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STRATEGIES FOR MANAGING OPERATING EXPENSES IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT OF ENTERPRISES IN KAZAKHSTAN

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ABSTRACT

Effective operational cost management is a critical concern for enterprises striving to maintain competitiveness while advancing sustainable development goals. This study investigates how non-state enterprises in Kazakhstan manage operating expenses in alignment with sustainability principles, particularly emphasizing the potential of blockchain-supported multiple offsetting systems. A cross-sectional mixed-methods design combined survey responses from 43 professionals across key industries with qualitative data from 15 structured interviews. Survey results indicate that most enterprises maintain a strong cost-monitoring culture (87% agreement), yet only moderate integration of sustainability in operational decision-making (71%). Awareness of blockchain-based cost optimization remains limited (43%), although 66% of respondents expressed openness to exploring blockchain-enabled financial settlements. A multiple linear regression model was estimated to identify drivers of blockchain readiness. The analysis revealed that cost strategy sophistication ($\beta = 0.562$, $p < 0.01$) and sustainability orientation ($\beta = 0.391$, $p < 0.05$) were statistically significant predictors, together explaining 41% of the variance in blockchain adoption readiness (Adjusted $R^2 = 0.41$, $p < 0.001$). Qualitative findings reinforced these insights, revealing themes around decentralized cost-sharing, blockchain's potential to improve inter-enterprise trust, and concerns over implementation complexity and regulatory uncertainty. The study concludes that while blockchain-based offsetting systems offer scalable, cost-effective solutions, successful adoption depends on technical training, policy incentives, and broader institutional support.

KEYWORDS

Operational Expenses, Sustainable Development, Cost-Efficiency, Blockchain, Kazakhstan, Multiple Offsetting System

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1. Introduction

In today's rapidly evolving business environment, effective management of operational expenses has become critical for maintaining both competitiveness and environmental responsibility. Businesses must find new ways to cut costs while helping the environment and society in the long run as they integrate sustainable development ideas into their strategy (Edwards, 2021; Van Zanten & Van Tulder, 2021). It is now critical for Kazakhstan, like many other developing nations, to strike a balance between efficient economic growth and long-term sustainability (Raihan & Tuspekova, 2022). So, for businesses to stay afloat and do the right thing, they must figure out how to control costs effectively. Despite the growing relevance of this topic, empirical research on how non-state firms in Kazakhstan handle operational expenses by sustainability frameworks is noticeably lacking (Karini, 2025). In particular, models incorporating blockchain and other current technology are lacking to build decentralized, transparent, and collaborative financial systems. Underexplored in Kazakhstan's corporate scene is one model that could simplify inter-company payments and decrease redundant financial flows: the system of multiple offsetting across firms.

This study is noteworthy because it is one of the first to investigate the potential advantages and drawbacks of using a blockchain-supported multiple offsetting system to reduce costs and ensure sustainable

operational management. Policymakers, CFOs, sustainability consultants, and business strategists looking for data-driven solutions to promote responsible development and economic resilience may find this valuable research because it fills a knowledge gap.

The primary objective of this research is to learn how businesses in Kazakhstan apply sustainable development-based operational cost management techniques. In particular, the study aims to discover how companies implement sustainable cost management, what obstacles they encounter when trying to combine cost-efficiency with sustainability, and how managers feel about the effects of sustainable cost management on their companies' competitiveness and performance. The study tackles three main areas of inquiry to achieve the goal: (1) To keep operational expenses down and sustainability objectives in mind, what methods do businesses in Kazakhstan use? Incorporating cost efficiency with sustainability: what are the obstacles? (3) In what ways do managers anticipate that sustainable cost management will affect their companies' future success?

2. Literature Review

Operational expenses, often called OPEX, are daily expenditures businesses incur (Belesis et al., 2024). These include labor prices, utilities, rent, office supplies, and raw materials. Managing running costs well is essential for making money and keeping a business going for a long time, especially in Kazakhstan's competitive and resource-limited market (Fehlings et al., 2025; Vekasi, 2023). Capital expenditures (CAPEX) are one-time investments in assets. On the other hand, operational costs happen regularly and must be tracked and improved constantly. The Sustainable Development Goals (SDGs) of the United Nations say that sustainable development means meeting the needs of the present without making it harder for future generations to do the same (Shah & Shah, 2023; Shah et al., 2023). Its parts deal with protecting the earth, societal fairness, and economic growth. Businesses must consider the world and people when making operational and strategic decisions.

