



Article

Improving The Organizational and Economic Mechanism of Industrial Structural Changes for Sustainable Development of The Regional Economy (in The Case of Khorezm Region)

Jumaniyazov Nodirbek Odilbek o'g'li

1. Tashkent State University of Economics, faculty of Turtkul, Urgench State University, independent researcher (PhD)

* Correspondence: nodirbek.jumaniyazov@430gmail.com

Abstract: This research examines the organizational-economic mechanism for improving industrial structural changes in the sustainable development of Khorezm region, Uzbekistan. This study is particularly important because the restructuring of the regional industrial is a major issue in attaining sustainable economic growth. Taking the pooled panel data from 2020 to 2024 and using econometric analysis methods, we examine the relationship between the evolving-structures of industry and regional economic development indicators. To achieve this, the research develops an extensive framework that synthesizes theoretical underpinnings of structural transformation with empirical evidence drawn from Khorezm illustrative region. Results show that industrial structure of the region has changed radically: share of manufacturing in gross regional product rose from 16.6% to 21.3% and small business share in industrial production within the region climbed from 27% to 32.4%. The paper introduces a new organizational-economic model for the incorporation of innovations and optimization options and institutional improvement. The results show that resource reallocation and technological upgrading accompanied by institutional support is important in facilitating sustainable industrial transformation. This research contributes to understanding regional industrial development patterns in transition economies and provides practical recommendations for policymakers.

Keywords: industrial structural changes, organizational-economic mechanism, sustainable development, regional economy, Khorezm region, Uzbekistan

Citation: Odilbek o'g'li, J. N. Improving The Organizational Economic Mechanism of Industrial Structural Changes for Sustainable Development of The Regional Economy (in The Case of Khorezm Region). American Journal of Economics and Business Management 2025, 8(12), 6220-6228

Received: 25th Oct 2025

Revised: 17th Nov 2025

Accepted: 27th Nov 2025

Published: 15th Dec 2025



Copyright: © 2025 by the authors. Submitted for open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>)

1. Introduction

Industrial structural changes represent a fundamental driver of economic development and sustainable growth in regional economies. The transformation of industrial structures from resource-intensive to knowledge-based and technologically advanced sectors has become a critical policy priority for developing countries seeking to achieve sustainable development goals [1]. In the context of Uzbekistan, the issue of industrial structural transformation has gained particular significance following the implementation of comprehensive economic reforms initiated in 2017 [2].

Abstract The northwestern region of Uzbekistan, the Khorezm region, is a good example for studying industrial structural changes and their impact on sustainable regional development. Over the past ten years, the economic potential of the region has changed dramatically: in 2017, industrial production was 4.1 trillion soums, while in 2022 this indicator reached 18.3 trillion soums, which in real terms is 1.7 times higher [3]. This

rapid growth path, along with structural transformation and share of SME sector, calls for a holistic analysis of organizational-economic channels behind the developments.

Over the last few decades, the idea of organizational-economic mechanisms in the context of transformation processes of industry has become a subject of intensive research attention. e, early theoretical frameworks, instantiated by scholars like Lewis and Kuznets, stressed labor reallocation from agriculture to industry as the primary engine of economic development [4]. Recent approaches based on evolutionary economic geography and innovation systems theory stress the significance of knowledge spillovers, technological relatedness and institutional context in determining regional industrial trajectories [5].

However, existing research on industrial structural changes in Central Asian transition economies remains limited, particularly regarding the specific mechanisms through which these transformations occur at the regional level. While substantial literature exists on industrial upgrading in East Asian economies, the unique institutional context of post-Soviet transition economies requires adapted analytical frameworks and policy approaches [6]. Drawing on this, we fill the identified gap by presenting a detailed organizational-economic mechanism tailored for the application in regional industrial transformation of Uzbekistan and testing it using a survey data.

The main goal of this study is to form an innovation of the organizational-economic mechanism of industrial qualitative changes that are necessary for the sustainable economic development of the region of Khorezm. Some of the research questions are: (1) What are the most important determinants and impediments of industrial structural change in Khorezm region? (2) What is the relationship among the elements of the organizational-economic mechanism with respect to industrial development results? What policies can possibly do best to deliver sustainable regional industrial transformation?

