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TRANSACTION COSTS AND INFORMATION ASYMMETRY IN STATE ATOMIC SUPERVISION: ECONOMIC AND INSTITUTIONAL TRANSFORMATION IN KAZAKHSTAN

Abstract

The article examines the economic, regulatory and organizational foundations of state control and supervision in Kazakhstan. This study analyzes the evolution of the institutional architecture within the newly established regulatory agency. The aim of the study is to comprehensively assess the economic, institutional, and regulatory foundations of state control and supervision in Kazakhstan's atomic energy sector, analyze the effectiveness of the regulatory authority and the transaction costs incurred by supervised entities, and develop proposals for improving risk-based regulation, strengthening regulatory independence and resource capacity, and reducing compliance costs. Particular attention is given to the implementation mechanisms of state supervision and control in the atomic energy sector, drawing upon an array of inspection statistics and empirical data from nuclear facilities, including the market operator. The study also assesses the transaction cost burden of the national operator. A comparative and contrastive analysis on the quantitative parameters (staffing levels and oversight maintenance budgets) of regulatory authorities in the Republic of Kazakhstan and foreign countries was conducted. The impact of IAEA requirements on the development of the national regulatory framework and the institutional regulatory model has been demonstrated. The scientific novelty of this research lies in the comprehensive assessment of state supervision, positioning it not merely as a strictly legal function, but rather as an economic institution. The author's primary contribution consists in providing quantitative and qualitative justification of the causality, utilizing comparative international benchmarking, between risk-based regulatory enforcement and the compliance cost trajectories of entities under supervision. Based on the conducted analysis, proposals are formulated to improve the economic efficiency, governance mechanisms and regulatory framework, including the elimination of information asymmetry and the minimization of the risk of opportunistic behavior, strengthening the independence and resource capacity of the regulator, developing a risk-based and preventive approach, digitalizing supervisory activities, and enhancing transparency and public participation.

Keywords: state control, institutional economics, transaction costs, nuclear industry, economic efficiency, information asymmetry, macroeconomic stability.

Introduction

In the context of global atomic energy development, state supervision of this field is becoming particularly relevant. The atomic industry is driven by the potential risk of critical incidents posing a threat to the environment and human life. Government control within the nuclear industry does not serve simply as an administrative burden. It serves as a primary driver for long-term energy safety and competitiveness of the national economy [1], functioning as a core mechanism to mitigate market failures [2]. This issue is of strategic significance to the Republic of Kazakhstan, given the nation's status as a global leader in uranium mining, alongside ongoing discussion regarding the prospects of construction of a nuclear power plant and expanding industrial, research and medical use of nuclear technologies.

International experience, as reflected in the International Atomic Energy Agency (IAEA) documents and the materials of the International Nuclear Safety Group (INSAG) demonstrates that national systems of state control and supervision serve as the basic element of the global nuclear safety and security regime. Raineri R. and co-authors argue that nuclear safety constitutes a pure public good, this view is supported by domestic scholars (Kornilov A. and Al'nazirov R.), and it's

provision by the private sector under free-market conditions would be insufficient [3-4]. While the author's findings rely on the experiences of specific countries, they notably overlook the context of Central Asia, particularly Kazakhstan, the world's leading producer of natural uranium. For instance, the scale of operations of the national operator, NAC Kazatomprom JSC, which produced up to 25,839 tonnes of uranium (approximately 20% of global primary production in 2025 [5], generates risks of large-scale negative externalities in the event of operational failures. Hossain et al. suggest that the market-oriented nature of extractive companies is aimed at profit maximization [6]. The limitations of the studies by Hossain et al. stem from its reliance on outdated data, while those by Kornilov A. and Al'nazirov R. constrained by a scarce evidence base, whereas this article provides an analysis of the most recent years. Consequently, stringent state control is essential for the internalization of environmental risks, compelling supervised entities to invest in radiation security and safety regardless of global market volatility. The necessity of such an approach has been previously addressed by Idrisov T. and Koptelov M. [7]; however, their research is limited by a narrow departmental focus. Specifically, their analysis relies exclusively on the economic dimensions of nuclear safety, whereas the present study adopts a more holistic perspective by integrating economic, institutional, and regulatory dimensions of the sector.

