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Algorithm for introduction of KPI-indicators into the system of financial controlling of enterprises of Kyrgyzstan

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Abstract. The purpose of this study was to substantiate the theoretical and applied principles of creating a mechanism for integrating key performance indicators into the financial controlling system of enterprises in Kyrgyzstan to enhance the effectiveness of management decisions and ensure transparency of financial monitoring. The research combined theoretical analysis, legal evaluation, and practical testing of the effectiveness of models using performance indicators in controlling. Scientific approaches to indicator formation were examined, and the regulatory framework of Kyrgyz financial control – including the Constitution, the Budget Code, and strategic national development documents – was analysed in detail. The practical component focused on the activities of Open Joint-Stock Company "Kyrgyztelecom," Open Joint-Stock Company "RSK Bank," and Open Joint-Stock Company "Eldik Bank," which applied performance indicators to manage and improve financial results. Following implementation, Kyrgyztelecom's profit increased to 107.7 million soms or 1.23 million dollars, while banks demonstrated higher transparency of reporting and enhanced quality of controlling procedures. The main barriers identified included the absence of a unified national standard, insufficient digitalisation, shortage of skilled personnel, and fragmentation of information systems. Based on the obtained findings, a six-step algorithm for integrating performance indicators into financial controlling was developed, enabling the transition from reactive to proactive management and strengthening analytical coordination across management levels. The practical significance of the study lies in offering enterprises a structured methodological framework for adapting performance-based controlling systems to national and sectorial economic conditions

Keywords: performance measurement; strategic management; efficiency; analytics; budget; human resource

Introduction

The transition of Kyrgyz enterprises towards market-oriented management systems has necessitated the development of advanced controlling mechanisms. Financial controlling, as a subsystem of enterprise management, remains insufficiently developed due to the absence of standardised key performance indicator (KPI) systems and

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limited digital integration. Within enterprise performance management, there is an increasing demand for digital tools that enable accurate result evaluation and real-time decision support. F. Nunes *et al.* (2024) examined the implementation of KPIs and the creation of Power Business Intelligence (BI) monitoring dashboards in an automotive component manufacturing company. Based on employee surveys, 22 new indicators were designed for various departments, improving analytical accuracy, standardising control procedures, and accelerating managerial decision-making. Similarly, R. Therivel & A. Gonzalez (2024) highlighted the significance of enhancing approaches to evaluating enterprise sustainability by combining quantitative and qualitative indicators within a unified management framework. Their study demonstrated that integrating KPIs with environmental monitoring tools enhances transparency in decision-making and harmonises financial and environmental objectives.

The necessity for management performance assessment systems that combine financial, social, and environmental dimensions continues to grow. A. Faveto *et al.* (2024) proposed a conceptual model for integrating KPIs into the strategic management of sustainable regional development, employing both quantitative and qualitative analysis methods. The authors demonstrated that using multidimensional KPIs creates a flexible framework for evaluating policy effectiveness and improving the transparency of managerial decisions. In parallel, M. van de Ven *et al.* (2023) developed an integrated model for constructing KPIs aimed at assessing the efficiency of strategic projects in the public sector. They outlined the stages of KPI formation – from building indicator databases to automated evaluations through digital dashboards. This model demonstrated high accuracy in identifying inefficient managerial processes and improved coordination between strategic and operational planning levels.

Scholarly research has devoted considerable attention to enhancing the effectiveness of performance management systems, particularly by refining methods for defining and integrating KPIs. H. Purwoko *et al.* (2023) summarised prior studies and demonstrated that KPI implementation serves as a universal tool for performance assessment across diverse organisations. Their findings confirmed the importance of selecting relevant indicators that reflect strategic objectives and enable the monitoring of changes over time. However, management systems have yet to develop a unified approach to KPI selection and integration, complicating the objective evaluation of performance and the alignment of strategic and operational aims. D. Rodrigues *et al.* (2021) proposed using the Analytic Network Process to select relevant KPIs within production systems, systematising 58 previously identified indicators and narrowing them down to nine core metrics consistent with the Balanced Scorecard framework. The resulting model proved effective in ensuring consistency between strategic and operational management levels, enhancing control accuracy and decision-making efficiency.

Insufficient alignment between performance measurement systems and actual organisational outcomes remains a major challenge for effective management. K. Kushariyadi *et al.* (2025) explored the relationship between KPI measurement, employee performance, and organisational effectiveness using quantitative methods and statistical analysis in SPSS. Their results indicated a strong positive correlation between KPI indicators, employee productivity, and overall effectiveness, with 62.3% of performance variation explained by these variables. Likewise, T.T. Mtau & N.A. Rahul (2024) examined the relationship between KPI systems and performance improvement, determining those well-structured indicators promote the achievement of strategic objectives and ensure greater transparency in managerial processes. They stressed that KPI utilisation enhances coordination between management levels and contributes to more efficient resource allocation.