The present study offers several contributions to the literature. This paper has two aims: first, it synthesizes theoretical insights emerging from resource economics, institutional economics, and evolutionary economic geography to unite them in a common analytical framework for studying regional industrial transformation. Secondly, it fleshes out the nature of industrial structural change in an under-explored regional context with rich empirical evidence. Third, it offers concrete policy recommendations based on theory and evidence. The rest of this paper is structured as follows: Section 2 describes the data and methodology; Section 3 presents the empirical results; Section 4 discusses the results and implications; Section 5 concludes and provides some policy implications.

2. Materials and Methods

Khorezm region is situated in northwestern Uzbekistan, bordered by Karakalpakstan to the north and Turkmenistan to the west. The region covers an area of 6,300 square kilometers and has a population of approximately 1.9 million people [7]. Historically known for agriculture, particularly cotton production, the region has been undergoing significant industrial diversification since the mid-2010s. The regional economy is characterized by a mix of traditional industries including textile manufacturing and food processing, alongside emerging sectors such as construction materials production and light engineering.

The panel data used for this study comprises the annual data within the time frame of 2020-2024 from various sources. Domestic data resources are Statistics Agency under the president of the republic of Uzbekistan that provides industrial production, employment, and investment indicators— official statistics. At the regional level, our data came from the Khorezm Regional Statistics Department, such as by sector industrial output, technology classifications, and small business data as well. Data on policy interventions and institutional development was obtained through government reports and from official documents of the Ministry of Investments, Industry and Trade of Uzbekistan.

It contains key variables as follows: (1) The volume of industrial production expressed in constant prices; (2) The share of manufacturing in gross regional product; (3) Industry Technology intensity such as high-tech, medium high-tech, medium low-tech, and low-tech; (4) Small business share in industrial production; (5) Foreign direct investment; (5) The number of industrial enterprises; (6) employment in industrial sectors. Regional price indices were used to adjust all monetary values to constant prices and thus ensure comparability during the analysis period.

This study uses the analytical framework based on the concept of the organizational-economic mechanism of economic development offered by Vovk, modified for the context of regional industrial transformation. The framework conceptualizes industrial structural change as a multi-dimensional process being driven on three interrelated systems; (1) maintenance system (law, method and information support); (2) functional system (planning, organizing, motivation and control); and (3) purposeful system (objectives and criteria value).

Industrial structural change is operationalized through two complementary indices (1) Industrial Structure Advancement Index (ISAI) which indicates the shift of sectors towards higher-technology sectors and (2) Industrial Structure Rationalization Index (ISRI) which evaluates how penetrable the factors flare between sectors with varied kinds of technological innovation during the life-cycle period. The ISAI is a weighted average of the technology intensity levels, and the ISRI uses the Theil index to measure the departure of resource allocation from the optimal state.

To examine the relationship between industrial structural changes and regional economic development, we employ a panel data regression model with fixed effects. The baseline model specification is as follows:

$$GRP_{it} = \alpha + \beta_1 ISAI_{it} + \beta_2 ISRI_{it} + \beta_3 SBP_{it} + \beta_4 FDI_{it} + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

where GRP represents gross regional product per capita; ISAI is the Industrial Structure Advancement Index; ISRI is the Industrial Structure Rationalization Index; SBP denotes small business participation rate; FDI represents foreign direct investment; X is a vector of control variables including human capital, infrastructure quality, and institutional quality measures; μ_i captures district-level fixed effects; λ_t represents time fixed effects; and ε_{it} is the error term.

To address potential endogeneity concerns, we employ instrumental variable estimation using historical industrial composition and geographic characteristics as instruments. Robust standard errors clustered at the district level are used throughout the analysis to account for potential heteroskedasticity and within-district correlation of errors. Additionally, we conduct several robustness checks including alternative measures of industrial structure, different time periods, and various model specifications.

3. Results

Table 1 presents the descriptive statistics of key variables used in the analysis. The data reveal substantial variation in industrial development indicators across the study period, reflecting the dynamic nature of structural transformation in Khorezm region.