Furthermore, contemporary economic theory demonstrates that an efficient regulatory-body generates significant direct economic effects. This theory is also supported by Ivanov A. [8], who emphasizes the preventive reduction of expected accident costs and insurance cost mitigation. The need to diversify the energy mix and achieve carbon neutrality, the quality of supervision establishes macroeconomic cause-and-effect sequence: effective oversight → safe facility operation → energy security → sustainable economic growth.

Institutional independence, regulatory certainty and adequacy of resources determine the effectiveness of accident prevention and the minimization of radiation risks. Scientific papers by foreign and domestic authors emphasize that the formal existence of legislation in itself does not guarantee a high level of safety without developed mechanisms of supervision, preventive control and prompt response. Kazakh scholarly literature provides a detailed examination of general nuclear policy perspective, but the challenges within the fragmentation of the regulatory framework, the practical implementation of prompt response actions, and the impact of international standards on national administrative mechanisms have not been sufficiently systematized. Comparative analysis of global and national authors who explored these issues is integrated directly into the subsequent analytical sections of this paper.

In this regard, this study aims to conduct a comprehensive economic and managerial assessment of the state atomic supervision of Kazakhstan (through the lens of transaction costs and information asymmetry) to substantiate the transition to an economically efficient oversight model. The optimization of the regulatory and institutional architecture, integration of digital technologies, and human-resource provision serve as mechanisms for reducing the administrative burden and overcoming systemic barriers.

Materials and methods of research.

The study was carried out within the framework of fundamental and applied research, focused on identifying operational patterns and directions for the improvement of supervision and control. The object of the research is the national system of state atomic oversight, viewed as a complex of mechanisms for optimizing regulatory and transaction costs, institutional structure and administrative procedures, and legal norms that ensure nuclear and radiation safety.

The author comprised economic effectiveness criteria, which were evaluated through the dynamics of the transaction burden on market operator. The measurable indicators included a dataset of conducted inspections [9], the number of identified violations [9. -1], and the volume of administrative fines [10], imposed on the entities under control. Institutional adequacy was assessed through the state apparatus's capacity to provide proper supervision. The criteria were the quantitative parameters of the regulatory body (maintenance budget and staff size [11-12]) in comparison with

international benchmarks [13-15]. Regulatory efficiency, which was evaluated through the forms of state oversight, legal norms and IAEA documents [16-24].

The type of research is defined as a quantitative and qualitative economic analysis, supplemented by legal-regulatory and institutional approaches, which is determined by the nature of the problem under study and the established objective: to assess the alignment of the national regulatory model with global nuclear safety and security regime requirements and to develop proposals for its enhancement.

Qualitative and quantitative methods were applied to measure the compliance burden on market operators using empirical data on conducted inspection. In turn, the method of economic benchmarking was used to analyze the resource adequacy (staff sizes and budgets) of the authorities, thereby translating the administrative characteristics of nuclear control into measurable indicators.

Institutional analysis was conducted to identify the structure of the regulatory body and operational logic of forms of control and supervision (inspections, preventive control, investigations and prompt response actions). A structural-functional method was applied, which allowed for an assessment of their compensatory potential.

The formal-legal method enabled the identification of substance, structure, and systemic links between atomic legislative norms and facilitated an assessment of their degree of internal consistency and legal certainty. A comparative legal method was employed to align national legal institutions of supervision and control with international standards and best practices, thereby identifying existing legal regulatory gaps and conflicts.

For a comprehensive interpretation of the findings, a systematic method was employed, whereby state control and supervision was analyzed as a multi-level system comprising economic, institutional, normative and procedural layers to formulate conclusions and proposals for improving the economic, organizational and legal mechanisms for exercising control functions.

This study is based exclusively on an analysis of publicly available government data (the datasets presented in the tables and diagrams cover varying timeframes due to the limited availability of public data.), macroeconomic statistics, regulatory frameworks, and published reports.

Data presentation and processing was conducted analytically through a multi-stage analytical framework based on the methods outlined above. The findings are structured and visualized through tables and diagrams. Initially, the economic, institutional and structural-functional approaches were applied to map the regulatory organization models and the distribution of powers, to assess the level of economic efficiency, independence and human resource availability, as well as to examine the specific forms of control and supervision. This was followed by economic, formal-legal analysis to define the budget, administrative penalties, structure and content, to evaluate the internal consistency and legal certainty of the regulatory norms. Finally, economic, systemic and logical-legal analyses were employed to synthesize these findings into practical recommendations presented in this study.