Most reviewed studies underscore that the adaptation of KPI models in enterprises characterised by low digitalisation and economic instability remains limited. Therefore, the purpose of this study was to develop theoretical and practical foundations for establishing a mechanism to integrate KPIs into the financial controlling systems of Kyrgyz enterprises in order to strengthen managerial decision-making and foster greater openness and accountability in financial control processes. To achieve this purpose, the following objectives were defined: to analyse contemporary scientific approaches to KPI implementation in enterprise management and financial controlling systems, and to assess the potential for adapting existing KPI models to the conditions of Kyrgyz enterprises, taking into account the level of digitalisation and the regulatory environment.

Materials and Methods

The study was theoretical and applied in nature and covered the period 2022-2024. At the initial stage, the theoretical foundations of the implementation of KPI in financial controlling were considered. For this purpose, the method of system-comparative analysis was used, which made it possible to explore the scientific approaches of T. Kladnytska *et al.* (2023), A. Ibrahim *et al.* (2024) and A. Twin (2025). The choice of these works was due to their relevance and interdisciplinary nature: in the work of A. Twin, the types of KPI and their role in measuring performance were generalised; in the study of T. Kladnytska *et al.*, the role of financial controlling as a strategic management tool was substantiated; in the work of A. Ibrahim *et al.*, the practices of assessing the effectiveness of management processes at the project level were revealed. A comparison of these approaches made it possible to determine the logical basis for further adaptation of the KPI model to the national economic system of Kyrgyzstan.

An analysis of the regulatory and organisational framework of financial controlling in Kyrgyzstan was conducted. For this purpose, the method of content analysis of official sources was used. The activities of the National Bank of the Kyrgyz Republic (n.d.) and the Chamber of Accounts of the

Kyrgyz Republic, which perform key functions in the field of financial supervision, were considered. The Constitution of the Kyrgyz Republic (2021), which defines the legal framework for budget control, as well as the Budget Code of the Kyrgyz Republic (2016), which regulates financial processes at the state level, were separately analysed.

The Law of the Republic of Kazakhstan No. 304 (1998), the Law of the Republic of Kazakhstan No. 2444 (2022) and the Law of the Kyrgyz Republic No. 461 (1998) were additionally studied. The analysis made it possible to systematise the norms of financial control and identify the absence of a single state standard for KPI-controlling. Materials from international institutions – the International Federation of Accountants (n.d.) and the International Organisation of Supreme Audit Institutions (n.d.) – were also reviewed to assess the degree of harmonisation of the national legal framework with international standards. The study also included an analysis of strategic documents for the country's development, in particular the National Development Strategy of the Kyrgyz Republic 2018-2040 (2018) and the Regulation on the State Agency for the Management of State Property under the Cabinet of Ministers of the Kyrgyz Republic (Kyrgyzstan Newsline, 2023). The structural-functional analysis method made it possible to determine how these documents affect the formation of effective management, the implementation of KPIs and the strengthening of controlling functions in the public sector.

The practical component employed the case-study method, focusing on three enterprises: Kyrgyztelecom (n.d.), RSK Bank (n.d.), and Eldik Bank (n.d.). This approach made it possible to trace the relationship between KPI introduction and improvements in financial performance, reporting transparency and employee motivation. However, the analysis was primarily qualitative in nature, as the study did not include detailed quantitative measurement of KPI impact on enterprise performance indicators. Instead, empirical observations and comparative analytical methods were used, based on data from sources such as World Bank (2020) and Akchabar (2022; 2025). These additional sources, including SAP Systems, Applications, and Products in Data Processing/High-Performance Analytic Appliance (n.d.) and Power BI, were examined to illustrate the practical tools applicable for automating KPI monitoring and data visualisation, while the Ministry of Economy and Commerce of the Kyrgyz Republic (n.d.) materials were analysed to clarify the institutional and methodological framework for harmonising performance measurement standards across Kyrgyz enterprises. This made it possible to identify the main limitations of the implementation of the KPI system, associated with regulatory gaps, lack of digital tools and human resources. The final stage was the development of an algorithm for integrating KPI into the financial controlling system, built on the basis of the generalisation and modelling method. In the process of its formation, examples of performance indicators presented in the works of P. Martinis (2024) and S. Beaver (2025) were used. This ensured the formation of a holistic methodology that combines theoretical principles, digital tools and analytical approaches adapted to the conditions of Kyrgyz enterprises.

Results

Basics of implementing key performance indicators in financial controlling

Financial controlling represents an integral component of the enterprise management system, ensuring coordination between strategic objectives and on-going operational processes. Its function extends beyond recording actual performance results to include the creation of an information environment that supports managerial decision-making aimed at improving resource efficiency, profitability, and financial stability. In this context, KPI serve as a tool that unites the analytical and control functions of financial controlling, providing a quantitative assessment of the extent to which strategic and tactical objectives are achieved.

The concept underpinning KPI use is rooted in performance management theory, which involves assessing activity through objectively measurable parameters. KPIs make it possible to formalise the relationship between enterprise goals, financial outcomes, and the factors influencing their attainment. They perform a dual role: on one hand, they operate as a monitoring mechanism reflecting the actual state of the management system; on the other, they function as a guide for forecasting, planning, and regulating performance. As a result, KPIs are viewed not only as indicators of success but also as a feedback instrument that allows timely responses to deviations from planned targets and facilitates the correction of managerial decisions (Twin, 2025).

