MUHANDISLIK & IQTISODIYOT

ijtimoiy-iqtisodiy, innovatsion texnik, fan va ta'limga oid ilmiy-amaliy jurnal

2025 oktyabr

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"GLOBAL RAQAMLI INTEGRATSIYALASHUV: 2030-YILGACHA YASHIL IQTISODIYOTGA O'TISHDA TEXNOLOGIK VA INDUSTRIAL SANOATNI RIVOJLANTIRISH ORQALI MIKRO VA MAKROIQTISODIY BARQAROR O'SISHNI TA'MINLASH DOLZARBLIGI"

"GLOBAL DIGITAL INTEGRATION: THE RELEVANCE OF ENSURING MICRO AND MACROECONOMIC SUSTAINABLE GROWTH THROUGH TECHNOLOGICAL AND INDUSTRIAL DEVELOPMENT IN THE TRANSITION TO A GREEN ECONOMY BY 2030"

«ГЛОБАЛЬНАЯ ЦИФРОВАЯ ИНТЕГРАЦИЯ: АКТУАЛЬНОСТЬ ОБЕСПЕЧЕНИЯ УСТОЙЧИВОГО МИКРО- И МАКРОЭКОНОМИЧЕСКОГО РОСТА ЧЕРЕЗ РАЗВИТИЕ ТЕХНОЛОГИЧЕСКОЙ И ИНДУСТРИАЛЬНОЙ ПРОМЫШЛЕННОСТИ В ПЕРЕХОДЕ К ЗЕЛЁНОЙ ЭКОНОМИКЕ К 2030 ГОДУ»

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05.01.00 – Axborot texnologiyalari, boshqaruv va kompyuter grafikasi
05.01.01 – Muhandislik geometriyasi va kompyuter grafikasi. Audio va video texnologiyalari
05.01.02 – Tizimli tahlil, boshqaruv va axborotni qayta ishlash
05.01.03 – Informatikaning nazariy asoslari
05.01.04 – Hisoblash mashinalari, majmualari va kompyuter tarmoqlarining matematik va dasturiy ta'minoti
05.01.05 – Axborotlarni himoyalash usullari va tizimlari. Axborot xavfsizligi
05.01.06 – Hisoblash texnikasi va boshqaruv tizimlarining elementlari va qurilmalari
05.01.07 – Matematik modellashtirish
05.01.11 – Raqamli texnologiyalar va sun'iy intellekt
05.02.00 – Mashinasozlik va mashinashunoslik
05.02.08 – Yer usti majmualari va uchish apparatlari
05.03.02 – Metrologiya va metrologiya ta'minoti
05.04.01 – Telekommunikasiya va kompyuter tizimlari, telekommunikasiya tarmoqlari va qurilmalari. Axborotlarni taqsimlash
05.05.03 – Yorug'lik texnikasi. Maxsus yoritish texnologiyasi
05.05.05 – Issiqlik texnikasining nazariy asoslari
05.05.06 – Qayta tiklanadigan energiya turlari asosidagi energiya qurilmalari
05.06.01 – To'qimachilik va yengil sanoat ishlab chiqarishlari materialshunosligi
05.08.03 – Temir yo'l transportini ishlatish
05.09.01 – Qurilish konstruksiyalari, bino va inshootlar
05.09.04 – Suv ta'minoti. Kanalizatsiya. Suv havzalarini muhofazalovchi qurilish tizimlari
10.00.06 – Qiyosiy adabiyotshunoslik, chog'ishtirma tilshunoslik va tarjimashunoslik
10.00.04 – Yevropa, Amerika va Avstraliya xalqlari tili va adabiyoti
08.00.01 – Iqtisodiyot nazariyasi
08.00.02 – Makroiqtisodiyot
08.00.03 – Sanoat iqtisodiyoti
08.00.04 – Qishloq xo'jaligi iqtisodiyoti
08.00.05 – Xizmat ko'rsatish tarmoqlari iqtisodiyoti
08.00.06 – Ekonometrika va statistika
08.00.07 – Moliya, pul muomalasi va kredit
08.00.08 – Buxgalteriya hisobi, iqtisodiy tahlil va audit
08.00.09 – Jahon iqtisodiyoti
08.00.10 – Demografiya. Mehnat iqtisodiyoti
08.00.11 – Marketing
08.00.12 – Mintaqaviy iqtisodiyot
08.00.13 – Menejment
08.00.14 – Iqtisodiyotda axborot tizimlari va texnologiyalari
08.00.15 – Tadbirkorlik va kichik biznes iqtisodiyoti
08.00.16 – Raqamli iqtisodiyot va xalqaro raqamli integratsiya
08.00.17 – Turizm va mehmonxona faoliyati

Ma'lumot uchun, OAK Rayosatining 2024-yil 28-avgustdagi 360/5-son qarori bilan "Dissertatsiyalar asosiy ilmiy natijalarini chop etishga tavsiya etilgan milliy ilmiy nashrlar ro'yxati"ga texnika va iqtisodiyot fanlari bo'yicha "Muhandislik va iqtisodiyot" jurnali ro'yxatga kiritilgan.

