Journal of Applied Economic Sciences
Volume XXI, Spring, Issue 2(92), 2026

Internal Control System as a Factor of Reliability in Management Reporting Under Conditions of Economic Turbulence

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Article's History
Received 30th of November, 2025; *Revised* 29th of December, 2025; *Accepted* 29th of February, 2026; *Available online*: 30th of March, 2026. *Published* as article in the Volume XXI, Spring, Issue 2(92), 2026.

Suggested Citation
Shchyrba, I., Khmeliuk, A., Budko, O., Bobyl, V., & Salo, Y. (2026). Internal Control System as a Factor of Reliability in Management Reporting Under Conditions of Economic Turbulence. *Journal of Applied Economic Sciences*, Volume XXI, Spring, 2(92), 565 – 578. https://doi.org/10.57017/jaes.v21.2(92).10

Abstract
This paper examines the role of internal control systems (ICS) in ensuring the reliability of management reporting under conditions of economic turbulence. Using a panel dataset of 52 Ukrainian enterprises over the period 2020–2024, the research applies fixed-effects and dynamic panel (System GMM) models to evaluate both the direct and moderating effects of internal control and macroeconomic instability. The results indicate that internal control systems have a significant positive impact on reporting reliability, while economic turbulence negatively affects the quality of management information. Importantly, the interaction between internal control and turbulence reveals a buffering effect, demonstrating that mature control systems partially mitigate the adverse impact of external shocks. Firm

size and profitability further enhance reporting reliability, whereas financial leverage increases the risk of distortions. The study contributes to the literature by providing empirical evidence on the stabilizing role of internal control systems in volatile environments and offers practical implications for strengthening risk-oriented governance and digital control mechanisms to support resilient decision-making.

Keywords: internal control; management reporting; economic turbulence; panel data; corporate resilience.

JEL Classification: M41; D81; G32; L21.

Introduction

Currently, the economic turbulence caused by war risks, global crises and market instability has a significant impact on the reliability of management information. Against the backdrop of increasing uncertainty, management reporting becomes an indispensable instrument for both strategic and tactical decision-making. However, its reliability is contingent upon the robustness of internal control mechanisms. An insufficient level of transparency and control over internal processes increases the risk of management data distortion and undermines the effectiveness of corporate governance. The challenge lies in determining the capacity of an internal control system to ensure the reporting reliability within a rapidly evolving environment. In the scholarly literature, there is a gap between theoretical implications as for control's significance and empirical evidence of its impact on management reporting.

In an unstable environment, the enterprises' investment decisions are complicated by systemic risks which confirms the increasing turbulence and entropy of business processes (Mushnykova et al., 2024). Scenario modelling demonstrates that economic recovery necessitates adaptive management mechanisms underpinned by rapid structural transformations (Prokhorova et al., 2025). Internal control increases the transparency of risk communications and the quality of management data assessment (Elsayed & Elshandidy, 2021). When it comes to enterprises operating in environments characterized by heightened operational risks, the control framework positively influences their financial performance (Eniola et al., 2021). For SMEs, the integration of control and information systems enhances business productivity and flexibility (Alawaqleh, 2021). In the hospitality sector, the accuracy of reporting is contingent upon managerial competencies and staff training, thereby emphasizing the decisive role of internal control (Donkor, 2025).

Extant literature underscores that internal control shapes management practices through institutional norms and professional interactions (Henk, 2020). Developed control systems enhance organizational performance and support strategic decision-making (Otoo et al., 2023). Empirical evidence suggests that managers possessing an accounting background can improve audit quality within ESG strategies (Kim, 2023). In nations marked by high uncertainty, controls built upon COSO and ERM frameworks contribute to reducing complex risks (Chen et al., 2025). Thus, the current literature highlights the increase in turbulence, the dependency of managerial efficacy on the quality of control, and the imperative for digital solutions. This creates a significant challenge for enterprises striving to ensure the reliability of management information amid instability. Hence, our article seeks to assess the impact of internal control on the reliability of management reporting in the context of economic turbulence, thereby enhancing its scientific and practical significance.

The aim of the paper is to empirically validate the influence of internal control system maturity on the reliability of management reporting under conditions of economic turbulence. The objectives are to: (i) construct relevant indices, (ii) measure the level of economic turbulence, and (iii) examine the relationships among these indicators through an econometric model.