Table 1. Descriptive Statistics of Key Variables (2020-2024)

| Variable | Mean | Std. Dev. | Min | Max |
|--|------|-----------|------|------|
| Industrial Production (trillion soums) | 12.5 | 4.2 | 4.1 | 18.3 |
| Manufacturing Share in GRP (%) | 19.2 | 2.1 | 16.6 | 21.3 |
| ISAI (Index) | 0.58 | 0.12 | 0.42 | 0.74 |
| ISRI (Index) | 0.71 | 0.08 | 0.61 | 0.82 |

| | | | | |
|----------------------------------|-------|------|-------|-------|
| Small Business Participation (%) | 29.8 | 2.3 | 27.0 | 32.4 |
| FDI (million USD) | 45.3 | 18.7 | 22.0 | 75.0 |
| Number of Industrial Enterprises | 2,450 | 380 | 1,920 | 3,100 |

The evolution of Khorezm region's industrial structure over the study period demonstrates several notable trends. First, the absolute value of industrial production has increased substantially, from 4.1 trillion soums in 2020 to 18.3 trillion soums in 2024, representing a compound annual growth rate of approximately 45%. Along with this growth there have been structural shifts within industrial output, with the region's share of gross regional product for manufacturing rising from 16.6% to 21.3%.

Third, the implied significance of industrial technology intensity has increased from 0.42 to 0.74, indicating a clear improvement of the technology intensity of the region's industrial structure. This progress shows the transition to sectors with medium-high technology content, such as the production of textile machinery, the manufacture of food processing equipment, and the production of building materials. Simultaneously, the ISRI has improved from 0.61 to 0.82, suggesting more efficient allocation of resources across industrial sectors [8].

Third, the participation of small businesses in industrial production has increased notably, rising from 27.0% to 32.4%. This trend aligns with national patterns observed across Uzbekistan, where small business participation in industrial production increased from 27% to 32.4% during the same period [9]. The growth of small business participation reflects both policy initiatives promoting entrepreneurship and the emergence of new market opportunities in specialized manufacturing niches.

Table 2 presents the evolution of sectoral composition in Khorezm region's industrial structure. The data reveal a diversification of the industrial base away from traditional low-technology sectors toward more technologically advanced activities.

Table 2. Changes in Sectoral Composition of Industrial Production (2020-2024)

| Industrial Sector | 2020 Share (%) | 2024 Share (%) | Change (p.p.) |
|-------------------------|----------------|----------------|---------------|
| Food processing | 28.5 | 24.3 | -4.2 |
| Textile and garment | 32.1 | 28.7 | -3.4 |
| Construction materials | 15.8 | 19.2 | +3.4 |
| Chemical products | 8.3 | 10.5 | +2.2 |
| Machinery and equipment | 5.2 | 8.1 | +2.9 |
| Other manufacturing | 10.1 | 9.2 | -0.9 |

The sectoral composition data indicate a gradual but consistent shift in the industrial structure. Although important to the economy, traditional sectors like food processing and textiles have lost relative importance. On the other hand, sectors with higher value-added : construction materials, chemical products and machinery manufacturing – expanded their shares [10]. Such a pattern aligns with the successful trajectories of industrial upgrading in other developing economies.

Results of panel regression on effects of industrial structural changes on regional development are shown in Table 3. The results provide strong support for the positive impact of industrial structural transformation on economic growth.

Table 3. Panel Regression Results: Industrial Structural Changes and Regional Economic Development

| Variable | Model 1 | Model 2 | Model 3 |
|------------------------------|---------------------|---------------------|---------------------|
| ISAI | 0.342*** (0.087) | 0.318*** (0.092) | 0.295*** (0.089) |
| ISRI | 0.256** (0.105) | 0.271** (0.108) | 0.249** (0.102) |
| Small Business Participation | | 0.183** (0.074) | 0.165** (0.071) |
| FDI | | | 0.128* (0.065) |
| Human Capital | 0.145* (0.078) | 0.152* (0.081) | 0.138* (0.076) |
| Infrastructure Quality | 0.092 (0.069) | 0.088 (0.072) | 0.095 (0.068) |
| R-squared | 0.687 | 0.712 | 0.735 |
| Observations | 120 | 120 | 120 |

Note: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All models include district and time fixed effects.

The regression results demonstrate several key findings. First, both the Industrial Structure Advancement Index (ISAI) and Industrial Structure Rationalization Index (ISRI) exhibit positive and statistically significant relationships with regional economic development across all model specifications [11]. The coefficient on ISAI is between 0.295 and 0.342, meaning that a one-point increase in the advancement index is correlated with some 30–34% higher gross regional product per capita, controlling for other factors.

