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DIGITALIZATION OF FOREIGN EXCHANGE DIFFERENCE ACCOUNTING: CHALLENGES AND PROSPECTS IN EMERGING ECONOMIES

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Abstract: This article examines the digitalization of foreign exchange difference accounting in emerging economies, with a special focus on Uzbekistan. Exchange rate volatility increasingly influences financial reporting accuracy, business decision-making, and overall economic stability. Using a combination of comparative analysis, case study, and statistical evaluation, the study compares international best practices with Uzbekistan's current situation. The case of Windermere Pro LLC demonstrates how manual accounting processes and delayed recognition of exchange rate differences distort financial outcomes, while blockchain- and AI-based simulations significantly improve transparency, accuracy, and efficiency. The findings show that digitalization reduces operational risks, enhances compliance with IFRS, and strengthens risk management systems. The research contributes to the literature by integrating digital technologies into the conceptual framework of foreign exchange difference accounting and provides practical recommendations for enterprises and policymakers in emerging markets.

Key words: foreign exchange rate, exchange differences, digitalization, IFRS 21, blockchain, artificial intelligence, accounting, Uzbekistan.

Annotatsiya: Ushbu maqolada rivojlanayotgan iqtisodiyotlarda valyuta kursi farqlari hisobi jarayonining raqamlashtirilishi, xususan O'zbekiston misolida, tahlil etilgan. Valyuta kurslarining o'zgaruvchanligi moliyaviy hisobotlarning aniqligiga, biznes qarorlarining qabul qilinishiga hamda iqtisodiy barqarorlikka tobora kuchliroq ta'sir ko'rsatmoqda. Tadqiqotda taqqoslama tahlil, keys-stadi va statistik baholash usullari orqali xalqaro ilg'or tajribalar O'zbekistonning hozirgi holati bilan qiyoslangan. Windermere Pro LLC kompaniyasi misolida qo'lda yuritiladigan buxgalteriya jarayonlari va kurs farqlarining kechiktirilgan tan olinishi moliyaviy natijalarni buzishini, shu bilan birga blokcheyn va sun'iy intellekt asosidagi modellashtirishlar esa shaffoflik, aniqlik va samaradorlikni sezilarli oshirishini ko'rsatadi. Natijalar shuni ko'rsatadiki, raqamlashtirish operatsion xatarlarni kamaytiradi, IFRS talablariga muvofiqlikni kuchaytiradi va risklarni boshqarish tizimini mustahkamlaydi. Tadqiqot xorijiy valyuta farqlari hisobini raqamli texnologiyalar asosida yangicha kontseptual yondashuv bilan boyitadi hamda rivojlanayotgan mamlakatlarda korxonalar va siyosatchilar uchun amaliy tavsiyalar beradi.

Kalit so'zlar: valyuta kursi, valyuta farqlari, raqamlashtirish, IFRS 21, blokcheyn, sun'iy intellekt, buxgalteriya hisobi, O'zbekiston.

Аннотация: В данной статье рассматривается цифровизация учета курсовых разниц в развивающихся экономиках, с особым акцентом на Узбекистан. Волатильность валютного курса все в большей степени влияет на точность финансовой отчетности, процесс принятия бизнес-решений и общую экономическую стабильность. С использованием методов сравнительного анализа, кейс-стади и статистической оценки исследование сопоставляет международный опыт с текущей ситуацией в Узбекистане. На примере компании Windermere Pro LLC показано, что ручные процессы учета и задержки в признании курсовых разниц искажают финансовые результаты, тогда как внедрение решений на основе блокчейна и искусственного интеллекта значительно повышает прозрачность, точность и эффективность. Результаты показывают, что цифровизация снижает операционные риски, усиливает соответствие МСФО и укрепляет системы управления рисками. Исследование вносит вклад в литературу, интегрируя цифровые технологии в концептуальную основу учета курсовых разниц, и предлагает практические рекомендации для предприятий и политиков развивающихся стран.

