ASSESSMENT OF INVESTMENT AND INNOVATION IMAGE OF THE REGIONS OF UKRAINE IN TERMS OF SUSTAINABLE TRANSFORMATIONS

Iryna Bashynska*[1,2]
[1] Department of Enterprise Management, AGH University of Science and Technology
Krakow, Poland, bashynska@agh.edu.pl
[2] Department of Accounting, Analysis and Audit, Odessa National Polytechnic University
Odesa, Ukraine
https://orcid.org/0000-0002-4143-9277

Ganna Smokvina
Department of Accounting, Analysis and Audit, Odessa National Polytechnic University
Odesa, Ukraine, a.a.smokvina@op.edu.ua
https://orcid.org/0000-0001-6058-4720

Larisa Yaremko
Department of the International Economic Relations, Lviv University of Trade and Economics
Lviv, Ukraine, yaremkolarisa@lute.lviv.ua
https://orcid.org/0000-0002-4258-1195

Yuliya Lemko
Department of Political Science and International Relations, Lviv Polytechnic National University
Lviv, Ukraine, yuliia.r.lemko@lpnu.ua
https://orcid.org/0000-0002-9864-6963

Tetiana Ovcharenko
Department of Innovation and Investment Management, Taras Shevchenko National University of Kyiv
Kyiv, Ukraine, Tetyana_Ovcharenko@knu.ua
https://orcid.org/0000-0002-0000-0671

Suhang Zhang
Department of Business Economics and Administration, Sumy State Pedagogical University
named after A.S. Makarenko, Ukraine, econom@sspu.edu.ua
https://orcid.org/0000-0003-3047-6125

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Abstract
The article examines the existing methods of assessing the innovation and investment image of the region and proposes an author's methodology that considers the development of the region's production and infrastructure to form a strategic policy to create and apply innovation and economic potential of the region. The research hypothesis is based on the use of the method of distance from the standard, allowing to obtain relatively objective and fair assessments of the innovation and investment image of the region, considering the leading indicators of enterprises, ensuring their differentiation by industry. Enterprises, industries, and regions in the top rankings are considered more attractive to investors in terms of innovation, economic and social development. To confirm the hypothesis, the method of assessing the innovation and investment image of the regions was considered, which begins with an empirical, theoretical study and ends with the practicality of use. A method for determining the rating of business activity of innovation-active and investment-attractive enterprises considering their territorial and sectoral affiliation has been developed. The study has a significant economic and regional impact: using this method of assessing the innovation and investment image of the regions allows investors to evaluate and select the region in which the investment proposal will consider the features and priorities of economic development of the region and industry trends.

Keywords
industrial development; investment and innovation image; modelling; region; strategic planning; sustainable transformation.

Introduction

The region's sustainable development is determined by the stability of the functioning of structure-forming industries [1–3]. Assessment of the innovation and investment image of the region in the conditions of sustainable market transformations acquires certain features and significance, as it combines innovation and investment components of development. This assessment is a logical continuation of evaluating its investment environment, investment and innovation potential, and investment attractiveness, which scientists pay considerable attention to [4,5].

In market conditions, the investment resources of any country region are one of the essential factors in its innovative development [6–8]. The region's domestic investment potential is becoming insufficient to ensure the required level of investment, so its positive image is the most critical competitive advantage in the international investment market.

This component of the effective functioning of the regional economy has significant potential in the form of land and labour resources, natural resources, intellectual property and more. Primary and secondary markets of investment resources of Ukraine can be integrated into the world economic space because this is what forms the attractive investment climate of its regions and their innovation and investment image.

The study aims to study the existing methods and develop recommendations for improving the methodology for determining the rating of business activity of innovative and investment-attractive enterprises in regions.

