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IMPROVING THE EFFECTIVENESS OF INFRASTRUCTURE PROJECT MANAGEMENT THROUGH STRATEGIC AUDIT

Abstract. In the face of accelerating technological change and growing complexity in infrastructure development, traditional approaches to strategy formation and control have become inadequate. This paper examines the role of strategic audit in assessing and enhancing the effectiveness of strategies for implementing infrastructure projects and programs under conditions of uncertainty and turbulence. The research aims to clarify the conceptual link between organizational development strategy and strategic audit in the infrastructure domain and to propose an audit framework capable of evaluating strategic responsiveness, adequacy of organizational and economic elements, and alignment with external factors. Methodologically, the study employs a combination of literature review, systematization, diagnostic interviews, PEST analysis, and SWOT techniques, together with lessons drawn from the IPMA Delta model and recent innovations such as simulation-based control in complex projects. The results include a diagnostic checklist, a set of improved audit procedures (formalization, scenario analysis, digital analytics) and a refined SWOT-based assessment tailored to infrastructure contexts. It is shown that the audit of strategy is not a mere verification exercise but a continuous adaptive process that helps management teams detect strategic misalignments, strengthen institutional resilience, and embed proactive learning. The paper concludes with recommendations for integrating digital tools (AI, big data), building strategic competencies, and aligning national infrastructure agendas with project-level audit practices. Future research should test the proposed audit framework empirically in diverse geographic and sectoral settings. Practical significance is demonstrated using the example of the Western Europe – Western China highway project, showing how strategic audit enables proactive management adjustment and resilience strengthening.
Keywords: strategic audit; infrastructure projects; management strategy; uncertainty; organizational resilience; performance diagnostics; adaptive control.

INTRODUCTION

The planet is undergoing fast transformation. The life cycle of knowledge and technologies for managing complex projects and programs is significantly reduced. Innovation increases the technical and technological complexity of infrastructure projects and programs. These key trends create serious challenges in the development of project and program management systems.

Thus, applying proven best practices (benchmarking) is no longer the way forward. Forming a vision, goals, and strategy for implementing infrastructure projects in advance makes us rigid, not flexible. When creating a project or program begins with focusing on what is valuable to customers, it is enough to use best practices.

However, the complexity and innovative nature of infrastructure projects and programs create a number of challenges. One of the answers to these challenges is lean and flexible management of infrastructure projects and programs. Management teams learn to distinguish between what has value and what does not matter – a path that has been traversed over decades of development of management methodologies.

A number of infrastructure projects have taken the first steps to implement the necessary lean and flexible transition that supports sustainable development and adaptability to turbulent environmental changes.

In the context of today's destructive economic relations in the world community, the problem of choosing a strategy for infrastructure projects as drivers of countries ' development is vital and relevant.

Difficulties in developing an adequate strategy for implementing infrastructure projects and programs open up new ways for audit activities to make qualitative changes.

THE RESEARCH OBJECT AND ITS TECHNOLOGICAL AUDIT

The object of the research is models, methods and processes of strategic audit of infrastructure projects and programs. Today, a well-defined strategy for implementing infrastructure projects and programs is a determining factor for success.

In this case, the strategy:

– integrates infrastructure program management teams with the organization's mission and vision of the customer, as well as other key stakeholders.

– ensures the current activities of an infrastructure project or program, forming a management approach.

– identifies, evaluates, and analyzes critical success factors for infrastructure projects and programs.

– defines, evaluates, and analyzes key performance indicators for implementing infrastructure programs.

Building a strategy for infrastructure projects and programs that meets these requirements in the face of uncertainty and critical environmental impacts is a complex scientific task that has great practical significance.

Thus, the uncertainty of conditions and critical influences of the environment of infrastructure projects and programs are characteristic shortcomings inherent in this object of research in modern operating conditions.

One of the most problematic aspects is the construction of models and methods for conducting strategic audit of infrastructure projects and programs implemented in conditions of uncertainty of success criteria, the system of values created, technical and technological solutions, management goals and processes.