Results and its discussion

To ensure logical consistency and systematization of this section, the assessment of the state atomic supervision was structured based on an economical approach. The theory of transaction costs [1. – 7], synthesized with the concept of overcoming information asymmetry within the principal and the agent framework [2. – 30] was applied as the foundational methodology for the economic analysis. This macroeconomic basis was adapted by the works of domestic researchers whose methodological foundation for introducing economic mechanisms to ensure energy security was laid in this research.

In accordance with the methodology, the analytical part of the economical block of the research was systematized into a comparative analysis of the staffing levels and budget for supervision of Kazakhstani and foreign regulators, and the analysis of the economic burden factors (transaction costs) through the lens of national operator indicators resulting from information asymmetry. An assessment of the intensity of inspection activities and the effectiveness of administrative fines was conducted.

This analytical sequence formed the basis for deducing nuclear oversight problems by identifying structural deficits to assessing their economic consequences.

The institutional and legal-regulatory study provided systematized results of the current status and evolutionary trajectory of state supervision and control. The results are presented in a logical sequence consistent with the research purpose and objectives and are benchmarked against findings reported in the Kazakhstani and foreign scholarly literature.

1. Analyses of resource adequacy

The conducted financial and economic benchmarking revealed profound disparities in the resource adequacy of atomic regulators of 4 states as shown in the Table 1. Diagrams 1 and 2 represent the budget and staff capacity of the authorities of Kazakhstan, Canada, France and Sweden.

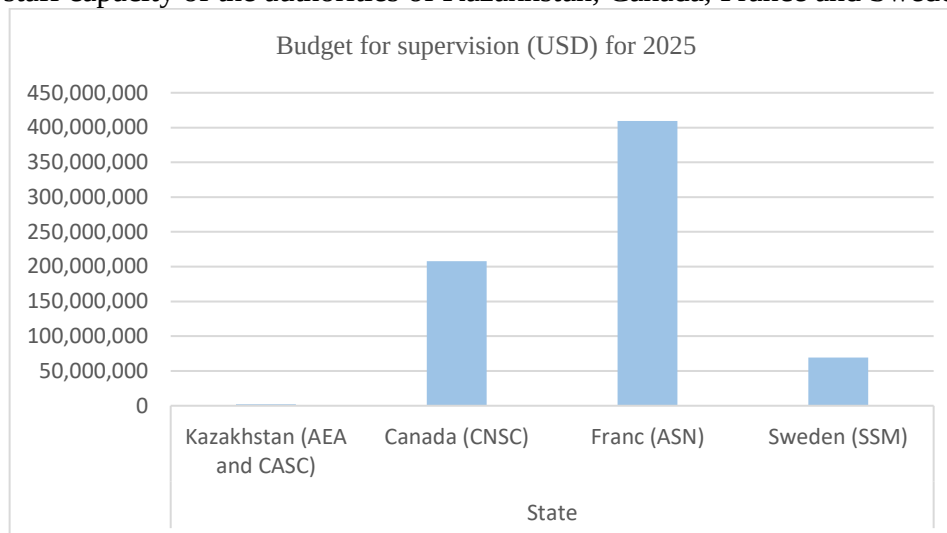


Figure 1. Budget for supervision for 2025

Note: compiled by the authors based on Budget Programs and national reports [11. – 1], [12. – 1], [14. – 65], [15. – 50], [25]

The number of personnel and budget of regulatory bodies in these 4 countries (the diagrams 1 and 2) represent disparities: Kazakhstan is almost from 3 to 17.5 times smaller (in employees) and from 31 to 185 times smaller than the other 3 governments.