The goal involves the consistent implementation of the following tasks:

- to characterize the existing methods of assessing the investment attractiveness of the region
- to conduct a rating assessment of the regions of Ukraine for 2020
- identify factors that affect the innovation and investment image of the regions
- identify the principal areas of innovation and investment image of the regions
- to propose methods and criteria for assessing the investment attractiveness of the external environment for the activities of regional complexes
- to evaluate the methodology and analyze the results

Theoretical Basis

The innovation and investment image of the country is determined by the policy of innovation and investment development and factors of innovation and investment attractiveness of the regions. That is, the closest to the concept of innovation and investment image of the area is investment attractiveness, so it is the method of its evaluation was chosen for in-depth analysis, the results of which are shown in Figure 1.

Almost all these methods consider investment indicators (components). Still, the innovation factor as an independent is considered only in the evaluation methodology of Nechyporuk [9], so other methods cannot fully characterize the innovation and investment image of the region.

Among scientists, the assessment of the image of the regions of Ukraine is often reduced to the ranking of areas by the level of attractiveness to investors.

The introduction of the rating system for enterprises of different regional complexes is a means of intensifying the activities of enterprises, encouraging them to participate in investment and innovative regional competitions, and tenders open additional sources of investment for successful enterprises.

Any investment project has a thematic focus; its most significant effect is achieved in regions with the best investment environment. Therefore, the assessment and forecasting of its investment attractiveness play a vital role in substantiation of the region's innovation and investment development policy.

The rating of regions should be carried out using indicators from investors' point of view, which are most important when deciding on the place and volume of investment. The input data needed to calculate the integrated rating of the region are data on:

1. Economic development of the region: real sector (revenues of local budgets per capita, UAH; volume of investments in housing construction per capita, UAH; share of unprofitable enterprises, %); foreign economic activity (volume of imports per capita, dollars; foreign direct investment per capita, dollars).
2. Market infrastructure: business services (availability and number of insurance institutions, banks, and leasing companies); transport (density of roads; the volume of passenger traffic); telecommunications.
3. Financial infrastructure (availability of financial institutions).

4. The state of human resources (number of registered unemployed; mortality per 1,000 people).
5. Activities of local authorities in the field of private entrepreneurship of small and medium-sized businesses [10–12].

A feature of the use of indicators of variation in the socio-economic development of the regions of Ukraine is the scope of variation ($R = Xmax - Xmin$); this applies to the objectives of interregional comparisons within a particular project. The region's investment attractiveness is determined by its investment potential, which can be assessed using a set of macroeconomic indicators: profit margins, inflation, economic growth, etc.