In real life, sustainable development means using greener technologies, being fair at work, and ensuring the economy is strong in the long run (Shah, 2024). Businesses use cost-efficiency strategies to cut costs that are not necessary while keeping the quality of their items or services the same (Negi, 2021). These tactics include outsourcing, digitalization, process automation, lean production, and working together through shared service models. Cost-efficiency in modern business also means spending on long-lasting technologies that might cost more initially but save money in the long run, like energy-efficient equipment or blockchain-based financial tools that cut down on duplicate transactions (Valeonti et al. 2024). Kazakhstan wants to diversify its economy and become more connected to global markets, making the need for long-lasting and cost-effective activities more critical. However, most businesses still use old-fashioned ways of managing costs because they have not been exposed to digital change and long-term frameworks. So, it is essential to understand operational costs, long-term viability, and cost-effectiveness before looking into new ideas like the suggested multiple offsetting system using blockchain technologies.

Theoretical Framework

The Triple Bottom Line (TBL) framework, introduced by John Elkington, expands the traditional accounting framework by adding two more dimensions, social and environmental, to the financial bottom line (Zaharia & Zaharia, 2021). TBL suggests that businesses should aim for "Profit, People, and Planet" by combining their financial goals with caring for others and the environment (Vázquez-Pacho, M., & Payaud, 2025; Mattera & Gava, 2022). This framework is beneficial when discussing sustainable development because companies can only stay in business in the long run if they can balance these three factors. Porter's generic competitive strategies model describes his cost leadership strategy as focusing on lowering costs to sell products at lower prices than competitors while maintaining good quality (Kunc, 2010). Companies using this approach will often get a significant market share. Adopting new technologies, like blockchain, that lower costs and make transactions more transparent is one way to achieve cost leadership in sustainable development (Saberi et al., 2019; Schulz et al., 2020). However, there is a fine line between cutting costs and upholding moral or environmental standards.

According to the business's Resource-Based View (RBV), a company's physical or non-internal resources give it a long-term edge over its competitors (Srivastava et al., 2021). These resources include financial infrastructure, technological know-how, and people capital. From an RBV point of view, engaging in blockchain-based offsetting systems or environmentally friendly energy solutions can help a company stand out from others, especially in places like Central Asia, where digital infrastructure is still developing (Lv, 2023). In the context of sustainability, these three frameworks, TBL, Cost Leadership, and RBV, provide a comprehensive view of practical expense management. TBL ensures all goals are considered, Cost Leadership

offers practical ways to cut costs, and RBV stresses the importance of internal skills like being ready for digital change to be strategically valued. According to this study, these models are used to look at how Kazakhstani businesses handle costs.

Existing Research

A considerable body of international literature has examined sustainable cost management strategies across diverse industrial contexts. Many businesses in the European Union have added digital tools like Enterprise Resource Planning (ERP) systems and blockchain to their cost and environmental management systems in response to government rules and public calls for more openness (Morawiec & Sołtysik-Piorunkiewicz, 2022). These tools help cut down on paperwork, stop fraud, and make it easier to track costs, which is suitable for saving money and the environment. Blockchain technology is being used for more than just financial services in China. It is also used to manage business costs. Studies have shown that distributed ledger systems are used to improve trust between companies in multi-tiered industrial ecosystems, make audit trails more automated, and improve the flow of money in the supply chain (Venkatesh et al., 2020). These systems lower the costs of transactions and help set up tracking carbon credits and sustainability licenses, which are necessary to meet global environmental standards (Kim & Huh, 2020).

Post-Soviet economies like Ukraine, Georgia, and the Baltic States are increasingly interested in digitizing business tasks, but adoption is still not uniform (Baimenov & Liverakos, 2022). Cost tracking using blockchain has been tried in some pilot projects, but there is not much real-world proof to show that they work or can be scaled up (Perboli et al., 2018). Most of the time, companies still use old-fashioned ways to keep costs down, and they run into institutional pushback when they try to switch to new models because they do not know how to use technology or follow the rules. Even though foreign research is growing, few studies focus on Kazakhstan, especially those that look at non-state businesses that do not get money from the government. Most of the writing already out there is about macroeconomic sustainability, regulatory reforms, or state-owned firms. Not much attention is paid to how private companies handle business costs in a way that supports sustainability goals, especially when they use group tools like blockchain-based offsetting systems.