The central question is to find out whether a mature internal control system can compensate for the negative turbulence impact on the quality of management data. The main hypothesis posits that enterprises with a developed control system have a higher reliability of reporting, even under conditions of external shocks. An additional hypothesis suggests the existence of an interaction effect where a strong control system diminishes the effects of economic turbulence.

The novelty of this study lies in elaborating a comprehensive econometric model that integrates micro-level indicators of the internal control system with macro-level indicators. An integrated approach to assessing the reliability of management reporting is proposed, which resides upon a synthesis of financial, non-financial and audit data. The subjective biases of respondents' evaluations were eliminated due to conducted representative analysis of secondary sources. The practical significance of this research resides in using its potential to improve internal control policies, increase the transparency of management reporting and reduce the risks associated with ineffective decision-making in times of crisis.

1. Literature Review

In light of the fact that control serves to maintain financial and managerial stability during periods of crisis, in the extant literature the role of the internal control system is interpreted more broadly than the traditional error prevention paradigm. Previous research shows the correlation between the quality of control and the enterprises' capacity to sustain stability of outcomes and achieve sustainability goals, even under the influence of external shocks (Hamed, 2023). This broadens the understanding of internal control as an element of corporate governance aimed at ensuring the reliability of managerial information and preserving stakeholder trust. However, empirical evidence of effectiveness across diverse industries remains scant.

During the pandemic and subsequent recovery phases, organizations equipped with mature control mechanisms have distinguished themselves through operational flexibility and accelerated recovery, as showed by Wang et al. (2023a) and Zhu & Song (2021). At the same time, an examination of the SOX framework revealed that the formal existence of controls does not guarantee effectiveness if these mechanisms are not intricately connected to risk assessment and non-financial reporting (Su et al., 2022). Given the above, the necessity for a more profound integration of control within managerial decision-making processes is underscored, though the extent of such integration in developing countries remains insufficient.

In certain studies, the susceptibility of controls to the manipulation of financial levers is emphasized, particularly within the public sector and among companies with complex ownership structures. According to Chen & Liu (2025), weak control environments facilitate a latent redistribution of debt burdens, forming the illusion of financial sustainability. In countries with transitioning economies, this is exacerbated by political and regulatory uncertainties, which entail information asymmetry and necessitate the modernization of control methodologies.

Further research combines internal control with Enterprise Risk Management (ERM), performance improvement, and digital transformation. Gao *et al.* (2025) have shown that integrating risk management with financial reporting reduces operational failures and increases cash flows predictability, which is a critical factor in turbulent times. The focus shifted to the control's ability to perform a moderating function, mitigating the negative effects of managerial errors and ESG risks (Feng & Mohd Saleh, 2024). That being said, the scalability of such approaches across varying institutional settings requires further and evidence-based investigation.

Wang et al. (2023b) showed that in the setting characterized by increased uncertainty, internal control mitigates the negative impact of environmental variability on productivity. However, outcomes vary based on market structure and ownership models. This indicates that there is no universal influence and that the effectiveness of control depends on both sectoral and institutional parameters.

In the Ukrainian and broader Eastern European context, the quality of control is intricately linked to financial processes' digitalization and infrastructural modernization. Notably, Koldovskiy (2024) underscores that information *technology solutions strengthen control mechanisms and accelerate management reporting in the wartime, although their implementation requires substantial resources. Prokopenko et al. (*2024) demonstrated that blockchain technology enhances the operations transparency and mitigates the risk of distortions. However, such solutions' efficacy depends upon the technical preparedness of enterprises. This points to the uneven digital maturity and the imperative for comprehensive reforms.

In light of the above literature review, three areas are delineated, namely: the reliance of control quality on the sustainability of management results, the moderating effect of control in the face of elevated risks, and also digitalization serving as a catalyst for transparency in management reporting (Hamed, 2023; Feng & Mohd Saleh, 2024; Koldovskiy, 2024). The approaches vary in terms of the depth of control integration within management and the types of risks that necessitate mitigation. This confirms the need to examine the interplay between internal control and turbulence, since as individual studies of these components fail to assess their collective impact on management reporting.

2. Research Methodology

2.1. Research Design and Analytical Framework

The methodological framework of the study is underpinned by a combination of quantitative and qualitative analytical tools, enabling a reliable assessment of the impact of internal control systems on management reporting. The research process was structured into four interrelated stages, reflecting the logic of constructing, validating and interpreting the econometric model. Each stage integrates work with secondary data, index formation, statistical processing and analytical generalization. This approach ensures the consistency and reproducibility of the study, thereby increasing the reliability of the obtained conclusions (Table 1).