Traditionally, financial controlling is built upon key functions such as planning, control, analysis, and the regulation of financial flows. The integration of KPIs into this system entails the creation of a comprehensive model in which key indicators coordinate different management levels – strategic, tactical, and operational. At the strategic level, KPIs assess the implementation of corporate objectives related to profitability, investment appeal, liquidity, and business sustainability. At the tactical level, they serve as tools for evaluating the performance of departments, business units, and projects. At the operational level, KPIs monitor processes that directly influence financial results, such as cost management, receivables, inventories, production cycles, or budgeting (Kladnytska *et al*., 2023).

The principal advantage of embedding KPIs into financial controlling lies in establishing a unified measurement framework that reconciles financial and non-financial aspects of performance. For instance, combining traditional financial indicators (profit, marginal revenue, return on assets, liquidity ratio) with non-financial metrics (labour productivity, customer service quality, innovation rate, staff satisfaction) provides a more objective and comprehensive view of enterprise performance. This combination facilitates a shift from reactive control to proactive management, whereby KPI analysis enables not only the evaluation

of past performance but also the forecasting of trends and prevention of potential risks. Theoretical approaches to integrating KPIs into financial controlling rest on the principles of consistency, relevance, transparency, and adaptability. The principle of consistency requires that all indicators form a logically coherent structure in which each KPI aligns with the enterprise's overarching goals. Relevance ensures that every indicator carries managerial value and supports decision-making for performance improvement. Transparency guarantees clarity in KPI calculation methodologies, fostering trust among employees. Adaptability reflects the capacity of the KPI system to evolve according to internal and external conditions, a particularly important factor for enterprises in transitional economies such as Kyrgyzstan (London Premier Centre, 2023).

The implementation of KPIs in financial controlling follows a phased approach. The first stage involves identifying the enterprise's strategic objectives and decomposing them into specific management tasks. The second stage focuses on determining the key success factors that directly affect the attainment of these objectives. The third stage consists of developing a system of indicators that quantitatively reflect the level of task achievement. Subsequently, KPIs are embedded into the enterprise's information support system, enabling automated monitoring and the visualisation of results through dashboards or financial panels. The final stage entails evaluating the effectiveness of the KPI system and adjusting it in line with changes in the business environment (Ibrahim *et al.*, 2024).

A crucial theoretical condition for effective KPI implementation is maintaining balance within the system. This principle implies an optimal ratio between the number of indicators and the capacity to monitor them effectively. An excessive number of KPIs can cause information overload and hinder decision-making, whereas too few indicators risk distorting the overall picture of performance. Consequently, prioritisation – identifying the most significant indicators that reflect the strategic logic of enterprise functioning – becomes a critical step. From a financial controlling perspective, KPIs should fulfil three core functions: diagnostic, motivational, and integrative. The diagnostic function involves identifying deviations from planned financial parameters and analysing their causes. The motivational function connects KPI assessment with employee incentives and remuneration, fostering engagement and shared accountability. The integrative function creates a unified information environment that connects all levels of management – from financial analysts to top executives (Setiawan & Purba, 2020).

Another theoretical dimension is the alignment of KPIs with the concept of risk-oriented management. Within financial controlling, this implies that the system of indicators should not only evaluate performance but also signal potential financial risks – such as declining solvency, excessive credit load, cost structure imbalances, or cash flow instability. Thus, KPIs become a preventive control instrument that enables the early identification of risks and the avoidance of financial crises. Modern theoretical approaches to KPI system development also emphasise the role of digital technologies. The advancement of BI, Big Data analytics, and artificial intelligence allows the transition from static measurement to dynamic, data-driven analysis. This development creates opportunities for automated models of financial forecasting, investment efficiency evaluation, and scenario-based planning. For enterprises in Kyrgyzstan, the adoption of such technologies is a key factor in improving controlling accuracy and decision-making speed (Ionescu *et al.*, 2024).

Therefore, KPIs within the financial controlling system function not merely as tools for evaluating outcomes but as mechanisms of strategic management. They integrate the analytical and managerial functions of controlling, establishing the foundation for enterprise financial stability and competitiveness. Effective KPI implementation requires a clear methodology, digital infrastructure, and organisational readiness to utilise analytical data in decision-making processes. Accordingly, the priority for Kyrgyz enterprises is to develop a comprehensive algorithm for integrating KPIs into financial controlling that accounts for national economic conditions, technical capacity, and human resources – thus providing the foundation for a contemporary performance management model.

Assessment of the current state of financial controlling at enterprises in Kyrgyzstan

The system of financial controlling in Kyrgyzstan is shaped through the interaction of state, internal, and corporate control mechanisms that encompass both the public and private sectors. At the national level, several key institutions are responsible for formulating and implementing financial control policies. The Ministry of Economy and Commerce of the Kyrgyz Republic (n.d.) serves as the central authority for fiscal policy, budget planning and execution, debt management, and oversight of financial reporting. The National Bank of the Kyrgyz Republic (n.d.) regulates and supervises commercial banks and non-bank financial institutions, maintaining monetary stability and enforcing currency and licensing regulations. The Chamber of Accounts of the Kyrgyz Republic functions as the supreme audit institution, conducting external audits of central and local government budgets, social funds, and state enterprises to ensure legality, transparency, and accountability in public financial management. The Service for Regulation and Supervision of the Financial Market under the Ministry of Economy and Commerce of the Kyrgyz Republic (n.d.) oversees non-bank financial institutions, contributing to the development of a transparent and competitive financial environment. Local self-government bodies also carry out financial control functions at the municipal level, aligning their activities with national regulatory frameworks.