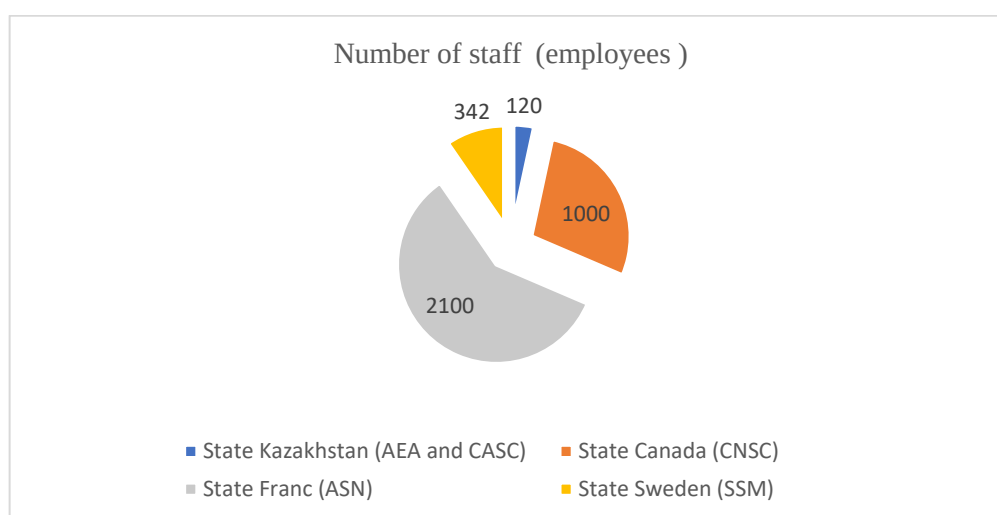


Figure 2. Staff capacity in 2025

Note: compiled by the authors based on Budget Programs and national reports [11. – 2], [12. – 2], [13. – 69], [14. – 63], [15. – 49]

The 2025 calculation of the budget allocation per employee (the Table 1) demonstrates a significant institutional gap, so in Kazakhstan, the budget per employee stands at 18,435 USD for this year, which is almost 11 times smaller than the other 3 states.

Table 1 - Disparities in the resource adequacy in 2025

State	Number of staff (employees)	Budget for supervision (USD)	Budget per employee (USD/1 person)
Kazakhstan (AEA and CASC)	120	2 212 192	18 435
Canada (CNSC)	1000	208 043 000	208 043
France (ASN)	2100	409 500 000	195 000
Sweden (SSM)	342	69 520 000	203 275

Note: compiled by the authors based on Figures 1 and 2

From a qualitative economic perspective, such a per-capita funding deficit generates severe institutional constraints. It creates a critical risk of «brain drain», and the budgetary limits constrain the capacity for regulatory digitization. This evidence demonstrates a regulatory bottleneck caused by resource scarcity, where extensive control is structurally unfeasible.

2. Analyses of inspections and the volume of administrative fines. The empirical public data reveals a fundamental economic disproportion in the current control system (data in the Table 2). Over the past four years, the authorized body identified 193 gross violations (70% of the conducted inspections) by supervised entities; however, the total amount of administrative fines imposed over a four-year period amounted to almost 12 million KZT.

Table 2 - Administrative offenses and gross violations identified in the nuclear field for 2022-2025

Year	Total registered administrative offenses in the reporting period	Collected administrative fines (KZT)	Total inspections	Gross violations identified
2025	4	1 224 818	36	26
2024	3	295 360	45	22
2023	6	1 362 750	74	41
2022	92	8 971 527	120	104
Total	105	11 854 455	275	193

Note: compiled by the authors based on Registered Administrative Offenses and on the Inspection Map for Entrepreneurs [9. – 2], [10. – 1]

From the perspective of institutional economics, these statistics indicate a complete absence of an economic deterrence effect. The financial penalty fails to act as an incentive for preventive compliance, since the state's transaction costs associated with administering inspections exceed the fiscal outcome of the fines. Consequently, the current punitive model of state supervision is transactionally inefficient.

3. Analyses of information asymmetry and transaction costs. The efficiency of regulatory oversight is constrained by the problem of information asymmetry between the regulatory-body (the principal) and the supervised entity (the agent). The national operator consistently possesses more comprehensive data regarding the status of nuclear facilities than the authority, thereby creating a risk of opportunistic behavior (safety shortcuts). For example, NAC, for this risk reduction, as shown in its integrated annual report [29], has adopted international transparency standards, including GRI, SASB, and TCFD, and since 2024–2025 has also integrated TNFD metrics. The engagement of auditing firms for the verification of non-financial reporting serves as an economic mechanism to mitigate agency costs and validate data accuracy for the state.

