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Viacheslav Ivanchenkov*
Doctoral Student, Associate Professor
Odesa National University of Technology
65039, 112 Kanatna Str., Odesa, Ukraine
https://orcid.org/0000-0002-7074-3024

Volodymyr Vovk
PhD in Economics, Associate Professor
Simon Kuznets Kharkiv National University of Economics
61166, 9A Nauka Ave., Kharkiv, Ukraine
https://orcid.org/0000-0002-1140-3273

Oksana Yermolenko
PhD in Economics, Associate Professor
Simon Kuznets Kharkiv National University of Economics
61166, 9A Nauka Ave., Kharkiv, Ukraine
https://orcid.org/0000-0002-3599-9016

Galina Prusova
PhD in Agriculture, Senior Researcher
Livestock Farming Institute of National Academy of Agrarian Sciences of Ukraine
61026, 1A Tvarynnyky Str., Kharkiv, Ukraine
https://orcid.org/0000-0002-2604-5720

Olena Revenko
PhD in Economics, Associate Professor
Simon Kuznets Kharkiv National University of Economics
61166, 9A Nauka Ave., Kharkiv, Ukraine
https://orcid.org/0000-0003-0110-7291

Innovative factors ensuring strategic changes in sectors of the national economy

Abstract. As an essential component of strategic changes at the national economic level, the process of transformations in industries plays a vital role in creating a favourable environment for attracting investments, developing new technologies, and improving the population's quality of life. This article aimed to determine the features of the formed industry structure of the national economy through an assessment of factors that influence the provision of strategic changes in the sectors of the national economy to determine the direction of strengthening the innovation component of industry transformations. The economic aspects of strategic changes at the national economy level are identified and analysed, considering the features of the country's innovation, investment, and environmental policies, the

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*Corresponding author

productivity of innovations themselves, and the involvement of businesses in the innovation process. An analysis of the level of development of innovation factors that influence the provision of strategic changes in the sectors of the national economy of the studied countries is presented. The assessment of factors influencing the provision of strategic changes in the branches of the national economy (16 factors) was carried out using the construction of an economic and mathematical model. The results obtained showed a direct dependence of strategic changes in national economies on innovation factors. The exception were the factors of state environmental policy and education financing. In the economy of Ukraine, a decrease in the activity of innovation factors was revealed, except for the production potential of business. Focusing on this system of factors will contribute to a comprehensive understanding of modern requirements and management capabilities for ensuring strategic changes in sectors of the national economy through mechanisms of innovative development

Keywords: socio-economic development; sustainable development; types of economic activity; industry structure; transformation; factor influence; technological progress

INTRODUCTION

The process of sectoral transformations as a component of strategic changes at the level of the national economy relates to several key aspects. These include the transition to a more efficient and innovative production model, the development of competitive industries, as well as adaptation to changes in global market conditions. Sectoral transformations play an important role in creating a favourable environment for attracting investment, developing new technologies, and raising the standard of living of the population. Such changes contribute to the reorientation of the economy to a more sustainable and balanced way of development, which is reflected in the general economic growth and social progress of the country. This approach allows to consider strategic changes in the sectors of the national economy as a key element for stimulating innovation, growth, and creating sustainable economic development in the country. The feature of the modern industry environment is that its practices are constantly being researched and reformed in the context of technologies that change these practices because of technical and informational achievements considering the principles of sustainable development. Society, enterprises, and individuals face a system of challenges that are not so easy to overcome.

The value of existing research on ensuring strategic changes in the sectors of national economies can be assessed from different positions. R. Guo *et al*. (2020) found the impact of company size on the ability to transfer knowledge and implement sustainable innovations in business practice. The authors proposed strengthening inter-organisational management as the main motivational factor for stimulating innovative shifts. The researchers focused on small and medium-sized companies' tangible and intangible assets. Small and medium-sized enterprises also became research subjects in innovation implementation in the work of A. Afshar Jahanshahi *et al*. (2020). However, the scientists did not find the impact of business size on companies' innovative activity level. According to the research results, the authors called corporate culture and the level of its development at the enterprise the main drivers of the implementation of green innovations. The main incentive for companies to implement green innovations and processes was identified as a customer-centric corporate culture and market eco-trends.

Increased investment in technological progress and ICT also contributes to economic progress. The availability of finance and economic growth are interdependent, as they create favourable conditions for investment and financing in the market while reducing financial costs and expanding financial services. Many organisations consider green innovation an essential component of their strategy to reduce the negative impact of traditional growth models. F. Han *et al*. (2024) identified public policies and government initiatives as essential components for accelerating green innovation transformations. For example, the Chinese government has already included green innovation in its constitution in 2018, creating a basis for developing a green technology bank to support the implementation of green technologies. Innovation and progress in the field of technology are key growth factors aimed at increasing the dynamics of national economies and reducing the negative impact on the environment. A fundamental problem for modern society, which has become the foundation of green transformation plans in many countries, is the need to reduce CO_2 emissions. Investigating this problem and directions for its possible solution, S. Ding *et al*. (2023; 2024) developed a forecast model for estimating CO_2 emissions, which combines an inventive cumulative generating extinction operator, a data smoothing index, and particle swarm optimisation on carbon emissions. The information accumulated using this model informs decarbonisation plans for Chinese provinces.

Researchers are of broad interest in factors that mediate the potential for innovative changes in business entities and economies. Strategic aspects of the impact of innovations on the expected changes in the socio-economic development of national economies also appear to be unstudied and challenging to assess. Relevance is also added by the dynamism of factors that determine the possibilities of innovative development of the economy. One of the conditions determining the need for further scientific research on the level of innovative development of the economy of Ukraine is the presence of a military conflict. War on the country's territory complicates and slows down the processes of innovative transformations in the national economy. A military conflict causes a significant lag in the Ukrainian economy from the level of development of the EU countries and the world. In this regard, constant monitoring and benchmarking of Ukraine's innovative development level in the context of other countries is necessary to assess the degree of the gap and find possible options for its reduction in the future. These aspects determined the feasibility of conducting this scientific research. The

purpose of the article was to determine the features of the formed sectoral structure of the national economy through the assessment of factors affecting the provision of strategic changes in the sectors of the national economy and to determine directions for strengthening the innovative component of sectoral transformations.

MATERIALS AND METHODS

To determine the optimal number of factors, the following criteria were used in the study: cumulative percentage – those factors are selected as determinants that ultimately cover approximately three-quarters of the original information (the cumulative percentage should be more than 75%); Kaiser's criterion, according to which only factors with an eigenvalue of more than one were selected. According to R.B. Cattell (1966) eigenvalue graph, the number of factors should be left up to the "breaking point". This is the point at which the eigenvalue line becomes aligned (levelled). If the number of factors is large and the increase in explanatory variance is too small, then the approximate number of factors can be taken at the level of the first or second breaking level of the graph. To assess the factors influencing the provision of strategic changes in the sectors of the national economy in different countries, a system of indicators has been developed that considers the following requirements: the significance of indicators and their groups for state management of sustainable development based on the innovative component. Based on the results of the analysis of the current state of socio-economic aspects of ensuring strategic changes in the sectors of the national economy in the countries of the world (in particular, in Ukraine), it was established that its development is influenced by the results of the activities of the sectors themselves, their age, quality, professional structure, and conditions, which have developed in the external environment and leave an imprint on the organisation of relations with other participants (partners, actual and potential consumers of business products). The comparability of indicators included in the economic-mathematical model is already ensured in the procedure of the factor analysis itself, which allows the use of data expressed in different units of measurement. The internal calculation mechanism eliminates such incomparability through the procedure of their standardisation.

Thus, because of modelling, enough factors are formed to describe the dynamics of the entire array of primary information in dimensionless (relative) units. This approach allowed to compare them with each other and build dynamic series while using a significantly smaller array of information for further calculations and conclusions. With the possibility of regulating indicators and forecasting the level of changes in factors that can act as indicators of development, based on which it is appropriate to justify measures to improve the system of ensuring strategic changes in the sectors of the national economy in the global (cluster) structure in general and the national economy of an individual country in particular. With the ability to forecast not only the components themselves, defined as influencing factors, but also based on their totality, it is possible to calculate the integral indicator of development and its forecast model if necessary. Considering the above, Table 1 presents the system of indicators that served as initial data for factor modelling and their notation in the model.