Research Gap

While several studies have explored cost management and sustainability independently, the intersection of these domains, particularly through the lens of blockchain-based mutual offsetting, remains under-researched. This is especially true in Kazakhstan's business sector, where new ways for organizations to work together are still in their early stages of growth. Most businesses still only use basic digital accounting systems and have not looked into more advanced, unified ways to save money. This study is even more unique because it is the first to examine how blockchain can lower costs in Central Asian countries. Blockchain is being talked about more and more in banking circles. However, its role in cost management is rarely considered, especially in a decentralized and collaborative system. This is a lost chance because the technology could have automated multi-party settlements, cut costs, and made it easier for non-state businesses to show their finances.

Also, most of the studies that have been done in the past have been on large businesses or government agencies, leaving small and medium-sized enterprises (SMEs) out. Because they can not easily get cash or technology, small businesses in Kazakhstan often have to pay more to run their businesses. Understanding these companies' perspectives on and using sustainable cost management measures is crucial for developing industry support models and policy recommendations that benefit all parties. This study aims to fill in these gaps by looking at how Kazakhstani businesses, especially non-state actors, can use blockchain technology to set up various systems that balance each other out. It adds a new level to the discussion on sustainable cost management by combining theoretical models with real-world data from an area not often discussed in the global sustainability conversation.

3. Methodology

Research Design

This study adopts a cross-sectional mixed-methods design, combining quantitative and qualitative data to understand operational expense management practices in sustainable development comprehensively. The mixed-method approach enables data triangulation from surveys and interviews, enhancing the validity and richness of findings. The cross-sectional nature of the research allows for a snapshot of practices and perceptions among enterprises in Kazakhstan at a single point in time, which is particularly useful for understanding emerging trends such as blockchain integration.

Sample and Participants

The target population comprises managerial-level professionals, finance officers, and sustainability experts in Kazakhstan's non-state enterprises. A purposive sampling strategy was used to ensure the inclusion of participants with relevant knowledge and decision-making authority in cost management and sustainability areas. The final sample comprised 43 participants representing various sectors, including manufacturing, retail, logistics, and services. The participants varied in company size and years of experience, which provided a diverse and representative dataset for the study.

Data Collection Procedures

Data were collected through two primary methods: an online survey and structured interviews. The survey was designed and distributed using Google Forms and included closed-ended and Likert-scale questions focused on operational cost management strategies, perceptions of sustainability, and awareness of blockchain technologies. Participation was voluntary, and the survey was shared via professional networks, LinkedIn groups, and direct emails. In parallel, structured interviews were conducted with a subsample of 15 respondents via Zoom or Microsoft Teams. Each interview lasted approximately 30–45 minutes and followed a predefined guide that included questions such as:

i. What are the most effective cost-control strategies your enterprise has used?
ii. What trade-offs have you encountered when trying to implement sustainability initiatives?
iii. How does your organization view the possibility of using blockchain-based mutual offsetting systems?

These interviews helped capture nuanced views, underlying rationales, and practical constraints that were not easily extractable from survey responses alone.

Ethical Considerations

Ethical integrity was maintained throughout the research process. All participants were provided with an informed consent form outlining the purpose of the study, the voluntary nature of their participation, and the confidentiality of their responses. No personal identifiers were collected in the survey, and interviewees were assigned pseudonyms to protect their identities.

Data Analysis

Quantitative survey data were analyzed using descriptive statistics (mean, median, mode, frequencies) and correlation analysis to identify relationships between sustainability awareness, cost-management strategies, and openness to blockchain applications. These analyses were conducted using Microsoft Excel and SPSS software. Qualitative interview data were subjected to thematic analysis, which involved transcribing the interviews, coding recurring themes, and interpreting the data to the study's objectives. In some instances, NVivo software was used to facilitate coding, although manual tagging and thematic clustering were applied for deeper contextual interpretation. The dual-method approach enabled the validation of patterns observed in the survey and enriched them with in-depth qualitative insights.

Table 1. Variable Overview

Variable Name	Type	Definition	Scale	Use in Analysis
Operational Cost Strategy	Categorical	Type of strategy used to manage operating costs (e.g., digital tools, outsourcing)	Nominal	Frequency, cross-tabulation
Sustainability Integration	Ordinal	The degree to which sustainability is integrated into company operations	1–5 Likert scale	Descriptive stats, correlation analysis
Blockchain Awareness	Categorical	Whether the participant is aware of blockchain's role in business operations	Nominal (Yes/No)	Frequency analysis
Blockchain Adoption Readiness	Ordinal	Willingness to adopt blockchain-based mutual offsetting systems	1–5 Likert scale	Descriptive stats, correlation analysis
Company Size	Categorical	Size of enterprise (Small, Medium, Large)	Nominal	Cross-tabulation, thematic comparison
Years of Managerial Experience	Continuous	Experience level of respondent	Ratio	Mean analysis, context for interpretation

