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INTEGRATION OF BLOCKCHAIN TECHNOLOGIES FOR ENSURING TRANSPARENCY IN ACCOUNTING

ABSTRACT

Accounting transparency is primarily a critical issue in Ukraine, where the country has been dragged down for years by systemic corruption and inefficiency. This study considers the potential application of blockchain technologies for improving accounting practices' transparency and the factors hindering their further advancement. The research is based on a descriptive methodology. It combines primary data from 15 companies via semi-structured interviews carried out in Ukraine in 2022 and 2023, with secondary data represented by reports on the companies in the industry and the global benchmarks in Ukraine. The relationship between blockchain adoption and transparency and the barriers to blockchain adoption, characterised by high costs, lack of regulatory certainty, and infrastructural constraints, were analysed using descriptive statistics, correlation analysis and SWOT analysis. Blockchain adoption is positively correlated with higher transparency, where blockchain systems surpass conventional accounting in traceability and reduce fraud at the cost of significant financial and technological involvement. The study demonstrates blockchain's potential to enhance transparency in accounting while highlighting its limitations and the financial, infrastructural, and regulatory challenges hindering its implementation in Ukraine.

Keywords: blockchain technology, accounting transparency, SWOT analysis, Ukraine

JEL Classification: M41, O31

INTRODUCTION

The economies must gain economic stability and investor confidence where systemic problems exist (Gryshova et al., 2020). For years, corruption, inefficiency and lack of public trust in accounting practices have plagued Ukraine's financial environment (Cifuentes-Faura, 2024). It tightens geopolitical tensions and changes the economic landscape, and these problems exacerbate the already urgent requirement for transparency in Ukraine (Guenette et al., 2022). However, traditional accounting methods, though functional, have demonstrated their inability to fight fraud and establish trust. This creates a compelling research problem: How could blockchain be integrated into accounting practices in Ukraine to increase its transparency (Suslenko et al., 2022)?

Blockchain technology has developed globally as a powerful tool that improves accountability, reliability, and transparency in financial reporting systems (Ajayi-Nifise et al., 2024). Features like immutable ledgers, automated smart contracts, and decentralised control make blockchain technology unmatched by traditional accounting methods regarding security and traceability. Blockchain has emerged as a critical enabler in the fight against fraud, increasing audit quality and smoothing out the compliance process in developed economies (Dizman, 2021). The United States, Switzerland, and Singapore lead blockchain adoption and are successfully implementing this technology across many sectors, from the financial to the supply chain management sector (Kucukaltan et al., 2024; Zehnder, 2024). Deloitte, one of the 'Big Four' accounting firms, has implemented blockchain solutions for secure audit trails and has realised blockchain tools for improving their clients' real-time financial reporting (Dyball & Seethamraju, 2022). JPMorgan's Quorum blockchain network is disrupting payment processing methods in banking and is an example of what blockchain can do to change banking norms (Shevchenko & Lunsford, 2023).

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However, Ukraine's blockchain path is different. The realm of accountancy has only partly embraced blockchain technology, and the nation has made some progress when using it in voting systems and land registries (Ushenko et al., 2023). The discrepancy is primarily because of infrastructural, regulatory and economic hurdles. A 2023 report by the Ukrainian Blockchain Association says that only 12 per cent of the financial firms in the country have played with blockchain accounting tools, which is significantly lower than an average of 35 per cent in the European Union (Ivanova, 2024). Some key challenges include the need for outdated IT infrastructure, inadequate regulatory clarity on the nature of blockchain transactions, and insufficient professionals with the skills to apply blockchain technology in financial applications (Hashimzai & Ahmadzai, 2024).

Some examples of blockchain experiments in Ukraine show what it can bring. For example, the Ukrainian government partnered with Bitfury, a global company in blockchain, to create a blockchain land registry system designed to address corruption and make land registration transparent (Hedegaard et al., 2023). Then there's Prozorro, a blockchain-inspired public procurement system designed to guarantee transparency in government spending. Prozorro has attracted international attention, winning awards for innovative use of technology which promotes accountability (Brick Murtazashvili et al., 2024).

Although these innovations exist, barriers to Ukrainian businesses' blockchain adoption in accounting are still significant (Petchenko et al., 2023). Fraud and data manipulation seriously threaten traditional accounting systems in the country, which rely heavily on manual processes and centralised data storage. For instance, a 2021 Transparency International study indicated a situation where the overindulgence in fraud accounting practices and financially poor oversight took millions of dollars each year off Ukraine firms (<https://ti-ukraine.org/en/>). However, the challenges of offline ledger synchronisation, multiple actors keeping track of dozens if not hundreds of unique records, and various parties reconciling their records can be addressed using blockchain technology's tamperproof records and automated reconciliations.