Table 1. The composition of the initial indicators regarding the assessment of the provision of strategic changes in the sectors of the national economy

Indicator	Legend in the model
Population, thousand persons	X1
Gross national income (GNI) per capita, USD	X2
Urban population, % of total population	X3
Export of agricultural products, million USD	X4
Human freedom index	X5
Employment rate, %	X6
Social progress index	X7
Digital competitiveness ranking	X8
Value added of services, % of GDP	X9
Value added of production, % of GDP	X10
Human development index	X11
Global innovation index (GII)	X12
Aquaculture production, metric tons	X13
Terrestrial protected areas, % of total land area	X14
Government expenditure on education, total, % of government spending	X15
Life expectancy at birth, years	X16

Source: created by the authors

The indicators were selected based on the analysis of literary sources devoted to the analysed issues (Zatonatska & Voznenko, 2019; Commission Staff Working Document No. 52021SC0352, 2021; Key enabling technologies policy, 2022; Kunytska-Iliash & Berezivskyi, 2023; Problems and prospects..., 2023) and taking into account the specifics of the socio-economic and organisational and cultural environment, the importance of the selected socio-economic phenomenon for the fulfilment of the tasks set before it, and the purpose of the study. The availability of information and the complexity of additional calculations were also considered. A number of the indicators employed

in the analysis are not available for the subsequent years. Thus, summarising information on all selected statistical indicators for 2021 led to a reduction of the sample to 62 countries of the world. To better select the factors and increase the factor load of the components of them, the normalised Varimax rotation method is used in the work, which allowed to maximise the variance between the factors and provides the possibility of its simpler interpretation in the case of multidimensionality of the initial data. They were formed using official sources of statistical information (Expenditure..., 2020; Agricultural products, 2021; Terrestrial..., 2021; Aquaculture..., 2022; Human development index, 2022; Services..., 2022; GNI per capita..., 2023; Vásquez *et al.*, 2023; Manufacturing..., 2023; Social progress..., 2023; The World Factbook, 2023; Unemployment..., 2023; Urban population..., 2023; World Intellectual Property Organization, 2023; World digital..., 2024; World Health Organization, 2024). The selected indicators were checked for the correlations, based on the results of which correlated indicators (X7, X11, X12) were excluded from the model. Therefore, the basis of the analysis was the observations for the specified period on the following variables: X1, X2, X3, X4, X5, X6, X8, X9, X10, X13, X14, X15, X16.

RESULTS

Processes of structural transformations call for the establishment of a certain type of relationship between enterprises and the authorities, between clusters of enterprises, between countries, etc. The reason why it is so important to consider the influence of the external environment when analysing strategic changes in the sectors of the national economy is based on their concept. This opinion is so widespread that when defining the concept of strategic changes in the sectors of the national economy, attention is focused on the process of transformations that take place in specific sectors of the economy of the countries in order to increase their efficiency, competitiveness, and impact on general economic development (Zatonatska & Voznenko, 2019; Kunytska-Iliash & Berezivskyi, 2023). This process may include the following aspects: structural changes (transition from traditional to new sectors of the economy, changes in production, consumption and distribution of resources); innovations and technological progress (development of new technologies, their integration into production and implementation of innovative methods and processes); development of human resources (investment in training and improving the qualifications of the workforce to meet the requirements of new sectors of the economy); regulatory policy (implementation of new rules and policies to promote the development of specific industries, types of activities or reform existing rules to stimulate economic growth and investment); international competition (promoting the development and competitiveness of export-oriented industries); strategic partnerships and investments (formation of integrated business structures with companies that have technological or financial resources for the joint development of new sectors of the economy.

From an economic point of view, the processes and results of structural transformations of the economy depend on the face of such challenges as high inflation and interest rates, geopolitical conflict, and the market consequences of the COVID-19 pandemic, which is evidence of the power of innovation. As per the latest data by the World Intellectual Property Organization (2023), global investment in research and development (R&D) saw a substantial increase, reaching 5.2% in 2021 compared to 2020. This growth rate is almost on par with the 6% growth rate observed in 2019, pre-pandemic. Notably, business spending on R&D surged by 7% in 2021, marking the highest growth rate since 2014. Key players in the innovation market also showed a significant increase in R&D spending in 2021: China (9.8%), the United States of America (5.6%), Japan (3.6%), Germany (2.7%), and the Republic of Korea (7.1%). Even excluding the significant contribution of the United States and China, global R&D in 2021 experienced growth of 2.7%. The growth rate of business R&D is also positive, at 4.1% in 2021 compared to a decrease of 1.7% in 2020. According to the report from the World Intellectual Property Organization (2023), Ukraine entered the group "Productivity above the expected level of development". The level of innovation productivity of national economies varied depending on the income level across country groups (Table 2; Fig. 1).

Table 2. Innovation performance at different income levels (performance above expectation for level of development)

High-income group	GII (Score)	Upper middle-income group	GII (Score)	Lower middle-income group	GII (Score)	Low-income group	GII (Score)
Switzerland	67.6	China	55.3	India	38.1	Rwanda	20.6
Sweden	64.2	Thailand	37.1	Viet Nam	36.0	Madagascar	19.1
United States	63.5	Brazil	33.6	**Ukraine**	32.8	Burundi	12.5
United Kingdom	62.4	North Macedonia	33.0	Philippines	32.2		
Finland	61.2	South Africa	30.4	Indonesia	30.3		
Netherlands (Kingdom of the)	60.4	Republic of Moldova	30.3	Mongolia	28.8		
Germany	58.8	Jordan	28.2	Morocco	28.4		
Denmark	58.7	Jamaica	27.1	Tunisia	26.9		
Republic of Korea	58.6			Uzbekistan	26.2		

Table 2. Continued

High-income group	GII (Score)	Upper middle-income group	GII (Score)	Lower middle-income group	GII (Score)	Low-income group	GII (Score)
France	56.0			Pakistan	23.3		
Japan	54.6			Senegal	22.5		
Israel	54.3						
Canada	53.8						
Estonia	53.4						

Source: created by the authors based on World Intellectual Property Organization (2023)

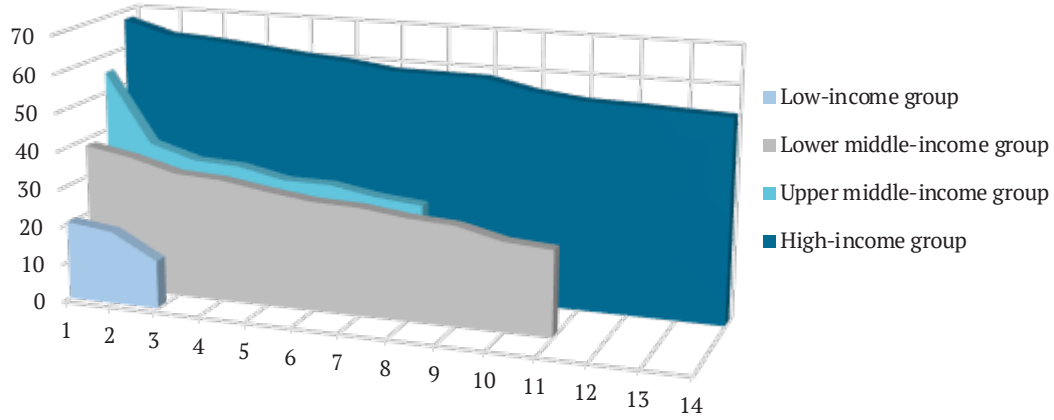

Figure 1. Distribution of countries with high innovation productivity according to the GII depending on the level of income

Source: created by the authors based on World Intellectual Property Organization (2023)

As can be seen from the given distribution, most of this group of innovative productivity is represented by high-income and lower-middle-income countries (more than 69%). The economic interpretation can be as follows: when incomes are significant, a surplus of funds can be directed to innovative development, and innovations are considered a source of subsequent income. Suppose the income is below the average level. In that case, more than one's funds are needed to develop innovations, investors are needed, and innovative products are perceived as ways to improve or optimise processes and costs. Such features determine high innovative productivity, considering a particular country's innovative investment and environmental policy. Thus, all processes in the field of enterprise activity are interconnected and mutually conditioned, both by the internal and external environment. Regarding innovation efficiency, technological progress is the main driver for improving innovation performance (Lin *et al.*, 2019). In addition, strategic economic initiatives can achieve significant achievements in industry by collaborating with enterprises, academic institutions, and research organisations to create a unified innovation sector, which is critical to the sustainable development and strategic transformation of national economic sectors (Ding *et al.*, 2024). According to compliance with the criteria for explaining the variation of indicators and load values, Table 3 shows the values of the contribution of factors to the total variability of their aggregate. As the data shows, the selected factors are significant: their eigenvalues are > 1. Furthermore, the first factor makes the largest significant contribution, explaining 32.051% of the variability, and together, the four factors explain 75.623% of the total variance of the indicators. This shows that the factor analysis carried out based on the given data made it possible to present the original variables at the level of 75.623% commonality, which reflect the provision of strategic changes in the sectors of the national economy of the represented countries in 2021, with four independent variables (Table 4).