Strategic audit is a review and evaluation of the quality of work of the departments of the organization, project or program where strategic management is carried out. Such an audit can be either comprehensive (covering all stages of the strategic management process) or targeted (affecting only part of the process).

Strategic audit is an examination of the achievement of the goals of infrastructure projects and programs. When conducting the audit, the auditor evaluates the results of the strategic analysis carried out in the organization, the strategic choice made and the implementation of the strategy, as well as monitoring its implementation. At the same time, qualitative indicators of goal setting and goal achievement become dominant, especially at the levels of performance audit and strategic audit. This requires the development of appropriate audit methods and approaches.

Strategic audit of infrastructure projects and programs reveals the degree of connection of the policy with the specifics of the project and the external conditions of its implementation. Each of the parts of the strategic audit is based on the corresponding area of strategic accounting and strategic analysis. All this is combined together into accounting and analytical support for making strategic decisions, which, in combination with the infrastructure project development strategy, are subject to strategic audit.

In the context of an economic crisis, the problem of successful implementation of infrastructure projects can be solved by forming a sound development strategy for the organization that implements the project, and carrying out activities aimed at achieving the project goals. In this regard, to increase the validity of strategic management, strategic audit is of particular importance, which involves the formation of complete information about the future development of the organization under the influence of internal and external factors.

The general vector of development of strategic audit from the moment of its inception to the present time assumed that auditors performed only certain technical and tactical procedures aimed at confirming the reliability of reporting data used for short-term management decisions by various groups of stakeholders. The audit reports did not contain information necessary to achieve the long-term goals of the economic entity and to stimulate the dialectic of qualitative development of the financial and economic condition of the infrastructure project or program.

Assistance to an infrastructure project or program in forming a strategy with subsequent audit control over its implementation allows you to quickly respond to the constantly changing impact of external and internal factors. This ensures the stable development of organizations operating in turbulence.

Thus, the audit of an organization's development strategy in modern conditions is becoming

PURPOSE AND OBJECTIVES OF THE STUDY

The purpose of the study is to study the content and processes of strategic audit as a direction of audit activity in relation to infrastructure projects and programs.

To achieve this goal, you must complete the following tasks:

1. Determine the relationship between the concepts of "organization development strategy" and "strategic audit of infrastructure projects and programs".

2. Substantiate approaches to the audit assessment of the ability of the infrastructure project management system to respond to uncertainty factors, changes in the external environment, and the degree of adequacy of organizational and economic elements of the management system that ensure the achievement of strategic goals.

RESEARCH EXISTING SOLUTIONS TO THE PROBLEM

The main directions of solving the problems of building and implementing an effective strategy for implementing infrastructure projects and programs in conditions of uncertainty and turbulent environmental impacts identified in world studies can be identified [1, 2]. However, these studies do not consider models and methods of strategic audit of infrastructure projects and programs, which are temporary organizations with the formation of a culture in the in the process of implementing a project or program. Also, the issue of creating an effective strategy in conditions of uncertainty under the influence of a turbulent environment is not considered.

Works [3, 4] are devoted to the formation of the strategy of projects and programs, but they remain unresolved issues related to complex infrastructure projects that are implemented in conditions of uncertainty and critical influence of the environment.

The study [5] presents a view on the use of knowledge ontologies for evaluating strategies. However, it does not cover the use of knowledge systems for auditing infrastructure project and program strategies.

The authors of [6] defined a model of organizational competence. This model is partially used as a basis for conducting a strategic audit in this study. At the same time, there are still issues related to modeling uncertainty in the strategy of infrastructure projects and programs.

Tools for analyzing strengths and weaknesses are described in [7]. These tools are used in this study to analyze proposals for applying the developed models and methods for conducting strategic audit of infrastructure projects.

The paper [8] is devoted to visualization of strategic decisions of project management, but it covers only part of the strategic audit process.

