, основанную на оценке аудиторского риска как произведения вероятности (P) и степени воздействия (I), выражаемого формулой $R = P \times I$. Методология предусматривает распределение объектов аудита по трём зонам риска с использованием матрицы рисков (карты рисков, heat map), а также ведение реестра рисков.

Предлагаемый подход позволяет сосредоточить аудиторские ресурсы на наиболее рискованных закупках, снизить субъективность при отборе объектов аудита и сфокусировать аудиторские процедуры на наиболее существенных направлениях контроля. Результаты исследования способствуют повышению эффективности внутреннего аудита государственных закупок и обеспечивают его научно обоснованную организацию.

Ключевые слова: государственные закупки, внутренний аудит, риск-ориентированный аудит, аудиторский риск, матрица рисков, вероятность, степень воздействия, реестр рисков, существенность, бюджетные организации.

INTRODUCTION

Public procurement is an area in which a significant share of budget funds is spent and where the risk of violations is relatively high. Due to the large number and volume of procurement transactions carried out in budgetary organizations, it is practically impossible to audit all of them fully and to the same extent. Therefore, the organization of internal audit requires a scientifically grounded approach that directs audit resources to the most significant and risk-sensitive areas.

The volume of public procurement in Uzbekistan is increasing year by year, with large-scale procurements being carried out in education, healthcare, construction, and other sectors. Given limited audit resources, it is not feasible to cover such procurement activities completely. Therefore, the risk-based approach, which directs available resources toward the highest-risk procurements, has become one of the main principles of modern internal auditing.

In modern internal audit practice, the leading methodological basis is risk-based internal auditing. This approach aligns audit activities with the risks inherent in an organization's operations and provides for the priority and more in-depth examination of high-risk areas. However, a comprehensive and practical methodology for applying risk-based auditing in public procurement has not yet been sufficiently developed.

In the context of reforms in the public procurement system of the Republic of Uzbekistan and the development of the internal audit institution, organizing procurement audits on a risk-based basis is of particular importance. In practice, the selection of audit objects is often based on subjective considerations, which may

reduce audit effectiveness. The purpose of this article is to develop a risk-based methodology for the internal audit of public procurement and substantiate the mechanism for its practical application.

LITERATURE REVIEW

Risk-based auditing and risk management have been examined in numerous studies. In the field of internal auditing, Sawyer (2012) and Moeller (2016) identify the risk-based approach as the foundation of modern internal audit. They argue that audit planning and execution should be based on the risks inherent in an organization's activities. Kazakova (2019) summarizes the concept of audit risk and methods for its assessment.

The COSO Enterprise Risk Management model defines risk assessment in terms of probability and impact and provides the basis for constructing a risk matrix (COSO, 2017). This model serves as the theoretical foundation for risk-based audit methodology. Issues related to risk assessment in the public sector have also been considered in the works of Burtsev (2000).

Risks and violations in public procurement have been analyzed in foreign studies and documents of international organizations (Arrowsmith, 2014; Thai, 2009). In particular, the Open Contracting Partnership systematizes risk indicators in public procurement (Open Contracting Partnership, 2024). INTOSAI's ISSAI 4000 standard and GUID 5280 guideline determine that the selection of audit objects in compliance audits should be based on risk and materiality.

The concept of audit risk is also central to international auditing standards. The audit risk model represents audit risk as a combination of inherent risk, control risk, and detection risk, allowing the auditor to adjust the scope of audit procedures according to the level of risk. In public procurement audits, this model should be applied with due consideration of the specific characteristics of the procurement process.

The concept of Risk-Based Internal Auditing (RBIA) links internal audit with an organization's risk management system. Under this approach, the audit plan is developed with priority given to high-risk areas. The Global Internal Audit Standards of the Institute of Internal Auditors also require risk-based audit planning (IIA, 2024). This methodological framework can be effectively applied to public procurement audits.

RESEARCH METHODOLOGY

The study analyzes international risk assessment and risk management methodologies and adapts them to public procurement audits. A systematic approach was used to develop the risk-based methodology as an integrated system. Through comparative analysis, traditional and risk-based audit approaches were compared.

ANALYSIS AND RESULTS

The central concept of the risk-based audit methodology is audit risk. Audit risk refers to the probability that a violation, error, or inefficient use of funds may occur in the procurement process and remain undetected during the audit. A risk-based approach increases audit effectiveness by directing audit resources toward high-risk areas.