The integration of blockchain into accounting, relatively quickly, is gaining popularity globally. IBM is providing blockchain platforms specifically designed for financial reporting and compliance, and global standards-setting organizations, including the International Federation of Accountants (IFAC), are researching whether blockchain can modernise accounting practices (Bhuvana & Aithal, 2020). While adopting such e-services continues to grow globally, the adoption landscape is still very much diverse, with Ukraine among the developing economies that have been slow to keep up. However, this disparity points out a need for a systematic and detailed analysis of the feasibility and ramifications of blockchain in Ukraine's particular conditions.

LITERATURE REVIEW

The relationship between blockchain technology adoption and accounting transparency has recently gained increasing academic attention. Blockchain has been the subject of many studies and has proven its ability to increase transparency by streamlining immutable ledgers and decentralised control. For example, Patel et al. (2019) focused on adopting blockchain in financial reporting systems in emerging markets. Blockchain significantly increased transparency in the process, with tamper-proof ledgers and real-time audit capability. The study's results demonstrated a 35% decrease in discrepancies in costs within the firms' two years of use of blockchain technologies. However, the study was limited to relatively advanced emerging markets with developed infrastructure, focusing less on the distinctive problems of transitional economies like Ukraine. That's not happening in Ukraine, as blockchain adoption is still nascent here and requires significant backing from infrastructural and regulatory support.

Ajayi-Nifise et al. (2024) explored the regulatory environment's role in encouraging accounting transparency through blockchain. By analysing regulatory frameworks of mature and not-so-mature countries concerning blockchain, they concluded that transparent and supportive regulations played a key role in enabling the success of blockchain in accounting systems. The study found that overly restrictive or ambiguous policies hindered the adoption of blockchain and, by extension, its potential to drive transparency. Similarly, Ukraine faces similar challenges, including inconsistent enforcement and highly fragmented policy, which could lead to the lack of integration of blockchain technologies into accounting systems.

The second consideration regarding blockchain adoption is the cost of implementing its features in accounting transparency. Fuadah and Setiyawati (2020) investigated the fact that high costs tend to keep firms back from deploying blockchain systems despite their capacity to make data more transparent. The study showed that small and medium enterprises (SMEs) faced the most significant barriers to adoption due to a lack of resources. However, larger firms could offset adoption costs with long-term transparency and fraud prevention benefits. Although they conducted a global analysis, their work failed to offer practical solutions for developing economies, where costs are incredibly tight. As with any new

technology or approach, there is a financial burden in using blockchain, which in Ukraine, where SMEs power the economy, may widen existing gaps unless specific subsidies or incentives are applied.

Abad-Segura et al. (2024) investigated how technological infrastructure facilitates accounting transparency in adopting blockchain. They analysed emerging markets and discovered that regions with the most advanced technological infrastructure — namely, high-speed internet and cloud computing — had considerably higher prospects for increasing blockchain-induced accounting transparency. However, they said that without strong infrastructure, blockchain systems couldn't achieve operational efficiency that would enable them to improve transparency. Although this study delivered quantitative insights, it did not assess the socio-political factors typically a strong driver in infrastructure development in a country like Ukraine. A significant challenge is the digital divide between urban and rural areas in Ukraine, which makes it possible that firms in poorly developed areas may not benefit equally from blockchain improvements in transparency.

Organisational readiness is finally identified as a key determinant of how blockchain helps to increase accounting transparency. To explore the level of impact of organisational factors, such as leadership, skills, and a culture of innovation on blockchain adoption, Král and Schnackenberg (2024) tried to find out. They found that adopting blockchain works better for firms with strong leadership support and a well-trained staff. Yet, the study only concentrated on multinational corporations in developed markets, which means that the scope of the Ukrainian inclusion is not entirely applicable to Ukrainian companies, which, as time goes by, still do not have the technical expertise and organisational readiness to integrate blockchain technologies. The results indicate demand for capacity-building initiatives in Ukraine, especially for small firms that might lack the resources to adjust to technological shocks.

The literature reveals a consistent pattern: Blockchain technologies hold promise to increase accounting transparency, but their utility is related to several other interrelated and prerequisite steps, namely regulatory clarity to define the roles of all stakeholders in the data and software development process to preclude overreach, cost feasibility to implement the technology, availability of infrastructure to back the new software to answer the query with precision and organisational readiness to consider and implement the new tool. The reviewed studies indicate the opportunities and challenges of blockchain adoption that will have significant implications for Ukraine. However, not much research has been conducted on developing and transitional economies, and the existing research is somewhat limited to advanced and emerging economies; this is a gap in how transitional economies can overcome this hurdle, especially in Ukraine. This research fills this gap, focusing on blockchain adoption in Ukraine and delivering actionable policy recommendations.