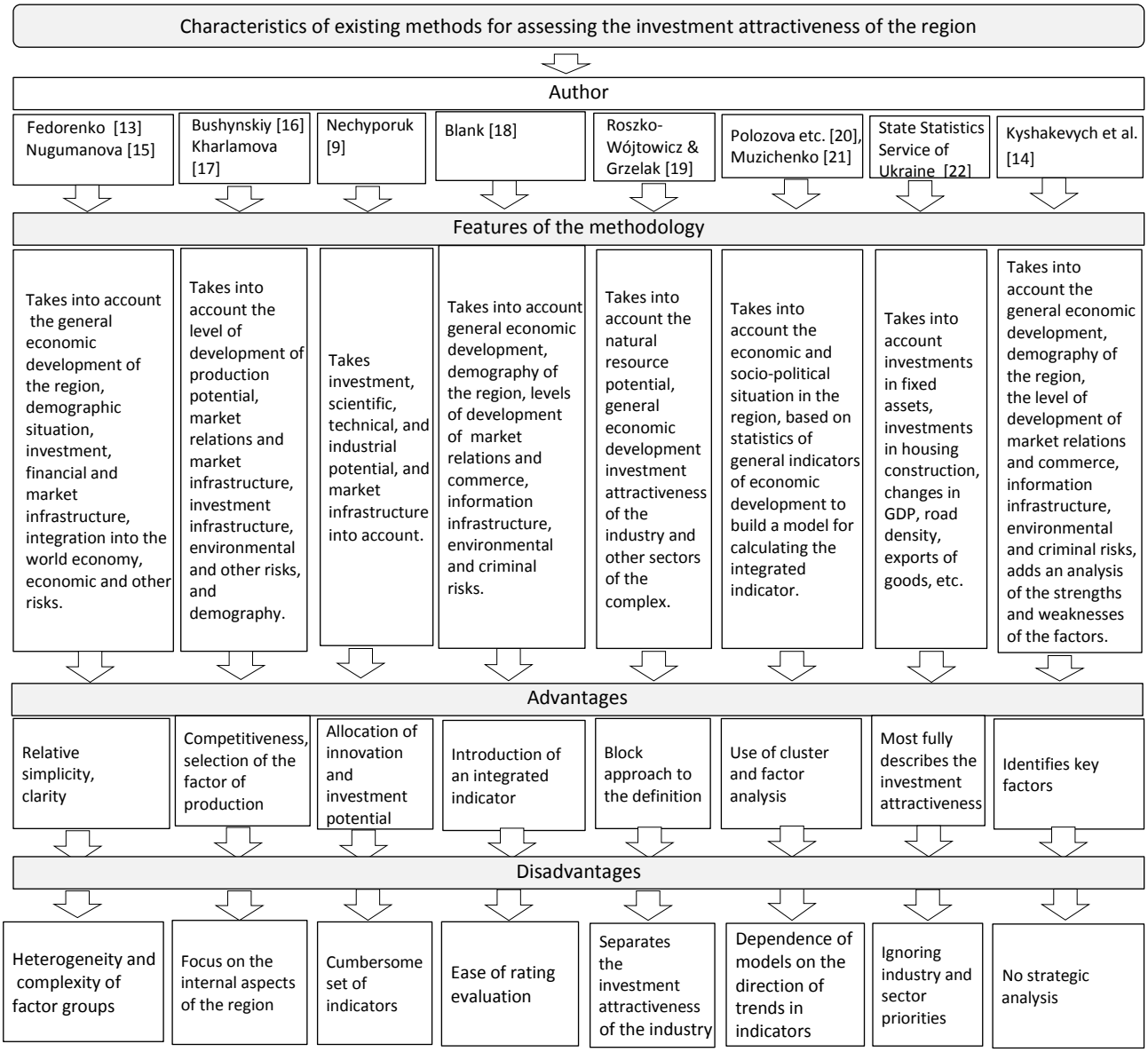


Figure 1. Characteristics of existing methods for assessing the investment attractiveness of the region.
Source: developed by the authors based on [*9,13–22]*

The concepts of "region" and "investment attractiveness" are correlated mainly on the economic basis: if the internal preconditions for the economic development of the region are weak, its investment attractiveness for investors, especially foreign ones, will be lower.
In most methods [14–22] to determine the investment attractiveness of regions, the overall priority of the group of economic indicators is 60-80%. But its level is significantly influenced by infrastructural, socio-political,

technological, and legal factors. This methodology was used to determine the rating of individual regions of Ukraine in 2020, Table 1.

Table 1. Rating assessment of the regions of Ukraine for 2020. *Source: edited by the authors based on [23]*