Audit risk consists of several components. Inherent risk is the risk associated with the complexity of the procurement type and the specific characteristics of the sector, before considering control measures. Control risk is the probability that the existing internal control system will not prevent or detect the risk in a timely manner. Detection risk is the probability that audit procedures will not identify an existing violation or error. A risk-based methodology requires audit planning to take these components into account.

In a traditional non-risk-based audit, all procurements are examined to the same extent or selected randomly. This approach is inefficient in conditions of limited audit resources, because auditor time may be spent on low-risk procurements while high-risk procurements remain insufficiently examined. The risk-based methodology addresses this shortcoming by focusing attention on procurements with the highest level of risk.

In the methodology proposed by the author, audit risk is assessed using two dimensions: the probability of occurrence (P) and the impact (I) if the risk occurs. The risk level is calculated as the product of these two dimensions: $R = P \times I$. Probability and impact are assessed on a defined scale, for example: 1 — low, 2 — medium, 3 — high. As a result, a risk score is determined for each procurement or procurement stage, making it possible to compare them by risk level.

Probability (P) reflects the likelihood of risk occurrence and depends on factors such as procurement type, number of participants, and previously identified violations. Impact (I) reflects the level of potential damage, including financial, legal, and reputational consequences, if the risk occurs. The criteria for assessing probability and impact are presented in Table 1.

Table 1
Scale for assessing audit risk probability (P) and impact (I)¹

Level	Probability (P)	Impact (I)
High	The risk is likely to occur (e.g., a large single-party purchase)	Considerable financial loss, illegality or serious reputational risk
Medium	There is a medium probability that the hazard will occur	Moderate amount of damage or partial violation
Low	Risk is unlikely to occur (e.g. simple standard purchase)	A small amount of damage or a small deviation

When assessing probability, a number of factors specific to public procurement are taken into account. These include high procurement value, a limited number of bidders, the use of a non-competitive or single-source procurement method, previous violations by the supplier, and frequent changes to the procurement plan. The more numerous and significant these factors are, the higher the probability of risk is assessed.

Impact assessment considers various aspects of potential damage if the risk occurs. Financial impact is measured by the amount of possible budget loss, legal impact by the seriousness of the violation, and reputational impact by the potential loss of trust in the organization and the public procurement system. The impact level is assessed as high for large and socially significant procurements.

After assessing probability and impact, each procurement is placed in a risk matrix, or heat map. A risk matrix is a tool that visually displays the level of risk at the intersection of probability and impact and categorizes risks by color. The proposed three-level risk matrix is presented in Table 2.

Table 2
Public procurement audit risk matrix²

Impact (I) \ Probability (P)	Low (1)	Medium (2)	High (3)
High (3)	3	6	9
Medium (2)	2	4	6
Low (1)	1	2	3

The matrix shows that procurements with a risk score of 1–2 are classified as low risk and placed in the green zone. Procurements with a score of 3–4 are classified as medium risk and placed in the yellow zone, while procurements with a score of 6–9 are classified as high risk and placed in the dark yellow and red zones. This classification allows the auditor to prioritize procurements according to their risk level.

The methodology can be explained through a practical example. Suppose a procurement has a single bidder, which indicates a high probability of risk ($P = 3$), and involves a large budget, which indicates a high impact ($I = 3$). In this case, the risk score is $R = 3 \times 3 = 9$. Therefore, the procurement falls into the red zone and should be subject to intensive review as a priority. In contrast, for a simple, low-value, competitive procurement, where $P = 1$ and $I = 1$, the risk score is $R = 1$. Such procurement falls into the green zone and requires only minimal review.

The advantage of the risk matrix lies in its simplicity and visual clarity. It allows procurements to be categorized by risk level without complex calculations. If necessary, the matrix can be expanded to a five-level 5×5 scale, which would increase the accuracy of assessment. However, the three-level matrix is more convenient for practical application due to its simplicity.

Identified and assessed risks are recorded in the risk register. The risk register is a document that systematically reflects the risk description, probability, impact, risk score, and measures taken to address the risks. Its sample structure is presented in Table 3.

¹ Prepared by the author

² Author development

Table 3
Model structure of public procurement audit risk register³

Index	Contents
Risk description	A brief description of the identified risk (e.g. price gouging)
Purchase stage	The stage to which the risk applies (plan, price, method, evaluation, contract, execution)
Probability (P)	Rating on a scale of 1–3
Impact (I)	Rating on a scale of 1–3
Risk Score ($R = P \times I$)	Multiplier of probability and impact
Danger zone	Green / yellow / red
Control measure	Action taken or recommended to reduce the risk

The risk register is not a static document, but a continuously updated tool. It is updated when new procurements are carried out, measures are taken to address previously identified risks, or circumstances change. This allows the auditor to monitor risk dynamics and adjust audit activities in a timely manner.