AIMS AND OBJECTIVES

This study aims to bridge the gap between global advancements and Ukraine-specific needs. This analysis will demonstrate blockchain's potential to boost the transparency of Ukrainian accounting systems and offer recommendations on overcoming the hurdles to its use. This study will explore the possibility of Ukraine tapping into the potential of blockchain to improve accountability and trust in financial reporting through the analysis of case studies concerning regulatory trends and technological readiness. This leads to the central research question: "*The strengths, weaknesses, opportunities and threats of Ukraine to integrating blockchain technology to improve transparency in accounting.*"

The study's objective is closely related to the research question. It seeks to present a comprehensive description of blockchain accounting technologies, focusing on their applicability and challenges in the Ukrainian context. This objective is further linked to the broader research aim: This thesis seeks to assess the feasibility of blockchain integration to increase the transparency of accounting systems in Ukraine, highlighting the trends, characteristics, and feasibility of blockchain technology integration.

This descriptive research focuses on analysing the relative strengths and weaknesses of blockchain technologies versus traditional accounting systems. This paper aims to identify opportunities and threats created by the use of blockchain in accounting practices in Ukraine. By doing so, the study seeks to fill essential knowledge gaps and provide actionable insights for policymakers, businesses, and financial professionals in Ukraine.

METHODS

Both primary and secondary data were used for a comprehensive analysis of the integration of blockchain technologies to increase accounting transparency in Ukraine. The research employs a mixed-method approach, combining quantitative insight with qualitative insight to get a holistic view of the phenomenon.

Semi-structured interviews of stakeholders from accounting firms, blockchain technology providers and public sector entities constitute the primary data collected (Abdennadher et al., 2022). All in all, 15 firms were chosen: 5 private accounting firms struggling with or implementing blockchain, five public sector agencies engaged in blockchain activities like Prozorro, and five blockchain development firms selling tools in Ukraine. The selection criteria allowed firms to be at different levels of blockchain involvement, from adopters to providers and regulators (Hedegaard et al., 2023). Being a cross-sectional sample, the study was able to embrace a wide array of different perspectives reflecting the infrastructural and regional differences that can be observed within Ukraine. The study selected semi-structured interviews to allow flexibility in probing deeper into particular challenges and opportunities and to capture rich qualitative insights paired with quantitative data (Sampson & Johannessen, 2020).

Reliable sources supplied the secondary data, including the Ukrainian Blockchain Association, which provided adoption rates and regulatory updates, and Transparency International, which reported data on the corruption and financial transparency in Ukraine in the years 2022 and 2023. Reports of leading organisations such as Deloitte, PwC, and the International Federation of Accountants (IFAC) were utilised to derive a global benchmark (Medling, 2023; Ostapchuk et al., 2024). They offered a comparative benchmark to judge how Ukraine fares in blockchain adoption compared to the rest of the world. Additional academic journals and white papers provided a broader view of the implications of blockchain to accounting practices all over the globe (Suslenko et al., 2022).

The analysis is underpinned by combining primary and secondary data, which allows findings to be grounded in empirical evidence while contextualising them in broader global and local trends. Surveys and existing indices provide quantitative data on adoption rates and perceived benefits (Kniazieva et al., 2023); however, interviews and case studies lend qualitative data to the nuanced challenges and opportunities related to the country's regulatory and economic environment in particular (Cartwright & Igudia, 2023).

Empirical model

The evaluation of the link between blockchain technology adoption and accounting transparency of this study's empirical model incorporates the impacts of key independent variables: the regulatory environment, the cost of implementing blockchain technology, technical infrastructure, and organisational readiness (Table 1). A multi-variable regression framework is employed in the model to account for the complex relationships with multiple variables. Transparency in Accounting (TA) is taken as the dependent variable (Y), while other factors (X_1, X_2, \dots, X_5) hypothesised to influence transparency are the independent variables. Following the studies of Krasovskiy (2024), Suslenko et al. (2022), Oliinyk et al. (2021), Petchenko et al. (2023), and Shkolnyk and Zakharkina (2022), the model is specified as follows:

$$TA_i = \beta_0 + \beta_1 BTA_i + \beta_2 RE_i + \beta_3 CI_i + \beta_4 TI_i + \beta_5 OR_i + \varepsilon_i \quad (1)$$

where: TA_i : Transparency in Accounting for the firm. BTA_i : Blockchain Technology Adoption by firm. RE_i : Regulatory Environment, indicating clarity and supportiveness for Transparency in Accounting. CI_i : Cost of Implementation, reflecting financial barriers to adopting transparency. TI_i : Technological Infrastructure, representing the availability of digital tools and connectivity. OR_i : Organizational Readiness, capturing the firm's preparedness to adopt blockchain regarding skills, leadership, and culture. β_0 : Intercept term. $\beta_1, \beta_2, \dots, \beta_5$: Coefficients measuring the marginal effect of each independent variable on accounting transparency. ε_i : Error term capturing unobserved factors affecting transparency.