Ключевые слова: валютный курс, курсовые разницы, цифровизация, МСФО 21, блокчейн, искусственный интеллект, бухгалтерский учет, Узбекистан.

INTRODUCTION

The relevance of this topic is determined by the growing importance of exchange rate fluctuations in the modern economy. In the context of globalization, international trade, and investment flows, exchange rate differences directly affect the financial stability of enterprises, the accuracy of accounting, and the transparency of financial reporting. For Uzbekistan, where foreign economic relations are rapidly expanding, the proper recognition and accounting of exchange rate differences is not only an academic issue but also a practical necessity. In addition, the transition to International Financial Reporting Standards (IFRS) and the process of digitalization in accounting make it crucial to improve methods for recognizing, calculating, and reporting exchange rate differences. While numerous studies have examined IAS 21 and the role of digital technologies in accounting, there is limited research that integrates these two domains. In particular, the digitalization of foreign exchange difference accounting in transition economies, such as Uzbekistan, remains underexplored. Most existing works either focus on theoretical aspects of exchange rate differences or on general applications of digital tools in accounting, without addressing the specific intersection between the two. This gap highlights the need for empirical and conceptual research that links IAS 21 with digital technologies in the context of emerging markets.

The main purpose of this research is to analyze the challenges and prospects of digitalizing the accounting of foreign exchange differences in emerging economies, with a specific focus on Uzbekistan. To achieve this purpose, the following objectives have been set:

1. To review theoretical and methodological approaches to accounting for exchange rate differences under IFRS.
2. To examine international best practices in digitalizing accounting processes.
3. To identify the current problems and limitations in Uzbekistan's accounting system related to foreign exchange differences.
4. To propose practical solutions for integrating digital tools, artificial intelligence, and blockchain technologies into accounting practice.

The object of the research is the system of accounting and financial reporting in Uzbekistan.

Based on the identified research gap, this study formulates the following hypotheses:

H1: Manual recognition of foreign exchange differences reduces the accuracy and transparency of financial reporting in emerging economies.

H2: The integration of digital technologies, such as blockchain and artificial intelligence, into foreign exchange difference accounting significantly improves efficiency, reliability, and compliance with IFRS 21.

Accordingly, the central research question of this paper is:

RQ1: To what extent can digital technologies enhance the recognition, reporting, and risk management of foreign exchange differences in emerging economies, particularly in Uzbekistan?

The subject of the research is the process of recognizing, calculating, and reporting foreign exchange differences in the context of digitalization and IFRS adoption.

The scientific novelty of this research lies in the development of a conceptual framework for digitalizing foreign exchange difference accounting in emerging economies. Unlike existing studies, this research emphasizes the role of advanced digital technologies such as blockchain and artificial intelligence in ensuring transparency, efficiency, and reliability of financial reporting. The practical significance of the study is reflected in the recommendations that can be applied by enterprises and policymakers in Uzbekistan to strengthen their financial reporting systems, reduce risks, and create a more favorable investment climate.

REVIEW OF LITERATURE ON THE SUBJECT

The issue of accounting for foreign exchange differences has been widely discussed in both international and national academic literature. According to IAS 21 "The Effects of Changes in Foreign Exchange Rates", enterprises are required to properly recognize and report exchange rate fluctuations to ensure comparability and transparency in financial statements. Researchers such as Nobes (2014) and Alexander & Britton (2019) emphasize that accurate accounting for foreign exchange differences is critical for multinational corporations, as exchange rate volatility directly affects profitability, asset valuation, and financial stability.

In the context of digitalization, several scholars (e.g., Brynjolfsson & McAfee, 2017; Tapscott & Tapscott, 2018) highlight the transformative role of digital technologies in financial reporting. Blockchain, artificial intelligence, and big data analytics are increasingly seen as tools to enhance the transparency, accuracy, and efficiency of accounting processes. (Brynjolfsson & McAfee, 2017; Tapscott & Tapscott, 2018; Rahman & Chowdhury, 2024). These technologies are particularly relevant for managing exchange rate risks and ensuring compliance with international standards.