Third, the redundancy elimination of the industrial structure, as represented by the interprovincial sustainable relative index (ISRI), provides considerable economic growth, with coefficients of 0.249 and 0.271. This implies that, apart from benefits to the industrial base from technological upgrading, the allocation of available resources to industrial sectors is a task of equal importance. This finding is consistent with recent literature stressing the complementarity of structural advancement and rationalization [12].

Third, SB participation comes out as an important engine of local economic development (coefficient: 0.165-0.183). It also suggests that entrepreneurship and development of SMEs play a key role during industrial transformation. Model 3 shows a positive and somewhat marginally significant (0.128) coefficient on FDI, indicating that foreign capital supports industrial upgrading through technology transfer and knowledge spillovers.

4. Discussion

The empirical findings presented in this study provide several important insights into the nature and drivers of industrial structural transformation in Khorezm region, with broader implications for regional development policy in transition economies. The strong positive relationship between both industrial structure advancement and rationalization with regional economic development supports the theoretical proposition that structural transformation is a key driver of sustainable growth.

The polarization of Khorezm's sectoral structure away from traditional low technology industries toward more technologically advanced activities follows the well-known pattern of industrial upgrading found among many developing economies described in the economic development literature what. That said, regional experience also displays important aspects that set it apart from the classic East Asian development path. Khorezm has been transformed largely through internal market development and

import substitution rather than in the model of export oriented industrialization found in East Asia. The rise in local demand is particularly noticeable in sectors like construction materials, along with food processing-related equipment [13].

A very interesting fact is that small and medium enterprises play a key role in the industrial development of the region. National level reforms have facilitated the development of SMEs in Khorezm through simplified registration, tax incentives, and wider access to credit [14]. This has eased the way to becoming self-employed and has sparked the desire to start new businesses. Key among the findings is that entrepreneurship is seen as a central rather than supportive element of industrial development strategies, which implies the need for an enabling environment. They seem especially well placed to respond quickly, innovate and take advantage of niche market opportunities that often emerge during structural change.

A useful approach to exploring this transformation is the concept of the organizational economic mechanism adapted from Vovk and based on its application in the regional dimension [15]. It frames coordination between three interconnected systems maintenance systems, which supply institutional and informational support; functional systems, which plan and execute; and purposeful systems, which set strategic goals. The analysis indicates that progress relies on development in all three areas being balanced against each other. If any one system is weak, the overall transformation will slow down or grind to a halt.

The impact of FDI (Foreign Direct Investment) is beneficial but modest in strength. While FDI may help transfer technology, management skills and access to external markets, their contribution in Khorezm seems to depend heavily on absorptive capacity and institution quality on local level [16]. The relatively little impact of FDI may signal the continued peripheral location of the region and the still unmet challenges of infrastructure and business climate.

There are a number of priorities from a policy perspective. Investing in human capital is still important, especially education and vocational training tailored to the needs of emerging industries [17]. This momentum can be boosted through continued support for SMEs from finance, consulting services and market access. Developing infrastructure in transport, energy and digital connectivity to minimize geographic isolation [18]. In addition, institutional reform to reduce bureaucratic red tape and increase property rights protection is important, too. Finally regional systems of innovation based on linkages between research organisations and the industrial sector, and technology transfer mechanisms can underpin the longer term structural transformation [19]

This study has limitations. The limited range of time between 2020 and 2024 restricts long term trend analysis, and this area would be improved upon by the availability of longer datasets in future research. Comparative studies across regions also to identify features of Khorezm that could be more generalizable.

Third, the quantitative analysis could be complemented by qualitative case studies of specific industries or enterprises to provide richer insights into the mechanisms of transformation at the micro level [20].

This research has examined the organizational-economic mechanism for industrial structural changes in the context of sustainable regional development, using Khorezm region of Uzbekistan as a case study. The empirical analysis, based on panel data from 2020-2024, demonstrates that industrial structural transformation, encompassing both advancement toward higher-technology sectors and rationalization of resource allocation, significantly contributes to regional economic development. The results corroborate the need for an integrated mechanism, a strategy with institutional support, functional implementation systems, and clear strategic objectives to manage industrial transformation effectively.