The legal foundation of financial controlling in Kyrgyzstan rests on several fundamental legislative acts, including the Constitution of the Kyrgyz Republic (2021) and the Budget Code of the Kyrgyz Republic (2016). In

addition, several external regulatory references are relevant for comparative purposes, such as the Law of the Republic of Kazakhstan No. 147 (2021), the Law of the Republic of Kazakhstan No. 2444 (2022), and the Law of the Republic of Kazakhstan No. 461 (1998). The Budget Code of the Kyrgyz Republic establishes the key principles of budgetary control at both central and local levels, outlining the authority and responsibilities of public oversight bodies.

Kyrgyz legislation distinguishes between three main forms of financial control: state, internal, and corporate. State control functions as an external mechanism focusing on auditing the management and utilisation of public resources. Internal control ensures financial discipline within government agencies and public institutions. Corporate control, in turn, is directed at risk management, accounting accuracy, and regulatory compliance within private enterprises. Collectively, these levels form a multi-tiered structure that promotes transparency, fiscal discipline, and accountability throughout the national economy.

Kyrgyz legislation has gradually aligned with international standards such as Federation of Accountants (n.d.) and International Organisation of Supreme Audit Institutions (n.d.). The Law on Audit Activities (2021) introduced qualification and professional requirements consistent with Federation of Accountants's International Education Standards, while the State Service for Regulation and Supervision of the Financial Market facilitates the application of IFRS and ISA. The Chamber of Accounts operates in line with International Organisation of Supreme Audit Institutions guidelines, promoting accountability and transparency in public sector auditing. Although Kyrgyzstan does not yet have a unified national ISO certification framework, ISO principles of quality management, risk assessment, and control are increasingly reflected in national regulatory practices (World Bank, 2022).

Despite these advances, Kyrgyzstan still lacks a unified national standard for KPI-based controlling systems. Nonetheless, performance-oriented management principles are embedded in national programmes such as the National Development Strategy of the Kyrgyz Republic 2018-2040 (2018) and the reform of the State Property Management Fund into the State Agency for State Property Management (Kyrgyzstan Newsline, 2023). The latter introduced methodological guidelines for applying KPIs to evaluate state-owned enterprises across profitability, solvency, liquidity, and non-financial objectives. These indicators are formalised within management contracts and serve as the basis for annual performance evaluations. However, the absence of standardised criteria continues to complicate the harmonisation of KPI implementation across sectors, particularly among enterprises with limited digital maturity (World Bank, 2020).

Practical implementation of KPI-based controlling in Kyrgyz enterprises can be observed in several illustrative cases. Kyrgyztelecom (n.d.) introduced KPI-based performance management in 2024 to improve profitability and cost optimisation, achieving a net profit of 107.7 million KGS (USD 1.23 million) and total revenue of approximately 2.3 billion KGS (USD 26 million). The majority of revenue (57.8%) was generated by Internet and Internet Protocol Television (IPTV) services, which became a key growth driver. The company also reported a slowdown in the decline of fixed telephony revenues to around 1% annually (previously 9-10%), while reduced operating expenses – particularly overheads, wages, and inventories – improved efficiency in the first half of the year. However, profits remained significantly lower than in 2023 (668.3 million KGS or USD 7.64 million) due to the absence of extraordinary income that had previously supported financial results (Akchabar, 2025).

RSK Bank (n.d.) is a state-owned commercial bank of the Kyrgyz Republic, founded in 1996, with 100% of its shares owned by the government. It provides a wide range of services to retail and corporate clients. According to the World Bank and the US Department of State, in 2022 RSK Bank ranked among the five largest banks by assets (approximately USD 588 million), though it required improvements in control and risk management systems. At the annual general meeting of shareholders, the bank approved the "planned values of KPIs for 2024" alongside its income and expenditure budget and capital investment programme, formalising its approach to performance measurement. The inclusion of KPI reporting in the board of directors' quarterly agenda institutionalised monitoring at the strategic level and integrated KPIs into budgeting processes. While public reporting on KPI achievements remains limited, their formal adoption alongside financial planning represents a gradual transition towards performance-based management (Kyrgyz Stock Exchange, n.d.).