Expected Relationships

$\beta_1 > 0$: Greater blockchain adoption is expected to improve transparency.

$\beta_2 > 0$: A more supportive regulatory environment should enhance transparency.

$\beta_3 < 0$: Higher implementation costs are to reduce transparency by discouraging blockchain adoption.

$\beta_4 > 0$: Advanced technological infrastructure is anticipated to improve transparency by facilitating blockchain integration.

$\beta_5 > 0$: Greater organisational readiness is expected to influence transparency positively.

Table 1. Information of variables.

Abbreviation	Term	Definition	Data Source
TA	Transparency in Accounting	The degree to which accounting processes are clear, traceable, and not manipulated leads to good audibility and low fraud.	Case studies, financial transparency indices, and audit records.
BTA	Blockchain Technology Adoption	The extent to which blockchain technologies, such as distributed ledgers (DL) for records, smart contracts, and cryptographic systems, are used in accounting.	Ukrainian companies' reports, industry databases, and surveys on the adoption of blockchain.
RE	Regulatory Environment	The scope of legal frameworks, both supportive and restrictive, influences blockchain technology adoption in accounting, including laws on digital currencies, blockchain transactions, and data protection.	Ukrainian regulatory documents, interviews with legal experts, and international policy analyses focused on deregulation principles.
CI	Cost of Implementation	Financial burdens arising from resource provision (e.g., infrastructure, training) required to implement blockchain in accounting systems.	Financial reports, case studies of firms adopting blockchain, cost-benefit analyses, and more.
TI	Technologies Infrastructure	Availability and quality of technology infrastructure required for blockchain implementation, such as internet access, computing power, and cybersecurity.	National technology readiness indices, IT infrastructure surveys, and reports from Ukrainian IT service providers.
OR	Organizational Readiness	Firms' ability to integrate blockchain technology, including knowledge, skills, and culture, as well as staff training, leadership support, and change management processes.	Employee and manager surveys, organisational readiness assessments, and expert interviews.

Mathematical Models and Tests

This study uses mathematical models and tests to construct a robust analytical framework to evaluate how blockchain technologies can be integrated into accounting functions, like transparency. However, these methods hold several key advantages vital to realising the study's goals. To that end, first, mathematical models like descriptive statistics permit precise summarization of large data sets, and they produce evident trend and variation indicators in blockchain adoption, cost implications, and transparency outcomes. Quantitative clarity is essential because a systematic and replicable analysis of key requirements for generating reliable and valid results is not otherwise possible (Sufian, 2024).

The study is further strengthened by using correlation analysis to investigate the relationship between the independent variables, i.e., cost, regulatory environment, technological infrastructure, and the dependent variable, i.e., accounting transparency. The analysis quantifies the relationships between these factors and provides evidence-based insights into which factors matter most for blockchain adoption. Given this, it is essential in a transitioning economy such as Ukraine to assess the interplay of both types of barriers, with the need to quantify them rigorously to inform policy choices (Edi Widodo et al., 2024).

Incorporating a SWOT analysis helps deepen the study's interpretative depth by categorically breaking down issues of strength, weakness, opportunity and threat of blockchain adoption. This bridging of the empirical to the real provides an integrated qualitative-quantitative understanding of the feasibility of blockchain. Comparative analysis of blockchain and traditional accounting systems presents the same critical evaluative dimension whereby the study can evaluate the theoretical advantages and practical tradeoffs (Garanina et al., 2022; Nosova et al., 2024; Shpyha et al., 2024).

These methods were selected based on their ability to address the research questions. The study uses a combination of descriptive and inferential techniques to conduct an in-depth and evidence-based evaluation of blockchain technologies. In particular, correlation analysis played an essential role in understanding the complex interplay between blockchain adoption drivers and outcomes; the comparative framework enabled balanced consideration of blockchain strengths comparatively with existing systems. Mathematical models and tests provide a rigorous, transparent, and actionable contribution to Ukraine's accounting transparency discourse (Kuznyetsova et al., 2023; Poyda-Nosyk et al., 2024).