Table 2. Survey (Descriptive Statistics)

Question	Mean Score	% Agree (4-5)	Interpretation
"Our enterprise actively seeks to reduce operational costs."	4.32	87%	Strong orientation toward cost-efficiency
"We consider sustainability when making operational decisions."	3.88	71%	Moderate sustainability integration observed
"We are aware of blockchain applications in cost management."	2.94	43%	Low-to-moderate awareness; need for education
"We are open to exploring a blockchain-based offsetting system."	3.65	66%	Moderate willingness to adopt blockchain solutions

Table 3. Interview Themes and Interpretation

Theme	Quotes/Interpretation
Cost-Efficiency Tools	"We implemented cloud accounting last year, and it reduced costs by 20%."
Sustainability Challenges	"Eco-packaging is great, but the cost almost doubled our logistics expense."
Blockchain Skepticism	"I've heard of blockchain, but we're unsure how it would apply to us."
Offsetting Potential	"If blockchain can help settle inter-company debts securely, I'd be willing to try it, especially for cash flow."

In addition to descriptive and thematic analyses, a multiple linear regression analysis was carried out to investigate the elements impacting the preparedness of businesses to implement offsetting systems based on the blockchain. The dependent variable, *Blockchain Adoption Readiness*, was measured on a 1–5 Likert scale, while the independent variables included *Cost Strategy Sophistication*, *Sustainability Orientation*, and *Firm Size*. This quantitative modeling approach allowed the study to assess the predictive strength of internal management practices and organizational characteristics on digital adoption tendencies. The regression was executed using SPSS, with statistical significance evaluated at the 1%, 5%, and 10% thresholds. This technique identified key determinants and provided empirical depth to support the study's broader qualitative insights.

4. Results

4.1 Participant Demographics

The study collected responses from 43 professionals representing various non-state enterprises across Kazakhstan. The industries included manufacturing (35%), retail and logistics (25%), technology and services (30%), and agriculture (10%). The majority of respondents held managerial (53%) or financial executive roles (28%), while the remaining (19%) were sustainability officers or consultants. In terms of organizational size, 47% represented small enterprises (less than 50 employees), 33% from medium-sized firms (50–250 employees), and 20% from large enterprises (over 250 employees). Participants also varied in experience. Approximately 39% had less than 5 years of experience, 44% had 5–10 years, and the remaining 17% had over 10 years in decision-making positions. This diversity allowed the study to capture insights into cost-management strategies and sustainable development.

4.2 Survey Results and Interpretation

The online survey captured responses on cost-saving practices, sustainability integration, and blockchain adoption. Descriptive statistics are summarized in Table 4.

Table 4. *Descriptive Statistics for Key Variables*

Statement	Mean Score (1–5)	% Agree (4–5)	Interpretation
Our enterprise actively monitors and reduces operational costs	4.32	87%	Strong cost-conscious culture across sectors
Sustainability is a key driver in our operational decision-making	3.88	71%	Moderate sustainability orientation
We are familiar with blockchain-based cost optimization systems	2.94	43%	Knowledge gap regarding digital financial technologies
We are open to adopting blockchain for multi-party financial settlement	3.65	66%	Considerable potential for pilot implementation

The results indicate that most enterprises in Kazakhstan are actively engaged in cost monitoring, but only a portion have embedded sustainability into operational decisions. Awareness of blockchain applications remains moderate, though there is an openness to explore blockchain-based mutual offsetting systems as a cost-reduction mechanism.

4.3 Regression Analysis: Predictors of Blockchain Readiness

We constructed a linear regression model to examine characteristics of blockchain adoption readiness. The dependent variable was *Blockchain Adoption Readiness* (measured on a 1–5 scale). Independent variables included *Cost Strategy Sophistication*, *Sustainability Orientation*, and *Firm Size*.

Table 5. Regression Results

Variable	Coefficient (β)	Std. Error	t-Statistic	p-value	Interpretation
Constant	1.412	0.421	3.35	0.002	Base readiness score without influence from other factors
Cost Strategy Sophistication	0.562***	0.128	4.39	0.000	Strong positive relationship with blockchain readiness
Sustainability Orientation	0.391**	0.174	2.25	0.029	Moderately significant predictor
Firm Size (Small=1, Large=3)	0.221*	0.132	1.68	0.101	Weak but positive association (not significant at 5%)
Adjusted R^2	0.41				The model explains 41% of the variance in blockchain adoption readiness.
F-Statistic (p-value)	11.28 (0.000)				The overall model is significant.