Muassis: "Tadbirkor va ishbilarmon" MChJ

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MUNDARIJA

MUNDARIJA • СОДЕРЖАНИЕ • CONTENTS

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DIGITALIZATION OF ACCOUNTING AND AUDITING AND AUTOMATED CONTROL OF ENVIRONMENTAL COST DEVIATIONS IN THE BUILDING MATERIALS INDUSTRY

Komiljon Abdullajonovich Mirzaev
Researcher, Tashkent State University of Economics

Abstract. This thesis examines the digitalization of environmental cost accounting and auditing in the building materials industry. It proposes an integrated approach based on ERP systems, real-time monitoring, automated deviation analysis, and visual reporting tools. The system is designed to compare actual and standard costs, promptly identify deviations, and provide management and audit activities with reliable information. The proposed approach can improve the accuracy, transparency, and efficiency of environmental cost control and auditing.

Keywords: digitalization, ERP system, real-time monitoring, cost deviations, ABC/XYZ analysis, regression analysis, integrated accounting system, automated audit.

Annotatsiya. Mazkur tezisda qurilish materiallari sanoatida ekologik xarajatlar hisobini yuritish va audit jarayonlarini raqamlashtirish masalalari ko‘rib chiqilgan. ERP tizimlari, real vaqt rejimidagi monitoring, og‘ishlarni avtomatik tahlil qilish va vizual hisobot vositalariga asoslangan integratsiyalashgan yondashuv taklif etilgan. Mazkur tizim haqiqiy va me’yoriy xarajatlarni taqqoslash, og‘ishlarni o‘z vaqtida aniqlash hamda boshqaruv va audit faoliyatini ishonchli axborot bilan ta’minlashga qaratilgan. Taklif etilgan yondashuv ekologik xarajatlarni nazorat qilish va auditning aniqligi, shaffofligi hamda samaradorligini oshirishga xizmat qiladi.

Kalit so‘zlar: raqamlashtirish, ERP tizimi, real vaqt rejimidagi monitoring, xarajatlar og‘ishi, ABC/XYZ tahlili, regressiya tahlili, integratsiyalashgan hisob tizimi, avtomatlashtirilgan audit.

Аннотация. В тезисе рассматриваются вопросы цифровизации учета экологических затрат и аудита в промышленности строительных материалов. Предлагается интегрированный подход, основанный на использовании ERP-систем, мониторинга в режиме реального времени, автоматизированного анализа отклонений и инструментов визуальной отчетности. Система предназначена для сопоставления фактических и нормативных затрат, своевременного выявления отклонений, а также обеспечения управленческой и аудиторской деятельности достоверной информацией. Предлагаемый подход способствует повышению точности, прозрачности и эффективности контроля и аудита экологических затрат.

Ключевые слова: цифровизация, ERP-система, мониторинг в режиме реального времени, отклонения затрат, ABC/XYZ-анализ, регрессионный анализ, интегрированная система учета, автоматизированный аудит.

INTRODUCTION

The building materials industry is technologically complex and involves multi-stage, resource-intensive production processes. For this reason, comparing actual costs with planned costs based on established standards and monitoring them in real time plays a decisive role in increasing production efficiency. In many enterprises, there are opportunities to further improve the substantiation of regulatory cost indicators and strengthen the integration of digital cost-comparison systems with automated monitoring tools. Enhancing these processes can support the timely identification of cost deviations and facilitate well-founded and prompt management decisions. This thesis proposes a systematic approach to the digitalization of environmental cost accounting and auditing and the automated control of deviations.

The proposed system focuses on five areas for identifying deviations from cost standards. First, standard cost indicators for raw materials, energy, and labour resources for each type of product are integrated into the enterprise’s ERP (Enterprise Resource Planning) system. Second, sensors, electronic meters, and automated reporting systems are used to record costs in real time. Third, deviation analysis is automated using ABC/

XYZ analysis and statistical methods such as factor analysis and regression models. Fourth, the results are presented to management through a control panel (dashboard), tables, diagrams, and infographics. Fifth, the results of the analysis of deviations caused by internal and external factors are integrated into the audit report. The main directions of the system are summarized in Table 1.