The proposed risk-based methodology consists of five sequential stages. At the first stage, risks in the procurement process are identified. At the second stage, each risk is assessed in terms of probability (P) and impact (I). At the third stage, the risk score is calculated using the formula $R = P \times I$, and procurements are classified using the risk matrix. At the fourth stage, high-risk procurements are examined first and in greater depth. At the fifth stage, risks and the measures taken to address them are monitored, and the risk register is updated.

Each stage of the methodology includes specific tasks. At the risk identification stage, procurement documents, previous audit results, and data from electronic systems are analyzed. At the assessment stage, the probability and impact of risk factors are determined. At the classification stage, procurements are ranked by risk score, and an audit plan is developed. At the inspection stage, appropriate audit procedures are applied to high-risk procurements. At the monitoring stage, the results are analyzed, and the methodology is improved.

The monitoring stage ensures the continuous improvement of the methodology. Based on audit results, risk factors and their impact are reviewed, and assessment criteria are refined. This iterative process makes the methodology more accurate and effective over time and adapts it to changing conditions.

A key advantage of this methodology is that it replaces subjective judgment in selecting audit objects with a transparent and repeatable calculation. The auditor determines a risk score for each procurement on an objective basis, which helps different auditors reach comparable conclusions. In addition, the methodology makes it possible to allocate audit resources in proportion to the risk level of each procurement.

The risk-based methodology improves audit quality in several ways. First, it places audit planning on a scientific basis. Second, it increases the reliability of audit results, since high-risk areas are examined more thoroughly. Third, it ensures proper documentation and accountability of audit activities. Fourth, it forms a unified approach among different auditors.

The risk-based methodology is closely linked to the materiality approach. For high-risk procurements, a lower materiality threshold is set and the audit scope is expanded; for low-risk procurements, a higher materiality threshold is applied and a limited audit is performed. This relationship ensures more efficient use of audit resources.

The proposed methodology takes into account the specific features of the public procurement sector. Procurement-specific indicators, such as procurement value, number of participants, procurement method, previous violations, and contract amendments, are used as risk factors. This makes the methodology specifically suitable for public procurement audits and distinguishes it from a general risk-based approach.

However, certain difficulties may arise when applying the risk-based methodology. Risk assessment depends to some extent on the auditor's professional judgment, which may preserve an element of subjectivity. In addition, the methodology requires reliable data and appropriate auditor qualifications. To overcome these difficulties, risk assessment criteria should be standardized, and auditors should receive relevant training.

The digitalization of risk-based methodologies can further enhance their effectiveness. South Korea's Bid Rigging Indicator Analysis System (BRIAS) and the KONEPS e-procurement platform demonstrate the possibility of automatically identifying procurement risks based on data. In Uzbekistan, using data from the xarid.uzex.uz electronic procurement system to automatically calculate risk factors and classify procurements by risk level is a promising direction.

3 Author development

The proposed methodology complies with the requirements of international auditing standards. According to the ISSAI 4000 compliance audit standard, the auditor selects audit objects based on risk and materiality. The GUID 5280 Public Procurement Audit Guide also recommends a risk-based approach to procurement audits. Thus, the methodology proposed by the author is based on international standards and adapted to the public procurement sector of Uzbekistan.

CONCLUSIONS AND RECOMMENDATIONS

As a result of the research, the following conclusions were drawn regarding the risk-based internal audit methodology for public procurement.

First, due to the large volume of procurement in budgetary organizations, a risk-based approach is needed to focus audit resources on high-risk areas. This approach significantly increases audit efficiency.

Second, in the methodology proposed by the author, audit risk is assessed as the product of probability and impact ($R = P \times I$), while procurements are classified into three risk zones using a risk matrix, or heat map. This ensures objectivity and transparency in the selection of audit objects.

Third, maintaining a risk register enables systematic risk management, monitoring of risk status, and documentation of measures taken to address identified risks.

Fourth, the proposed five-stage methodology is closely linked to the materiality approach and takes into account the specific risk factors of the public procurement sector. It is recommended that the research results be used in planning and organizing public procurement audits, as well as in developing methodological manuals for internal audit.

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