An alternative solution to the problem is described in [9]. This option does not involve conducting a strategic audit in a commercial company. At the same time, questions of application in temporary organizations, such as infrastructure projects, remain outside the scope of research.

The paper [10] examines the issues of strategic gaps in the development of organizations. According to the authors, the key problems of strategic management are the imperfect implementation of audit tools in the practice of corporate governance.

The works [11, 12] show the application of the competence-based project management model in the development of organizations and tools for identifying organizational pathologies. However, these studies do not address the issues of auditing strategies for implementing infrastructure projects and programs.

Thus, the results of the analysis allow us to conclude that the problems associated with the development and application of models and methods for strategic audit of infrastructure projects and programs in conditions of uncertainty and turbulent environmental influences remain unresolved.

RESEARCH METHODS

Based on the methods of analysis and synthesis, various approaches to the definition of strategic audit are presented, as well as its content is disclosed by generalization.

The basic principles and concepts of management and strategic audit, as well as the works of domestic and foreign authors, were used as source materials. As a result, the place of strategic audit in the theory and practice of audit activity has been clarified.

The most important aspects in the auditor's assessment of external and internal factors that have a significant impact on the implementation of the organization's development strategy are highlighted. The structure of strategic audit is defined in the form of various strategies.

The use of elements of the PEST analysis method is proposed as a tool for its implementation of **PEST analysis**.

In the context of an economic crisis, strategic audit of infrastructure projects and programs contributes to the rapid response of customers to the constantly changing impact of external and internal factors.

A strategic audit is conducted when the strategy has already been developed, adopted, and implemented. During the audit, it is important for the auditor to understand how the organization's activities meet the requirements, changes in the environment, as well as possible actions of competitors and regulators in the current and future conditions [9].

Based on the results of the audit assessment, one of the following conclusions can be drawn:

1. The organization's developed and implemented development strategy fully meets the requirements of the external environment.

2. The formed and implemented development strategy of the organization does not meet the requirements of the external environment or does not fully meet them (the degree and causes of nonconformity are identified; it is possible to develop measures aimed at eliminating the causes of nonconformity).

3. Management's decisions on implementing the organization's development strategy do not correspond to the strategy itself [3].

It is advisable to study the impact of environmental changes on the content of an organization's development strategy in the following areas: economic factors; political factors; regulatory decisions; industry trends; technological factors; substitutes for products and services; new players in the market and other factors.

As a rule, the analysis of these factors is carried out within the framework of PEST analysis, which can be considered an integral part of the strategic audit methodology.

PEST analysis is designed to identify political, economic, social, and technological aspects of the external environment that affect the success of infrastructure projects and programs [7].

The political factors examined during the audit include changes in legislation affecting the project or program industry, tax policy, relations with national and regional authorities, business regulation policy, the level of political stability in the country (region), the approach of state and local government elections, etc.

So, at present, the most relevant issue is to study the compliance of companies ' activities with the state's import substitution policy (the possibility of obtaining additional subsidies, expanding the sales market due to changes in the competitive environment, etc.).

The main reason for studying economics is to assess the quality of resource allocation at the state level, which is the most important condition for the enterprise's activity [9, 10].

The main economic factors include general characteristics of the situation in the country's economy (industry), the exchange rate of the national currency, the level of inflation, the state of the banking system, changes in the main costs in the industry (gas, water, electricity), the unemployment rate.

The social component of PEST analysis is used to determine consumer preferences. Social factors include demographic changes, changes in the standard of living and lifestyle, changes in consumer tastes and preferences, changes in the level of education of the population, changes in the income structure.

The purpose of the technology component research is to identify trends in technological development that often cause changes and market losses, as well as the emergence of new products.

These factors include new inventions and the possibility of their application, the speed of changes and adaptation of new technologies in the industry, changes in communication technologies, the emergence of new materials, trends in the emergence of new goods and services in the industry [11].

Strategic audit considers the results of the analysis, which are formed in the form of a matrix, which records the factors of the macro environment, the strength of their influence (estimated in points, ranks, or other units of measurement).