Table 3. Contribution of factors to the total variance

Factor	Eigennumber	Total variance, %	Cumulative variance, %
F1	4.167	32.051	32.051
F2	2.275	17.499	49.550
F3	1.634	13.566	63.116
F4	1.059	12.507	75.623

Source: created by the authors

Table 4. Data for factor analysis by country

Salary No.	Country	Population, thousand persons	GNI per capita, USD	Urban population, % of total population	Export of agricultural products, million USD	Human freedom index	Employment rate, %	Social progress index	Rating of the digital collective enterprise, score	Services, value added, % of GDP	Manufacturing, value added, % of GDP	Human development index	GII	Aquaculture production, metric tons	Terrestrial protected areas, % of total land area	Government expenditure on education, total, % of government spending	Life expectancy at birth, years
		X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16
1	Argentina	45,195.8	20,925	92.229	42.673	7.38	53.8	78.64	43.64	52.5	15	0.842	29.80	3,687	8.48	12.28	75.4
2	Australia	25,499.9	49,238	86.362	46.716	8.84	61.9	87.83	78.68	65.7	6	0.951	48.30	126,206.3	20.36	13.13	84.5
3	Austria	9,006.4	53,619	58.995	21.313	8.67	57.3	88.05	80.88	62.4	17	0.916	50.90	4,920.39	29.28	8.85	81.6
4	Belgium	11,589.6	52,293	98.117	57.802	8.61	51.1	87.22	75.26	68.8	12	0.937	49.20	223	15.49	11.32	81.9
5	Botswana	2,351.6	16,198	71.56	136	7.9	46.1	65.89	33	63.6	6	0.693	24.68	163	29.14	21.46	61.1
6	Brazil	212,559.4	14,370	87.317	111.086	7.22	51.7	71.26	51.48	59.4	10	0.754	34.20	650,356.3	30.31	12.28	72.8
7	Bulgaria	6,948.4	23,079	76.025	7.348	8.08	53	76.81	50.78	62.3	10	0.795	42.40	15,173.62	41.04	10.56	71.8
8	Canada	37,742.2	46,808	81.653	87.299	8.85	61	88.17	87.31	69.6	10	0.936	53.10	191,449	11.91	11.05	82.7
9	Chile	19,116.2	24,563	87.817	23.976	8.44	51.9	80.78	61.8	36.8	9	0.855	35.10	1,443,520	20.89	19.36	78.9
10	China	1,439,323.8	17,504	62.512	88.526	5.57	64.7	65.74	84.43	53.3	27	0.768	54.80	72,805,297	15.62	10.85	78.2
11	Colombia	50,882.9	14,384	81.74	9.433	7.01	56.9	69.83	45.45	58	12	0.752	31.70	192,521	16.91	15.68	72.8
12	Croatia	4,105.3	30,132	57.878	4.325	8.16	48.3	82.32	49.75	60.4	11	0.858	37.30	26,830.7	38.36	10.72	77.6
13	Cyprus	1,207.4	38,188	66.856	555	8.42	58.9	83.18	59.37	73.2	6	0.896	46.70	7,862.3	38.59	12.74	81.2
14	Czech Republic	10,708.9	38,745	74.214	13.780	8.61	58.6	85.19	65.22	58.8	21	0.889	49.00	20,991	22.16	10.88	77.7
15	Denmark	5,792.2	60,365	88.24	25.053	8.98	59.5	90.54	95.16	66.7	12	0.948	57.30	40,594.2	16.97	11.89	81.4
16	Estonia	1,326.5	38,048	69.415	3.202	8.91	59.7	86.16	75.42	62.5	13	0.890	49.90	849.45	21.33	14.25	77.1
17	Finland	5,540.7	49,452	85.596	9.045	8.85	55.7	90.46	90.13	59.8	9	0.940	58.40	14,399.4	13.33	10.23	82.0
18	France	65,273.5	45,937	81.242	86.216	8.34	51.1	86.07	75.66	70.3	24	0.903	55.00	198,885.7	27.98	8.88	82.5
19	Germany	83,783.9	54,534	77.544	104.151	8.73	59.6	88.72	79.33	62.9	19	0.942	57.30	32,649	37.45	8.85	80.6
20	Greece	10,423.1	29,002	80.038	10.189	7.86	45.6	82.44	55.62	68.2	9	0.887	36.30	143,925.6	35.22	7.11	80.1
21	Hong Kong, China	7,182.7	62,607	100	9.487	8.41	56.3	65.74	96.58	89.6	1	0.952	53.70	3,908.87	41.88	12.82	85.5
22	Hungary	9,660.4	32,789	72.245	12.584	7.73	56.4	78.21	55.23	57	17	0.846	42.70	17,846.74	22.60	10.36	74.5
23	Iceland	341.2	55,782	93.944	2.781	8.77	64.6	89.54	77.61	64.6	9	0.959	51.80	53,136	20.30	15.61	82.7
24	India	1,380,004.4	6,590	35.393	50.490	6.39	43.9	60.19	55.13	47.5	14	0.633	36.40	9,408,300	7.52	14.65	67.2
25	Indonesia	273,523.6	11,466	57.29	65.099	7.1	64.7	66.67	50.15	42.8	19	0.705	27.10	14,606,534	12.17	16.07	67.6
26	Ireland	4,937.8	76,169	63.912	17.373	8.9	58.5	87.69	79.16	55.4	35	0.945	50.70	42,099	14.44	12.02	82.0
27	Israel	8,655.5	41,524	92.674	2.546	7.66	59.8	83.17	79.58	72.4	10	0.919	53.40	14,875	24.49	18.43	82.3
28	Italy	60,461.8	42,840	71.346	63.664	8.49	44.3	85.23	61.77	65.2	15	0.895	45.70	145,861.9	21.49	7.44	82.9
29	Japan	126,476.5	42,274	91.867	14.117	8.73	60	88.19	73.01	69.5	20	0.925	54.50	963,679.6	29.75	7.43	84.8
30	Jordan	10,203.1	9,924	91.626	1.361	6.91	31.4	67.32	52.52	61.1	17	0.720	28.30	2,145	4.47	9.68	74.3
31	Kazakhstan	18,776.7	23,943	57.821	3.935	6.77	65.7	71.21	66.07	53.9	14	0.811	28.60	5,438.4	10.03	24.08	69.4
32	Korea, Republic	25,778.8	44,501	81.414	15.905	8.39	79.6	86.47	89.72	57	25	0.925	59.30	2,427,677	16.97	12.83	83.7
33	Latvia	1,886.9	32,803	68.421	6.491	8.67	55.9	82.46	63.86	63.7	12	0.863	40.00	901.4	18.19	12.65	73.6
34	Lithuania	2,722.3	37,931	68.249	8.037	8.68	57.3	83.71	70.34	60.7	16	0.875	39.90	5,137.71	17.05	12.74	73.7