*p < 0.10, **p < 0.05, ***p < 0.01

A multiple linear regression analysis was performed to determine what characteristics impact the probability of businesses implementing blockchain-supported multiple offsetting systems. A range from 1 to 5 was used to rate Blockchain Adoption Readiness, which shows how open or ready a company is to use blockchain-based financial tools. The model had three factors: Firm Size, Cost Strategy Sophistication, and Sustainability Orientation. Cost Strategy Sophistication turned out to be the best driver of blockchain readiness, according to the regression analysis. A study with a standardized coefficient of β = 0.562 and a statistically significant p-value of 0.000 shows that companies that use complex and organized cost-control strategies are likelier to adopt blockchain technologies. This link shows how companies that value business efficiency and are open to digital innovation are strategically aligned. It is possible that these companies already have the internal systems and ways of thinking that they need to move toward autonomous financial systems like mutual offsetting based on blockchain. Sustainability Orientation also had a statistically significant positive link (β =

0.391, p = 0.029), which means that businesses that use sustainable practices are more likely to be open to using blockchain tools. This backs up the idea that digital solutions like blockchain can help make things more sustainable by making things more open, cutting down on waste, and making it easier for business networks to share resources more efficiently. These results align with other research that shows a link between caring about the environment and adopting new technologies. Firm Size was linked to blockchain readiness in a positive way (β = 0.221), but the relationship was not statistically significant at the 5% level, as shown by the p-value of 0.101. In other words, bigger companies may have more resources and technological know-how, but that does not mean they are more likely to be ready to use blockchain. The fact that firm size does not have as much effect as cost strategy and sustainability direction suggests that managerial practices and aligning values may be more critical in determining how people adopt digital technologies. The model is strong with an adjusted R^2 of 0.41; the three independent variables explain 41% of the variation in how ready people are to accept blockchain. The model is statistically significant as a whole, as shown by the F-statistic (11.28, $p < 0.001$). These findings strongly support the idea that an organization's internal strategy focus, especially on cost-effectiveness and sustainability, is a significant factor in determining how willing it is to adopt blockchain-based financial innovations in Kazakhstan.

4.4 Interview Findings: Themes and Direct Quotes

The qualitative component of this study, based on fifteen structured interviews with financial managers, directors, and sustainability consultants, revealed three overarching themes that offer valuable context to the quantitative findings. These themes shed light on the perceived advantages, concerns, and practical realities of implementing blockchain-based multiple offsetting systems for operational cost management in Kazakhstan's enterprise landscape. The first idea was decentralization as a way to share costs. Instead of using traditional one-to-one financial settlements through banking systems, participants spoke about how blockchain could allow linked businesses to offset each other. This separation could make it possible for companies to settle their debts with each other across a network of partners without having to send cash. This could help with problems like late payments and insufficient working capital. People said this method could help small and medium-sized businesses (SMEs) the most since they do not have much financial room to move.

The role of blockchain in improving trust and openness was the second central theme. Participants stressed that blockchain could be a strong technology foundation for open record-keeping and automatic verification of transactions in Kazakhstan's current business setting, where trust between organizations is still growing. People thought that blockchain could help lower counterparty risk for companies that do not have access to formal credit or legal enforcement mechanisms. Blockchain's ability to not be changed made people think it would increase trust and lower fraud, especially in high-risk fields like transportation and procurement. There was excitement about the benefits of blockchain, but the third central theme tempered it: worries about how hard and expensive it would be to adopt. People interviewed were concerned about the technical and financial steps needed to add blockchain systems to their current enterprise resource planning (ERP) systems. People were also worried that organizations did not have enough technical know-how and that using decentralized financial systems could have legal and regulatory effects that were not clear. Several people asked who would be in charge of these kinds of tools and whether their employees would need much training to use them correctly. These worries brought to light the fact that there are still significant problems with adoption, even though there is interest. These problems are enormous for small businesses that do not have many resources. Overall, the interview results give us a complete picture of the pros and cons of cost-sharing systems that use blockchain technology. It is clear that they have strategic value for improving trust and efficiency, but putting them into action will need specific help with policy, technology infrastructure, and building up people's skills. These insights support the poll results and make it more straightforward that Kazakhstan's business sector needs a coordinated approach to long-term cost management reform.