Similarly, Eldik Bank (2023) highlighted the adoption of performance and risk indicators within its 2023 Sustainability Report, signalling a shift towards results-oriented corporate governance. Founded in 1996 as a Cash and Savings Company, the bank was later transformed into a state-owned commercial institution with 100% government ownership. Eldik Bank serves both individual and corporate clients, operates a broad branch network, and positions itself as a "people's bank" providing accessible financial services for households and small to medium-sized enterprises. By the time of its rebranding from RSK Bank to Eldik Bank in 2024, it had developed a substantial capital base exceeding 76 billion KGS (USD 8.7 million) and was classified by international assessments as systemically important for Kyrgyzstan's financial system. Although specific KPI target values are not publicly disclosed, the bank implemented KPI-based management to monitor profitability, credit portfolio quality, and deposit growth. It also received a B- rating with a stable outlook from Fitch Ratings, reflecting its commitment to transparency and operational efficiency. The integration of KPI monitoring into budgeting and reporting processes was supported by a digital transformation strategy focused on service quality and customer experience. Despite progress, the bank continues to face liquidity and macroeconomic risks, and the absence of publicly

available quantitative KPI thresholds limits a comprehensive assessment of its controlling maturity (Eldik Bank, n.d.).

At the municipal level, the Bishkek City Administration approved a KPI system in late 2022 covering five key domains – economic development, transport and construction, social services, property management, and utilities – marking one of the earliest applications of KPI-based control in Kyrgyzstan's public sector (Akchabar, 2022). Despite these positive developments, several structural and institutional barriers still hinder the effective use of performance indicators in financial controlling. These challenges encompass regulatory, organisational, technical, human resource, and informational dimensions. Table 1 summarised the key barriers and potential mitigation measures.

Table 1. Key problems and barriers in the Use of KPI in Kyrgyz enterprises

Type of barrier	Description	Impact on financial controlling effectiveness	Possible mitigation measures	Example metric/tool
Regulatory/ legal	Lack of a unified national KPI or controlling standard; fragmented and sometimes contradictory legislation	Inconsistent implementation and interpretation of performance indicators across enterprises	Development of a national KPI standard; harmonisation of legislation and secondary acts	Compliance index (% alignment of enterprise KPIs with national standards); KPI Standardisation Dashboard (Ministry of Economy portal)
Organisational	Centralised control structures with weak coordination among departments; underdeveloped internal audit	Disconnection between strategic and operational controlling levels	Implementation of hybrid models; clear role definition; strengthening internal audit capacity	Internal Audit Scorecard (share of audited units per quarter); RACI Matrix coverage indicator (% defined responsibilities)
Technical/ informational systems	Limited use of ERP and BI platforms; fragmented or manually collected data	Errors, reporting delays, and inability to monitor KPI in real time	Investment in ERP/BI systems; centralised data architecture; system integration	ERP module for financial controlling (SAP S/4HANA); Power BI dashboard for real-time KPI tracking; data latency metric (hours)
Human resource	Shortage of professionals skilled in controlling, analytics, and digital tools	Incorrect KPI design, weak analytical interpretation, and inconsistent application	Training and certification programs; creation of controlling and analytics positions	Number of certified controllers (annual growth rate %); training completion rate; Human Resources dashboard for competency monitoring
Data quality/ information	Incomplete or unreliable data; multiple unsynchronised data sources	Distorted KPI monitoring and inaccurate decision-making	Data standardisation; quality control mechanisms; establishment of single data sources	Data quality check index (% validated records); ETL pipeline monitoring tool (Talend, Apache Airflow); duplicate data ratio indicator

Note: RACI – Responsible, Accountable, Consulted, Informed; ETL – Extract, Transform, Load
Source: compiled by the author based on World Bank (2020), Akchabar (2022; 2025), Ministry of Economy and Commerce of the Kyrgyz Republic (n.d.)

The analysis indicates that the main obstacles stem from a fragmented legal framework, the absence of standardised controlling procedures, limited technical infrastructure, and insufficient human capital. Kyrgyz enterprises, particularly those operating in the public and manufacturing sectors, frequently depend on manual data processing and non-integrated accounting systems, which delay performance evaluation and reduce transparency. The quality of financial data also varies considerably, undermining the reliability of KPIs and complicating benchmarking across enterprises. To overcome these challenges, Kyrgyzstan must continue aligning its legislation with international best practices, promote digital transformation within financial management, and enhance professional competence in controlling and auditing. The gradual adoption of ERP and BI solutions, combined with targeted training initiatives and improvements in data governance, will support the transition from fragmented oversight to a unified, data-driven controlling system. Consequently, the regulatory and organisational framework of financial controlling in Kyrgyzstan is evolving towards an integrated model that unites international standards, digital tools, and performance-based management principles, thereby ensuring greater accountability, efficiency, and transparency across both public and private enterprises.

Development of an algorithm for integrating KPIs into the financial controlling system

The development of an algorithm for integrating KPIs into the financial controlling system constitutes a methodological foundation for transforming traditional control functions into a performance-oriented management mechanism. Within Kyrgyz enterprises, this process seeks to reinforce the analytical dimension of financial decision-making, strengthen the link between strategic and operational objectives, and ensure that managerial actions are aligned with measurable outcomes. The incorporation of KPIs into controlling enables enterprises to move from reactive financial reporting towards proactive management based on quantitative assessment, predictive analytics, and strategic adjustment.

The first stage of the algorithm involves defining enterprise objectives, which provide the conceptual basis for constructing the system of performance indicators. The hierarchical alignment of strategic, tactical, and operational goals ensures a consistent flow of information and accountability throughout the organisation. Strategic objectives reflect long-term priorities such as profitability growth, market expansion, or capitalisation, while tactical goals focus on cost optimisation, liquidity enhancement, and operational efficiency. Establishing this hierarchy creates a logical framework for developing KPIs that translate abstract strategic intentions into measurable and controllable parameters.