Table 1: Methodological Framework

Stage	The content of the stage	Result
1st	Definition of the conceptual model and key variables	Logical scheme of relationships between control system, reporting and turbulence is constructed
2nd	Collection and encoding of secondary data from official sources	Created a data panel for 52 companies for 2020-2024
3rd	Calculation of indices and statistical indicators	Obtained standardized REL, ICS and TURB values for the model
4th	Econometric evaluation and verification of results	Hypotheses are tested, model diagnostics performed and conclusions are constructed

Source: Compiled by the authors.

The description of these stages reflects the logical structure of the study, progressing from conceptual development to empirical validation. In the first stage, the principal factors and relationships constituting the conceptual model were identified. The second stage was devoted to collecting the secondary data from the publicly accessible reports of the NCCSFR, the NBU, and the State Statistics Service. The third stage involved the construction of indexes of reliability of reporting, internal control and economic turbulence. In the fourth stage, an evaluation was carried out utilizing panel models with fixed effects, accompanied by robust checks to ensure the parameters' stability.

2.2. Data and Sample Description

The sample comprised 52 large public enterprises in Ukraine that adhere to international financial reporting standards (IFRS) and ensure the availability of management and audit data during the entire study period. The selection of companies was determined based on the completeness of the five-year panel and the information base's reliability. The criteria for selection included continuous reporting from 2020 to 2024, the availability of non-financial and audit data, public information on internal control, as well as industry representativeness. To integrate an international perspective, comparative macroeconomic and institutional indicators from EU and OECD countries were added to the analysis, facilitating a comparison of environmental conditions' impact on the efficacy of internal control systems. This combination provides an opportunity to interpret national results in a broader international context without changing the volume of micro-level data focused on Ukrainian enterprises.

Furthermore, the sample ensure representation of various sectors of the economy, including industry, energy, transport, telecommunications and financial services. The period 2020-2024 encompasses the stages of the pandemic, war events and economic reconstruction, which creates contrasting conditions for analysis. Employing this particular timeframe allows assessing the impact of turbulence on corporate governance and tracking adaptive responses of control systems. This sampling also minimizes structural distortions by including companies that maintained complete reporting throughout the duration.

2.3. Model Specification and Estimation Strategy

The methodological framework is presented in the form of a panel equation with fixed effects, which evaluates the relationship between the reliability of management reporting and the evolution of the internal control system, the degree of economic turbulence and their interaction. The model further incorporates firm-level financial controls and time-fixed effects to ensure robust estimation and to isolate the structural relationships between internal control systems, economic turbulence, and reporting reliability (eq.1)

$$REL\_it = \beta0 + \beta1\ ICS\_it + \beta2\ TURB\_t + \beta3\ (ICS\_it \times TURB\_t) + \beta4\ SIZE\_it + \beta5\ LEV\_it + \beta6\ ROA\_it + \mu\_i + \lambda\_t + \varepsilon\_it \quad \text{(eq. 1)}$$

where: REL_it - index of management reporting reliability for firm *i* in year *t*, constructed from normalized indicators including completeness of disclosure, timeliness, absence of corrections, and audit reliability; ICS_it - internal control system maturity index, reflecting the presence of an internal audit unit, audit frequency, automation of control processes, risk assessment practices, and compliance with COSO principles; TURB_t - index of economic turbulence in year *t*, based on indicators such as inflation volatility, exchange rate fluctuations, business expectations, and geopolitical risk; ICS_it × TURB_t - interaction term capturing the moderating (buffering) effect of internal control systems on the relationship between economic turbulence and reporting reliability; SIZE_it - firm size, measured as the natural logarithm of total assets (or sales); LEV_it - financial leverage, defined as the ratio of total liabilities to total assets; ROA_it - return on assets, representing firm profitability; μ_i - firm-specific fixed effects capturing unobserved heterogeneity (e.g., industry characteristics, corporate governance, ownership structure); λ_t - time fixed effects capturing macroeconomic shocks (e.g., pandemic, war, inflationary pressures); ε_it - error term.