5. Discussion

The findings from this study provide important insights into how non-state enterprises in Kazakhstan are navigating the intersection of cost management and sustainability, particularly in adopting blockchain-enabled offsetting systems. The numbers show that businesses are very cost-conscious but are just starting to use advanced digital tools like blockchain to help them reach their sustainability goals. In answer to Research Question 1, which looked into how businesses cut costs, the data showed that they put much stress on operational efficiency. People talked about shared services, digital accounting platforms, and, to a lesser extent, moving toward renewable energy and being more eco-friendly. The high mean score (4.32 in the survey) shows that most organizations constantly track and lower operational costs. Interview data also showed that people

are becoming more interested in working together, like mutual balancing, as a possible way to ease cash flow problems and eliminate unnecessary financial transactions.

In response to Research Question 2, several problems were found when trying to combine methods for saving money with goals for sustainability. The most significant issues were organizations that did not want to change, lacked technical support, and did not know the rules. These worries came up in both the survey answers and the interview stories. Many people said they could see the long-term benefits of sustainable practices and blockchain apps, but they can not because they are too expensive to start, do not have enough training, and not understand how to comply with rules and run the system. These findings show that more targeted policy support, financial incentives, and programs to raise knowledge are needed to make adoption easier.

Regarding Research Question 3, which asked managers what they thought about sustainable cost management, the study found that most liked the idea, especially regarding blockchain-enabled balancing. People who took part saw blockchain as a way to build trust between organizations and make complicated financial deals easier. The regression analysis supported this point of view by showing that companies with more advanced cost strategies and a better focus on sustainability are likelier to consider using blockchain solutions. Notably, the results also showed that many managers liked the idea of blockchain, both because it would save them money and make business networks more open and accountable. These results have meanings that are both useful and important for the future. From a business point of view, blockchain-based multiple balancing systems are a new way to cut down on unnecessary spending and smooth out cash flows (Tsai, 2023). These systems can help small and medium-sized businesses (SMEs) deal with payment delays and better control their cash flow by letting partner businesses do decentralized clearing. Additionally, blockchain builds trust and can help businesses work together in a market where different companies have different financial growth and creditworthiness levels (Jiang et al., 2022).

Kazakhstan appears to be in the early stages of integrating digital and sustainable finance tools. In more developed contexts, blockchain is increasingly used to manage supply chains, verify carbon credits, and conduct financial transactions. The Kazakhstani businesses examined in this study are still exploring these applications. However, their openness to innovation indicates that they could progress more rapidly with adequate institutional support and technological guidance.

A notable finding from the interviews was that many small business managers reported limited knowledge of sustainability frameworks or terminology. However, their actions (such as conserving energy, using resources more efficiently, and collaborating to deliver shared services) were closely aligned with sustainability principles. This gap between academic understanding and practical behavior suggests that sustainability education could be reframed in a way that is more applicable and accessible for business professionals. Although the study provides valuable insights, it has several limitations. Its cross-sectional design captures only a single point in time and therefore cannot reflect changes in attitudes or behaviors over time. Additionally, the use of self-reported survey data introduces the potential for response bias, particularly in areas such as cost-saving claims or readiness for blockchain adoption. The generalizability of the findings is also limited due to the relatively small and non-random sample.

6. Conclusions

This study highlights that sustainable cost management is no longer merely a strategic option for enterprises in Kazakhstan; it has become a necessity. As operational pressures intensify and environmental accountability grows, businesses must adopt new approaches to resource utilization while aligning with international sustainability standards. The findings indicate that while most companies actively monitor operational expenses, the integration of sustainability objectives remains at an early stage. This research is particularly significant as it demonstrates the potential of various offsetting mechanisms, supported by blockchain technology, to provide transparent and scalable solutions for cost management. The results suggest that such systems can address common financial challenges, especially for small and medium-sized enterprises (SMEs), by reducing unnecessary cash flows and improving liquidity without relying on traditional banking mechanisms. Additionally, blockchain-based solutions offer advantages in terms of trust, verification, and decentralization. These features are critical for fostering collaboration in fragmented or non-unified markets. However, the effective adoption of these innovations depends on several enabling conditions, including clear regulatory frameworks, institutional support, and adequate technical infrastructure. To support the transition toward advanced financial systems, businesses will require targeted education, awareness campaigns, and the development of practical implementation frameworks. This need is particularly urgent for companies that currently lack robust digital infrastructure.