The results of PEST analysis allow us to assess the external economic situation in the sphere of production and commercial activity.

RESEARCH RESULTS

Organizational and managerial diagnostics of the organization's management system strategy is the first stage of work. The goal of organizational strategy diagnostics is to identify the main problems, their interrelation, and suggest appropriate methods for developing necessary solutions.

Within this stage, work is simultaneously carried out in two directions: research of the existing management system of the organization, analysis of problems of organizational development and study of the existing technology of strategic project management.

During diagnostics, teams of key employees are formed, self-assessment and interviews are conducted. As a result of the analysis of the received information, the range of main problems that hinder the functioning and development of the organizational and managerial structure is determined, and ways to solve the identified problems are developed.

The following methods are used for diagnostics:

– analysis of product life cycles, production technologies, operational management processes, business development and implementation.
– analysis of management errors.
– work with organizational pathologies.
– developing diagnostic interview.
– grouping problems and opportunities.
– building graphs of problems, challenges, and solutions.

The application of these diagnostic methods, including self-diagnosis, in the development of the strategic management system will be considered on the example of a group of companies that carried out the construction of the Western Europe – Western China highway project.

Diagnostics was performed using the methodology of analyzing product life cycles, development strategies, production technologies, and operational management processes.

Organizational and managerial diagnostics of the infrastructure project or program strategy

Competitive organizations have always attracted great interest from leading investment banks and sharp envy from competitors. What determines their success? And how should managers act so that their organizations can take an example from such "stars"?

Development at each stage is formed on the basis of the philosophy of business life cycles, management systems, production technologies and products, innovative product platforms, integrated information systems and enterprise personnel.

Intangible assets in the form of innovative platforms are actively used in development processes, and one of the criteria for the effectiveness of the development program is the level of capitalization of intangible assets when they are transformed into tangible ones.

This stage of diagnostics in the strategic audit process determines quantitative growth (products, personnel, customers, space, equipment, productivity).

For "star" organizations, success leads to some exaggerations of their capabilities and mistakes that are easily forgiven.

Problems of strategic management of organizations according **to the IPMA Delta model** [11-13], identified during diagnostic interviews (Table 1, Table 2):

1. The project strategy is focused on financial indicators, ensuring the quality of the product. At the same time, there are no qualitative and measurable characteristics (KPIs) of the results of development projects.
2. Unclear wording allows you to interpret the strategy differently.
3. Information about crashes, problems, and changes in the strategy is received late, when it becomes impossible to hide it.
4. The control is based on reactive principles, which leads to a delayed reaction. Strategic management should be proactive.
5. The analysis of problems is carried out on an irregular basis, but at the request of the program management.
6. There are no formal procedures or instructions that require more attention to be paid to achieving strategic goals.

Table 1. Parameters for evaluating the strategy of projects and programs during the audit process

Section	Question	In practice in the best projects
Development and implementation of the project strategy	The project strategy is developed and implemented?	- external and internal factors are considered - key project values are determined - a decision is made on the management strategy and business model - the project strategy is consistent with the strategy of the permanent organization - the strategy considers the needs of stakeholders - the complexity of the project and the environment is matched. - innovations and adaptation opportunities are sought - the strategy includes a management approach- business continuity strategies are developed - project results are shared with stakeholders. - organizational competencies and abilities are considered - strategies are coordinated with partners for "win-win"; – the team participates in strategy development. - KPIs are systematically monitored to adapt the strategy.

Note: compiled by the author based on sources [11, 12, 13]

Results of the strategic audit of an infrastructure project or program

The basis for ensuring the manageability of the company is the construction of an organizational system of operational management.

Its key components are:

– long-term vision of the company (what kind of company we want to see in 3-5 years).
– company goals (must be SMART).
– goal achievement strategy (how to solve problems and respond to challenges).

– effective organizational structure.
– business processes and management procedures.
– an organizational culture that supports and motivates stakeholders to behave appropriately.

