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RESEARCH ARTICLE
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Green Economic Development in Kazakhstan: The Role of Public Regulation and Business-Led Investment

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ABSTRACT

The transition to a green economy is one of the key priorities for sustainable development, particularly in resource-dependent countries like Kazakhstan. The relevance of this research is determined by the need to balance investment incentives and fiscal instruments to accelerate environmentally oriented transformation. The aim of the article is to identify the mechanisms that have a decisive influence on the formation of a green economy in the Republic of Kazakhstan. The methodology is based on correlation and regression analysis and covers four groups of indicators: environmental investments, tax revenues for resource use, the scale of green construction, and the prevalence of ecological innovations, from 2016 to 2023. The results showed that investment measures do not have a statistically significant effect on the spread of environmental innovations ($R^2 = 0.620$, $p > 0.3$). On the contrary, fiscal instruments, in particular taxes on the use of natural resources, demonstrated a positive relationship with the volume of green construction ($R^2 = 0.504$, $p = 0.048$). Tax pressure can stimulate the behavioral transformation of businesses towards environmentally sustainable practices. Institutional conditions demonstrated higher efficiency compared to investment incentives. The mandatory regulatory instruments in the formation of green economy elements proved effective. The limited effectiveness of voluntary investment measures confirms the stronger regulatory role of fiscal mechanisms. State policy should focus on strengthening institutional regulation and developing targeted tax instruments to promote sustainable economic transformation in Kazakhstan.

KEYWORDS: Firm Behavior, Business, Government Regulation, Public Policy, Green Economy, Public Administration, Sustainable Development

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EJEBS

1. INTRODUCTION

The transition to a green economy has become a key component of the 2030 Agenda for Sustainable Development. SDG Goal 12 aims to ensure sustainable consumption and production, while Goals 7 and 13 aim to promote environmentally friendly energy sources and combat climate change (UN DESA, 2021). Greening the economy is increasingly viewed not as an auxiliary component of sustainable development, but as a necessary vector for modernizing economic policy. In recent years, there has been increased coordination of efforts at the international level to create sustainable growth models that integrate environmental priorities into macroeconomic planning. The Organization for Economic Cooperation and Development (OECD) emphasizes that the transition to a green economy requires a systemic restructuring of fiscal, investment, and regulatory mechanisms, with a critical role played not only by environmental technologies, but also by the institutional environment that stimulates or restricts their use (OECD, 2020). The European Union, through its European Green Deal, combines direct support for green innovation with strict carbon footprint regulation, resource taxation, and environmental standards (European Commission, 2020). Similarly, China, in its 14th Five-Year Plan (2021–2025), has set targets to increase the share of green investment, introduced environmental reporting requirements, and launched a reform of green taxes (NDRC, 2021).

The diversity of instruments to stimulate the green transition reflects the lack of a universal model. Some countries focus on direct public investment, while others emphasise market incentives or fiscal pressure. For example, Germany and the Netherlands actively use green taxes as a means of redistributing incentives in favor of sustainable solutions, while Japan relies on innovation subsidies and public partnerships (World Bank, 2022). Such diverse practices raise a vital research question about the comparative effectiveness of different approaches to promoting green transformations. In Kazakhstan, the issues of forming a green economy received institutionalization with the adoption of the concept of transition to a "green" growth model in 2013. According to the International Monetary Fund, in countries with limited budget resources, the sustainability of green reforms largely depends on the ability to use a combination of state and market mechanisms (IMF, 2022).

In Kazakhstan, the strategic foundations to green economy are defined by the national Concept for Transition to a Green Economy (Renewable Market Watch, 2018), the Strategic Development Plan of the Republic of Kazakhstan until 2025, and the State Program for the Development of Education and Science for 2020-2025, which emphasize ecological modernization, energy efficiency, and sustainable use of natural resources (Yessimkhan & Sartanova, 2024).

Given the above trends, the question of which mechanisms have a decisive influence on promoting the green agenda in the context of a transformative economy becomes relevant. Including mechanisms as voluntary business investment decisions and their participation in green innovation (UNEP, 2019), as well as the role of government intervention through environmental taxation and regulatory barriers (OECD, 2023). This paper attempts to empirically assess the relative influence of two key factors, private sector investment activity and government fiscal regulation on environmental outcomes in the Kazakhstani economy. The purpose of the study is to determine which factor has a greater impact on the development of the green economy in Kazakhstan: government regulation through fiscal mechanisms or private investment activity.

2. LITERATURE REVIEW

The concept of the green economy appears as a model within the broader framework of sustainable development, but its interpretation differs across studies. Morgera and Savaresi

(2013) interpreted the green economy not only as an environmental strategy, but also as a binding legal system in which environmental measures cannot violate human rights, and vice versa. Thus, economic efficiency should not take priority over the state's social responsibilities or human rights standards. Moreover, the green economy has been critically examined as a tool that, if improperly implemented, can reproduce global inequality (Ehresman and Okereke, 2015). The green economy remains formal and superficially linked to the SDGs, unless structural barriers to accessing natural benefits and institutional participation of vulnerable groups are removed. Therefore, a lack of a shared conceptual framework leads to a gap between rhetoric and measurable strategies (Georgeson et al., 2017). According to Merino-Saum et al. (2018), the green economy can be linked to the SDG system through a set of sustainable indicators selected based on the criterion of their impact on natural resources. There is no common understanding in the scientific literature of what exactly a "green economy" is; different authors provide different definitions that are poorly consistent with each other. There is no standard system of indicators that links different approaches into a single logical model. That is, even when metrics are proposed (for example, linking to SDGs), they are not integrated in such a way as to form a holistic measurement system.