The modern regulatory paradigm imposes substantial transaction and compliance costs. The company's annual reports for 2024–2025 highlight uncertainty stemming from revisions to the environmental legislation of Kazakhstan [29.– 82], [5. – 90]. Specifically, the commitment to decommission facilities by 2029 resulted in expenditures of 117.9 million KZT in 2025, as demonstrated in NAC's integrated annual report, [5. – 236]. The implementation of a risk-based approach will facilitate a reduction in inspection frequency for entities with LTIFR below 0.1, which, in accordance with internationally recognized standards, signifies an industry-leading level of operational safety.

The risk-oriented approach to safety will be aimed to strengthen governmental supervision, which is essential for the internalization of environmental risks. Evidence for this is provided by the 19 major violations of atomic safety and security standards identified in 2022 at the national operator's subsidiary company [9. – 3], also the operator's investment dynamics in mitigating these effects are evident in expenditures on occupational health and industrial safety, which increased from 8.08 billion KZT in 2022 to a record 15.02 billion KZT in 2025 (Table 3). The almost 86% increase in these expenditures over the four-year period confirms the government's role as an institution that compels market players to internalize public risks (to include into their production costs).

Table 3 - Expenditures on Occupational Health and Industrial Safety (OHS and IS) for 2022-2025

Indicator	A unit of financial measurement	2022	2023	2024	2025	Dynamics from 2022 to 2025
Expenditures on OHS and IS	Billion KZT	8,08	12,47	12,95	15,02	+85,89%
LTIFR	Index	0,11	0,15	0,09	0,14	+ 27,27%
Ecology investments	Billion KZT	1 074,8	1 306,5	1 090,0	3 200,0	almost 3 times more
Note: compiled by the authors based on the data of national operator's annual reports [26-28], [29. – 199], [5. – 5]						

4. Analysis of scholarly approaches and international standards. This phase of the study involved a systematic review of scholarly publications and international documents addressing the complexity of nuclear field regulatory governance. Current Kazakhstani and foreign scholarly discourse emphasize the pivotal role of the national regulatory body, the imperative of its institutional autonomy, and the alignment of national legal frameworks with the IAEA global standards [21. – 21], [22. – 15], [23. – 10], [30]. For the purpose of systematizing established scholarly perspectives and pinpointing the specific niche for this research, the review findings are summarized in the table 4.

Table 4 – Review of scholarly publications and international documents

Author (s), documents, year	Research object	The main findings	Correlation with the current study
IAEA (SF-1), 2006 [21. – 22].	National systems of nuclear safety and security	Independent regulator as a key element of ensuring safety and security	Used as a theoretical and normative basis
INSAG-21, 2006 [22. – 13].	Global nuclear safety regime	National supervision systems as the core of the global regime	Specification of conclusions regarding Kazakhstan
Mezerv R.A., 2009 [31].	Global nuclear governance	Safety and security effectiveness depends on the national regulator	Develops the thesis on the central role of the regulator
Taebi B., Mayer M. 2017 [34].	Nuclear security aftermath «Fukushima-1»	Expanded understanding of safety and security (integrity, public confidence, engagement)	Reveals the insufficient development of social component in the Kazakhstan
Nukusheva A.A. and others., 2021 and 2022 [30. – 725], [32].	International legal regulation	Harmonization of national regimes with international standards	Supplemented by the analysis of supervision practice
Batyrbekov E. and others., 2024 [33].	Kazakhstani nuclear program	Strengthening the regulator as a condition for NPP implementation	Specification of organizational and legal mechanisms

Velichkov K., 2023 [35].	Kazakhstani nuclear governance	Regulation as a global image factor	Specific supervision mechanisms are analyzed
Saipinov D., 2025 [36].	Kazakhstani atomic legislation	Fragmentation of the normative base	Analyses is conducted taking into account the updated model
Note: compiled by the authors			

As evident from Table 4, the majority of studies focus on the institutional role of the regulator and normative compliance with international standards [30. – 730], [31. – 112], [32. – 176]. At the same time, practical aspects of the supervision and control system's functioning under conditions of institutional transformation remains poorly explored. This research addresses the aforementioned gap by providing a comprehensive analysis of the organizational and legal control mechanisms.