Diagnostics of well-known companies that were certified according to the IPMA Delta model showed that their development projects are characterized by the absence of the above-mentioned components of the management system. Among the goals of management and the majority of employees, current activities (achieving the required level of profitability) prevailed, while the long-term and strategic orientation of the organization was extremely weak.

Manageability starts with defining the goals around which the project should be integrated. First of all, this applies to the highest goals of the organization (mission, development philosophy, strategy).

Correctly defining the functions of departments and employees is very important for accurately communicating project goals to their level. The better the functions are formulated, the more consistent the actions of departments and employees are, both with the overall goals of the company and with each other.

This approach allows you to achieve consistency in setting and communicating common organizational goals at all levels of the hierarchy, as well as horizontal consistency between departments.

The main advantage of this method of defining role functions is control: functions become verifiable, and their execution can be tracked.

Role functions are formulated in terms of the result of the activity (product method), that is, they are focused on contributing to the solution of the project's tasks as a whole. This approach provides:

– consistency in setting and communicating goals.
– coordination of the goals of departments and employees with the project goals.
– control and verifiability of function execution.

Table 2. Fragment of the checklist from the IPMA Delta organization audit

No	Direction	Question
1	Guide: Mission, vision, and strategy	Does the organization have a mission, vision, and strategy for managing projects, programs, and portfolios?
		Does the organization have processes in place to transform strategy into project, program, and portfolio management goals?
		How does the organization view the management, management, and implementation of projects, programs, and portfolios?
		Does management provide resources to achieve the goals of projects, programs, and portfolios?
		Are there standards and guidelines for managing risks and opportunities, and are they coordinated with the organization's general standards?
		Is there a process for engaging external stakeholders in project, program, and portfolio management?

Note: compiled by the author based on sources [11, 12, 13]

These examples demonstrate that strategic audit plays a significant role not only in identifying risks, but also in enabling proactive adaptation of strategy, ensuring sustainability, transparency, and alignment of infrastructure projects with national development priorities.

Western Europe – Western China highway project

Within the broader strategic framework of the Western Europe – Western China route, the highway project represents a core infrastructure initiative focused specifically on the construction, modernization, and operational upgrading of the transcontinental road network. The project

is not merely a transport corridor concept but a physical roadway system with defined engineering standards, funding structure, implementation schedule, and governance mechanisms.

The total length of the highway route is approximately 8,445 km, of which around 2,787 km traverse Kazakhstan. The Kazakhstani segment involved large-scale reconstruction across Aktobe, Kyzylorda, Turkestan, and Zhambyl regions, including pavement reinforcement, bridge rehabilitation, junction redesign, and installation of safety and monitoring systems. These works aimed to achieve high-capacity traffic throughput and compliance with international road class standards.

Financing of the highway project utilized a blended model, combining national budget funds with international development financing from institutions such as the Asian Development Bank, the World Bank, and the Islamic Development Bank. In selected regions, public–private partnership models were applied to ensure operational sustainability and lifecycle-based maintenance planning [14].

From a strategic audit perspective, the highway project requires systematic evaluation of investment justification, project governance, procurement transparency, construction quality assurance, and long-term asset performance. Key indicators include cost efficiency per kilometer, schedule adherence, pavement durability metrics, and the capacity of road service infrastructure to support freight mobility [15,16].

Table 3. PEST Analysis for the Highway Project

Political	Government support, international agreements, integration policies.
Economic	Transit revenue potential, trade expansion, cost and investment structure.
Social	Regional development, employment growth, workforce skills.
Technological	Digital logistics systems, smart customs, infrastructure monitoring.

Note: compiled by the author based on sources [11-16]

The PEST analysis evaluates the external macro-environmental factors that affect the planning, financing, and long-term sustainability of the highway project. These factors influence investment decisions, implementation coordination, and future operational efficiency (Table 3).