The purpose of the model is to assess the extent to which the development of the internal control system affects the reliability of management reporting under conditions of turbulence, controlling the impact of the size, leverage and profitability of the enterprise.

In this study, economic turbulence is defined as macroeconomic instability affecting firms' operating environments and information reliability during periods of heightened uncertainty. The turbulence index combines exchange rate volatility, inflation variability, business confidence indicators, and geopolitical risk measures reflecting external economic shocks. Exchange rate volatility captures currency instability affecting costs, revenues, and valuation expectations, while inflation variability reflects price uncertainty influencing planning accuracy. Business confidence indicators proxy market expectations, whereas geopolitical risk indices account for conflict-related uncertainty and institutional instability affecting firm behaviour. This composite approach ensures an applied measurement of turbulence that reflects real economic pressures rather than abstract macroeconomic fluctuations.

The dynamic specification extends the baseline fixed-effects model by incorporating a lagged dependent variable to capture persistence in reporting reliability and address potential endogeneity. The model is estimated using the System GMM approach (eq.2)

$$REL_{it} = \gamma\ REL\_\{i,t-1\} + \beta1\ ICS\_it + \beta2\ TURB\_t + \beta3\ (ICS\_it \times TURB\_t) + \beta4\ SIZE\_it + \beta5\ LEV\_it + \beta6\ ROA\_it + \mu\_i + \lambda\_t + \varepsilon\_it \quad \text{(eq. 2)}$$

where: REL_{i,t-1} — lagged value of the management reporting reliability index. All other variables are defined as in Equation (1).

Adding the corrected REL_{it} enables taking into account the inertia of reporting reliability. Companies that had high quality reporting in the previous period retain it in the future. Evaluation is carried out using the System GMM (Arellano-Bover/Blundell-Bond) method, which reduces endogeneity and enables the use of internal tools (adjusted variables).

Expected relationship:

- β1>0: better SVK - a more reliable management reporting;
- β2<0: higher turbulence - a lower reliability;
- β3>0: SVK partially compensates for the effects of turbulence (mediation/buffer effect).

3. Empirical Results and Model Validation

This section presents the empirical results of the econometric analysis, followed by model validation and additional robustness checks. The findings are further explored through dynamic and comparative analyses.

Panel Regression Results

The empirical analysis is based on a fixed-effects panel regression model that accounts for firm-specific characteristics and time-related shocks. Cluster-robust standard errors are employed to ensure the reliability of the estimated coefficients. The model incorporates key firm-level financial indicators alongside macroeconomic variables capturing the degree of economic turbulence (Table 2).

Table 2: Panel Regression Results: Internal Control Systems and Management Reporting Reliability (N = 52; T = 2020–2024; Fixed Effects; Cluster-Robust Errors)

Variable	Coefficient	St. error	t-stat.	p-value
ICS_{it} (Internal Control Index)	0.214	0.041	5.22	0.000
$TURB_t$ (index of economic turbulence)	-0.163	0.053	-3.08	0.002
$ICS_{it} \times TURB_t$	0.097	0.032	3.03	0.003
$SIZE_{it}$ (ln assets)	0.028	0.009	3.11	0.002
LEV_{it} (debt ratio)	-0.044	0.017	-2.59	0.010
ROA_{it}	0.135	0.038	3,56	0.001
D_{2021}	0.012	0.008	1.47	0.144
D_{2022}	-0.046	0.011	-4.18	0.000
D_{2023}	-0.021	0.010	-2.10	0.037
D_{2024}	0.008	0.009	0.92	0.359
Constanta	0.431	0.072	5.98	0.000

Note: Dependent variable: RELit – the index of the management reporting reliability (0–1). Fixed effects by enterprise and year are included in the model. The year 2020 is used as a base. Observations: 260 (52×5). R^2 (within) = 0.63; F-test of the model = 18.4 ($p < 0.001$).

Source: Authors' calculations based on data from the National Bank of Ukraine (2024), State Statistics Service of Ukraine (2024), National Securities and Stock Market Commission of Ukraine (2024), IMF (2024), OECD (2024), World Bank (2024), and Caldara & Iacoviello (2024).

The results indicate that the internal control system constitutes a significant determinant of management reporting reliability. The positive coefficient associated with the Internal Control Index (0.214) suggests that firms with more developed control frameworks exhibit higher levels of reporting accuracy and stability. Conversely, the negative coefficient of the Turbulence Index (−0.163) confirms that periods of economic instability adversely affect the reliability of management information.