The green economy is considered a holistic system of sustainable development, comprising three interrelated components: economic, environmental, and social, which are understood as equal axes (Khoshnava et al., 2019). That is, no element should dominate the others. Ecological sustainability and social well-being are placed on the same level as economic efficiency. In post-Soviet countries, the idea of a green economy is formally enshrined in regulatory documents (strategies, programs, laws), where the concept of a green economy turns out to be "poorly adapted", since there is a gap between the declared principles and real management actions (Oliinyk, 2020). Consequently, the real practice of planning and management does not correspond to these standards: plans are not implemented, and priority is given to economic tasks over environmental ones. Trushkina (2022) correlates the concept with the transformation of the industry structure, where the green economy covers logistics, waste management, and the construction sector, and involves a transition to cyclical business models. All the approaches considered are based on the need for a connection with the SDGs, but highlight different foundations: legal guarantees, social redistribution, metric systems, or industry transformation. The definition of the green economy is thus not reduced to a single formula and is determined through a dominant focus - legal, critical-social, indicator, or institutional-applied.

Differences in the interpretation of mechanisms that shape environmental innovation have developed progressively in the literature. A resource-based refinement was followed in Kiefer et al. (2019), where six groups of resources, competencies, and dynamic capabilities (RCC) were distinguished, indicating that systemic and radical innovations depend on different combinations of RCC. Therefore, internal knowledge, organizational culture, and financial autonomy are essential in shaping radical forms of environmental innovation. Government regulation has a dual effect: on the one hand, it restricts the freedom of firms by imposing rules and regulations (constraint), on the other hand, it stimulates them to seek new solutions and implement innovations to meet requirements (catalyst). Therefore, regulation does not simply hinder or help, but acts as both a barrier and an incentive, and the real outcome depends on how flexible and innovative firms are.

Green investments are explained through the operation of financial mechanisms and institutional barriers, rather than through norms and rules. Falcone (2020) provided one of the earliest systematizations of opposing positions in the economic literature, contrasting the neoclassical view, in which environmental regulation increases costs and reduces

investment attractiveness, with the Porterian perspective, which links regulation to innovative renewal and higher competitiveness (Fabrizi et al., 2024). Access to finance remains a key condition for implementing environmental investments; regardless of the regulatory impact, whether restrictive or stimulating, the lack of access to financial resources renders the effect unachievable.

Subsequent studies emphasized the role of institutional and financial frameworks. The main barriers to SME green investments are not technological or market-related, but rather insufficient government involvement and weak financial infrastructure (Chien et al., 2021). Regulatory frameworks, credit infrastructure, and transparency define the capacity of green finance to ensure environmental sustainability (Khan et al., 2022). Institutional support influences the scale of green investment, the return on investment, and the degree of technological specialization (Yang et al., 2024). To sum up, institutional conditions, from the nature of regulation to the transparency of financial procedures, act as a basis that determines either obstacles or opportunities for the development of environmental investments.

The use of tax instruments, which are often discussed as auxiliary measures, in environmental policy is considered in the literature as a way to transition from administrative measures to a system of economic incentives. Hawkins (2000) argued that green taxes function as a complement to normative regulation, which is not capable of independently ensuring environmental transformation. In European practice, environmental charges were intended to combine ecological and economic objectives. However, the uneven distribution of the tax burden constrained the long-term effectiveness (Bailey, 2002). Irregularities in the distribution of the tax burden made it difficult to achieve sustainable results. In the extractive sector, environmental taxation, when implemented under weak institutional conditions, may reduce investment and drive activity into the shadow economy unless supported by broader institutional coherence (Söderholm, 2006). On the contrary, in the Asian context, despite its limited effectiveness, fiscal incentives are crucial for ensuring green growth (Dulal et al., 2015). Toprak (2018) confirmed the need for a comprehensive adjustment of tax policy: not only adjusting rates, but also integrating with sectoral strategies, including energy and transport. Ljubičić (2025) proposed a more rational use of resources, which should simultaneously reduce the pressure on the environment; in other words, the tax system is restructured in such a way as to make environmentally harmful behavior unprofitable and environmentally sustainable behavior profitable. Environmental taxation depends on institutional coherence, sectoral structure, and consistency with macroeconomic policy.