Regions	**The results of calculations by groups of indicators**										Rating score	Place
	Economic development (25%)		Infrastructure development (22%)		Financial infrastructure (25%)		Human resources (13%)		Entrepreneurship and local government (15%)			
Vinnytsya	0.299	8	0.383	3	0.012	21	0.369	21	0.375	18	0.335	3
Volyn	0.287	10	0.235	17	0.085	7	0.442	4	0.423	12	0.251	12
Dnipropetrovsk	0.298	7	0.255	13	0.143	3	0.267	25	0.309	24	0.248	14
Donetsk	0.185	24	0.232	19	0.029	14	0.413	10	0.293	25	0.176	25
Zhytomyr	0.197	21	0.208	21	0.015	20	0.405	13	0.380	16	0.257	11
Zakarpattya	0.329	2	0.665	1	0.012	24	0.465	2	0.384	15	0.219	19
Zaporizhzhya	0.290	9	0.187	22	0.053	11	0.379	19	0.336	23	0.206	23
Ivano-Frankivsk	0.316	5	0.315	10	0.009	25	0.434	6	0.367	21	0.222	17
Kyiv	0.231	16	0.451	2	0.263	2	0.404	14	0.405	13	0.283	8
Kirovograd	0.186	23	0.355	7	0.053	10	0.380	17	0.477	4	0.274	10
Luhansk	0.170	25	0.220	20	0.140	4	0.451	3	0.342	22	0.180	24
Lviv	0.319	3	0.339	8	0.021	18	0.354	23	0.389	14	0.301	5
Mykolayiv	0.258	14	0.233	18	0.126	5	0.398	15	0.372	19	0.212	22
Odesa	0.297	6	0.327	9	0.058	9	0.386	16	0.430	11	0.251	13
Poltava	0.264	13	0.186	23	0.012	23	0.368	22	0.367	20	0.221	18
Rivne	0.242	15	0.260	12	0.065	8	0.418	9	0.436	10	0.344	2
Sumy	0.188	22	0.240	15	0.029	16	0.409	12	0.437	9	0.236	15
Ternopil	0.265	12	0.383	4	0.040	12	0.437	5	0.443	7	0.289	7
Kharkiv	0.211	20	0.298	11	0.029	15	0.285	24	0.482	3	0.306	4
Kherson	0.269	11	0.166	24	0.021	17	0.419	8	0.456	5	0.215	21
Khmelnytskiy	0.213	19	0.353	6	0.039	13	0.410	11	0.441	8	0.297	6
Cherkasy	0.221	18	0.247	14	0.012	22	0.369	20	0.378	17	0.231	16
Chernivtsi	0.318	4	0.369	5	0.019	19	0.815	1	0.498	2	0.279	9
Chernihiv	0.230	17	0.237	16	0.106	6	0.424	7	0.448	6	0.218	20
city of Kyiv	0.801	1	0.131	25	1.000	1	0.380	18	0.523	1	0.777	1

According to the analysis, groups and individual regions achieved their rating due to various factors: Kyiv is twice ahead of the nearest competitor – for a combination of almost all aspects; the indicator of Rivne region is mainly due to industries and agriculture – the region has the second rating point for economic development; Vinnytsia region – uses its natural potential and therefore undergoes significant structural changes in the regional economy. Kharkiv and Lviv regions also hold leading positions. Donetsk and Luhansk regions remain the least developed in economic development (Table 2). The downgrade of these oblasts is due to the high increase in receivables from enterprises and accounts payable to the budget.

Among agrarians, the Volyn region is in the lead, having increased its rating by several points compared to last year's result. The adverse development trend of this region has changed to a positive one due to the high development of the financial sector and human resources.

In recent years, the change of outsider regions and members of the leading growth group was not due to the improvement of the situation in the region but due to the deterioration of other regions.

Let's define the level of innovation and investment by the main factors of the attractiveness of individual regions grouped into four groups: priority, high, medium, and low attractiveness. To determine the total location of the region indicators of capital investment were selected; the share of sold innovative products in the total volume of sold industrial products and the importance of exports of goods.

Table 2. The level of investment and innovation attractiveness of the regions of Ukraine as of 01.01.2021.
Source: edited by the authors based on [23].