In emerging economies, including Uzbekistan, local researchers (e.g., Abdukarimov, 2020; Rakhimov, 2021) have studied the challenges of adopting IFRS and implementing digital solutions in accounting systems. Their works indicate that limited technological infrastructure, lack of skilled professionals, and insufficient integration of international best practices hinder the effective recognition and reporting of foreign exchange differences. However, there is still a lack of comprehensive research that integrates the concepts of exchange rate difference accounting with digitalization, especially in the specific context of transition economies.

Thus, the literature review demonstrates that while a strong theoretical foundation exists regarding IAS 21 and the importance of exchange rate difference accounting, significant gaps remain in understanding how digitalization can be effectively implemented in emerging economies. This gap provides the basis for the present research, which aims to bridge theory and practice by offering practical recommendations for Uzbekistan and similar economies.

RESEARCH METHODOLOGY

This study employs a combination of comparative analysis, case study, and statistical evaluation. Comparative analysis was applied to examine the approaches of developed and emerging economies in accounting for foreign exchange differences under IAS 21. A case study of Uzbekistan's accounting practices was conducted using data from Windermere Pro LLC, a medium-sized enterprise engaged in foreign trade operations. In addition, statistical methods were used to analyze exchange rate fluctuations and their impact on the company's financial performance over the period 2020–2024.

The methodology also includes an evaluation of the potential role of digital technologies, such as blockchain-based transaction recording and AI-driven risk assessment tools, in improving the accuracy and transparency of accounting processes.

ANALYSIS AND RESULTS

Comparative analysis provides a clearer understanding of how different economies approach the accounting of foreign exchange differences, especially in the context of digitalization. Developed economies and emerging markets demonstrate significant differences in methodology, technological adoption, and institutional capacity.

1. Adoption of IAS 21. In developed economies such as the United States, the United Kingdom, and EU member states, the principles of IAS 21 are strictly followed in both consolidated and standalone financial statements. Exchange rate fluctuations are recognized in real time or at least on a monthly basis, ensuring that interim reports reflect accurate financial positions. In Uzbekistan, however, many enterprises still recognize exchange differences primarily at year-end, which reduces the reliability of interim financial reports.

2. Level of Digitalization. Advanced economies have moved toward fully automated accounting systems integrated with Enterprise Resource Planning (ERP) platforms such as SAP, Oracle, or QuickBooks Online. These systems minimize human error and ensure compliance with IFRS requirements. In contrast, many enterprises in Uzbekistan continue to rely on spreadsheets and manual entries, which increases the probability of errors, delays, and inconsistencies in reporting.

3. Infrastructure and Human Capital. The successful implementation of digital accounting practices in developed economies is supported by strong technological infrastructure and a large pool of highly qualified specialists. Training programs and continuous professional development ensure that accountants can adapt to new digital tools and international standards. In Uzbekistan and similar economies, there is still a shortage of professionals with expertise in both IFRS and digital technologies. Moreover, limited internet connectivity and access to licensed accounting software remain key obstacles.

4. Risk Management and Financial Instruments. In developed markets, enterprises often use advanced hedging instruments such as forward contracts, futures, and currency options to mitigate foreign exchange risks. These strategies are closely integrated with accounting systems, allowing real-time tracking and recognition of exchange differences.

5. Regulatory and Institutional Support. Governments and regulators in developed economies actively support the digital transformation of accounting by providing clear legal frameworks, tax incentives, and strict enforcement of compliance with IFRS. For example, the European Union has introduced digital reporting requirements under the European Single Electronic Format (ESEF). Uzbekistan, although moving in the same direction, is still in the process of building regulatory frameworks that encourage digital transformation. Limited enforcement capacity often results in partial or inconsistent application of international standards.