Table 4. Continued

Salary No.	Country	Population, thousand persons	GNI per capita, USD	Urban population, % of total population	Export of agricultural products, million USD	Human freedom index	Employment rate, %	Social progress index	Rating of the digital collective enterprise, score	Services, value added, % of GDP	Manufacturing, value added, % of GDP	Human development index	GII	Aquaculture production, metric tons	Terrestrial protected areas, % of total land area	Government expenditure on education, total, % of government spending	Life expectancy at birth, years
		X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16
36	Malaysia	32,365.9	26,658	77.696	36.577	7.17	62	74.08	73.29	51.6	23	0.803	41.90	416,978.4	13.33	20.46	74.9
37	Mexico	128,932.8	17,896	81.016	46.712	6.92	56.7	70.84	48.74	59.2	18	0.758	34.50	246,913.7	14.49	16.19	70.2
38	Mongolia	3,278.3	10,588	68.785	504	8	55.8	67.21	40.69	39.6	7	0.739	34.20	0.00	19.79	9.99	71.0
39	Netherlands	17,134.9	55,979	92.572	129.038	8.78	64.2	88.97	93.31	69.4	11	0.941	58.60	40,590	22.48	11.02	81.7
40	New Zealand	4,822.2	44,057	86.789	54.541	9.01	66.9	87.26	77.13	65.6	10	0.937	47.50	116,839	33.39	14.29	82.5
41	Norway	5,421.2	64,660	83.323	16.004	8.75	63.3	90.74	91.3	52.5	5	0.961	50.40	1,665,112	29.92	10.27	83.2
42	Peru	32,971.9	12,246	78.5	12.720	7.93	71.7	70.7	47.23	49.2	13	0.762	31.20	150,817.6	22.27	16.71	72.4
43	Philippines	109,581.1	8,920	47.684	7.616	6.83	56.2	67.46	47.16	61	18	0.699	35.30	2,272,528	15.87	16.72	69.3
44	Poland	37,846.6	33,034	60.075	47.064	7.96	55	80.17	60.94	56.9	17	0.876	39.90	44,787	39.54	11.17	76.5
45	Portugal	10,196.8	33,155	66.849	11.513	8.69	54.7	84.75	65.18	64.7	12	0.866	44.20	19,516.48	22.91	9.71	81.0
46	Qatar	2,881.1	87,134	99.278	57	6.16	87.5	66.47	70.48	44.8	9	0.855	31.50	113.9	15.78	9.32	79.3
47	Romania	19,237.7	30,027	54.329	12.434	8.33	50.4	76.89	51.97	58.2	16	0.821	35.60	11,714	24.52	8.14	74.2
48	Russian Federation	144,386.8	27,166	74.934	43.804	6.23	58.3	71.99	60.27	52.9	14	0.822	36.60	319,342	11.45	8.94	69.4
49	Saudi Arabia	34,813.9	46,112	84.508	4.844	5.12	57	63.89	64.35	46.7	13	0.875	31.80	114,489.7	4.76	19.26	76.9
50	Singapore	5,850.3	90,919	100	16.058	7.98	66.3	83.76	95.14	69.4	21	0.939	57.80	5,243.56	5.55	13.06	82.8
51	Slovak Republic	5,459.6	30,690	53.82	5.223	8.21	56.6	81.29	54.2	59.1	20	0.848	40.20	2,304	37.59	9.35	74.9
52	Slovenia	2,078.9	39,746	55.427	4.139	8.37	55.5	84.19	64.97	57.7	20	0.918	44.10	1,685.9	40.36	11.50	80.7
53	South Africa	59,308.7	12,948	37.323	14.257	7.3	35.9	69.95	43.64	63	12	0.713	32.70	10,525.32	8.69	18.49	62.3
54	Spain	46,754.8	38,354	81.056	74.156	8.56	49.3	85.35	68.21	67.4	12	0.905	45.40	279,910	28.12	9.16	83.0
55	Sweden	10,099.3	54,489	88.238	21.187	8.83	59.7	89.42	95.19	64.8	13	0.947	63.10	15,253	14.52	13.49	83.0
56	Switzerland	8,654.6	66,933	73.996	11.301	9.11	64.1	90.26	94.94	71.9	18	0.962	65.50	2,364	12.13	14.55	84.0
57	Thailand	69,799.9	17,030	52.163	47.389	6.89	65.1	69.8	63.16	56.7	27	0.800	37.20	989,898	18.55	11.88	78.7
58	Türkiye	84,339.1	31,033	76.569	25.953	5.79	44	66.59	52.84	52.8	22	0.838	38.30	471,686	6.95	8.81	76.0
59	Ukraine	43,733.8	13,256	69.757	27.593	6.86	50.8	74.17	50.07	51.8	10	0.773	35.60	16,881.8	12.96	14.25	71.6
60	United Arab Emirates	9,890.4	62,574	87.299	15.746	6.06	74.8	70.7	90.52	51.6	10	0.911	43.00	2,662.94	19.35	14.76	78.7
61	United Kingdom	67,886.0	45,225	84.152	31.330	8.75	60.2	86.13	85.83	71.5	9	0.929	59.80	230,279.5	28.74	11.23	80.7
62	United States of America	331,002.7	64,765	82.873	201.572	8.73	58.2	84.65	100	77.6	11	0.921	61.30	448,614.6	13.02	12.65	77.2

Source: created by the authors based on Expenditure on tertiary education (% of government expenditure on education) (2020), Agricultural products (2021), Terrestrial protected areas (% of total land area) (2021), Aquaculture production (metric tons) (2022), Human development index (2022), Services, value added (% of GDP) (2022), GNI per capita, Atlas method (current US$) (2023), I. Vásquez *et al.* (2023), Manufacturing, value added (% of GDP) (2023), Social progress index rankings (2023), The World Factbook (2023), Unemployment (%) (2023), Urban population (% of total population) (2023), World Intellectual Property Organization (2023), World digital competitiveness ranking (2024), World Health Organization (2024)

Then, it is necessary to check the expediency of leaving four factors by the method of constructing a graph of eigenvalues ("stone scree") proposed by R.B. Cattell (1966) and N. Cliff (1987). Considering the above methodical recommendations regarding this criterion, from Figure 2, it could be maintained that the break occurs on component 4, and already from component 5, coordination and visual alignment of the graph begin.

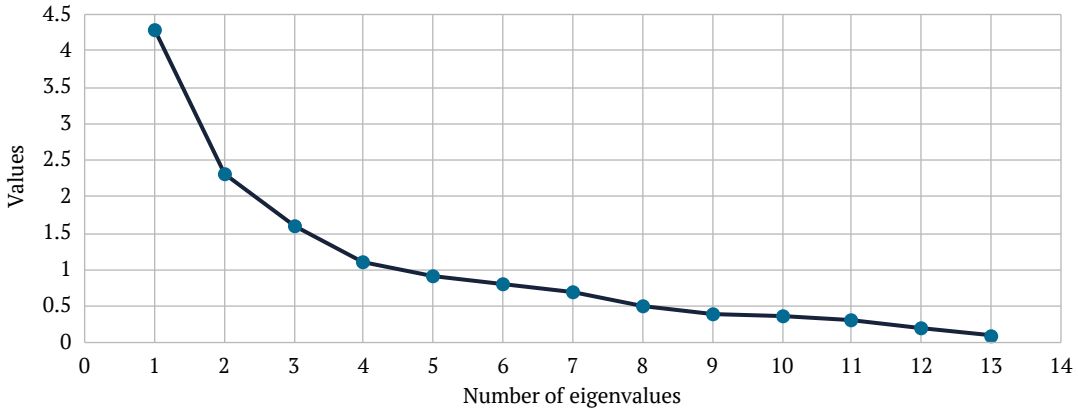

Figure 2. Graph of eigenvalues of factors

Source: made by the authors

Theoretically, it would be possible to leave three or four factors. Considering that three factors explain only a little more than 63% of the variance and four factors – more than 75% of the variance – makes sense to leave exactly four factors in the model. In the article, for the economic interpretation of the obtained factors, it is advisable to consider the values of their coefficients of scales (factor loadings), which are given in Table 5.

Table 5. Values of the factor loadings of the components

Indicator	Factor			
	F1	F2	F3	F4
X1	–0.189	**–0.867**	–0.194	–0.169
X2	**0.849**	0.120	0.276	0.034
X3	0.663	0.106	0.019	0.429
X4	0.134	–0.678	0.152	0.137
X5	0.298	0.237	0.698	0.144
X6	**0.712**	0.055	–0.309	–0.161
X8	**0.878**	–0.229	0.205	0.057
X9	0.297	–0.098	0.629	0.399
X10	0.021	–0.154	–0.092	**0.859**
X13	–0.022	**–0.791**	–0.180	–0.277
X14	–0.070	0.138	**0.700**	0.146
X15	–0.084	0.111	**–0.701**	0.361
X16	**0.766**	0.009	0.492	–0.076

Source: created by the authors

Since the factor loadings on the relevant indicator are the correlation coefficient between them, the components of the factors are determined by the loadings, the values of which exceed 0.7. Analysis of the data given in Table 5 allows to draw the following conclusions. To the first factor (F1) with loadings of 0.849, 0.712, 0.878, and 0.766, respectively, included indicators: GNI per capita (X2), employment rate (X6), digital competitiveness rating (X8), and life expectancy at birth (X16). The grouping of the specified indicators into one factor can have the following economic interpretation. The indicator GNI per capita (X2) entered the model with a positive indicator loading, so its increase will lead to improvement of the conditions for ensuring strategic changes in the sectors of the national economy. The meaning of this form of dependence can be explained as follows. If the indicator of the GNI per capita increases, it can lead to the following improvements in the conditions for ensuring strategic changes in the sectors of the national economy: an increase in investments, since a high GNI per capita can stimulate the inflow of investments in order to ensure the effective modernisation of economic sectors; the development of infrastructure because the increase in the income of the population promotes investments in the improvement of infrastructure, which will have the effect of supporting the development of sectors of the national economy; the growth of consumer demand, which will grow due to the greater solvency of the population, and demand, as it is known, is the root cause of the manufacturer's choice of a type of activity, the development of economic sectors, a change of their importance in the national economy, etc.

An increase in the competitiveness of manufacturers and the national economy in the international arena will be the result of an increase in financial resources available for the implementation of strategic projects in various sectors of the economy. This can help to implement the latest technologies, increase productivity, and improve the quality of products and services. A high level of GNI can make the country more attractive to foreign investors, which in turn stimulates the development of both existing and new sectors of the economy. Therefore, from the point of view of ensuring innovative development and strategic changes in the sectors of the national economy for any country, the amount of GNI per capita becomes an indicator of development and a source of funding for such development.

The level of employment (X6) was also included in the model with a positive value of the indicator loading, so its increase should have a favourable effect on the implementation of strategic changes in the sectors of the national economy. Indeed, the unemployed do not belong to the personnel of any economic entity and cannot participate in the formation or support of certain industry transformations, strengthening of innovative solutions, development of production implementations, etc. They can replenish the ranks of "stowaways", that is, be consumers of the products of the relevant industry. The growth of unemployment is a manifestation of non-acceptance of the ongoing reforms, a decrease in tax discipline, which collectively leads to budget losses and the inability to ensure the creation of public wellbeing. Therefore, in this case, the legalisation of labour relations and employment in general acts objectively as a factor of structural changes and reduces the shortage of personnel resources of operating enterprises.