Groups of regions by the level of investment and innovation attractiveness	**Regions**	**Region's place**		**Region's place by indicator**		
		2019	2020	The volume of capital investments	The share of sold innovative products in total	The volume of exports of goods per capita
Priority	city of Kyiv	1	1	1	21-22	1
	Donetsk	15	2	17	1	9
	Kirovograd	3	3	14	2	8
	Dnipropetrovsk	7	4	2	23-24	2
	Poltava	8	5	4	23-24	5
	Zaporizhzhya	10	6	10	9	4
High enough	Kharkiv	11	7	8	3-4	18
	Sumy	14	8	18	8	11
	Mykolayiv	5	9	16	6	3
	Luhansk	23	10	25	3-4	25
	Khmelnytskyi	24	11	11	17-19	20
	Odesa	18	12	6	10-11	16
Medium	Chernihiv	13	13	13	5	12
	Zhytomyr	20	14	12	15-16	17
	Volyn	2	15	5	17-19	15
	Cherkasy	16	16	19	10-11	14
	Vinnytsya	17	17	7	12-14	13
	Kyiv	6	18	3	12-14	6
Low	Ternopil	22	19	15	12-14	21
	Rivne	25	20	23	25	22
	Lviv	12	21	9	15-16	10
	Ivano-Frankivsk	21	22	20	21-22	19
	Chernivtsi	19	23	24	20	24
	Zakarpattya	9	24	22	17-19	7
	Kherson	4	25	21	7	23

Data analysis Table 2 showed that the country's western regions have the lowest investment and innovation attractiveness, i.e., they are not attractive enough for foreign investors.
The main directions of formation of innovation and investment image of the regions of Ukraine are:

- liberalization of investment activity, development of the market of goods and services
- regulation of investment activity by creating a stable regulatory framework
- ensuring the sustainable functioning of state and regional government and the administrative system
- elimination of legislative restrictions on the operation of foreign capital to a competitive investment environment
- improvement of financial support of innovation processes and innovation-oriented investments priority ones
- fight against corruption
- minimization of political risks

The issue of the formation of innovation and investment image of the territory should be considered regarding the existing environment, its transformational changes, and existing trends in the region. Therefore, the method of assessing the investment attractiveness of the external environment for the activities of regional complexes allows:

- first, to recommend to the regional authorities a mechanism of assistance for purposeful management of the general business climate in their region
- secondly, to give the enterprises complex analytical tools for assessing the relationship with regional offices. This, ultimately, allows you to make management decisions on further developing innovation and investment activities of complexes and economic systems

It is recommended to use the following criteria to assess the investment attractiveness of the external environment:

- tax burden above (below) the critical assessment and the availability of benefits for enterprises in the complex
- social security of employees, the degree of social tension, cultural and educational levels, and opportunities to increase them
- opportunities to obtain loans, interest rates
- the presence of laws and regulations that stimulate or, conversely, reduce the capabilities of the complex in the development of production
- the existence of regulations that encourage investment and protect the rights of investors
- degree of development of means of communication and means of communication
- availability of necessary resources for production (in% of cost): labour resources, energy, raw materials.
- a significant factor determines the degree of "importance" of each environment sector

Quantitative assessment of the favourable environment of the complex and the assessment of its impact on the environment is determined by calculating the coefficients: the favourable environment and the impact of the external environment.

One of the central tasks of the region's innovation and investment development policy is to ensure its complexes' investment attractiveness and components. When the financial reporting of units, in particular enterprises, does not fully characterize their activities, the level of reliable public information about innovative enterprises in a form accessible to investors increases. Therefore, it is advisable to openly publish regular ratings of their investment attractiveness, which becomes a reliable source of information for potential investors.

Considering the above provisions, a method for determining the rating of business activity of innovation-active and investment-attractive enterprises, which considers their territorial and sectoral affiliation, has been developed. Depending on the size of the enterprise, the complex is divided into three groups: the first-large enterprises, the second-medium and the third-small.

The practice of rating companies is quite common. Thus, according to Forbes, the newspaper annually publishes a list of the TOP-100 largest companies in Ukraine [24], and the domestic magazine "Finance and Economics" (TOP-200 Ukrainian companies by revenue) the largest companies in the world by capitalization or value multiplied the number of shares issued at their market price. The latter is determined in the case of their turnover in the securities market. But for most Ukrainian issuing companies, it is impossible to estimate the capitalization rate in this way; their shares do not have market quotations. Therefore, it is advisable to calculate the rating within the regions without it.

It is recommended to choose the indicator of the volume of sold products (gross income) as the primary selection criterion, which reflects the usefulness of manufactured goods for buyers with their established solvency and contains products shipped and released to consumers in value terms. This indicator determines the feasibility of the enterprise's economic activity, informing the investor about the dynamics of the indicator, the volume and industry affiliation of the enterprise.