Table 4. IPMA Delta Organizational Maturity Analysis of the Highway Project

Domain	Maturity Level (1–5)	Evidence	Improvement Actions
Project Management	3	Standardized controls exist	Unify monitoring procedures
Programme & Portfolio Management	2	Weak coordination	Introduce portfolio dashboards
Risk Management	2–3	Registers exist inconsistently	Centralized risk office
Governance	3	Framework exists	Clear role allocation
Finance & Business	3	Mixed financing model	Value-for-money assessment
HR & Leadership	2	Skill variability	PM certification requirements
Environment & Sustainability	3	Monitoring exists	Expand environmental KPIs

Note: compiled by the author based on sources [11-16]

The IPMA Delta maturity assessment evaluates the capability of organizations responsible for the project's implementation. It reflects the effectiveness of project governance, risk allocation, capacity building, and institutional learning mechanisms (Table 4).

SWOT ANALYSIS OF RESEARCH RESULTS

Based on the results of the strategic audit of infrastructure projects and programs, strengths and weaknesses, opportunities and threats were identified [2, 5, 7, 8], which are presented in **the SWOT matrix** (Table 5).

Table 5. SWOT analysis of the implementation strategy of infrastructure projects and programs

Strengths	Weaknesses
- High level of competence of management teams. - Use of modern project management tools and methodologies. - Attracting international partners and investors. - Experience in implementing complex projects in conditions of uncertainty. - Availability of innovative technologies and access to new developments.	- Lack of formalized strategic management procedures. - Poor coordination between project and program management levels. - Focus mainly on financial indicators in the absence of clearly defined quality KPIs. - Reactive management instead of proactive. - Insufficient level of institutional sustainability.
Opportunities	**Threats**
- Attracting new sources of funding, including international funds. - Expansion of cooperation with global companies and professional associations. - Use of digital technologies and automation systems to improve management efficiency. - Developing an organizational culture focused on innovation and sustainability.	- Instability of the political and economic situation. - High turbulence of the external environment. - Increased competition from foreign companies. - Changes in legislation that affect the conditions for project implementation. - Risks of technological backwardness and inability to adapt to new conditions.

Note: compiled by the author based on sources [2, 5, 7, 8]

Thus, the conducted SWOT analysis showed that infrastructure projects and programs have a significant potential for development due to the professional competencies of management teams, international cooperation and innovation. However, successful implementation requires addressing weaknesses – first of all, formalizing strategic management and increasing resilience to environmental threats.

Table 6. Stakeholder Analysis for the Western Europe – Western China highway project

Strengths	Weaknesses
- Strategic transit position. - Reduced transit time. - International connectivity. - Investment attraction.	- High capital cost. - Long payback. - Cross-border management complexity. - Infrastructure maintenance demand.
Opportunities	**Threats**
- Growth of logistics hubs. - Increased trade. - PPP expansion. - Regional integration.	- Geopolitical tensions. - Competing corridors. - Tariff volatility. - Regulatory inconsistencies.

Note: compiled by the author based on sources [2, 5, 7, 8, 14-16]

The SWOT analysis below outlines the strengths, weaknesses, opportunities, and threats associated with the Western Europe – Western China highway project as a strategic infrastructure initiative (Table 6).

SUGGESTIONS FOR IMPROVING STRATEGIC AUDIT

The conducted research allowed us to develop proposals for improving the effectiveness of strategic audit of infrastructure projects and programs.

Main areas of improvement:

1. Formalizing strategic management

– Development and implementation of common standards and regulations for conducting strategic audit.

– Introduction of clearly defined procedures for strategy formation and adjustment.

– Use of the KPI system, which includes not only financial, but also qualitative indicators (social, environmental, technological).

2. Proactive management approach

– Transition from reactive control to advanced forecasting of environmental changes.

– Use scenario analysis and stress testing to assess the strategy's resilience to various scenarios.

3. Developing institutional sustainability

– Creating organizational structures that can adapt to changes in external and internal factors.