In the study by Chang et al. (2016), sustainable construction is defined as a managed process based on a combination of regulatory frameworks, subsidies, and a system of standards that enable the Chinese construction sector to transition to environmentally friendly practices. Porfiriev et al. (2017) considered green construction as part of a strategy for sustainable urban development. However, in the Russian context, it remains voluntary, primarily relying on international certification standards and the dominance of energy efficiency as the primary criterion. In contrast to these approaches, Meng et al. (2021) included green construction in a broader paradigm of ecological civilization, where the priority is shifted from the technological and institutional dimension to cultural transformation, forming new forms of urban consumption and environmentally oriented life. Within the framework of the comparison, the emphases differ: on the one hand, the emphasis is on administrative and financial incentives, on the other, on the strategic sustainability of the urban environment, and further, on the formation of new behavioral norms.

Public policy in the field of the green economy is approached in the literature through institutional, normative, and applied perspectives. Lo and Howes (2013) examined

the organization of carbon markets in China as an outcome of the interaction between centralized regulation and market mechanisms. Nevertheless, there are contradictions between administrative coordination and financial incentives. State policy and the internal mechanisms determine how actively businesses invest in the environment and innovation (Ma et al., 2022).

In Kazakhstani research, the predominant attention has been given to normative and strategic dimensions, including innovative development (Diyar et al., 2014), institutional conditions related to sustainability issues such as decarbonization and the energy transition (Imangali & Bekturganova, 2024), as well as fiscal and investment instruments within the framework of the national green growth strategy (Yesbergen et al., 2024). Despite the general interest in mechanisms of state participation, all works analyze individual elements and do not address the holistic structure of interactions between measures and results. In this regard, this study will conduct a comprehensive analysis of the links between regulatory, fiscal, and investment mechanisms and the performance parameters of the green transformation.

3. RESEARCH METHODS

The research is based on secondary data The development of a green economy requires the active involvement of the business sector, institutional incentives and effective fiscal mechanisms. As the literature review has shown, the key factors are business investment activity, environmentally oriented expenditures, and tax policy in the field of natural resource management. In this case, the dynamics of dependent parameters, such as the scale of environmental innovations and the prevalence of green construction, are of particular importance.

To ensure transparency in the research design, the analytical procedure was structured into sequential stages, as outlined in Table 1.

TABLE 1. Stages of analysis and their purpose

Step	Stage	Action	Purpose
1	Data collection and coding	Assembly of macroeconomic indicators (2016–2023) and coding into dependent and independent variables	Obtain a structured dataset suitable for hypothesis testing
2	Hypothesis formulation	Definition of dependent and independent variables and formulation of three research hypotheses	Establish the analytical framework for empirical testing
3	Correlation analysis and data cleaning	Verification of linear relationships, detection of multicollinearity, and exclusion of unsupported models	Reduce hypotheses to statistically consistent ones (H1 and H2)
4	Descriptive dynamics	Classification of indicators into four groups: environmental investments, environmental taxes, green construction activity, ecological innovations, with dynamic analysis	Identify structural trends and ensure contextual interpretation of variables
5	Regression analysis and interpretation	Estimation of models for confirmed hypotheses, evaluation of coefficients, diagnostics, and interpretation of results	Test the strength and direction of institutional and fiscal effects on green transformation
6	Estimation (OLS)	Specified models	Regression tables (coefficients, SE, R^2, p)
7	Diagnostics	Estimated models	VIF, residual tests, 95% CIs
8	Robustness checks (optional)	Alternative specs (shares, lags, outliers)	Sensitivity results

Note: compiled by the authors

This stepwise design clarifies how the dataset was transformed from raw macroeconomic indicators into testable models. The structure also allows the exclusion of inconsistent hypotheses and strengthens the reliability of statistical inference. In this regard, three research hypotheses were formed:

Hypothesis 1. The growth of internal R&D costs in the business sector and the increase in investment volume for environmental protection is positively associated with the number of enterprises implementing ecological innovations.

Hypothesis 2. The increase in the tax burden for the use of natural resources (in absolute values) correlates with the growth in the volume of work in the field of green construction.

Hypothesis 3. The increase in the share of environmental taxes in GDP and the share of green construction in the total volume of work is associated with the growth in the share of ecological innovations in the overall structure of innovation activity.

Table 2 presents the dependent and independent variables used in the analysis.

TABLE 2. Hypotheses, dependent and independent variables

Hypothesis	Dependent variable	Independent variable
H1	Number of enterprises with ecological innovations	Internal expenditures on R&D in business sector; Investments in environmental protection (total, domestic, foreign)
H2	Volume of green construction works	Taxes on resource use; Total environmental taxes (mln. tenge)
H3	Share of ecological innovations in total innovations (%)	Total environmental taxes (as % of GDP); Share of green construction works (%)

Note: compiled by the authors

The analysis was conducted in several stages to identify the relationships between institutional and fiscal conditions and the scale of environmentally friendly activities.

The first stage described the dynamics of indicators for 2016-2023, within the framework of which four categories were identified that reflect the key areas of the formation of a green economy:

(1) financing and investment (cover internal R&D costs in the business sector and investments in environmental protection);

(2) environmental taxes (includes absolute values of taxes on pollution and resource use, as well as their share in GDP);

(3) green construction (characterizes the volume and share of green construction in the overall construction sector);

(4) environmental innovations (combines quantitative and specific indicators of the implementation of environmentally friendly solutions).