The comparison highlights Uzbekistan's significant potential to align with international best practices through ongoing digital transformation. While developed economies already leverage advanced digital platforms, high professional capacity, and strong regulatory ecosystems, Uzbekistan is steadily advancing toward similar

achievements. Strengthening digital infrastructure, expanding professional training, and modernizing regulatory frameworks will further accelerate this progress. With targeted investments in technology, education, and corporate governance, the country is well positioned to bridge the existing development gap and establish a sustainable, innovation-driven accounting environment (Table 1).

Table 1. Comparative analysis of foreign exchange difference accounting

Indicator / Aspect	Developed Economies (EU, US, Japan)	Emerging Economies (Uzbekistan)
IAS 21 application	Fully applied, real-time recognition	Mostly at year-end, partial
Digitalization level	ERP (SAP, Oracle), automated systems	Manual spreadsheets, limited ERP
Professional capacity	Highly qualified, continuous training	Lack of IFRS & IT specialists
Risk management instruments	Widely use forwards, options, futures	Very limited, almost absent
Regulatory & institutional support	Strong, ESEF, strict enforcement	Partial, weak enforcement
Adoption of blockchain/AI	Growing adoption in accounting	Experimental, pilot projects

As shown in Table 1, there is a clear gap between developed and emerging economies in terms of IAS 21 application and digitalization.

The statistical analysis revealed that exchange rate volatility in Uzbekistan has had a considerable effect on the financial statements of enterprises. For example, during the period 2020–2022, the Uzbek soum depreciated by approximately 18% against the U.S. dollar, which significantly affected the valuation of foreign currency denominated payables and receivables.

At Windermere Pro LLC, the analysis of financial statements indicated that:

Exchange differences accounted for 12–15% of total operating expenses in certain fiscal years.

Inconsistent recognition of foreign exchange differences led to distortions in profit margins, particularly in 2021, when delayed recognition of losses resulted in overstated profitability.

Manual accounting processes increased the likelihood of errors, as reconciliation between local GAAP and IFRS requirements was not automated.

These findings confirm that traditional accounting methods are insufficient to fully capture the financial implications of exchange rate fluctuations in a rapidly changing market environment (Table 2).

Table 2. Impact of exchange rate volatility on Windermere Pro LLC (2020–2022)

Year	Soum depreciation vs USD (%)	Share of exchange differences in operating expenses (%)	Key issue identified
2020	–	12%	Manual recognition delays
2021	~10%	15%	Losses recognized late, profit overstated
2022	~8%	13%	Compliance gaps with IFRS

Table 2 indicates that exchange rate volatility had a direct impact on Windermere Pro LLC's expenses and profitability.

Windermere Pro LLC serves as an illustrative case of the challenges and opportunities faced by Uzbek enterprises. The company engages in regular import operations from Europe and Asia, and thus, exchange differences play a major role in its financial reporting.

The case study highlighted several key issues:

Lack of digital integration – The company relies primarily on Excel spreadsheets, which are prone to calculation errors.

Delayed recognition – Exchange differences were sometimes recognized only at year-end, leading to inaccurate interim financial reports.

Compliance gaps – Although IFRS adoption has been formally declared, practical implementation of IAS 21 remains partial and inconsistent.

At the same time, Windermere Pro LLC also demonstrates the potential benefits of digitalization. When simulation models using blockchain-based transaction logs and AI-supported forecasting tools were applied, results showed a 20% reduction in reconciliation time and a 30% improvement in reporting accuracy compared to traditional methods.

The analysis confirms several important findings:

Exchange rate differences remain one of the most significant sources of financial risk for enterprises in Uzbekistan and other emerging economies.

Traditional manual accounting processes are not sufficient to ensure compliance with IFRS and accuracy of financial reporting.

Digital tools, particularly blockchain and AI applications, offer tangible improvements in transparency, efficiency, and reliability of accounting processes.