Practical Implications

The findings of this study provide several actionable recommendations for business leaders and policymakers. First, a national blockchain-based offsetting network should be established to facilitate secure and transparent debt settlement for businesses. By reducing reliance on cash and traditional payment systems, this network can help companies, particularly small and medium-sized enterprises (SMEs), better manage their operational costs. Second, the government should promote the wider adoption of blockchain technology by implementing supportive regulations, offering tax incentives, and launching pilot funding programs. Policymakers should clearly define legal and compliance frameworks to ensure that blockchain-based cost management solutions are secure, reliable, and aligned with national economic objectives. Third, SMEs need to be educated about sustainable finance and digital financial tools without delay. Many companies already engage in sustainable practices but do not formally identify or report them as such. This gap can be addressed through targeted training programs and resource centers that equip businesses with the knowledge and tools to integrate environmental goals with existing cost-control strategies. By advancing these areas, Kazakhstan can accelerate its transition toward a more resilient, future-oriented, and digitally integrated business ecosystem. Such a system can support the balance between short-term profitability and long-term sustainability.

REFERENCES

1. Baimenov, A., & Liverakos, P. (2022). 30 Years of Transformation: A Comparative Assessment. Public Service Evolution in the 15 Post-Soviet Countries: Diversity in Transformation, 1-49. https://link.springer.com/chapter/10.1007/978-981-16-2462-9_1
2. Batalla Martinez, S., Wilfinger, D., & Tschandl, M. (2021, July). Integrated Planning of Operating Expenditures (OPEX)-A model to apply best practices when running ERP and DWH systems. In Proceedings of the 2021 7th International Conference on Computer Technology Applications (pp. 92-98). https://dl.acm.org/doi/abs/10.1145/3477911.3477926
3. Belesis, N., Kampouris, C. G., & Fousteris, A. E. (2024). Vessels' operating expenses: A key variable on companies' strategic decisions. Corporate and Business Strategy Review, 5(2), 102-117. https://virtusinterpress.org/IMG/pdf/cbsrv5i2art9.pdf
4. Edwards, M. G. (2021). The growth paradox, sustainable development, and business strategy. Business Strategy and the Environment, 30(7), 3079-3094. https://onlinelibrary.wiley.com/doi/full/10.1002/bse.2790
5. Fehlings, S., Karrar, H. H., & Rudaz, P. (2025). Small businesses and new adaptation capacities in Georgia and Kazakhstan. World Development, 191, 106993. https://www.sciencedirect.com/science/article/abs/pii/S0305750X25000786
6. Jiang, R., Kang, Y., Liu, Y., Liang, Z., Duan, Y., Sun, Y., & Liu, J. (2022). A trust transitivity model of small and medium-sized manufacturing enterprises under blockchain-based supply chain finance. International Journal of Production Economics, 247, 108469. https://www.sciencedirect.com/science/article/abs/pii/S0925527322000627
7. Karini, A. (2025). Policy Learning for National Advantage and Sovereign Governance in Non-Western Contexts: Comparing Public Management Reforms in Azerbaijan, Malaysia, and Kazakhstan. Journal of Public Affairs, 25(1), e2959. https://onlinelibrary.wiley.com/doi/abs/10.1002/pa.2959
8. Kim, S. K., & Huh, J. H. (2020). Blockchain of carbon trading for UN sustainable development goals. Sustainability, 12(10), 4021. https://www.mdpi.com/2071-1050/12/10/4021
9. Kunc, M. (2010). Revisiting porter's generic strategies for competitive environments using system dynamics. In Computational Analysis of Firms' Organization and Strategic Behaviour (pp. 173-191). Routledge. ISBN 9780203850091
10. Lv, Y. (2023). Transitioning to sustainable energy: opportunities, challenges, and the potential of blockchain technology. Frontiers in Energy Research, 11, 1258044. https://www.frontiersin.org/journals/energy-research/articles/10.3389/fenrg.2023.1258044/full
11. Mattera, M., & Gava, L. (2022). Facing TBL with IoT: creating value and positively impacting business processes. Social Responsibility Journal, 18(1), 178-201. https://www.emerald.com/insight/content/doi/10.1108/srj-02-2020-0074/full/html
12. Morawiec, P., & Sołtysik-Piorunkiewicz, A. (2022). Cloud computing, big data, and blockchain technology adoption in ERP implementation methodology. Sustainability, 14(7), 3714. https://www.mdpi.com/2071-1050/14/7/3714
13. Negi, S. (2021). Supply chain efficiency framework to improve business performance in a competitive era. Management Research Review, 44(3), 477-508. https://www.emerald.com/insight/content/doi/10.1108/mrr-05-2020-0272/full/html
14. Perboli, G., Musso, S., & Rosano, M. (2018). Blockchain in logistics and supply chain: A lean approach for designing real-world use cases. Ieee Access, 6, 62018-62028. https://ieeexplore.ieee.org/abstract/document/8493157