Table 1
Main Directions of the Digital System for Identifying Deviations from Cost Standards[1]

Direction	Main activities	Expected results
Digitalization of regulatory costs	Establishing standards for raw materials, energy, and labour costs by product type and integrating them into the ERP system	Automated control based on established cost standards
Real-time monitoring	Recording actual costs online using sensors, electronic meters, and automated reporting systems	Immediate comparison of actual costs with regulatory indicators
Automation of deviation analysis	Applying ABC/XYZ analysis, factor analysis, and regression models	Identification of the causes, significance, and impact of cost deviations
Visual presentation	Presenting analytical results through dashboards, tables, diagrams, and infographics	Clear visual monitoring and support for operational management decisions
Integration into audit reports	Including the results of the analysis of deviations caused by internal and external factors in audit reports	Increased reporting transparency and improved audit reliability

A unified chart of accounts is integrated into the financial and managerial accounting information system through a digital control algorithm. This algorithm is implemented in five stages. At the first stage, all types of costs— raw materials, energy, wages, depreciation, social contributions, and environmental costs—are identified using special codes. At the second stage, they are classified according to their economic significance and adapted to both accounting systems. At the third stage, data are consolidated in a single electronic database and linked to cost volumes, product types, technological stages, and workshops. At the fourth stage, the costs attributable to a unit of product and deviations from established standards are automatically determined. At the fifth stage, real-time analytical indicators, performance indicators, and visual reports are generated. This database not only serves as a source of strategic information for management but also creates a reliable basis for audit activities.

The technical foundation of the modern system consists of software platforms. In particular, data recorded in “1C: Accounting”, ERP systems, and other accounting platforms can be processed in real time, calculations can be performed, and automatic reports can be generated. Integrating the environmental asset accounting model into the ERP system makes it possible to link environmental assets with electronic monitoring and automated reporting tools, maintain an electronic asset register, calculate depreciation, and manage maintenance costs in real time. This significantly increases the accuracy and timeliness of environmental accounting.

Digitalization contributes to the development of audit activities by complementing periodic audit procedures with continuous analytical monitoring. Within an automated digital system, documentary information can be verified, while cost deviations and environmental risks can be monitored in real time and analytical indicators can be generated automatically. This reduces audit risks, improves governance, and enhances the reliability of audit results.

CONCLUSION AND SUGGESTIONS

In conclusion, the integration of an automated cost control system, a unified accounting algorithm, and an ERP system in the building materials industry can improve the accuracy, reliability, and efficiency of environmental accounting, management, and auditing. The practical implementation of these solutions requires the digitalization of the regulatory framework, integration with ERP systems, and the training of internal auditors in the use of digital tools. Future research may examine opportunities for monitoring environmental risk indicators in real time using blockchain technology and artificial intelligence.

1 Source: author’s developments.

REFERENCES

1. Law of the Republic of Uzbekistan No. LRU-677 “On Audit Activity”, adopted on 25 February 2021 and entered into force on 27 May 2021. National Database of Legislation of the Republic of Uzbekistan. https://lex.uz/docs/5702566
2. Khasanov, B.A. *Boshqaruv hisobi va ichki audit metodologiyasini takomillashtirish masalalari* [Issues of Improving the Methodology of Management Accounting and Internal Audit]: Abstract of the dissertation for the degree of Doctor of Economic Sciences, specialty 08.00.08. Tashkent: Banking and Finance Academy of the Republic of Uzbekistan, 2004. 42 p.
3. Ilxamov, Sh.I. Ichki auditni tashkil etish konsepsiyasi [The Concept of Internal Audit Organization]. *Iqtisodiyot va innovatsion texnologiyalar*, 2021, No. 6, pp. 72–79.
4. Сабирьянова, Л.Р. Развитие риск-ориентированного управленческого учета производства строительных материалов: автореф. дис. ... канд. экон. наук: 08.00.12 — Бухгалтерский учет, статистика. Йошкар-Ола, 2012. 23 с.
5. Umobong, A.A., and Akani, D. IFRS Adoption and Accounting Quality of Quoted Manufacturing Firms in Nigeria: A Cross-Sectional Study of Brewery and Cement Manufacturing Firms. *International Journal of Business and Management Review*, 2015, Vol. 3, No. 6, pp. 61–77.
6. National Statistics Committee of the Republic of Uzbekistan. Official website and statistical publications. Stat.uz. Accessed in June 2026.

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