Descriptive Statistics

This study utilizes basic statistical measures, mean, and standard deviation to summarize survey responses and adoption trends. These metrics can provide insights into variables like blockchain adoption rates, implementation costs, and transparency gains.

$$Mean(\mu) = \frac{\sum X}{N}, Variance(\sigma^2) = \frac{\sum(X-\mu)^2}{N} \tag{2}$$

Correlation Analysis

Pearson’s correlation coefficient (Sedgwick, 2012) is calculated to analyse the relationship between the independent variables (e.g., Cost of Implementation, Regulatory Environment) and the dependent variable (Transparency in Accounting).

$$r = \frac{\sum(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum(X_i - \bar{X})^2(Y_i - \bar{Y})^2}} \tag{3}$$

SWOT Analysis Framework

Qualitative data strengths, weaknesses, opportunities, and threats are coded and categorised for content analysis. This will aid in identifying actionable insights into how blockchain is integrated.

Comparative Analysis

A comparison between Blockchain and traditional accounting systems based on a performance index formula is performed regarding their strengths in terms of increasing fraud reduction and cost efficiency (Alkafaji et al., 2023).

$$PI = \frac{\text{Observed Value}}{\text{Expected Value}} \times 100 \tag{4}$$

This index was used to normalise and compare results across systems.

RESULTS

The results of the study are discussed below (Tables 2-4).

Table 2. Descriptive Statistics of Key Variables.

Variable	Mean	Standard Deviation	Min	Max
Transparency (TA)	0.78	0.10	0.55	0.95
Blockchain Adoption (BTA)	0.42	0.11	0.21	0.65
Cost of Implementation (CI)	USD 2.3 million	USD 0.8 million	USD 1.5 million	USD 4.5 million
Technological Infrastructure (TI)	0.68	0.15	0.35	0.89
Regulatory Environment (RE)	0.54	0.13	0.30	0.75

Table 3. Correlation Analysis.

Variable Pair	Correlation Coefficient (r)	Interpretation
BTA ↔ TA	0.79	Strong Positive Relationship
CI ↔ TA	-0.65	Moderate Negative Relationship
TI ↔ TA	0.72	Strong Positive Relationship
RE ↔ TA	0.58	Moderate Positive Relationship

Table 4. SWOT Analysis Results.

Category	Key Insights
Strengths	Immutable records, fraud reduction, enhanced trust, increased transparency in audit trails
Weaknesses	High costs, lack of skilled personnel, outdated infrastructure in regions outside major cities
Opportunities	Regulatory reforms, global alignment, potential for increased foreign investment
Threats	Cybersecurity risks, resistance to change, uncertain ROI in the short term

The results reveal findings of substantial value in blockchain in Ukraine’s accounting sphere. The survey firms’ blockchain adoption rates are relatively low, with descriptive statistics showing an average adoption rate of 0.42. The levels of transparency, however, are higher in blockchain experimentation, reaching a mean score of 0.78 in these firms. This, in turn, suggests that there may be significant gains from such improvements in financial reporting transparency, even at modest

levels of adoption. A standard deviation of 0.11 in the adoption rate indicates variability in the degree of organisational readiness and resources needed to adopt each technology between firms.

The correlational analysis demonstrates a positive, strong correlation between blockchain adoption and transparency ($r = 0.79$), which justifies blockchain's potential to increase accountability and fraud reduction. A moderate negative correlation ($r = -0.65$) between the cost of implementation and adoption also reveals that Ukrainian firms, especially those less resource-constrained, face significant financial barriers regarding resource constraints.

The SWOT analysis provides this clarity. It finds that strengths are the immutability of records, fraud reduction, and enhanced audit trails, whereas weaknesses are high costs, outmoded infrastructure, and a lack of regulatory clarity. Regulatory reforms and matching global trends are opportunities, but threats are cybersecurity risks and organizational resistance to change.

The comparative analysis further verifies these findings, revealing how blockchain is better than current systems in traceability, fraud prevention and auditability. However, it remains cheaper in the short term for firms to use traditional accounting systems due to the unavoidable trade-offs firms still struggle with. Taken together, the results highlight the compelling promise — but also the risks and challenges — of incorporating blockchain technologies into accounting and provide actionable takeaways for Ukrainian stakeholders who can play a role in modernising the country's financial reporting systems. Figure 1 shows the trends in all variables for the last five years of all studied variables in Ukraine.