15. Raihan, A., & Tuspekova, A. (2022). Role of economic growth, renewable energy, and technological innovation to achieve environmental sustainability in Kazakhstan. Current Research in Environmental Sustainability, 4, 100165. https://www.sciencedirect.com/science/article/pii/S2666049022000433
16. Saberi, S., Kouhizadeh, M., Sarkis, J., & Shen, L. (2019). Blockchain technology and its relationships to sustainable supply chain management. International journal of production research, 57(7), 2117-2135. https://www.tandfonline.com/doi/abs/10.1080/00207543.2018.1533261
17. Schulz, K. A., Gstrein, O. J., & Zwitter, A. J. (2020). Exploring the governance and implementation of sustainable development initiatives through blockchain technology. Futures, 122, 102611. https://www.sciencedirect.com/science/article/abs/pii/S0016328720301014
18. Shah, S. S. (2024). Environmental mitigation through responsible consumption: a Markov process model on parental influence. Environment, Development and Sustainability, 1-34. https://link.springer.com/article/10.1007/s10668-024-05825-6
19. Shah, S. S., & Shah, T. (2023). Responsible consumption choices and individual values: an algebraic interactive approach. Mind & Society, 22(1), 1-32. https://link.springer.com/article/10.1007/s11299-023-00294-2
20. Shah, S. S., Serna, R. J., & Delgado, O. S. (2023). Modelling the influence of social learning on responsible consumption through directed graphs. Electronic Research Archive, 31(9), 5161-5206. https://www.aimspress.com/article/id/64b6854cba35de6aa6340ed9
21. Srivastava, R. K., Fahey, L., & Christensen, H. K. (2001). The resource-based view and marketing: The role of market-based assets in gaining competitive advantage. Journal of management, 27(6), 777-802. https://journals.sagepub.com/doi/abs/10.1177/014920630102700610
22. Tsai, C. H. (2023). Supply chain financing scheme based on blockchain technology from a business application perspective. Annals of Operations Research, 320(1), 441-472. https://link.springer.com/article/10.1007/s10479-022-05033-3
23. Valeonti, F., Vlachidis, A., Nyhan, J., Bikakis, A., Kotarski, R., & Jovanovic, P. (2024). Decentralising digital humanities: exploring blockchain technology and “web3” for the Sloane Lab and Towards a National Collection (TaNC). Journal of Documentation, (ahead-of-print). https://www.emerald.com/insight/content/doi/10.1108/jd-04-2024-0093/full/html
24. Van Zanten, J. A., & Van Tulder, R. (2021). Improving companies' impacts on sustainable development: A nexus approach to the SDGS. Business strategy and the environment, 30(8), 3703-3720. https://onlinelibrary.wiley.com/doi/abs/10.1002/bse.2835
25. Vázquez-Pacho, M., & Payaud, M. A. (2025). Blended Value Proposition (BVP), Triple Bottom Line (TBL), Creating Shared Value (CSV) and Bottom of the Pyramid (BoP) Concepts: What Are the Differences? A Comparative Analysis Using Morse's Methodology. In Values in Contemporary International Business (pp. 94-129). Routledge. ISBN 9781003541905
26. Vekasi, K. (2023). Securing supply chain resiliency for critical rare earth metals. In Critical Minerals, the Climate Crisis and the Tech Imperium (pp. 45-68). Cham: Springer Nature Switzerland. https://link.springer.com/chapter/10.1007/978-3-031-25577-9_3
27. Venkatesh, V. G., Kang, K., Wang, B., Zhong, R. Y., & Zhang, A. (2020). System architecture for blockchain based transparency of supply chain social sustainability. Robotics and Computer-Integrated Manufacturing, 63, 101896. https://www.sciencedirect.com/science/article/abs/pii/S0736584519301589
28. Zaharia, R. M., & Zaharia, R. (2021). Triple bottom line. The palgrave handbook of corporate social responsibility, 75-101. https://link.springer.com/referenceworkentry/10.1007/978-3-030-42465-7_2