The allocation of these categories is based on the need to structure various indicators according to their directions of influence on a sustainable economy: through investments, tax regulation, institutional practices of enterprises, and technological transformations. This classification enabled the meaningful interpretation of further analysis and logical coherence between variables. Thus, the table shows both dependent and independent variables that are used in empirical hypothesis testing. These variables reflect key areas of green economy formation: business investment activity, tax regulation of environmental management, and the introduction of environmentally-oriented technologies and practices.

At the second stage, a correlation analysis was conducted to identify linear dependencies between variables and eliminate factors with high multicollinearity (Figure 1).

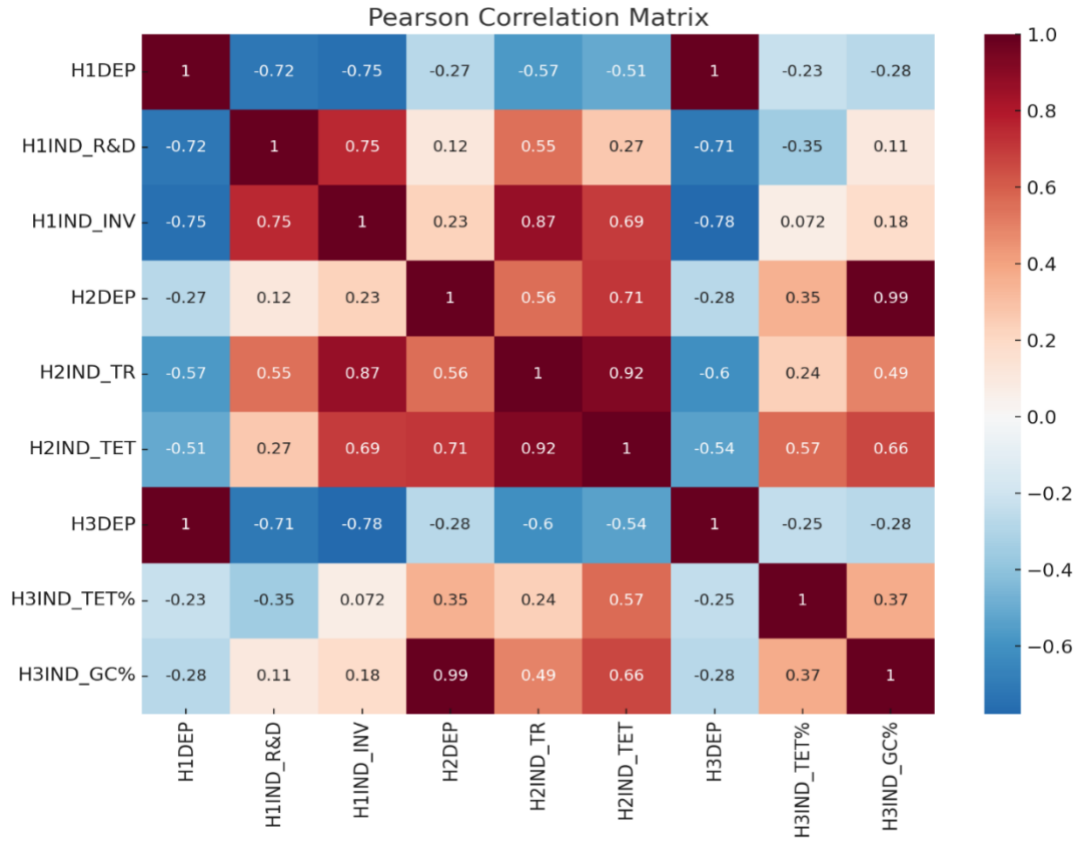

FIGURE 1. Correlation matrix

Correlation analysis revealed stable relationships only for hypotheses H1 and H2. Hypothesis H3 was excluded from regression modeling due to the absence of significant correlations between the dependent and independent variables (Table 3).

TABLE 3. Cleaned hypotheses, dependent and independent variables

Hypothesis	Dependent variable (code)	Independent variables (code)
H1	Number of enterprises with ecological innovations (H1DEP)	Internal expenditures on R&D in business sector (H1IND_R&D); Investments in environmental protection (H1IND_INV)
H2	Volume of green construction works (H2DEP)	Taxes on resource use (H2IND_TR)

Note: compiled by the authors

To confirm the findings, a Pearson correlation matrix was used, which estimated the strengths and directions of linear relationships. The final model included only those variables for which the correlation coefficients were statistically significant ($p < 0.05$ or $p<0.1$) and there was no multicollinearity. The final stage involved a regression analysis, within which three hypotheses were tested to establish statistically significant relationships between fiscal and institutional conditions and the characteristics of environmental activity of businesses.

4. FINDINGS

The analysis examines key areas of green economy development in Kazakhstan, including the dynamics of domestic R&D expenditures in the business sector, investments in environmental protection, and the structure of their sources. These parameters reflect institutional conditions and incentives that influence sustainable economic transformation. Particular attention is paid to distinguishing between domestic and external sources of financing, since the structure of investments can indicate the level of national business involvement and the effectiveness of public policy. The observed trends enable the identification of not only volumetric changes but also structural shifts in investment priorities.