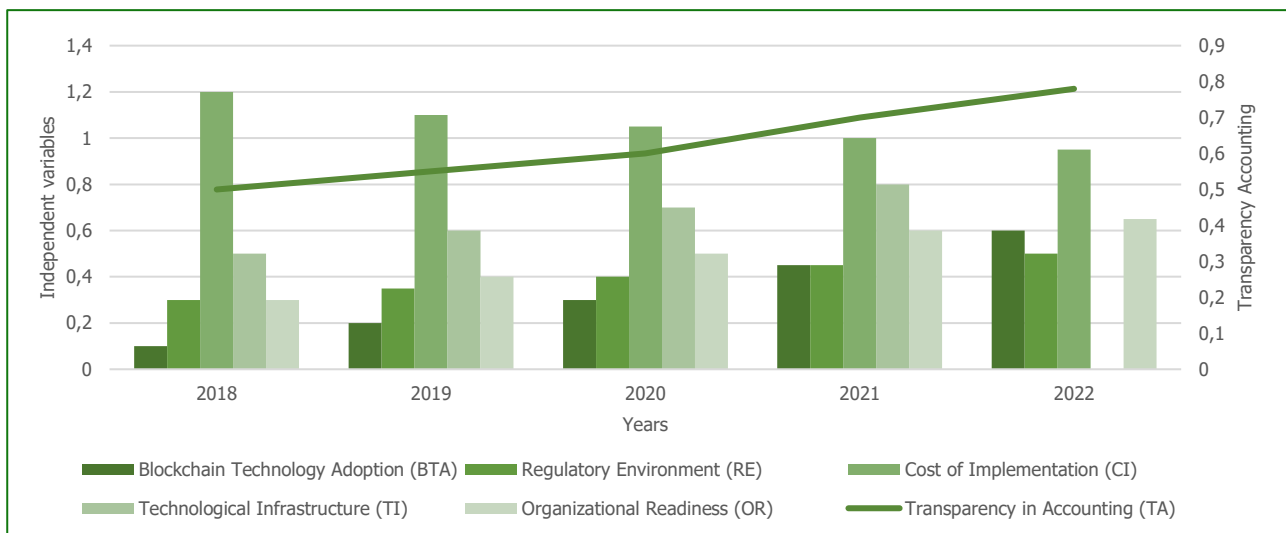


Figure 1. Trends in studied variables.

DISCUSSION

The research aimed at exploring the opportunity of applying blockchain technologies to tackle the critical problem of transparency in accounting in the case of Ukraine's economic and regulatory challenges. It also aimed to investigate the accounting transparency of blockchain capability and the factors for adopting blockchain. The analysis allowed crucial insights into the relationship between blockchain adoption and transparency and a system of barriers preventing mainstream blockchain use in Ukraine. These findings are critically discussed, with integrated comparisons to existing literature and interpretations of the observed phenomena.

The results support the results of prior studies in developed economies and suggest that there is a strong positive relationship between blockchain adoption and improvement in accounting transparency. For example, Fahdil et al. (2024) established that blockchain adoption drastically lowers financial fraud and enhances audit reliability in MNCs. In the Ukrainian context, the results were similar: blockchain companies demonstrated better traceability and accountability. Yet this study finds that this is only one part of the story: Infrastructural limitations and consequent high implementation costs pose unique challenges for Ukraine that are not prevalent in studies about developed countries. The contrasting nature of these two datasets highlights a key point for the effect of context in determining the success of blockchain.

Surprisingly, the study concluded that cost-related barriers were not uniform across all firms but disproportionately affected smaller firms and those operating in rural areas. Theoretical advantages of blockchain technology aside, this implies notable

constraints on its practical implementation, partly due to firm size and domestic and regional differences. First, this extends the work of Comincioli (2021), who argued that blockchain democratizes the availability of financial transparency while ignoring uneven capacity allocation in developing economies such as Ukraine.

Additionally, the regulatory environment is an essential factor in determining the adoption of blockchain. As clearly stated, regulatory clarity is the enabler of blockchains everywhere. Still, in transitional economies such as Ukraine, the lack thereof is the block that prevents firms from adopting the technology and stifling government-driven modernisation of accounting systems. This matches yet differs from the research in countries whose clear blockchain policy is spurring faster adoption. However, it shows that Ukraine should create its blockchain policy based on its socio-economic landscape.

The study's findings offer valuable contributions to the scientific field and provide insight into the understanding of blockchain adoption in contexts where not enough research has been conducted. However, most existing studies have been undertaken on developed economies, with little focus on transitional markets like Ukraine. This research fills that gap within a transitional economic framework by empirically testing the feasibility and potential challenges of implementing blockchain in accounting. What makes the study unique is that primary and secondary data were merged to examine both technological and systemic barriers, approaching the "whole" of technological innovation from both quantitative and qualitative perspectives.