The second stage concerns the selection of relevant indicators capable of quantitatively representing goal attainment. For Kyrgyz enterprises, a balanced approach is recommended, encompassing financial, operational, and socio-organisational dimensions. Financial KPIs assess economic performance through measures such as return on sales, profitability, and return on investment, whereas operational indicators evaluate the efficiency of internal processes, including inventory turnover and average collection period. Social and organisational indicators address human capital factors such as employee turnover, training expenditure, and satisfaction levels. The application of such a multidimensional structure ensures that controlling reflects both the enterprise's financial stability and its institutional capacity for sustainable growth.

The third stage focuses on developing a unified methodology for KPI calculation. For each indicator, the formula, unit of measurement, data sources, and reporting frequency must be specified. Methodological standardisation guarantees comparability across departments and over time, reducing informational asymmetry and the likelihood of interpretation errors. The data foundation for controlling is typically drawn from integrated ERP systems, which consolidate accounting, budgeting, human resources, and procurement modules, as well as from BI platforms that enable advanced analytics, visualisation, and forecasting. The effective use of these systems is essential for achieving real-time monitoring, improving financial discipline, and ensuring data reliability within the controlling function.

The fourth stage entails embedding KPIs directly into the financial controlling framework. This includes incorporating them into budgeting processes, management reporting, planning procedures, and employee motivation schemes. The integration of KPIs into financial plans enables continuous evaluation of deviations from expected targets, while dashboard visualisation tools facilitate prompt decision-making by senior management. Linking KPIs to incentive systems also promotes internal motivation and accountability, transforming performance measurement into a driver of organisational development (Klimaitienė *et al.*, 2020).

The fifth stage of the algorithm emphasises KPI monitoring and adjustment. This involves the continuous observation of actual performance, comparison with target benchmarks, and analysis of deviations. Corrective measures are then introduced to realign operations with strategic plans. Regular monitoring creates a feedback loop between managerial decisions and financial outcomes, enabling dynamic adaptation to market conditions, regulatory changes, or macroeconomic shifts. Periodic reassessment of indicators preserves the relevance and reliability of the controlling system. The sixth stage focuses on evaluating the overall effectiveness of the KPI-based controlling framework. This evaluation determines the extent to which selected indicators contribute to achieving strategic objectives and whether they generate meaningful analytical insights for decision-making. Indicators that lose explanatory value or fail to align with strategic priorities are revised or replaced. Consequently, the system evolves towards greater adaptability, flexibility, and coherence with the external business environment (Kaganski *et al.*, 2017). The empirical validation of the proposed algorithm is based on the identification of the most applicable KPIs for Kyrgyz enterprises. These indicators are summarised in Table 2, which provides practical examples of performance metrics relevant to financial controlling in the national context.

Table 2. Examples of KPIs for Kyrgyz enterprises

Dimension	Example of KPI	Calculation method	Purpose	Data collection frequency/data owner	Target/ threshold
Finance	Return on sales	(Profit ÷ Revenue) × 100%	To enhance profitability	Quarterly/Finance department	≥15%
Turnover	Inventory turnover ratio	Cost of goods sold ÷ Average inventory	To reduce warehouse costs	Monthly/Logistics or Operations department	≥6 times per year
Accounts receivable	Average collection period (ACP)	(Accounts receivable ÷ Revenue) × 365	To improve liquidity	Monthly/Accounting department	≤45 days
Human resources	Employee turnover rate	Number of employees left ÷ Average number of employees	To reduce personnel risks	Quarterly/HR department	≤10%
Customers	Customer satisfaction rate	Based on survey data	To strengthen customer retention	Semi-annual/Marketing and Customer Service unit	≥85% satisfaction index

Source: compiled by the author based on P. Martinis (2024), S. Beaver (2025)

The implementation of the algorithm has demonstrated that integrating KPIs into financial controlling facilitates a shift from passive supervision to active, results-oriented management. The systematic application of performance indicators enhances transparency, optimises resource allocation, and promotes the development of a performance-driven organisational culture. The methodology also strengthens enterprise adaptability by linking financial objectives with digital analytical tools and employee motivation systems. Consequently, the proposed algorithm can be viewed as a practical framework for Kyrgyz enterprises aiming to modernise their controlling systems in accordance with international standards of efficiency, transparency, and digital transformation.

In conclusion, the developed algorithm provides a comprehensive foundation for embedding measurable performance criteria within the financial controlling architecture of Kyrgyz enterprises. It integrates strategic management principles, digital analytical technologies, and financial accountability mechanisms into a coherent structure that ensures both efficiency and resilience. This approach enables enterprises to evolve their controlling function from retrospective monitoring to a dynamic system of forward-looking financial governance. Therefore, the model not only supports managerial decision-making but also establishes a scalable methodological basis for the further institutionalisation of KPI-driven controlling practices within Kyrgyzstan's transforming economic landscape.