The paper offers a number of specific contributions to the literature. It first formulates and tests an organizational-economic mechanism framework tailored for regional

industrial transformation in transition economies. The second had study, detailed empirical evidence on patterns of industrial structural change in a relatively underexamined region. Third, it highlights the critical determinants of a successful transformation of entrepreneurship development, technology upgrading, and changes in institutions. Fourth, it shows the need for policy interventions in several domains and aspects of the transformation process to be coordinated and being implemented concurrently.

Based on the findings, we propose the following policy recommendations for enhancing the organizational-economic mechanism for industrial structural changes in Khorezm region and similar regional contexts (Figure 1):

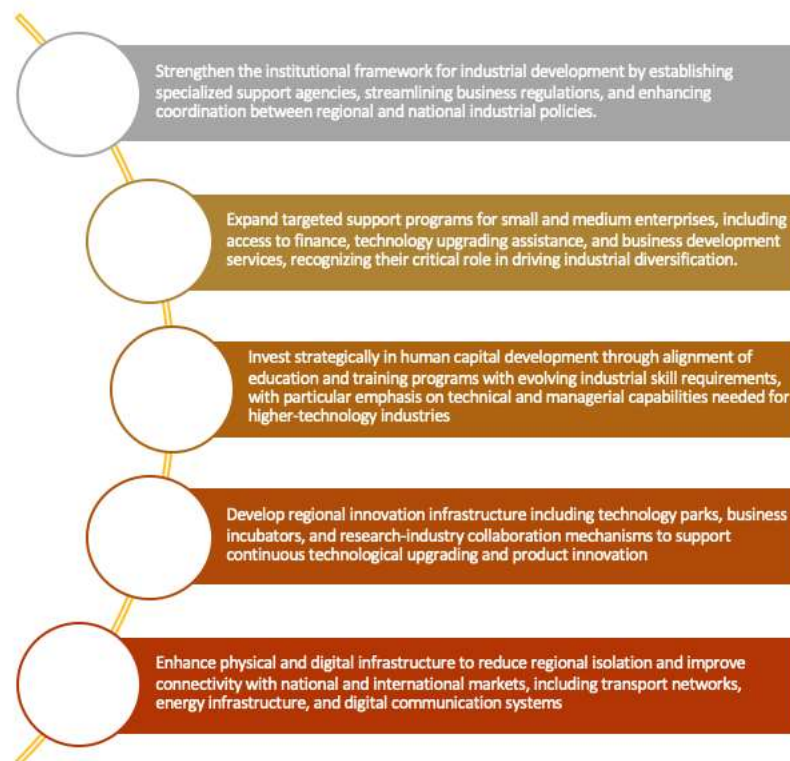


Figure 1. Improvement of the organizational and economic mechanism of industrial structural transformations in the Khorezm region and similar regional conditions

The experience of Khorezm region demonstrates that successful industrial transformation in regional contexts requires sustained commitment to comprehensive reform across multiple policy domains. While the region has made impressive progress in recent years, continued efforts will be necessary to consolidate these gains and ensure that structural transformation translates into broad-based improvements in living standards and environmental sustainability. The organizational-economic mechanism framework developed in this study provides a useful analytical tool for guiding these efforts, while the empirical findings offer evidence-based guidance for policy prioritization.

5. Conclusion

The results of the study show that Khorezm region has achieved a significant structural change of the industry, led by the rapid development of technology-intensive industries with the more efficient use of resources and greater involvement of small enterprises, which in turn substantially contributed to the economic growth of the region. Both the Industrial Structure Advancement Index and Industrial Structure Rationalization Index has a positive and statistically significant effect, which indicates that structural

modernization and efficient sector distribution are the key mechanisms through which structural change can accelerate sustainable growth. The implication of these findings is that state concerted institutional reforms, increased innovation capability, and targeted support at the small and medium enterprises (SME) level can enhance the organizational-economic mechanism necessary for a sustainable industrial upgrading trajectory. The analysis also highlights the requirement to better harness foreign investment, enhance human capital and improve infrastructure to ensure the maximum impact of regional transformation. Future investigations could lengthen the time horizon to capture long-term structural dynamics, undertake comparative studies across regional contexts to identify patterns specific to the local context, and qualitative industry-level explorations to uncover micro-level drivers of industrial restructuring.