Figure 2 shows the combined dynamics of four indicators for 2016-2023.

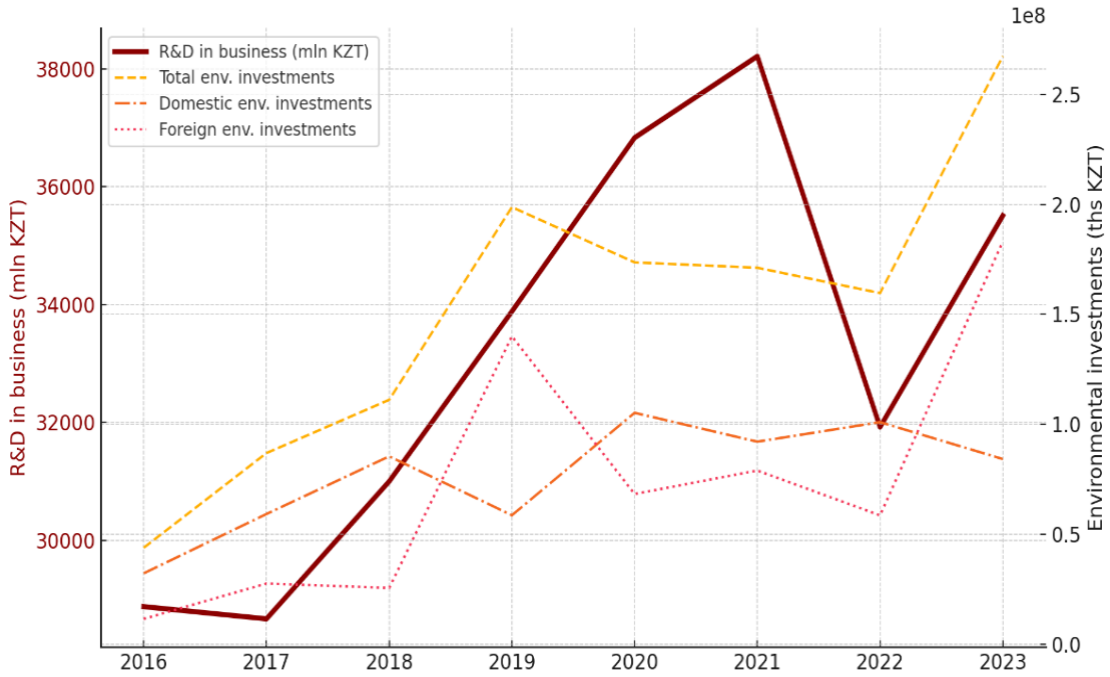

FIGURE 2. Environmental investments

Between 2016 - 2023, domestic R&D expenditure in the business sector remained in the range of 28.9–38.2 billion tenge, with the highest value recorded in 2021. A comparable trend in dynamics is observed in investments aimed at environmental protection: their total volume increased from 43.9 billion tenge in 2016 to 267.3 billion tenge in 2023, with the main acceleration occurring after 2019. A breakdown of the sources reveals that domestic investments dominated until 2019, but starting from 2020, the growth rate of external investments significantly exceeded that of domestic investments. In particular, the volume of external investments increased from 14.0 billion tenge in 2019 to 183.0 billion tenge in 2023, while internal investments in the same period did not show sustainable growth, varying between 84 and 105 billion tenge. Thus, the growth in overall investment activity was achieved mainly due to external financing, with a stable trajectory of internal R&D costs.

The intensification of investment activity in the environmental sphere was accompanied by an expansion of tax potential, formed through fiscal revenues associated with natural resource management and environmental protection (Figure 3).