The rating of digital competitiveness (X8) because of modelling also turned out to be a stimulant; the more it grows in the national economy, the more positive its impact on innovation capacity becomes. In part, the reasons for such interdependence coincide with the previous indicator. Because digital transformations of enterprises make it easier to enter foreign and domestic markets, especially under the conditions of mastering e-commerce. Digital technologies are widely used in marketing activities as a factor for improving the customer experience; they are effective in communication with consumers or potential customers, as well as for establishing internal relations (planners; automated databases of customers and suppliers; systems for monitoring and evaluating the performance of personnel, individual divisions, profit and cost centres, the enterprise, etc.).

The indicator of life expectancy at birth (X16) has a positive indicator loading in the model, so its increase will have a favourable effect on the processes of formation and development of strategic changes in the sectors of the national economy. It turns out that the constant increase of this indicator will have a positive effect on the conditions for ensuring strategic changes in the sectors of the national economy. It should be outlined that this dependence must be understood correctly: after reaching the retirement age, employment is generally limited, and when certain aspects of the innovative development of a specific enterprise (or clusters of enterprises) change, especially with high staff turnover, people who work in a team for a long time do resist such changes. The dynamics of this indicator may cause ambiguous effects and may have certain features in each industry. In general, the combination of these indicators for any country reflects the potential income from labour, the growing burden on the budget due to pension payments, and the actual increased life expectancy of the population. It is logical to observe such shifts in the improvement of living conditions, which is embedded in the concept of sustainable development.

Thus, the combination of the above indicators as part of the F1 reflects the importance and transparency of the state policy of socio-economic development to create favourable conditions for living and doing business. These indicators are related to the level of economic development of the country. GNI per capita indicates a country's economic well-being, employment rate indicates the availability of jobs for the population, digital competitiveness indicates a country's technological progress, and life expectancy is an indicator of the level of health care and general well-being of the population. Indirectly, they reflect the possibilities of innovative development and the reactions of businesses and citizens to the actions of the state. The structure of the F1 makes it possible to interpret a new aggregated variable – the well-being of the population and the digital development of business – which have a significant impact on the processes of policy formation and ensuring strategic changes in the sectors of the national economy. The second factor (F2) contains two indicators: population size (X1 – loading –0.867) and volume of aquaculture products (X13 – loading –0.791). Moreover, both indicators are in the model with a negative load, which can be explained as follows.

When the population grows, the innovative development of sectors of the national economy decreases due to the limited provision of their strategic changes. Especially if there is a declining dynamic of the economically active population. Such interdependence can be explained if the fact of a change in the number of people in the country is perceived as a consequence of the appearance of at least one of the reasons, the occurrence of which creates the need to state the severance of a person's relations with the corresponding country: one's own desire to migrate, violation of discipline (deportation), a valid reason caused by the impossibility to live and work further in this country (transfer of a husband or wife to work in another country; moving to a new place of residence; impossibility of living in this area, confirmed by a medical opinion; leaving the country for security reasons, death of an individual, etc.). Given the conditions of 2022-2024 in Ukraine, many people have lost contact with the country due to security issues; mortality and disability have also increased. For countries in which hostilities are not taking place, it makes sense to separately consider the state of the environment and indicators of birth/death rates and population growth due to migration reasons. The migration component of the population change process is also a rather ambiguous factor, which is explained by the complexity and multifaceted consequences of migration in the economic and social plan. Migration could be due to a protracted crisis or a threat to national values, but now it has acquired new features because some of those who went abroad will return, some have decided, and some will not. Therefore, the effects of migration can be both positive and negative for innovative development.

With an increase in the volume of aquaculture products (X13), the process of ensuring strategic changes in the sectors of the national economy, according to the logic of the model, should deteriorate. According to the Law of Ukraine No. 5293-VI (2012), aquaculture (fish farming) is represented by the agricultural activity of artificial breeding, maintenance and cultivation of aquaculture facilities in fully or partially controlled conditions for obtaining agricultural products (aquaculture products) and their sale, feed production, reproduction of biological resources, conducting selection and breeding work, introduction, resettlement, acclimatisation and reacclimatisation of hydrobionts, replenishment of aquatic biological resources, preservation of their biodiversity, as well as provision of recreational services. In the context of compliance with the principles of sustainable development, a reasonable reduction in the production of such products and less interference with the natural environment is considered logical. In practice, if with an increase in the volume of aquaculture products, the process of ensuring strategic changes in the sectors of the national economy deteriorates, there may be several reasons. One possible reason is insufficient infrastructure or resources to effectively distribute and supply this increased output. There may be non-systemic management problems or a lack of necessary strategic plans to take advantage of the new opportunities that arise with the growth of aquaculture volumes. Without proper attention to these aspects, the situation in this industry and related industries of the national economy may worsen.

The combination of both indicators (population and volume of aquaculture products) in the model has the following economic effect. Both indicators reflect the economic potential of regions in the country: a high volume of aquaculture products indicates the development of the agricultural sector and its profitability, and a large population can indicate the presence of a wide consumer market. The possibility of the development of the aquaculture sector in the region, because the increase in population can contribute to the demand for aquaculture products, which, in turn, can cause an increase in its volumes. Population and aquaculture production can mutually influence each other: a developed aquaculture sector can create new jobs and support economic growth in regions (country), which in turn can lead to population growth through labour migration.

However, thinking about why the combination of these indicators creates one disincentive factor may be based on the inexpediency of focusing on this sector in the long term, because the steady dependence of the economy on the aquaculture sector can lead to instability and risk for the national economy for several reasons. Any problems or crisis situations in this area can lead to serious obstacles to economic growth. For example, fish diseases or changes in climatic conditions can lead to significant reductions in production and profits in the aquaculture industry. One-sided specialisation in aquaculture can lead to job losses and reduced employment if the industry experiences crisis situations. This can cause social problems and economic instability both in individual regions and in the country. Therefore, to ensure stable economic development, it is important to develop a diversified economy, avoid excessive dependence on one industry, and consider the risks associated with such dependence. The given structure of the F2 makes it possible to interpret a new aggregated variable – the intensity of the development of the consumer base and innovative strategies for preserving biodiversity, which have a significant impact on the processes of organisation and ensuring strategic changes in the sectors of the national economy.

As for the third factor (F3), it includes two indicators: state terrestrial nature conservation areas (X14 with a weighting factor of 0.700) and state spending on education (X15 with a weighable factor of −0.701), which allows it to be interpreted as the state policy of nature use and education financing. The first indicator is included in the factor model with a positive indicator loading, i.e., an increase in the share of nature conservation areas (as a percentage of the total area) causes a strengthening of the provision of strategic changes in the sectors of the national economy. For example, the economy of Ukraine is characterised by a high specific weight of resource-intensive and energy-intensive technologies, the introduction and expansion of which was carried out in the most cost-effective way – without sufficient construction of appropriate treatment facilities. This was possible in the absence of effectively functioning legal, administrative, and economic mechanisms of nature management and without taking into account the requirements of environmental protection. And for any country, a purely resource-based approach remains relevant: the more nature conservation areas, the less land resources can be used by enterprises, which, of course, reduces the prospects for expanding both agricultural land and industrial zones. The transition of enterprises to the principles of the circular economy can be an innovative factor in solving such issues.

Moreover, it should be noted that increasing the share of public spending on education in modern conditions is not an absolute priority for most countries. School education is clearly supported, but further development of the educational component of human capital becomes under the control of the education seekers themselves and enterprises that are interested in the corresponding development. In this way, the sectoral profiling of education, which is relevant to the needs of the national economy, is ensured. Therefore, a negative indicator loading can be perceived as a fact that the reduction of the share of expenses in the total amount of public spending on education as an opportunity to redirect funding to the innovative development of industries. Thus, the combination of such indicators, which reflect the shares of state terrestrial nature conservation areas and state spending on education in a certain country, into one factor in modern conditions looks quite logical. The fourth factor (F4) contains one indicator: the added value of production in GDP (X10 – loading 0.859), which allows it to be interpreted as the production potential of business in the country. The indicator in the model is present with a positive load, so an increase in the added value of the production sphere causes a strengthening of the provision of strategic changes in the sectors of the national economy. From an economic point of view, such interdependence is manifested for the following reasons.