Importantly, the interaction term between internal control and turbulence (0.097) is positive and statistically significant, indicating that robust internal control systems partially mitigate the negative effects of external shocks. This finding highlights the buffering role of

internal control mechanisms in preserving the quality of information flows under adverse economic conditions. Control variables further reinforce these conclusions. Firm size (SIZE) and profitability (ROA) have positive and significant effects, suggesting that larger and more efficient firms maintain higher reporting reliability. In contrast, financial leverage (LEV) exerts a negative influence, indicating increased risks of reporting distortions in highly leveraged firms.

To ensure the validity and robustness of the empirical results, a series of diagnostic tests were conducted. The F-test confirms the overall statistical significance of the model, while the Hausman test supports the use of the fixed-effects specification over random effects.

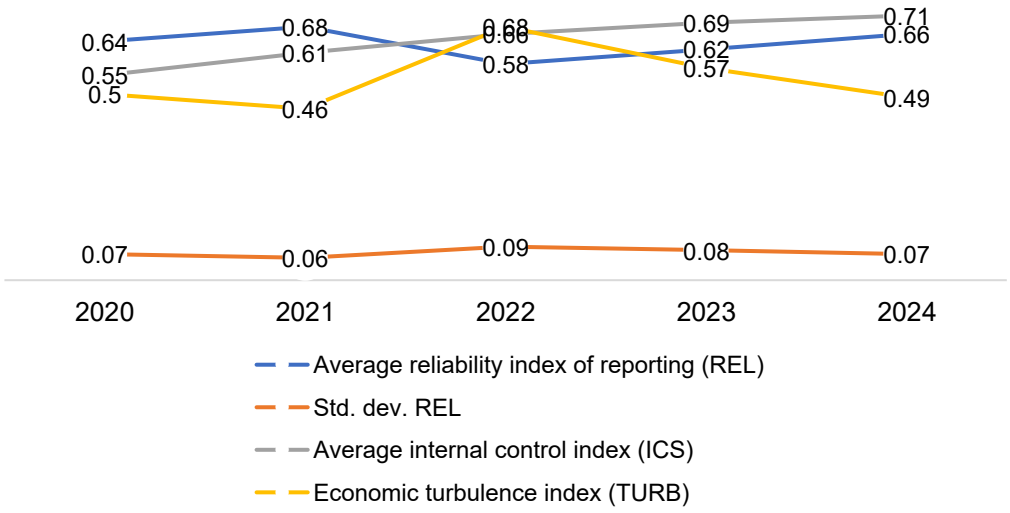
Multicollinearity was assessed using the Variance Inflation Factor (VIF), with all values remaining below the critical threshold, indicating no significant collinearity issues. The Breusch–Pagan and White tests were applied to detect heteroscedasticity, and robust standard errors were employed to correct for its presence.

Autocorrelation in panel data was examined using the Wooldridge test, while the dynamic specification was validated through the Arellano–Bond test, confirming the absence of second-order autocorrelation. Additionally, the Sargan/Hansen test supports the validity of instruments used in the GMM estimation. Overall, these diagnostic procedures confirm that the model is statistically sound and that the estimated relationships are stable and reliable.

Dynamic Analysis and Interpretation

The dynamic analysis of the results over the period 2020–2024 reveals significant fluctuations in reporting reliability, reflecting the impact of macroeconomic shocks. The average reliability index (REL) increased from 0.64 in 2020 to 0.68 in 2021, indicating post-pandemic stabilization. However, a sharp decline to 0.58 in 2022 corresponds to heightened turbulence caused by geopolitical and economic disruptions.

Figure 1: Trends in Key Indicators of Management Reporting Quality and Internal Control (2020–2024)



Source: Authors' calculations based on data from the National Bank of Ukraine (2024), State Statistics Service of Ukraine (2024), National Securities and Stock Market Commission of Ukraine (2024), IMF (2024), OECD (2024), World Bank (2024), and Caldara & Iacoviello (2024).

A gradual recovery is observed in 2023 (0.62) and 2024 (0.66), reflecting the adaptation of firms through improved control mechanisms and digitalization processes. In parallel, the Internal Control Index (ICS) shows a steady increase from 0.55 to 0.71 over the same period, indicating continuous institutional strengthening.