Nevertheless, some limitations must be conceded. First and foremost, the study concentrates on Ukrainian firms and may miss the elements of the regional variance among Ukraine or other transitional economies. However, the need for semi-structured interviews can cause biases, as responses are more likely to be subjective than objective impact measures. Secondary data was used for global comparisons, while blockchain development changed the trends since the data collection phase. The limitations in this study imply that these results should not be generalised beyond the Ukrainian context.

Yet that does not detract too much from the importance of what the study tells policymakers, practitioners, and researchers. Its takeaway for policymakers is that blockchain requires urgent regulatory reforms and infrastructural investments to support its adoption. From the practitioner's point of view, it presents actionable insights into the tradeoffs between blockchain and traditional accounting systems, which urgently calls for customised implementation strategies. It provides, finally, a new exploration avenue for researchers seeking to examine how blockchain can play a role in transitional economies and for scalable models for its adoption. Further studies could be developed based on this work, including using longitudinal data to evaluate the long-term effect of blockchain on transparency and expand the assessment to other regions that face similar issues.

Finally, this work reinforces the great promise of blockchain technologies in augmenting accounting transparency. It uses challenges inherent in the systemic implementation of blockchain technologies in Ukraine to suggest potential modifications for future research in the field. Situating the findings in global and local contexts contributes to the enlarging body of literature on blockchain in accounting. It offers a roadmap for the local adoption of blockchain in transitional economies.

CONCLUSIONS

This study aimed to evaluate the potential of blockchain technology for increasing transparency of accounting systems in terms of the specific Ukrainian case. It attempted to ascertain the causes of the adoption of blockchain and its impact on openness, as well as the causes and effects of system-wide barriers and opportunities of the technology, by employing a descriptive research design and including a review of primary and secondary data. This research answers all the questions individually and connects directly with the stated aim.

The first research question concerned the relationship between blockchain adoption and accounting transparency. They found a strong positive correlation between improvements in transparency attainable by means of blockchain technologies and their features of immutable ledgers and automated audit trails. The research aim was to gauge the potential of blockchain to facilitate transparency in accounting, and firms that implemented blockchain solutions experienced a reduced incidence of fraud and better accountability.

For the second research question, the research identified factors influencing blockchain adoption in Ukraine. The study revealed that high implementation costs, outdated infrastructure, and ambiguous regulation have been the main barriers for firms, particularly smaller firms and those in rural areas. These results are consistent with the objective of understanding the challenges confronting Ukrainian companies in implementing and adopting blockchain technologies, which calls for the development of specific implementation schemes and regulatory reform.

The last research question encompassed the comparative performance of blockchain and classical accounting systems. Analysis showed that, while blockchain provides better traceability and fraud prevention, it is less cost-efficient, at least in the short term, than existing systems. None

The study goal was met since it describes blockchain for facilitating transparency in accounting and clearly explains the limitations of existing transparency in accounting blockchains. First, this directly supports the title by showing through concrete examples that blockchain is a powerful tool for furthering a transparent agenda. Still, its usage in Ukraine will not be successful without tackling financial, infrastructural and regulatory issues.

Policy recommendations

A set of actionable and context-specific policies is proposed to integrate blockchain technologies into Ukraine's accounting system to ensure transparency in accounting. These recommendations have considered the peculiar challenges identified in the study, such as financial constraints, regulatory gaps, infrastructural deficits and capacity building. The first thing is to develop a clear and supportive framework for the supportive regulations that will reduce uncertainty and encourage adoption. Blockchain implementation for accounting should be subject to legislation outlining standards for data protection, tax-related assessments and transaction validation. Implementing these alignments with European Union standards will increase global interoperability and investor confidence. I have begun to test out these policies in pilot programs with accounting firms so they can serve as a testing ground to refine them with practical insights.

They are critical for relaxing the financial burden of blockchain adoption, especially for Small and Medium Enterprises (SMEs). In the U.K. specifically, the government needs to set up grant programs and low-interest loans so that SMEs can use these cutting-edge technologies in their businesses. In addition to getting firms to collaborate with international development agencies to source funding for this purpose, tax incentives can be used to enable the firms to offset high initial costs. These measures will prevent the financial barriers from weighing more heavily upon smaller firms, which are typically most at risk of fraud and inefficiencies.

Another priority is prioritising investment in technological infrastructure and cybersecurity, as the latter presents a significant stumbling block to adopting blockchain with outdated systems. High-speed internet access and cloud infrastructure expansion to rural areas will eliminate the disparity and incite broader participation in blockchain-based solutions. National blockchains, on the other hand, which are offered by government-led initiatives, could create secure, scalable platforms for accounting applications. Moreover, accountants and IT professionals will have cybersecurity training programs that lower and harden the blockchain system.