Stimulation of investments: this effect is explained by the fact that investments in modern technologies and R&D can support strategic changes aimed at increasing

competitiveness and stability of the economy. Development of innovations and high-tech industries: as practice shows, an increase in added value can be reflected accordingly in the development of innovative technologies and production methods. The same applies to high-tech sectors of the economy, which are of strategic importance for the competitiveness of a certain country in the global market environment. In turn, innovation becomes a driver of strategic change, allowing industries to adapt to new challenges and market conditions. The increase in labour productivity is due to the introduction of new technologies, personnel training, and optimisation of production processes. As a result, it can stimulate production growth and create new opportunities for further strategic changes. The creation of new investment markets because of increased added value can create new opportunities for investment in other sectors of the economy, which, in turn, can support strategic changes and the development of various related and supporting industries. Therefore, increasing the added value of the production sphere, as a rule, plays a key role in ensuring strategic changes in the sectors of the national economy, contributing to their sustainable development and competitiveness. Thus, the given composition of significant indicators of four factors, obtained because of the conducted factor analysis based on statistical data of 62 countries, allows to draw the following general conclusions.

Thus, conditions for the formation and level of ensuring strategic changes in the sectors of the national economy based on innovations for the analysed period are determined by the following factors: population well-being and digital business development (F1); intensity of development of the consumer base and innovative strategies for preserving biodiversity (F2); state policy of nature use and financing of education (F3); production potential of business in the country (F4). Most factor loadings on indicators are positive (X2, X6, X8, X10, X14, X16), which indicates the existence of a high directly proportional orientation of the action of the identified components to ensure strategic changes in the sectors of the national economy. Such indicators are stimulants for strategic industry changes based on innovation, as their growth will have a positive effect on such a result in the end. And the received indicators with a negative loading (X1, X13, and X15) are destimulants regarding such provision; that is, when they increase, the state of the phenomenon under study will worsen.

The innovative components (factors) of ensuring strategic changes in the sectors of the national economy in the analysed countries for 2021 are multidirectional and have different intensity, as it is shown in Figure 3-6, and they are displayed by the values of the factors by country, respectively. The results of the analysis of the actual values of the factor "well-being of the population and digital business development" (F1) in terms of the studied countries showed (Fig. 3) that Singapore, Qatar, Korea, the United Arab Emirates, Switzerland, and the Netherlands have the largest positive values, and Denmark, given the complexity of the factor exclusively from stimulants, is evidence of a high standard of living and digitalisation of business as an innovative factor of ensuring strategic changes in the sectors of the national economy.

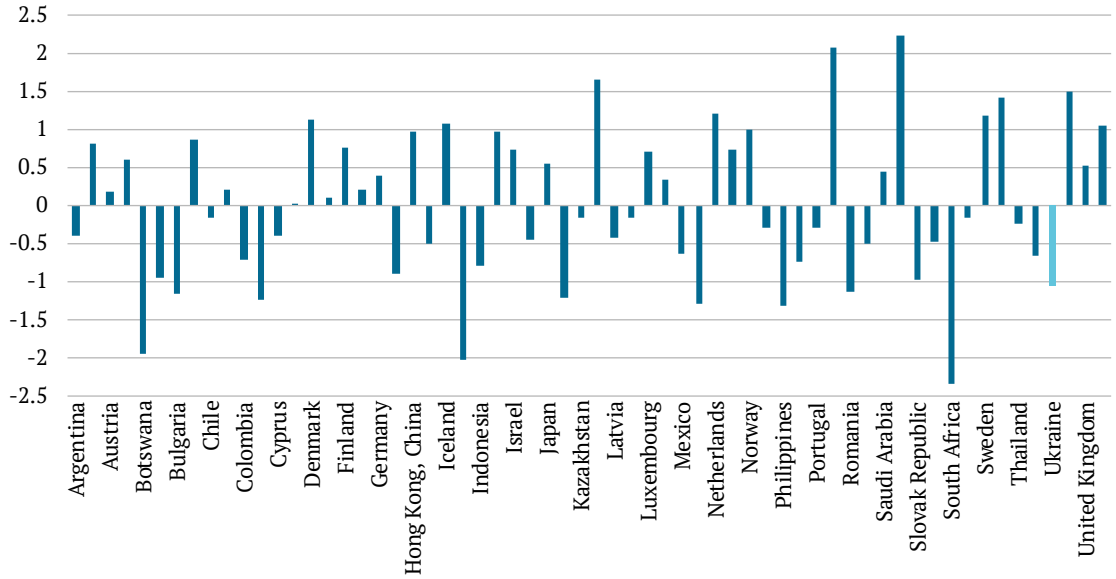

Figure 3. Actual values of the factor "population well-being and digital business development" (F1) by country
Source: created by the authors

Ukraine is positioned in the lower (negative) part of the diagram with a value of −1.05, which indicates significant risks. Issues of employment, income of the population, and the decrease in life expectancy, especially for men, remain problematic. Under martial law, these risks are further exacerbated by mortality, high business costs, uncertainty, and migration. The only steadily improving aspect remains the rapid digitisation of business. The review of the actual values of the factor "intensity of consumer base development and innovative biodiversity preservation strategies" (F2) in the section of the given countries proves the best indicators in China, India, Brazil, and the Netherlands (Fig. 4).

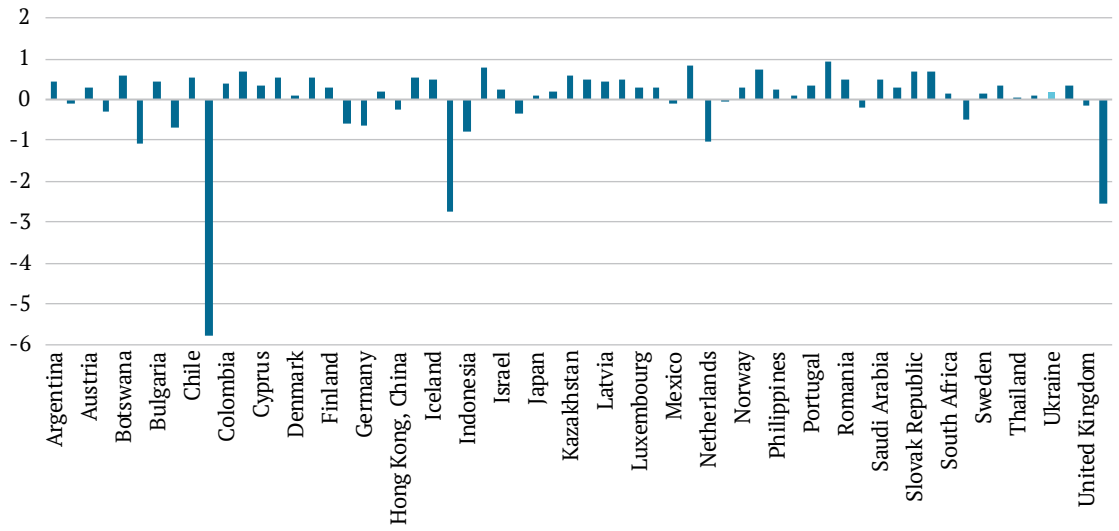

Figure 4. Actual values of the factor "intensity of consumer base development and innovative biodiversity preservation strategies" (F2) by country
Source: created by the authors

Since both components of the factor are destimulants, the positive value of F2 (0.19) should be regarded as a negative trend for the time being, although the value is small in magnitude. It should be outlined that due to security issues, there is currently population instability both within the country as a whole and by region. For the development of agricultural activities related to the production of aquaculture products, there are also issues due to pollution and damage to artificial reservoirs due to military actions. Figure 5 shows a significant number of countries have a positive development of the factor with sufficiently high values.

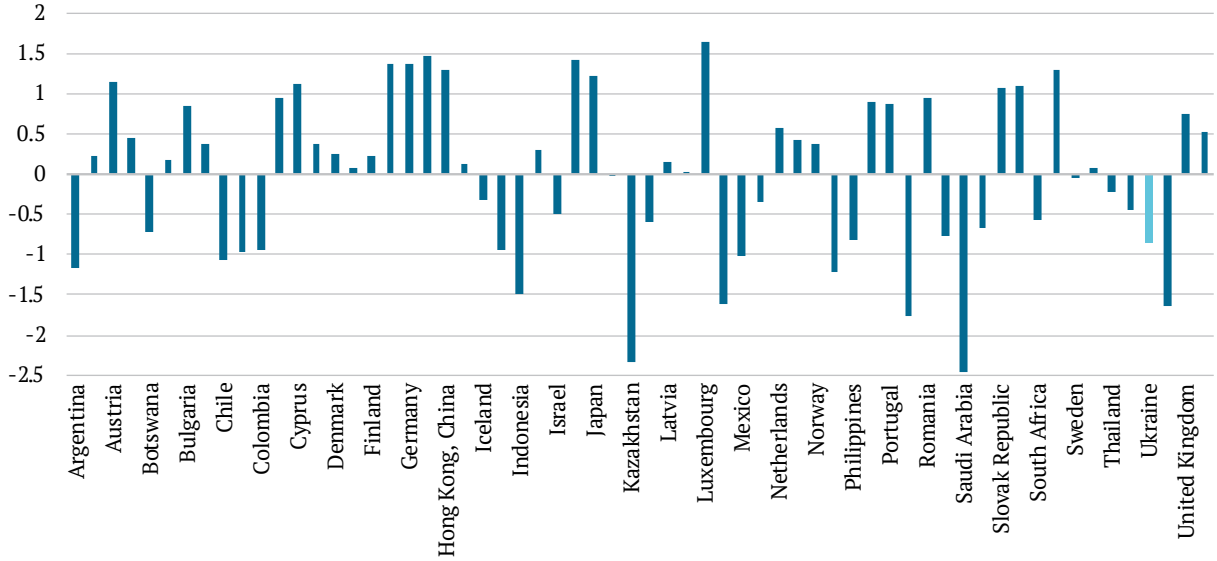

Figure 5. Actual values of the factor "state policy of nature use and financing of education" (F3) by country
Source: created by the authors