– Increasing the level of autonomy of management teams in making strategic decisions.

– Strengthen engagement with key stakeholders.

4. Innovation and digitalization of audit

– Introduction of modern information systems for monitoring and analyzing the implementation of projects and programs.

– The use of Big Data, artificial intelligence, and digital doubles technologies to predict risks and evaluate the effectiveness of a strategy.

5. Developing the competencies of management teams

– Conducting targeted training and certification programs in the field of strategic management and audit.

– Increase the level of involvement of project teams in the process of strategy development and adjustment.

– Applying the best international practices and standards (PMI, IPMA, ISO).

6. International cooperation

– Involvement of foreign experts and consultants to conduct an independent strategic audit.

– Participation in international projects and initiatives aimed at infrastructure development and exchange of experience.

The proposed measures will significantly improve the effectiveness of strategic audit, ensure the sustainability of infrastructure projects and programs, as well as their compliance with dynamic environmental conditions.

CONCLUSION

In the course of this study, the following conclusions have been formulated. Unlike traditional audit approaches limited to verification of costs and compliance, the proposed strategic audit model positions audit as a continuous, adaptive mechanism enabling early strategic adjustment and organisational learning in large-scale highway investments. The diagnostic checklist and scenario-based analytical procedures introduced here represent the author's original contribution, providing practical tools for enhancing resilience and performance in the management of the Western Europe–Western China highway project.

1. Strategic audit is an important tool for ensuring the sustainability of infrastructure projects and programs in conditions of high uncertainty and turbulence in the external environment. It allows you to identify the strategy's compliance with development goals and objectives, as well as ensure its adaptation to changing conditions. For the Western Europe – Western China highway project in Kazakhstan – spanning thousands of kilometres through varying terrain and multiple regional jurisdictions – strategic audit allows evaluators to judge not only the initial investment rationale and construction execution but also the alignment of the highway with Kazakhstan's evolving transit, economic and regional development goals.

2. The developed models and methods of strategic audit make it possible to conduct a comprehensive assessment of the effectiveness of management decisions, including economic, organizational, social and technological aspects. In the context of the highway project, this means moving beyond simple cost-per-kilometre or schedule metrics to include aspects such as pro-

curement governance, construction quality assurance (for example, pavement durability metrics), lifecycle maintenance regimes, and capacity of roadside service infrastructure to support freight mobility.

3. The analysis showed that the key problems remain:

– insufficient formalization of strategic management frameworks for the highway project.

– focus mainly on financial indicators in the absence of a complete KPI system encompassing schedule-adherence, asset-performance and service-capacity metrics.

– reactive management instead of proactive rather than proactive forecasting.

– low level of institutional stability and coordination across agencies responsible for highway operation and maintenance.

4. The following areas of improvement of strategic audit are proposed:

– formalization of strategy development and implementation procedures specific to the highway's lifecycle (from construction through operation and maintenance).

– transition to proactive management through scenario-analysis and forecasting (e.g., freight-flow shocks, accelerated wear, climate stress).

– development of organizational sustainability, digitalization of audit and asset-monitoring systems (e.g., real-time pavement condition sensing, service-infrastructure capacity dashboards).

– improve the competence of management teams and actively use international experience and best practices in highway asset governance and audit.

5. SWOT analysis has demonstrated the significant potential of infrastructure projects (for example, the Western Europe–Western China highway project) and programs, but its implementation requires addressing identified weaknesses and minimizing threats. The highway has the capacity to become a major freight-mobility corridor through Kazakhstan, improving logistics, regional development and connectivity. However, unless governance, lifecycle asset performance, and strategic audit mechanisms are strengthened, the project risks under-performing in terms of durability, service capacity and cost-effectiveness.

Thus, the introduction of strategic audit into the practice of managing infrastructure projects and programs, as Western Europe – Western China highway project will significantly increase their efficiency, effectiveness and sustainability, which is especially important in today's global turbulence. Particularly in today's context of shifting trade patterns, infrastructural demands and climate pressures, the highway – a major trans-Kazakhstan investment – is best managed not as a one-off construction activity but as a dynamic asset requiring continuous audit, adaptation and strategic oversight.