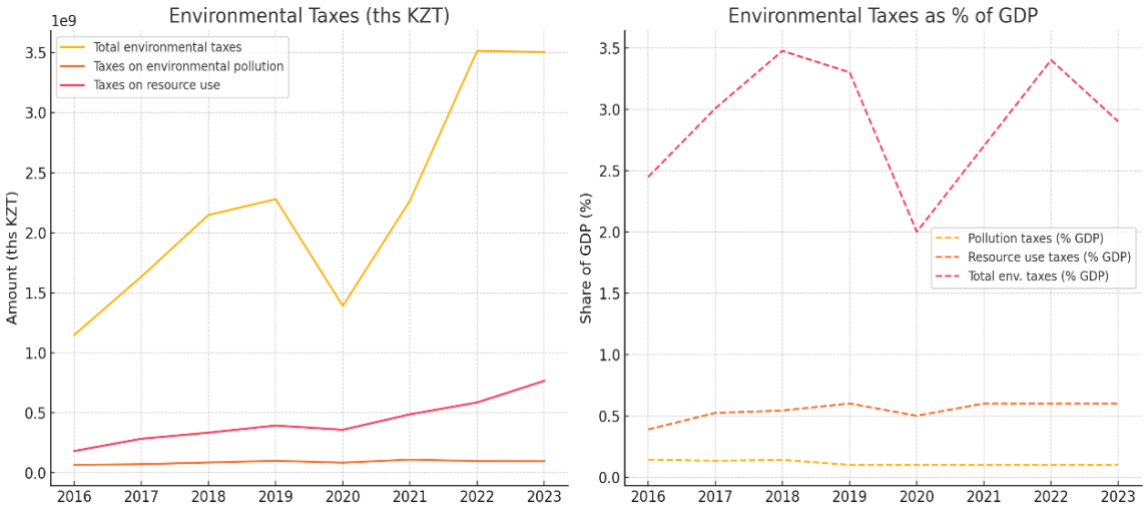

FIGURE 3. Environmental taxes

The total volume of environmental taxes increased from 1.15 trillion tenge in 2016 to 3.50 trillion tenge in 2023, with the majority of the increase occurring between 2020 and 2022. Resource use taxes provided a stable contribution to the structure of tax revenues, increasing more than fourfold, from 182.4 to 766.6 billion tenge. At the same time, environmental pollution taxes demonstrated less pronounced dynamics, remaining within the range of 85-110 billion tenge since 2018.

In response to the growing tax and investment flows in the environmental sphere, there is a gradual introduction of sustainable practices in the construction industry, including the implementation of green building projects (Figure 4).

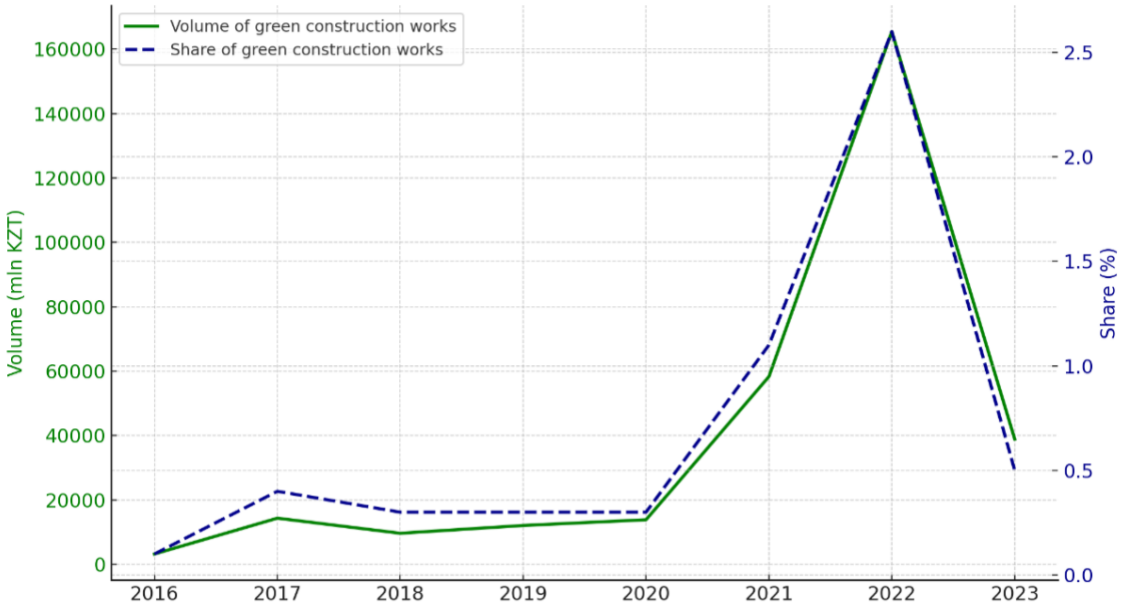

FIGURE 4. Green construction activity for 2016-2023

An analysis of the share of taxes in GDP shows the stability of the share of pollution charges at 0.1%, while the share of resource use taxes increased from 0.39% in 2016 to 0.6% in 2019 and remained at this level in subsequent years. The total share of environmental taxes peaked in 2018 (3.48% of GDP) and then varied between 2% and 3.4%. This configuration indicates a growing fiscal burden, driven by increased attention to the rational use of natural resources and enhanced tax administration in environmentally sensitive sectors.

The volume of work performed within the framework of green construction increased from 3.25 billion tenge in 2016 to 165.4 billion tenge in 2022, but in 2023, a decrease to 38.9 billion tenge was recorded. The share of such works in the total construction volume remained at the level of 0.1-0.3% until 2020, after which it reached a peak of 2.6% in 2022. However, in 2023, it decreased again to 0.5%. Thus, despite individual bursts of activity, the development of green construction has been uneven, episodic, and without a stable trend. In other words, the volumes and shares of such work have fluctuated sharply over the years, without demonstrating consistent growth or consolidation at a high level. This indicates a lack of stable institutional support, constant demand, or a fixed regulatory framework.

Indicators characterizing the prevalence of environmental innovations indicate a systemic reduction in the scale of their application in corporate practice (Figure 5).