Figure 1 illustrates these dynamics, highlighting the inverse relationship between economic turbulence and reporting reliability, as well as the stabilizing role of internal control systems. Notably, despite peak turbulence in 2022, the ICS continued to improve, demonstrating its compensatory function.

A comparative analysis across sectors reveals significant heterogeneity in the impact of internal control systems. Firms in the financial, telecommunications, and energy sectors exhibit the highest levels of reporting reliability, reflecting stronger regulatory frameworks and more advanced control mechanisms. In contrast, industrial and commercial enterprises demonstrate weaker relationships between internal control and reporting reliability, primarily due to fragmented procedures and lower levels of digital maturity. Smaller firms show a reduced impact of internal control systems, as their governance structures tend to be less formalized.

Comparative insights with EU and OECD countries indicate that the effectiveness of internal control systems is stronger in more stable institutional environments. In less stable contexts, such as Ukraine, the impact of internal control remains positive but more variable, highlighting the importance of institutional quality.

Overall, the results confirm that internal control systems serve as a key stabilizing mechanism for management reporting reliability, particularly under conditions of economic turbulence. Their effectiveness is reinforced by firm size, profitability, and digitalization, while high leverage and macroeconomic instability weaken reporting quality. The empirical findings validate the study's hypotheses, demonstrating that mature internal control systems not only improve reporting reliability but also mitigate the adverse effects of external shocks. These results provide robust evidence of the strategic role of internal control in enhancing corporate resilience and supporting effective decision-making in volatile environments.

4.Discussion

The findings of this study are consistent with prior literature identifying internal control systems as a critical determinant of management reporting reliability under conditions of economic instability. As noted by Mähönen (2020), the integration of control and reporting remains challenging due to variations in institutional maturity, which helps explain differences in control effectiveness across contexts. The present results confirm that external shocks reduce data accuracy even when formalized procedures are in place, as instability disrupts information flows and reporting processes. However, the positive effect of the Internal Control System (ICS) demonstrates that structured auditing and digital tools play a key role in mitigating information asymmetry.

Reliable management reporting reduces information asymmetry by enhancing the transparency, consistency, and credibility of managerial information available to stakeholders. This, in turn, lowers perceived investment risk, improves market efficiency, and reduces uncertainty-related valuation discounts. When internal control systems strengthen reporting reliability, firms benefit from improved investor confidence, lower risk premiums, and enhanced access to external financing. Therefore, internal control systems extend beyond compliance functions and operate as governance mechanisms that transform information quality into measurable economic value.

In contrast to Kazemi et al. (2025), who emphasize the integration of risk management and control, the present study identifies a buffer effect arising from the interaction between ICS and economic turbulence. This effect indicates that robust control systems partially offset the negative impact of macroeconomic volatility on information reliability. The negative coefficient associated with turbulence confirms that external shocks—such as geopolitical instability or financial disruptions, undermine the availability and accuracy of management information.

Consistent with Wang et al. (2023), who highlight the role of internal control in enhancing productivity, this study demonstrates that internal control contributes to organizational resilience by stabilizing managerial processes. The stronger impact of ICS in larger firms reflects their greater capacity to invest in digital control systems and advanced auditing mechanisms. Similarly, the positive effects of firm size (SIZE) and profitability (ROA) suggest that more resourceful organizations are better positioned to maintain reliable reporting practices under uncertainty.

Compared to studies focusing primarily on fraud prevention (Mendes de Oliveira et al., 2022), the present findings reveal a broader role of internal control systems in ensuring the stability and predictability of information flows. At the same time, the negative effect of turbulence on reporting reliability supports the argument of Handoyo & Anas (2024) that institutional stability is essential for sustaining reporting quality. Disruptions in supply chains and limited access to verified data sources during crisis periods further exacerbate these challenges, underscoring the importance of a stable institutional environment.

In line with Sumets et al. (2022) and Voronina et al. (2024), the results highlight the role of internal control in managing multidimensional risks, including economic, operational, and informational risks. The effectiveness of control systems is further enhanced through the integration of financial and non-financial data, as well as through digitalization processes. Consistent with Kobets et al. (2024) and Nicola-Gavrilă & Popîrlan (2025), digital technologies strengthen control mechanisms, improve transparency, and support continuous monitoring of management processes.