The leaders were Luxembourg, Italy, Greece, France, Germany, Spain, and Japan. Saudi Arabia, Kazakhstan, Qatar, Malaysia, the United Arab Emirates, Peru, and Argentina have the worst results. Ukraine has an average value of the factor (−0.85). If analysing the indicators included in F3, Greece, Italy, and Japan have the lowest indicator of public spending on education (from 7 to 8%), while the development of F3 in these countries is high. Botswana, Chile, Malaysia, and Israel have the highest indicator of public spending on education (from 18 to 21%). In Ukraine, over the past 8-10 years, this indicator has ranged from 13 to 14.5%. As for the share of state land conservation areas, which is the basic factor F3 as a stimulant, it should be outlined that it has a large spread. Thus, Luxembourg, Bulgaria, Hong Kong, Poland, Great Britain, Cyprus, Croatia, Slovenia, and New Zealand have the largest shares (from 51 to 33%), and this fact significantly affected the positive value of the F3 factor. Ukraine has an average negative level

of F3 by module. It is worth emphasising the need to focus public policy on innovations capable of reducing pollution, economical and repeated use of resources, calling business to social responsibility, and paying attention to environmental issues. These aspects should be taken into account when determining the directions of strategic changes in industries and issues of their resource provision.

The analysis of the actual values of the factor "production potential of business in the country" (F4) by country is also interesting from a scientific point of view, which, according to the results of modelling, is a stimulant. Figure 6 shows that Hong Kong, Botswana, the United States of America, Brazil, Israel, and Luxembourg have the highest values. Ireland, Thailand, China, Korea, Slovakia, and Slovenia have the lowest level of the factor (F4) due to the low added value of production. Ukraine has a positive value of this factor (0.53). The basis of Ukrainian exports has been raw agro-industry and metals for a long time. Agriculture and processing industry make a significant contribution.

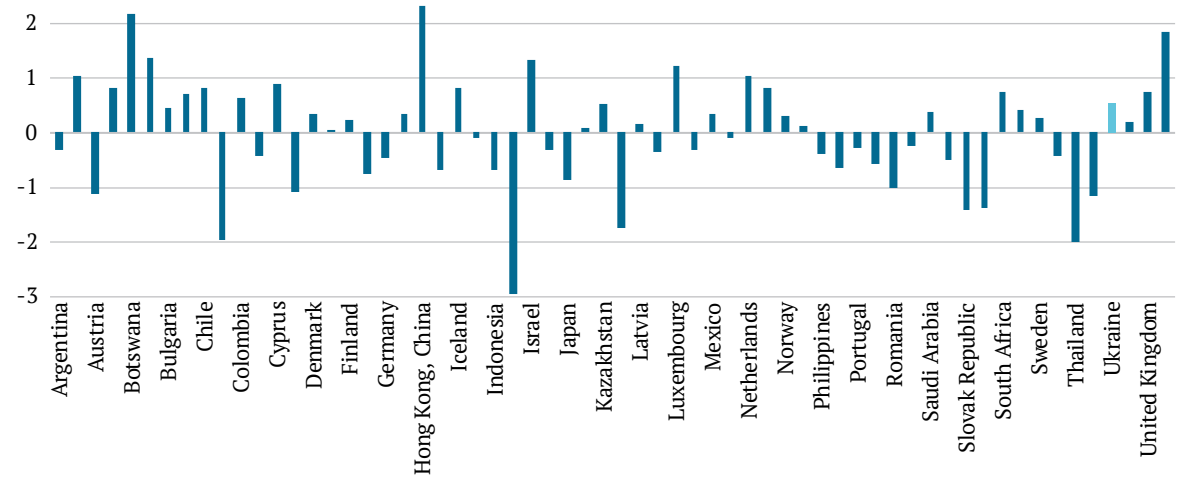

Figure 6. Actual values of the factor "production potential of business in the country" (F4) by country
Source: created by the authors

As practice shows, a limited part of goods exported by Ukraine in modern conditions has a high level of added value (Export evolution..., 2023). The significant part remains focused on raw materials. This has a negative impact on the country's potential profit, as high value added is a key element of competitiveness and sustainable economic growth. Graphically, the dynamics of innovative factors influencing the provision of strategic changes in the sectors of the national economy for Ukraine is shown in Figure 7.

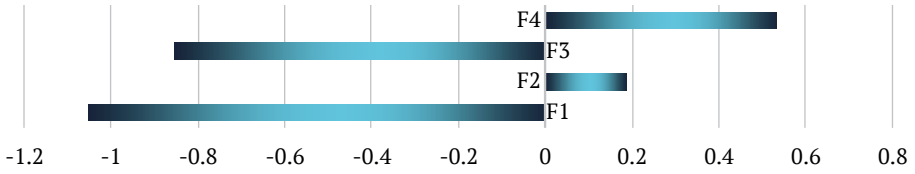

Figure 7. Actual values of innovative influence factors (F1, F2, F3, F4) on ensuring strategic changes in the sectors of the national economy of Ukraine
Source: created by the authors

Considering the indicator loading of the considered factors during modelling and thus determining their economic interpretation, it should be noted that only the "production potential of business in the country" (F4) has positive dynamics. The identified problems and risks in other innovative factors must be considered when forming a system of financial support mechanisms for strategic changes in the sectors of the Ukrainian economy. The given analysis of the level of development of innovative factors influencing the provision of strategic changes in the sectors of the national economy based on the studied countries of the world shows that the biggest problems are present in the spheres of implementation of state policy regarding the formation of the normal socio-economic situation in the country (this fact is also confirmed by the dispersion of most of the indicators of the F1 and F2), formation of relations between business and population based on social responsibility. The F3 is characterised by the least constant attention of the state, which allows to conclude that there is a lack of a comprehensive approach to the strategy of effective environmental management and financing of education, which should be based on the principles of sustainable development and the increase of human capital as a stimulant of innovative activity. But the problems with the first two factors have not been resolved yet, so this is indeed a more distant prospect, especially due to migration and security conditions. Therefore, it is necessary to lay the foundation

for their solution now, as a basis for the recovery of the business economy and the labour market.

DISCUSSION

Since the above-mentioned problematic aspects are significantly dependent on the external environment, it is appropriate further to consider the peculiarities and prospects of the functioning of the system of state regulation of structural transformations in the vector of sustainable development, considering the state of democratic processes and the specifics of relations with the public in the process of making socially responsible decisions in the context of industry changes. For example, the national economies of G10 countries have the highest level of economic growth compared to other regions. Studies of the factors of economic growth in these economies are of particular interest because they emphasise the role of natural resources, innovation, and financial globalisation as crucial factors. The significant share of global gross domestic product (GDP) of the G10 is also marked by significant developments in innovation, technological progress, and financial engagement with other developed economies and developing countries. However, the economies of these countries also show dependence on natural resources, which have an obvious impact on their extraction and use. Theoretical and empirical relationships between these variables have been identified.

For example, M. Shahzad *et al*. (2022) believed that natural resources stimulate economic growth, providing additional opportunities for earning and increasing national income. At the same time, the authors' research data showed low implementation of green innovations in the practical activities of business entities in Pakistan. In this regard, scientists developed a model for stimulating the implementation of green innovations based on the existing unified theory of acceptance and use of technology (UTAUT) model, the results of which showed that the main factor in the activity of green transformations of companies was "green behavioural intention", the level of which depends on the size of the business and companies. The authors also confirmed the significant influence of green transformations in business, such as the cost of green innovations, their expected productivity, and working conditions for personnel. The important task of ensuring strategic changes at the level of the national economy is the identification of risk factors. Thus, because of research by Ukrainian scientists T. Shtal *et al*. (2023), a methodical approach was proposed, which allows identifying those factors that have the greatest impact at each stage of the project's life cycle. Mathematical models have been developed that allow identifying exactly those risk factors that can have the most negative impact, both in terms of frequency of occurrence and the number of possible losses.