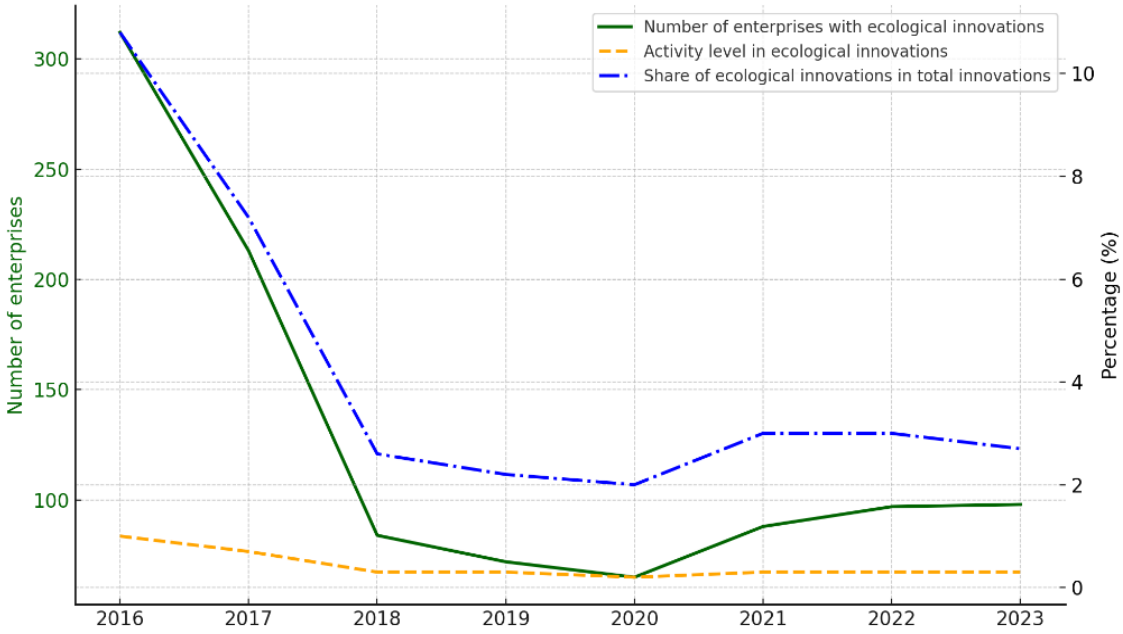

FIGURE 5. Ecological innovations for 2016-2023

Over the period 2016–2023, the number of enterprises implementing environmental innovations decreased by 214 units from 312 to 98. The level of activity in this area decreased by more than threefold, from 1.0% to 0.3%, and has remained at this minimum level since 2020. The sharpest decline was recorded in 2017 and 2019, when the number of enterprises decreased by 141, and the level of activity fell from 0.7% to 0.3%. The share of environmental innovations in the total volume of all innovative solutions decreased from 10.8% in 2016 to 2.7% in 2023, despite a temporary increase to 3.0% in 2021–2022. A comparison

of absolute and relative indicators demonstrates not only a reduction in the scale of enterprise involvement, but also a general narrowing of the significance of environmental issues in the structure of corporate innovations. The parameters indicate a lack of stable incentives that facilitate the systematic implementation of environmentally oriented solutions.

In Table 4, there are results for the regression analysis of hypothesis 1.

TABLE 4. Regression results for Hypothesis H1: ecological innovations and investment factors

Indicator	Model H1 Result
R	0.788
R^2	0.620
Adjusted R^2	0.469
RMSE	63.780
Durbin-Watson	1.586
Autocorrelation (p)	0.194
ANOVA (F, p)	F = 4.086; p = 0.089
Coefficient (H1IND_R&D)	–0.009
t-value, p-value (H1IND_R&D)	t = –0.854; p = 0.432
95% CI for Coefficient (H1IND_R&D)	[–0.035 ; 0.018]
Coefficient (H1IND_INV)	$–6.061\times10^{-7}$
t-value, p-value (H1IND_INV)	t = –1.152; p = 0.302
95% CI for Coefficient (H1IND_INV)	$[–1.959\times10^{-6} ; 7.467\times10^{-7}]$
VIF / Tolerance	2.311 / 0.433 (for both independent variables)
Intercept	509.612 (p = 0.133), 95% CI: [–221.347 ; 1240.571]

Note: compiled by the authors based on calculations

Hypothesis H1 is not confirmed. Despite the moderate strength of the model (R^2 = 0.620), neither of the independent variables, neither internal R&D expenditures (p = 0.432) nor environmental protection investments (p = 0.302), demonstrated a statistically significant relationship with the number of companies implementing ecological innovations. Also, both variables have negative coefficients, which contradicts the expected direction of the relationship. The obtained results indicate the absence of a direct relationship between investment activity and the actual spread of environmental innovations in the corporate sector.

In Table 5, there are results for the regression analysis of hypothesis 2.