Discussion

KPI systems hold a significant position within contemporary management theory and practice. They are employed to enhance managerial transparency, align strategic and operational decisions, and assess both the financial and non-financial performance of enterprises. In academic research, KPIs are increasingly viewed as an integral component of digital business transformation and a key instrument in the shift towards analytical and proactive management. This study and that of B. Mičieta *et al.* (2025) were similar in considering KPI implementation as a fundamental tool for improving managerial efficiency and the financial stability of enterprises. Both works highlighted that the integration of financial and non-financial indicators within the controlling system strengthens transparency, analytical capacity, and the link between strategic objectives and performance outcomes. B. Mičieta *et al.* research, however, was applied in nature, focusing on financial ratio analysis within a Slovak furniture enterprise, revealing positive trends in liquidity, profitability, and Economic Value Added. In contrast, this study adopted a theoretical and methodological perspective, developing an algorithm for integrating KPIs into the financial controlling of Kyrgyz enterprises across the stages of goal-setting, indicator selection, digitalisation, monitoring, and evaluation.

The ideas of S. Munmun *et al.* (2023) further extended this concept, emphasising that KPIs carry not only financial but also motivational significance. Their research examined how performance indicator systems influence employee engagement and productivity, establishing a clear link between workforce efficiency and overall company results. The present study broadened this logic by combining motivational and managerial dimensions through the development of a systemic model of KPI-controlling that enhances strategic coherence in decision-making. The conclusions of U. Balon *et al.* (2024) were consistent with this research, affirming that integrating KPIs into digital management systems is essential for enterprise effectiveness. U. Balon *et al.*, however, concentrated on the practical aspect – applying KPIs within the framework of Industry 4.0, where automation and artificial intelligence enable real-time control. In contrast, this study addressed the methodological dimension – constructing a generalised algorithm for implementing KPIs in financial controlling that reflects both digital and strategic levels of management.

Digitalisation also featured centrally in the study by M. Sishi & A. Telukdarie (2025), who argued that KPIs form the core of next-generation industrial systems combining analytics, automation, and digital twins. Yet, while M. Sishi & A. Telukdarie approached KPIs from a technological standpoint, the present study interpreted them through a financial and managerial methodology aimed at enhancing the precision of controlling and the consistency of inter-departmental decisions. A valuable addition was provided by J. Krasodomska & E. Zarzycka (2021), who examined the non-financial dimension of KPIs, particularly in the context of corporate reporting by Polish firms under Directive 2014/95/EU. Their findings revealed how stakeholder pressure influences the disclosure of sustainability indicators. This research, by contrast, concentrated on the internal analytical function of KPIs as a control mechanism ensuring management efficiency and digitalisation within the financial monitoring framework.

A practical parallel can be drawn with the study by E. Nabovati *et al.* (2023), which viewed KPIs as tools for systematising performance metrics in Iranian hospitals. The authors identified twenty-five key indicators reflecting financial efficiency, service quality, and patient safety. In this paper, such approaches were generalised: the KPI integration algorithm was designed to harmonise the strategic, operational, and financial objectives of enterprises while enabling their digital execution through ERP and BI systems. This study and that of Y. Sun (2022) also shared a focus on how KPIs enhance management efficiency and decision-making transparency. Both found that indicator systems facilitate the coordination of strategic, tactical, and operational levels of management and promote the transition towards proactive governance. However, Y. Sun's research focused on the implementation of KPIs in Chinese small and medium-sized enterprises, exploring their role in human resource management, motivation, and the efficient allocation of resources.

A systematic comparison of the reviewed works revealed that most scholars regard KPIs as a fundamental component of modern management, though each

addresses the concept from a distinct perspective. For instance, E. Dindar (2025) interpreted KPIs as instruments for integrating economic, social, and environmental dimensions within GRI and Sustainable Development Goal reporting for the Turkish automotive sector. Her conclusions demonstrated a high disclosure level for social indicators but an evident lack of environmental and managerial metrics. In this context, the present study logically extended the multidimensional approach but concentrated not on external reporting, rather on the internal architecture of financial controlling – developing an algorithm that unifies financial, organisational, and digital indicators within a single system.

A different emphasis was presented in W. Sultan's (2022) research, which explored KPI application in Saudi Arabia's public sector through the Balanced Scorecard model. W. Sultan defined KPIs as a foundation for strategic monitoring, accountability, and the standardisation of management processes. Although the integration of indicators into e-government systems proved successful, the author noted persistent cultural and organisational barriers to their widespread adoption. In contrast, this study developed the theoretical basis for KPI construction within the corporate rather than public context, proposing a universal financial controlling algorithm tailored to enterprises operating in transitional economies. Y. Yurtay *et al.* (2023) demonstrated an innovative approach to KPI implementation in Kazakhstan's industrial systems by integrating machine learning into production efficiency forecasting. Their findings confirmed that artificial intelligence enhances the precision of control and managerial adaptability. Compared with their work, the present study is more conceptual – rather than engaging in technological experimentation, it establishes a holistic methodology for KPI-controlling, ensuring coherent interaction between strategic, financial, and digital management levels.