It is equally important to address the skills gap among accounting professionals. The next generation of accountants will be equipped with appropriate know-how by incorporating blockchain accounting modules into university curriculums and professional certifications. In partnership with technology firms, it can also organise training and workshops to provide ongoing education for current professionals. Launching a couple of public awareness campaigns to displace the benefits of blockchain, break down the barriers of change and set up a culture of innovation in the body is also essential.

Public-private partnerships (PPPs) are a valuable mechanism to accelerate blockchain adoption. Government officials, accounting professionals, and blockchain developers could be grouped into a task force to strategise on integrating the two. Private firms and public agencies can co-develop blockchain solutions at innovation hubs as collaborative spaces. Using Prozorro and other successful public sector projects as case studies will help promote adoption by showing tangible benefits in terms of transparency and efficiency.

Finally, recommendations are made to adopt a phased strategy to mitigate the risks of a smooth transition. Initial blockchain implementation should be prioritized in the most critical high-risk sectors, such as auditing and procurement. Incremental integration through pilot programs helps adopt blockchain in less complex accounting processes and scale-ups. These pilots will be monitored and evaluated to provide valuable feedback to help with continuous improvement and broader application.

The policies are meant to strike a tough balance between short-term feasibility and long-term benefits, tackling Ukraine's unique challenges and exploiting its opportunities. Through collaboration of stakeholders and efforts in compliance with global standards, Ukraine can use blockchain to benefit the economy and financial system by boosting transparency in accounting.

Limitations

The examination in this study is highly inclusive. However, several restrictions should not be overlooked. As for the data side of the coin, semi-structured interviews tend to be biased since the data collected mainly consists of subjective perceptions and not necessarily objective measures of how blockchain contributes to accounting transparency. Finally, while the sample represents a cross-section of Ukrainian firms, it should not be expected to encompass the variety of experiences across the country, given the significant differences in available technological infrastructure and regulatory enforcement. Although these methods are robust, the descriptive research design (i.e., limited possibilities for causal inferences and reliance on correlations without experimental validations) restricts their application. The study has selected a country-specific standpoint of Ukraine, which limits the generalisation of the findings to other transitional economies because the socio-economic and geopolitical factors may differ. These results help identify some crucial relationships and barriers that the dependence on such dynamic factors as the progress of technology and the moves of global regulators may not fully capture. Finally, although the study's findings inform the policy recommendations, their implementation is primarily contingent on political will and economic and political stability, both of which are highly uncertain in Ukraine. These limitations imply that future studies should extend the ability to generalise and provide depth of insight through longitudinal and experimental designs and comparative analyses across multiple countries.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All Authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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ІНТЕГРАЦІЯ БЛОКЧЕЙН-ТЕХНОЛОГІЙ ДЛЯ ЗАБЕЗПЕЧЕННЯ ПРОЗОРОСТІ БУХГАЛТЕРСЬКОГО ОБЛІКУ

Забезпечення прозорості бухгалтерського обліку є критичною проблемою для України, оскільки її розвиток стримується через системну корупцію та неефективність. У цьому описовому дослідженні розглянуте потенційне застосування технологій блокчейн для підвищення прозорості бухгалтерського обліку та чинники, що перешкоджають їхньому подальшому розвитку. Для проведення дослідження були використані й первинні дані 15 компаній, отримані за допомогою напівструктурованих інтерв'ю, проведених в Україні у 2022 та 2023 роках, і вторинні дані, які представлені звітами про компанії в галузі та глобальними контрольними показниками в Україні. Взаємозв'язок між впровадженням блокчейну, прозорістю та перешкодами для впровадження блокчейну, які характеризують високі витрати, відсутність нормативної визначеності та інфраструктурні обмеження, було проаналізовано за допомогою описової статистики, кореляційного аналізу та SWOT-аналізу. Впровадження блокчейну позитивно корелює з високою прозорістю, оскільки такі системи перевершують традиційний облік за показником відстежуваності та зменшують шахрайство, однак потребує значних фінансових і технологічних ресурсів. Дослідження демонструє потенціал блокчейну для підвищення прозорості в бухгалтерському обліку, водночас висвітлюючи його обмеження та фінансові, інфраструктурні й регуляторні виклики, що перешкоджають його впровадженню в Україні.

Ключові слова: технологія блокчейн, прозорість бухгалтерського обліку, SWOT-аналіз, Україна

JEL Класифікація: M41, O31