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ИНФРАҚҰРЫЛЫМДЫҚ ЖОБАЛАРДЫ БАСҚАРУ ТИІМДІЛІГІН СТРАТЕГИЯЛЫҚ АУДИТ НЕГІЗІНДЕ ЖЕТІЛДІРУ

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Аңдатпа. Турбуленттілік пен технологиялық өзгерістердің күшеюі жағдайында инфрақұрылымдық жобаларды басқарудағы дәстүрлі стратегия құру және бақылау тәсілдері жеткіліксіз болып отыр. Зерттеудің мақсаты – ұйымдық даму стратегиясы мен стратегиялық аудит арасындағы өзара байланысты нақтылау және сыртқы ортаға бейімділікті бағалауға мүмкіндік беретін құралдарды әзірлеу. Жұмыста ғылыми әдебиеттерді талдау, PEST және SWOT-талдау, IPMA Delta® үлгісі, сондай-ақ стохастикалық бақылаудың заманауи тәсілдері қолданылды. Нәтижесінде сценарийлік талдау, цифрлық аналитика және бейімделген бағалау рәсімдерін қамтитын стратегиялық аудиттің диагностикалық құралы ұсынылды. Стратегиялық аудит сәйкестікті тексеру ғана емес, өзгерістерді басқарудың үздіксіз процесі ретінде қарастырылуы тиіс екені көрсетілді. Ұсынылған үлгінің практикалық маңызы – оны ұлттық инфрақұрылымдық жобаларды стратегиялық басқаруды жетілдіруде қолдану мүмкіндігі. «Батыс Еуропа – Батыс Қытай» автожолы жобасының мысалында стратегиялық аудиттің басқаруды белсенді түрде реттеуге және тұрақтылықты нығайтуға қалай мүмкіндік беретінін аңғартатын практикалық маңыздылығы көрсетілген.
Түйін сөздер: стратегиялық аудит, инфрақұрылымдық жобалар, басқару стратегиясы, белгісіздік, ұйымдық тұрақтылық, диагностикалық рәсімдер, бейімделген бақылау.

СОВЕРШЕНСТВОВАНИЕ ЭФФЕКТИВНОСТИ УПРАВЛЕНИЯ ИНФРАСТРУКТУРНЫМИ ПРОЕКТАМИ ЧЕРЕЗ СТРАТЕГИЧЕСКИЙ АУДИТ

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Аннотация. В условиях усиливающейся турбулентности и технологических изменений традиционные подходы к формированию стратегии и контролю реализации инфраструктурных проектов оказываются недостаточными. Целью исследования является уточнение взаимосвязи между стратегией организационного развития и стратегическим аудитом в инфраструктурной сфере, а также разработка инструментария для оценки адекватности стратегий и их адаптивности к внешней среде. В работе использованы методы анализа и синтеза научной литературы, PEST- и SWOT-анализ, элементы модели IPMA Delta, а также современные подходы к стохастическому контролю проектов. В результате сформирован диагностический инструментарий стратегического аудита, включающий сценарный анализ, цифровую аналитику и адаптивные процедуры оценки. Показано, что стратегический аудит должен рассматриваться не только как проверка соответствия, но и как непрерывный процесс управления изменениями, способствующий повышению устойчивости организации и эффективности использования ресурсов. Практическая значимость заключается в возможности применения предложенной модели для совершенствования стратегического управления национальными инфраструктурными проектами. Практическая значимость продемонстрирована на примере проекта строительства автомагистрали Западная Европа – Западный Китай, показывающего, как стратегический аудит позволяет проактивно корректировать управление и повышать устойчивость.
Ключевые слова: стратегический аудит; инфраструктурные проекты; стратегия управления; неопределённость; организационная устойчивость; диагностические процедуры; адаптивный контроль.