The question of the universality of the selected innovative factors of influence on ensuring strategic changes in the sectors of the national economy remains debatable. For example, research by U. Joshua *et al*. (2020) found that foreign direct investment has a limited impact on economic growth in South Africa, which contradicts data presented in other studies of the region (Muluh *et al*., 2022), as well as for Asian economies (Gbemenou *et al*., 2020). This difference in results may be explained by differences in specific countries, time periods, or data used. For example, a 1% increase in foreign direct investment leads to a small shift in GDP in the long run. Also, such an indicator as trade openness has a significant impact on GDP, which confirms the hypothesis of economic growth caused by trade. This is also confirmed by previous studies for various countries: Turkey (Alsamara *et al*., 2019), BRICS countries (Rani & Kumar, 2019), South Africa (You *et al*., 2020), etc. The case where a country abandons trade openness or reduces its level of participation in international trade can lead to the opposite effect. However, this result does not support the findings of some previous studies, such as M. Shahzad *et al*. (2022), which may be due to differences in terms of trade or prevailing economic and political factors in each specific country. The same happens with other factors.

Thus, strategic economic initiatives should focus on strengthening the underlying innovation power and sustaining economic and environmental systems by increasing the level of interaction and coordination. To achieve long-term sustainability of strategic economic initiatives, economic and environmental systems must develop interrelatedly, and coordination between them is crucial. The main aspects of SEI research usually cover the assessment of innovation performance, the analysis of economic and environmental consequences, and the relationship with economic development. Regarding innovation performance, technological progress is the main driver for improving it, according to S. Lin *et al*. (2019).

Studies conducted in the African countries (Joshua *et al*., 2020), G7 countries (Qin *et al*., 2021), Europe (Skare & Porada-Rochon, 2022), and China (Zhou *et al*., 2022) confirm the positive impact of technological innovation on economic and environmental indicators of strategic changes in the sectors of national economies. However, studies conducted in South Asia (Mughal *et al*., 2022) indicate an increase in greenhouse gas emissions because of innovation activities. In addition, Y. Chen & D. Zhang (2021) studies of incentives for total factor productivity in high-tech industries found out that they mostly depend on technological progress. Also in this direction, a logistic regression model was developed by M. Shabir *et al*. (2023) to assess the impact of SEI industrial activity on ecosystems. Focusing on marine technological innovation, threshold regression was used by X. Liu *et al*. (2021) to examine the nonlinear effects of innovation, and it was determined that when the level of innovation exceeds a certain threshold, its impact on marine economic performance decreases.

The impact of the globalisation process on the economic progress of various countries has been remarkable, due to their financial development, as noted by S. Kihombo *et al*. (2021). Since globalisation is important in bringing about strategic changes in the sectors of national economies, various studies have been conducted that examined globalisation using an index that included economic, political, and social indicators. However, some studies, like S. Gygli *et al*. (2019), considered such factors as foreign investment, international debt, international payments, reserves, investment barriers, and various investment-related agreements. The authors of this article share the opinion of these scientists from both scientific positions. Innovations are closely related to economic progress and positive structural shifts in the national economy, as they form the basis of socioeconomic development. It is worth

agreeing with the results of studies by Q. Dong *et al*. (2023), T. Shtal *et al*. (2023; 2024), and other scientists who focused on the problem of increasing CO_2 emissions due to the increase in the level of innovative activity of business entities (increasing the volume of resource consumption, production, and consumption).

These opposing trends lead scientists to a single conclusion: innovations in further structural transformations of national economies are exclusively ecological. Therefore, studies confirm that to achieve sustainable development and strategic changes in the sectors of national economies, it is important to focus on strengthening the innovative power and to promote interaction and coordination between economic and ecological systems. Studies of strategic economic initiatives usually include evaluation of innovative efficiency and analysis of economic and environmental consequences, which contribute to the development of integrated approaches to solving complex problems. Despite the positive impact of technological innovation, some studies point to potential risks, such as increased greenhouse gas emissions. The authors of the article consider the efficiency of the formed sectoral structure of the national economy of the country as an integral indicator of the effectiveness of the existing mechanism for ensuring the performance of functions and tasks of the state in solving specific socio-economic issues on the way to sustainable development.

CONCLUSIONS

Based on the conducted study of indicators expressed by socio-economic indicators of the development of the countries of the world, a sample of 16 independent variables was determined in the section of 62 national economies, which acted as the initial data of the factor analysis. As a result, the composition and content of external factors of influence on ensuring strategic changes in the sectors of the national economy based on innovations, which, unlike the existing ones, are defined by the following components: the well-being of the population and digital development of business (F1), intensity of development of the consumer base and innovative strategies for preserving biodiversity (F2); state policy of nature use and financing of education (F3); production potential of business in the country (F4). The following general conclusions were made. There is a high, directly proportional orientation of the actions of the identified components to ensure strategic changes in the sectors of the national economy. The exception is the innovative F3 (state policy of nature use and financing of education). The analysis of the actual values of the identified innovative influence factors showed a significant differentiation of countries according to the state of their development and the reasons for such changes. The assessment of factors influencing the provision of strategic changes in the sectors of the national economy makes it possible to identify directions for strengthening the innovative component of sectoral transformations. The comparative analysis of Ukraine and the countries represented in the sample was also carried out. The only innovative factor that underwent positive changes was F4 (production potential of business in the country). The outlined problems and risks in the above innovation factors must be considered when forming a system of financial support mechanisms for strategic changes in the sectors of Ukraine's economy.

Considering the results obtained, it is worth emphasising the following as further directions of scientific research in the context of assessing the impact of the innovation factor on the strategic structural transformations of sectors of the national economy of Ukraine: to conduct an analytical assessment of the losses in the innovation potential of Ukraine's economy and its sectors that resulted from the military conflict in the country; to analyse the innovation gaps between the economy of Ukraine and the EU countries that formed during the war years. It is planned to develop forecasts regarding the necessary amounts of financial support to eliminate the gaps in the state of actual innovation development of the Ukrainian economy and the economies of European countries; to determine the composition of the priority structural innovation changes that the economy of Ukraine will need to overcome the consequences of the military conflict and restore the potential for economic growth.

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CONFLICT OF INTEREST

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В'ячеслав Іванченков

Докторант, доцент
Одеський національний технологічний університет
65039, вул. Канатна, 112, м. Одеса, Україна
https://orcid.org/0000-0002-7074-3024

Володимир Вовк

Кандидат економічних наук, доцент
Харківський національний економічний університет імені Семена Кузнеця
61166, просп. Науки, 9А, м. Харків, Україна
https://orcid.org/0000-0002-1140-3273

Оксана Єрмоленко

Кандидат економічних наук, доцент
Харківський національний економічний університет імені Семена Кузнеця
61166, просп. Науки, 9А, м. Харків, Україна
https://orcid.org/0000-0002-3599-9016

Галина Прусова

Кандидат сільськогосподарських наук, старший науковий співробітник
Інститут тваринництва Національної академії аграрних наук України
61026, вул. Тваринників, 1А, м. Харків, Україна
https://orcid.org/0000-0002-2604-5720

Олена Ревенко

Кандидат економічних наук, доцент
Харківський національний економічний університет імені Семена Кузнеця
61166, просп. Науки, 9А, м. Харків, Україна
https://orcid.org/0000-0003-0110-7291

Інноваційні чинники забезпечення стратегічних змін у галузях національної економіки

Анотація. Як суттєва складова стратегічних змін на національному економічному рівні, процес трансформації промисловості відіграє важливу роль у створенні сприятливого середовища для залучення інвестицій, розвитку нових технологій та покращення якості життя населення. Метою статті було визначити особливості сформованої галузевої структури національної економіки через оцінку факторів, що впливають на забезпечення стратегічних змін у галузях національної економіки для визначення напрямів посилення інноваційної складової галузевих перетворень. Визначено та проаналізовано економічні аспекти стратегічних змін на рівні національної економіки з урахуванням особливостей інноваційної, інвестиційної та екологічної політики країни, продуктивності самих інновацій та залучення бізнесу до інноваційного процесу. Проведено аналіз рівня розвитку інноваційних факторів, що впливають на забезпечення стратегічних змін у галузях національної економіки досліджуваних країн. Оцінка факторів впливу на забезпечення стратегічних змін галузей національної економіки (16 факторів) була проведена за допомогою побудови економіко-математичної моделі. Отримані результати показали пряму залежність стратегічних змін національної економіки від інноваційних чинників. Виключеннями стали фактори державної політики природокористування та фінансування освіти. В економіці України було виявлено зниження активності дії інноваційних чинників, за виключенням виробничого потенціалу бізнесу. Зосередження уваги на цій системі факторів сприятиме комплексному розумінню сучасних вимог та можливостей менеджменту щодо забезпечення стратегічних змін у галузях національної економіки через механізми інноваційного розвитку

Ключові слова: соціально-економічний розвиток; сталий розвиток; види економічної діяльності; галузева структура; перетворення; фактор впливу; технічний прогрес