Overall, the study contributes to the literature by demonstrating that the effectiveness of internal control systems depends not only on formal structures but also on adaptability, digital maturity, and institutional context. These findings support the transition from rigid, compliance-based control models toward flexible, risk-oriented frameworks integrated with digital technologies, which are essential for ensuring sustainable and reliable management reporting in turbulent environments.

This study is subject to several limitations. First, the use of secondary data may introduce inconsistencies due to incomplete or unevenly updated information across firms. In particular, the limited availability of high-quality non-financial data may affect the precision of the Internal Control System (ICS) index. Second, the analysis is restricted to the period 2020–2024, which, while capturing significant economic turbulence, may not fully reflect long-term structural dynamics. Third, although fixed-effects panel models control for unobserved heterogeneity, they do not fully address potential endogeneity between management reporting quality and firm-level financial decisions.

Future research could extend the temporal scope of analysis, incorporate alternative econometric techniques such as nonlinear or dynamic models, and explore sector-specific variations in greater depth to provide a more comprehensive understanding of the relationship between internal control systems and reporting reliability.

The findings of this study provide important implications for both practitioners and policymakers. At the firm level, organizations should prioritize the strengthening of internal control systems through regular audits, implementation of risk-oriented control frameworks, and integration with strategic decision-making processes. The adoption of digital monitoring tools is particularly important for enhancing the transparency, timeliness, and reliability of management reporting.

Furthermore, investment in staff training, particularly in COSO-based frameworks and risk management practices, can significantly improve the effectiveness of internal control environments. At the regulatory level, policymakers should consider developing standardized frameworks for assessing the maturity of internal control systems, particularly for publicly listed companies.

In addition, greater emphasis should be placed on integrating internal control systems with broader corporate governance and risk management structures. Such integration would enhance organizational resilience, improve decision-making quality, and reduce the risks associated with information distortions during periods of economic instability.

Conclusion

The study successfully achieves its stated objectives and the completion of all tasks set in the introductory section of the article. The developed econometric model enabled an empirical examination of the influence of the internal control system on the reliability of management reporting during economic turbulence. The analytical results revealed that the coefficient associated with the internal control index is 0.214, confirming its positive impact on the reliability of management information. Conversely, the negative effect of the turbulence index (-0.163) indicates a decrease in reporting stability during crisis events, while the positive interaction (0.097) demonstrates the compensatory role of control procedures. Therefore, the tasks set to determine the relationships between control mechanisms, macroeconomic risks and the quality of management data have been accomplished.

The results support the hypothesis that a mature internal control system increases the reliability of management reporting even in high environmental uncertainty. The increase in the average reliability index from 0.58 in 2022 to 0.66 in 2024 indicates the effectiveness of the policy of enhancing control processes. Companies that have actively implemented digital monitoring technologies have maintained a higher level of trust in reporting data. This confirms that management reporting becomes more sustainable under the conditions of integration of the internal audit system with risk management. Thus, the purpose of this study has been achieved and the proposed model has proven its analytical and practical value for management decisions.

The general findings indicate that internal control is a pivotal element in ensuring the reliability of management reporting during periods of economic instability. Its efficacy is amplified when synergized with the automation of reporting processes, corporate training, and risk-oriented procedures. The implementation of systematic control enhances investor confidence, augments the transparency of corporate governance, and fosters the formulation of more precise management forecasts. Further research may focus on extending the temporal frames of observation, exploring sectoral differences, and modelling dynamic effects in crisis phases. A promising direction for exploration is the assessment of the digital control technologies and artificial intelligence on the quality of management reporting in the face of the growing global turbulence.

Credit Authorship Contribution Statement

All authors contributed substantially to the development of this study. Shchyrba, I. and Khmeliuk, A. were primarily responsible for the conceptualization, supervision, and overall coordination of the research. Shchyrba, I., Khmeliuk, A. and Budko, O. contributed to the formal analysis, investigation, and preparation of the original draft. Bobyl, V. and Salo, Y. were mainly involved in data curation, software implementation, and visualization of results. All authors contributed to the methodology design, validation of findings, interpretation of results, and critical revision of the manuscript. All authors have read and approved the final version of the manuscript.

Acknowledgments/Funding

The authors did not receive financing for the development of this research.

Conflict of Interest Statement

The authors declare no conflict of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethical Approval Statement

This study is based exclusively on secondary data from publicly available and institutional sources. It does not involve human participants, personal data, or confidential information. Therefore, ethical approval was not required.

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