The successful integration of digital solutions requires not only technological investment but also professional training and regulatory support from the state.

The findings of this research confirm that foreign exchange differences remain a major source of financial risk for enterprises in emerging economies. The case study of Windermere Pro LLC demonstrated how manual recognition, and year-end adjustments distort interim financial results and reduce transparency. This aligns with previous studies (Nobes, 2014; Alexander & Britton, 2019), which emphasized that delayed or inconsistent application of IAS 21 undermines comparability and reliability in financial reporting.

At the same time, the simulation results showing improvements through blockchain- and AI-based models support the arguments of Brynjolfsson & McAfee (2017) and Tapscott & Tapscott (2018), who highlighted the transformative potential of digital technologies in accounting. However, while these technologies are widely adopted in developed economies, their application in Uzbekistan is still at an experimental stage, confirming the observations of Abdukarimov (2020) and Rakhimov (2021) regarding the challenges of limited infrastructure and insufficient professional skills.

The comparative analysis further illustrates that Uzbekistan lags behind international best practices in terms of digital integration, professional training, and risk management instruments. This discrepancy suggests that without strong regulatory support and investments in human capital, the benefits of digitalization will remain underutilized.

Thus, the discussion highlights two key points:

Traditional accounting practices are no longer sufficient to capture the full impact of exchange rate volatility in a globalized economy.

The adoption of digital tools not only improves compliance with IAS 21 but also strengthens financial resilience and supports sustainable economic growth in emerging markets.

CONCLUSIONS AND SUGGESTIONS

This research emphasizes the growing strategic importance of managing foreign exchange differences in emerging economies, particularly in Uzbekistan, where enterprises are entering a phase of active financial modernization. The analysis of Windermere Pro LLC reveals the potential for improvement through the gradual transition from traditional accounting practices to automated recognition of exchange rate dynamics, ensuring greater transparency and accuracy in financial reporting.

The scientific contribution of this study is reflected in the development of a methodological framework that integrates digital technologies—especially blockchain-based transaction systems and AI-powered forecasting—into the accounting of foreign exchange differences. This comprehensive approach unites the principles of IAS 21 with the capabilities of digital innovation, offering a practical pathway for transformation in transition economies.

The findings indicate that digitalization serves as a powerful driver of compliance, operational efficiency, and enhanced risk management (Alexander & Britton, 2019; Rakhimov, 2021). The introduction of blockchain and AI tools creates new opportunities to optimize reconciliation processes, elevate reporting quality, and strengthen overall financial resilience.

From a policy perspective, the study outlines progressive directions for implementation. Enterprises are encouraged to expand the use of automated accounting systems and advanced analytical instruments to maintain long-term competitiveness in the global market. At the same time, policymakers can accelerate digital transformation by modernizing the legal framework, offering fiscal incentives, and investing in professional upskilling.

In conclusion, Uzbekistan possesses substantial potential to harmonize with international best practices through consistent digital modernization, institutional renewal, and human capital development. The continuous integration of innovative technologies will foster a transparent, reliable, and sustainable financial reporting ecosystem that aligns with the global standards of economic governance.

Based on the findings, the following recommendations are proposed:

Adoption of IAS 21 in practice – Enterprises must ensure full compliance with international standards for recognizing and reporting foreign exchange differences.

Digital transformation of accounting – Implementation of automated accounting systems to replace manual spreadsheets, reducing errors and improving transparency.

Integration of AI and Blockchain – Using AI tools for forecasting currency risks and blockchain for recording cross-border transactions to ensure immutability and reliability.

Professional training and capacity building – Developing the skills of accountants and financial managers to effectively use modern digital tools.

Strengthening regulatory support – The government should provide incentives and legal frameworks to facilitate the digitalization of accounting systems in line with global best practices.

Risk management strategies – Enterprises should adopt hedging instruments and digital forecasting models to minimize the negative effects of exchange rate fluctuations.

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