TABLE 5. Regression results for Hypothesis H2: green construction and resource taxation

Indicator	Model H2 Result
R	0.710
R^2	0.504
Adjusted R^2	0.422
RMSE	41,108.326
Durbin-Watson	2.093
Autocorrelation (p)	0.830
ANOVA (F, p)	F = 6.106; p = 0.048
Coefficient (H2IND_TR)	4.325×10^{-5}
t-value, p-value (H2IND_TR)	t = 2.471; p = 0.048
95% CI for Coefficient	$[4.238\times10^{-7} ; 8.608\times10^{-5}]$
VIF / Tolerance	1.000 / 1.000
Intercept	–57,229.864 (p = 0.220)

Note: compiled by the authors based on calculations

Hypothesis H2 is confirmed. There is a statistically significant positive relationship between resource use taxes (H2IND_TR) and the volume of green construction (H2DEP), with a coefficient of 4.325×10^{-5} at $p = 0.048$. The model explains 50.4% of the variance of the dependent variable ($R^2 = 0.504$), indicating a moderate strength of the regression dependence. The absence of multicollinearity (VIF = 1.000), acceptable autocorrelation of residuals ($p = 0.830$), and a confident 95% confidence interval confirm the stability of the model. Thus, increasing tax pressure on resource use is a factor that stimulates the transition to environmentally oriented construction practices.

The results obtained for the model of hypothesis H2 enable us to conclude that fiscal instruments have a more pronounced impact than investment measures. In particular, the statistically significant positive relationship between resource taxes and the volume of green construction confirmed the impact of tax regulation as an effective tool for transforming business behavioral strategies towards environmentally friendly practices.

In contrast, the results for hypothesis H1 showed that there was no significant impact of internal R&D costs and investments in environmental protection on the prevalence of ecological innovations. Voluntary investment decisions do not provide a sufficient incentive for the systematic implementation of sustainable technological solutions. Thus, institutional conditions based on regulatory and fiscal restrictions are more effective in stimulating environmental activity than investment and incentive mechanisms. These differences highlight the importance of stringent regulatory measures in shaping the elements of the green economy.

The results of the analysis showed that the impact of resource taxes on stimulating green building is consistent with the findings of Hawkins (2000), Söderholm (2006), and Ljubičić (2025), where taxation was considered as an element of redistribution of incentives in environmentally sensitive sectors. Therefore, fiscal policy is effective in transforming business behavioral strategies. In contrast, the lack of a link between investment and environmental innovation is at odds with the findings of Khoshnava et al. (2019), Khan et al. (2022), and Ma et al. (2022), where investment measures were attributed to the main factors of sustainable transition. The recorded discrepancy may be due to institutional constraints, insufficient elaboration of mechanisms for translating investments into management decisions, and the lack of mandatory regulatory support, which together reduce the effectiveness of government measures based only on incentive instruments.

Other studies demonstrate differences between fiscal and investment measures. The positive relationship between resource taxes and green building growth found in model H2 is consistent with the findings of Toprak (2018), who considered fiscal instruments as an effective lever for sustainable transition. On the other hand, the lack of a significant impact of domestic investment and R&D on green innovation, recorded in model H1, confirms the doubts of Dulal et al. (2015) about the effectiveness of investment incentives while subsidizing traditional industries. Chien et al. (2021) noted that institutional inconsistencies and low transparency hinder the effective utilisation of green finance. Despite the intensification of fiscal and investment measures, the lack of an assessment of their impact on innovative practices limits the effectiveness of the implemented policies. The identified differences confirm the priority of mandatory regulatory mechanisms over voluntary incentives.

6. CONCLUSION

The objective of this study is to examine the impact of investment and fiscal mechanisms on the development of environmentally friendly practices in Kazakhstan's economy, within the framework of state regulation. The scientific novelty of the research lies in the empirical identification of the differentiated effectiveness

of fiscal and investment mechanisms, which demonstrates the priority of regulatory pressure over voluntary incentives in the institutionalization of the green economy. The conducted analysis showed differences in the degree of influence of investment and fiscal factors on environmentally oriented business activities in Kazakhstan.

Firstly, there is an increase in the total volume of investments in environmental protection. However, the primary source of this growth is external investments rather than internal ones. This indicates insufficient involvement of domestic businesses in the environmental modernisation process and a high dependence on external financing for the country.

Secondly, there has been a steady decline in the number of companies implementing environmental solutions in their corporate innovation efforts. From 2016 to 2023, this number decreased more than threefold, indicating a lack of motivation among businesses to integrate environmentally friendly practices in the absence of effective incentives and support mechanisms. Regression analysis confirmed that voluntary investments by companies, including R&D spending, do not significantly contribute to the spread of green innovations.

Thirdly, tax policy has demonstrated a more pronounced impact. The increase in taxes on the use of natural resources correlates with an increase in "green" construction volumes, which confirms the effectiveness of fiscal instruments as a factor in changing business strategies. Unlike investment measures, taxes perform not only a fiscal function, but also an environmental one, orienting companies towards sustainable activities.

Future research should focus on sector-specific assessments of fiscal efficiency, cross-country comparisons of regulatory practices, and the role of green finance in complementing state policy. The management strategy should be based on clear indicators, substantiated reporting forms, and institutional pressure mechanisms capable of transferring sustainability from the declarative to the practical plane. The focus of management is not stimulation as such, but the formation of restrictions that make other behavior economically irrational.

AUTHOR CONTRIBUTION

Writing – original draft: Laila G. Kirbassova, Karlygash N. Tastanbekova, Gulmira S. Yerkulova.
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