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6. State control and supervision forms and implementation of a risk-based approach. The study revealed that the Kazakhstani state supervision and control system encompasses scheduled and unscheduled inspections, preventive control with on-site and off-site visits, accident investigations, and rapid response measures. The institutionalization of preventive control with off-site visits reflects a transition towards a risk-oriented supervision model. Nevertheless, in contrast to the practices described in the IAEA documents and foreign researches, in the Republic of Kazakhstan, the risk-based approach is implemented predominantly at a formal-normative level. Inadequate analytical capacity and a lack of digitalization limits the capacity for a comprehensive evaluation of risks and diminishes the preventive potential of supervision. The punitive structure of state supervision is transactionally inefficient. This discrepancy stems not from a fundamental disagreement in the theoretical perspectives, but rather from varying degrees of institutional and technological maturity across the respective supervision frameworks. This empirically substantiates the critical need for shifting from the comprehensive penalization of violations to risk-oriented profiling (reputational risks for business with financial sanctions).

7. Systematic problems of state supervision and control and directions for their improvement.

The conducted analysis has identified a set of interrelated issues impacting economic, institutional, legal and organizational levels of the state supervision and control system. In order to synthesize these findings and formulate practice-oriented recommendations, the research results are systematized in table 5.

Table 5 – Problems of oversight and directions for their improvement

Identified problem	Root causes of problem formation	Adverse effects	Propose directions for enhancement
Limited de facto independence of the regulator	Institutional and financial constraints	Decline in regulatory effectiveness	Strengthening the legal status and autonomy
Human resource shortage	Lack of experts	Formalization of regulation, brain drain	Developing international partnerships for knowledge transfer and forming sustainable internal human capital
Fragmentation of formative base	A plurality of disconnected legal acts	Complexity of law enforcement	Codification of rules

Formalistic risk-based control	Information asymmetry. transaction cost burden. insufficient digitalization	Weak preventive effect	Implementation of digital platforms
Limited transparency	Lack of participatory mechanisms and public data	Erosion of public trust	Development of public reporting
Note: compiled by the authors			

As evidenced by Table 5, the identified issues are systematic and mutually reinforcing. Addressing these issues requires a comprehensive approach involving economic, institutional, normative and technological measures, which is consistent with the international organizations results or findings of previous studies [36. – 200].

8. Scientific novelty, practical significance and research limitation. The scientific novelty of the study lies in the holistic analysis of state supervision and control system within an empirical demonstration of the transactional inefficiency inherent in the current punitive model, conceptualizing the system as a mechanism for managing transaction and compliance costs, new institutional context, as well as in identifying the gap between formal compliance with international standards and the actual effectiveness of supervision activities.

The results hold practical value for nuclear infrastructure development by public administration bodies. A limitation of the study is its scarcity of empirical data resulting from limited public access to information.

Conclusions

This paper provides a comprehensive assessment of the economic indicators of the national operator, institutional structure, regulatory framework and oversight forms, administrative fines, inspections results, revealing key challenges and achievements that must be addressed to enhance Kazakhstan atomic system's safety.

The operational capacity of the regulatory-body remains hampered by persistent human and financial resource limitations. Inadequate budgetary allocations and human resource gaps, together with a transactionally inefficient model of administrative penalties, undermine control effectiveness and regulator autonomy, posing a significant barrier to the progressive evolution of the system.

The identified institutional gap in resource adequacy (where the budget allocation per regulatory employee is almost 11 times lower than the standards of leading nuclear nations), combined with the marginal fiscal outcome of oversight (only 12 million KZT in fines for 193 gross violations), indicates a complete absence of an economic deterrence effect. Under the current paradigm, the state incurs disproportionately high transaction costs for administering inspections, which fail to generate economic incentives for supervised entities to ensure strict compliance. The transactionally inefficient system of administrative fines must be replaced with mechanisms of economic deterrence and partial fee-recovery. As noted in domestic academic paper, the effective provision of security in Kazakhstan is impossible without the implementation of specialized economic mechanisms (Igaliyeva, L., Utepkaliyeva, K., Bakirbekova, A.et al.) [37]. This approach is conceptually rooted in the theory of performance-based regulation, that has been demonstrated by Coglianese C. [38]. According to this theory, dynamic regulatory requirements exhibit significantly higher efficacy compared to fixed administrative fines.