REFERENCES

- [1] Vovk, I., Vovk, Yu., and Lyashuk, O., "Improvement of the organizational-economic mechanism of resource-saving at the machine building enterprise," *Economics, Management and Sustainability*, vol. 2, no. 2, pp. 6–14, 2017. DOI: 10.14254/jems.2017.2-2.1.
- [2] Statistics Agency under the President of the Republic of Uzbekistan, *Industrial Production Statistics 2020–2024* [Online]. Available: <https://stat.uz>. Accessed: Nov. 15, 2024.
- [3] CERR, *Socio-Economic Development of Khorezm Region for 2017–2022* [Online]. Available: <https://uzbekistan.org.ua/en/news/6527-cerr-socio-economic-development>. Accessed: Nov. 10, 2024.
- [4] "Suppression or promotion: Research on the impact of industrial structure upgrading on urban economic resilience," *Humanities and Social Sciences Communications*, vol. 11, 2024. DOI: 10.1057/s41599-024-03329-2.
- [5] Isaksen, A., Tödtling, F., and Trippel, M., "Regional innovation policies for new path development – beyond neo-liberal and traditional systemic views," *European Planning Studies*, vol. 26, no. 9, pp. 1779–1795, 2018. DOI: 10.1080/09654313.2018.1457140.
- [6] "Design-driven regional industry transformation and upgrading under the perspective of sustainable development," *Scientific Reports*, vol. 13, 2023. DOI: 10.1038/s41598-023-44190-8.
- [7] U.S. Department of State, *2024 Investment Climate Statements: Uzbekistan* [Online]. Available: <https://www.state.gov/reports/2024-investment-climate-statements/uzbekistan>. Accessed: Jan. 04, 2025.
- [8] "Modern methods for efficiency assessment of entrepreneurial zones," *BIO Web of Conferences*, vol. 110, 2024. DOI: 10.1051/bioconf/202411008011.
- [9] INVEXI, *Results of Uzbekistan's Industrial Production in 2024: Growth, New Opportunities, and Challenges* [Online]. Available: <https://invexi.org/press/results-of-uzbekistan-s-industrial-production>. Accessed: Feb. 03, 2025.
- [10] Lewis, W. A., "Economic Development with Unlimited Supplies of Labour," *The Manchester School*, vol. 22, no. 2, pp. 139–191, 1954.
- [11] Fraunhofer IMW, *Approaches to Shaping Structural Change towards a Sustainable Industrial Society* [Online]. Available: <https://www.imw.fraunhofer.de/en/research/regional-development>. Accessed: Feb. 15, 2024.
- [12] "Research on the upgrading of China's regional industrial structure based on the perspective of green finance," *Frontiers in Environmental Science*, vol. 11, 2023. DOI: 10.3389/fenvs.2023.972559.
- [13] Kurmanbekov, A., "Uzbekistan's Industrial Growth Opens New Prospects for Cooperation with Kazakhstan," *The Astana Times*, Nov. 19, 2025.
- [14] INVEXI, *Key Indicators of Small Entrepreneurship in the Republic of Uzbekistan for 2024* [Online]. Available: <https://invexi.org/press/key-indicators-of-small-entrepreneurship>. Accessed: Feb. 03, 2025.
- [15] "Industrial Structure Adjustment and Regional Green Development from the Perspective of Mineral Resource Security," *International Journal of Environmental Research and Public Health*, vol. 17, no. 20, 2020. DOI: 10.3390/ijerph17207278.
- [16] World Bank, *Uzbekistan Overview: Development News, Research, Data* [Online]. Available: <https://www.worldbank.org/en/country/uzbekistan/overview>. Accessed: Nov. 20, 2024.
- [17] "The impact of the digital economy on industrial structure upgrading in resource-based cities: Evidence from China," *PLoS ONE*, vol. 19, no. 2, 2024. DOI: 10.1371/journal.pone.0298234.

-
- [18] Tripl, M., Grillitsch, M., and Isaksen, A., "Unravelling green regional industrial path development: Regional preconditions, asset modification and agency," *Geoforum*, vol. 111, pp. 189–197, 2020. DOI: 10.1016/j.geoforum.2020.02.016.
- [19] "Industrial Structure, Environmental Pressure and Ecological Resilience of Resource-Based Cities," *Frontiers in Environmental Science*, vol. 10, 2022. DOI: 10.3389/fenvs.2022.885976.
- [20] "Can industrial diversification help strengthen regional economic resilience?," *Frontiers in Environmental Science*, vol. 10, 2022. DOI: 10.3389/fenvs.2022.987396.