Similarly, J. Peng (2022) focused on optimising personnel evaluation systems in Chinese SMEs, illustrating that KPIs can function as elements of both managerial and motivational mechanisms, reinforcing the relationship between productivity, management quality, and profitability. While J. Peng emphasised analytical hierarchies and digital modelling, this study shifted attention from the micro-level of labour processes to the macro-level – the methodological system of financial controlling within enterprises. Another notable contribution was that of C. Bagwe (2024), who analysed financial control as a foundation of corporate sustainability. C. Bagwe proposed a six-stage model for evaluating financial system efficiency – from goal-setting and monitoring to gap identification and corrective actions. Although KPIs were not explicitly examined, his systemic control approach corresponds with the logic of the present research: in both, financial diagnostics are viewed not as a formal procedure but as an analytical mechanism for ensuring enterprise stability. Overall, the comparative analysis of these studies shows that despite differing contexts – from industry and the public sector to small businesses – all affirm the strategic importance of KPIs as a cornerstone of effective controlling. From machine-learning-based practical models to theoretical and methodological frameworks for financial monitoring, KPIs emerge as a mechanism uniting analytics, digital technologies, and managerial accountability.

Conclusions

Summarising the findings of the study, it should be emphasised that the proposed algorithm for integrating KPIs into the financial controlling systems of enterprises in Kyrgyzstan has established a comprehensive methodological foundation for the transition towards results-oriented management. The theoretical framework of the research demonstrated that KPIs function not merely as instruments for measuring goal attainment, but also as effective mechanisms for aligning strategic, tactical, and operational levels of management. As a result, financial controlling assumes the roles of not only accounting, but also forecasting, planning, and analytical support for managerial decision-making.

An analysis of the current state of financial controlling in Kyrgyz enterprises revealed that the regulatory framework is gradually aligning with international standards set by Federation of Accountants, International Organisation of Supreme Audit Institutions, and ISO. However, the absence of a unified national KPI standard remains a major impediment. Insufficient digitalisation, a shortage of qualified specialists, fragmented information systems, and weak coordination between control levels continue to undermine managerial efficiency. Nevertheless, certain examples – such as the operations of Kyrgyztelecom, RSK Bank, Eldik Bank, and the Bishkek municipal administration – have demonstrated the successful application of KPIs as a tool for enhancing transparency, profitability, and the quality of financial analysis.

The developed algorithm, encompassing six stages – from defining strategic objectives and selecting relevant indicators to monitoring, evaluating outcomes, and adjusting the system – has proven its capacity to ensure the integration of KPIs into financial planning, budgeting, and motivation mechanisms. Its practical implementation supports the creation of a unified analytical environment in which data from ERP and BI systems are integrated with managerial decisions, providing the basis for a new generation of digital controlling. Through this approach, enterprises are shifting from reactive to proactive management founded on quantitative assessment, predictive analytics, and adaptive strategic adjustment.

Hence, the integration of KPIs into financial controlling serves not only as a means of improving managerial efficiency but also as an essential element in the modernisation of corporate governance in Kyrgyzstan, in line with international standards of transparency, digital transformation, and sustainable economic development. The principal limitation of this study lies in its predominantly theoretical and normative-methodological focus, without a detailed quantitative assessment of implementation results. Future research should therefore involve practical experiments across enterprises in different sectors of Kyrgyzstan to

empirically validate the effectiveness of the proposed algorithm and its adaptability to digital management systems.

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Conflict of Interest

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Алгоритм впровадження KPI-показників в систему фінансового контролю підприємств Киргизстана

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Анотація. Метою даного дослідження було обґрунтування теоретичних та прикладних основ створення механізму інтеграції ключових показників ефективності в систему фінансового контролю підприємств Киргизстана з метою підвищення ефективності управлінських рішень та забезпечення прозорості фінансового моніторингу. Дослідження об'єднало теоретичний аналіз, правову оцінку та практичне тестування ефективності моделей використання показників ефективності у контролінгу. Було розглянуто наукові підходи до формування показників та детально проаналізовано нормативно-правову базу фінансового контролю Киргизстану, включаючи Конституцію, Бюджетний кодекс та стратегічні документи національного розвитку. Практична частина була зосереджена на діяльності відкритого акціонерного товариства «Киргизтелеком», відкритого акціонерного товариства «РСК Банк» та відкритого акціонерного товариства «Елдік Банк», які застосовували показники ефективності для управління та покращення фінансових результатів. Після впровадження прибуток «Киргизтелеком» виріс до 107,7 млн сомів або 1,23 млн доларів, а банки продемонстрували більш високу прозорість звітності та покращену якість процедур контролю. Серед основних перешкод було визначено відсутність єдиного національного стандарту, недостатню цифровізацію, нестачу кваліфікованого персоналу та фрагментацію інформаційних систем. На основі отриманих результатів було розроблено шестиетапний алгоритм інтеграції показників ефективності у фінансовий контроль, що дозволяє перейти від реактивного до проактивного управління та посилити аналітичну координацію на всіх рівнях управління. Практичне значення дослідження полягає в тому, що воно пропонує підприємствам структуровану методологічну основу для адаптації систем контролю на основі ефективності до національних та галузевих економічних умов

Ключові слова: вимірювання продуктивності; стратегічне управління; ефективність; аналітика; бюджет; людські ресурси