The practical instrument for implementing this theory into the atomic control is the preventive economic incentive that involves abandoning ineffective fixed administrative penalties in favor of supplemental inspections. In case of declining safety performance indicators of entities under oversight, the authority initiates supplemental inspections, the regulatory operational costs of which will be covered by these supervised entities.

The findings substantiate that the Republic of Kazakhstan possesses a robust framework for nuclear energy sector expansion, supported by the national legislative acts that is broadly consistent with the IAEA International Safety Standards [24. – 14]. Particular attention is paid to the protection of citizens' life and health, environmental preservation, and the priority of safety over financial and

other interests. Nevertheless, the current legal framework and the scarcity of public data necessitate further enhancement regarding public engagement, transparency and interaction with civil society, posing a persistent challenge for the supervision system.

Implantation of a risk-oriented approach to control and supervision, including preventive off-site visits control, represents a significant step forward. Nevertheless, effective operationalization of this approach requires the advanced digital data collection and analysis systems, and the refinement of proactive risk identification algorithms, and it should be considered as an indispensable mechanism for macroeconomic optimization. Contemporary literature (Kurmanov, N., Bakirbekova, A., et al.) has already demonstrated that the implementation of information and communication technologies serves as a key driver for the transformation of the energy sector and economic growth in Central Asian countries [39]. Extrapolating this macroeconomic trend to the digital transformation of supervision through the deployment of predictive analytics and the concept of virtual inspections will enable a transition to continuous remote oversight. This involves integrating risk-scoring models that analyze incoming data streams in real-time to predict potential equipment failures. When safety requirements remain consistently within established limits, the authority applies a virtual inspection protocol, completely eliminating the need for on-site inspections (physical inspections will be conducted exclusively for responding to mathematically verified anomalies.). This model allows for a reduction in aggregate transaction costs (the compliance costs for businesses and the logistical expenses of the regulatory-body) and in information asymmetry between the principal and the agent.

The challenges of automated oversight in fiscal domain and the reduction of physical inspections (where predictive analytics has already been established) have been investigated in the works of Kozhubekova, A. [40]. Nevertheless, this model in atomic oversight remains unexplored in local scholarship.

Within the scope of this research, targeted recommendations are proposed to overcome the information asymmetry between the regulatory-body and the controlled entities, to minimize aggregate transaction costs, to strengthen the human resource independence and the institutional resilience of the regulatory authority, to improve the legal framework, as well as to advance digital transformation of the control system. The recommendations for improving the regulatory and institutional frameworks are viewed as instruments required for the practical implementation of this economically efficient model. Consequently, considering the practical absence of comprehensive analyses of economic deterrence and regulatory cost-recovery models within domestic academic literature, the detailed development of applied mechanisms for integrating these economic recommendations into the atomic supervision sector will serve as the logical continuation of this paper and will form the subject of a separate future article.

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ҚАЗАҚСТАНДАҒЫ МЕМЛЕКЕТТІК АТОМ ҚАДАҒАЛАУЫНДАҒЫ ТРАНСАКЦИЯЛЫҚ ШЫҒЫНДАР МЕН АҚПАРАТТЫҚ АССИММЕТРИЯ: ЭКОНОМИКАЛЫҚ ЖӘНЕ ИНСТИТУЦИОНАЛДЫҚ ТРАНСФОРМАЦИЯ

Аңдатпа

Мақалада Қазақстанда мемлекеттік бақылау мен қадағалаудың экономикалық, реттеушілік және ұйымдастырушылық негіздері қарастырылады. Жаңадан құрылған реттеуші органның институционалдық құрылымының даму эволюциясына сараптама жасалды. Зерттеудің мақсаты - Қазақстанның атом энергетикасы саласындағы мемлекеттік бақылау мен қадағалаудың экономикалық, институционалдық және нормативтік-құқықтық негіздерін кешенді бағалау, реттеуші органның қызмет тиімділігі мен бақылау субъектілерінің транзакциялық шығындарын талдау, сондай-ақ тәуекелге бағдарланған реттеуді жетілдіру, реттеушінің тәуелсіздігі мен ресурстық әлеуетін арттыру және талаптарды сақтау шығындарын төмендету жөнінде ұсыныстар әзірлеу. Атом энергиясын пайдалану саласындағы мемлекеттік қадағалау мен бақылауды іске асыру нысандарына ядролық объектілерді, оның ішінде нарық операторын тексеру статистикасы және эмпирикалық деректер массиві негізінде ерекше назар аударылды. Ұлттық оператордың транзакциялық жүктемесі бағаланды. Зерттеуші Қазақстан Республикасы мен шет елдердің реттеуші органдарының сандық параметрлеріне (штаттық санына мен бақылауды қамтамасыз ету бюджеттері) салыстырмалы-салғастырмалы талдау жүргізді. Атом энергиясы жөніндегі халықаралық агенттігі талаптарының ұлттық нормативтік база мен реттеудің институционалдық моделінің дамуына тигізетін ықпалы көрсетілді. Зерттеудің ғылыми жаңалығы мемлекеттік қадағалауды тек құқықтық функция ретінде ғана емес, экономикалық институт ретінде кешенді бағалаумен айқындалады. Жүргізілген талдау негізінде экономикалық тиімділігі, реттеушілік базаны және басқару тетіктерін жетілдіру жөнінде ақпараттық асимметрияны жою және оппортунистік мінез-құлық тәуекелін барынша азайту, реттеуші органның тәуелсіздігі мен ресурстық қамтамасыз етілуін нығайту, тәуекелге бағдарланған және профилактикалық тәсілді дамыту, қадағалау қызметін цифрландыру, ашықтық пен қоғамдық қатысуды күшейтуді ұсыныстар тұжырымдалған.

Негізгі сөздер: мемлекеттік бақылау, институционалдық экономика, транзакциялық шығындар, атом саласы, экономикалық тиімділік, ақпараттық асимметрия, макроэкономикалық тұрақтылық.

ТРАНСАКЦИОННЫЕ ИЗДЕРЖКИ И ИНФОРМАЦИОННАЯ АСИММЕТРИЯ В ГОСУДАРСТВЕННОМ АТОМНОМ НАДЗОРЕ: ЭКОНОМИКО-ИНСТИТУЦИОНАЛЬНАЯ ТРАНСФОРМАЦИЯ В КАЗАХСТАНЕ

Аннотация

В статье рассматриваются экономические, регуляторные и организационные основы государственного контроля и надзора в Казахстане. Проанализирована эволюция институциональной архитектуры вновь созданного органа-регулятора. Цель исследования - комплексно оценить экономические, институциональные и нормативно-правовые основы государственного контроля и надзора в атомной энергетике Казахстана, проанализировать эффективность деятельности регулирующего органа и транзакционные издержки подконтрольных субъектов, а также разработать предложения по совершенствованию риск-ориентированного регулирования, повышению независимости и ресурсной обеспеченности регулятора и снижению издержек соблюдения требований. Особое внимание уделено формам реализации государственного надзора и контроля в области использования атомной энергии на основе массива статистики проверок и эмпирических данных ядерных объектов, в том числе и оператора рынка. Оценена транзакционная нагрузка национального оператора. Исследователь осуществил сравнительно-сопоставительный анализ количественных параметров (штатной численности и бюджетов на содержание контроля) регуляторов Республики Казахстан и зарубежных стран. Показано влияние требований МАГАТЭ на развитие национальной нормативной базы и институциональной модели регулирования. Научная новизна исследования заключается в комплексной оценке государственного контроля не как сугубо юридической функции, а как экономического института. Вклад автора состоит в количественном и качественном обосновании связи, на основе сопоставления с международной практикой, между комплаенс-издержками поднадзорных субъектов и внедрением риск-ориентированного подхода. На основе проведенного анализа сформулированы предложения по совершенствованию экономической эффективности, управленческих механизмов и правовой базы: устранение информационной асимметрии и минимизации риска оппортунистического поведения, укрепление независимости и ресурсного обеспечения регулятора, развитие риск-ориентированного и профилактического подхода, цифровизация надзорной деятельности, усиление транспарентности и общественного участия.

Ключевые слова: государственный контроль, институциональная экономика, транзакционные издержки, атомная отрасль, экономическая эффективность, информационная асимметрия, макроэкономическая стабильность.

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