The second important indicator is the profitability of sales, which is an indicator of the efficiency of the enterprise and is calculated as the ratio of balance sheet profit to revenue from sales (in%). Another indicator of the efficiency of the enterprise - is the return on assets, which is a classic, most often used to assess the efficiency of use of funds and is calculated as the ratio of balance sheet profit to the average value of assets. At negative values of these indicators, the enterprises are excluded from a rating.

To assess the enterprise's activities is also used and labour efficiency, which is analogous to productivity but is calculated instead of produced based on sold products, as the ratio of revenue from sales to the average number of employees.

Methods

The research hypothesis is based on the use of the method of distance from the standard of Bakanov & Sheremet [25], which allows for obtaining relatively objective and fair assessments of the innovation and investment image of the region, considering the leading performance indicators of enterprises, ensuring their differentiation by industry. Enterprises, sectors, and regions that fall into the top rankings are considered more attractive to investors in terms of innovation, economic and social development.

To confirm the hypothesis, consider the methodology for assessing the innovation and investment image of the regions, which begins with an empirical, theoretical study and ends with the practicality of the use Figure 2.

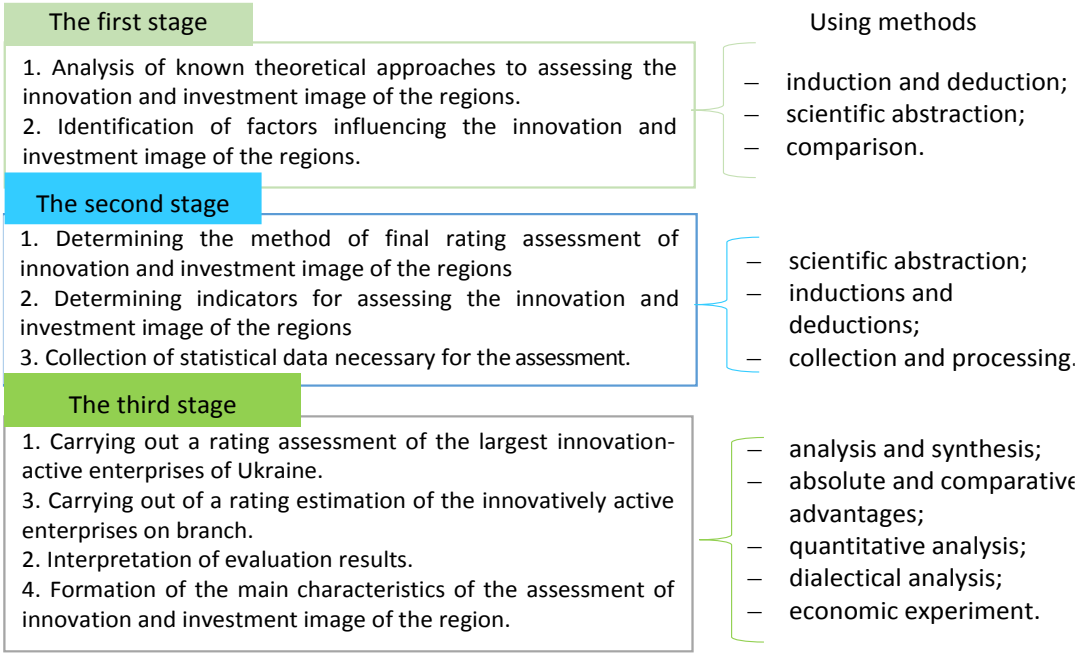


Figure 2. Algorithm of research methodology. *Source: own development.*

To determine the final rating, the standard method of Bakanov & Sheremet [25] or the method of distance from the standard, the essence of which is to find the coefficients of deviation from the standard, their subsequent generalization and weighting on the coefficient of significance.

The initial data are given in the form of a matrix a_ij, where the rows contain the numbers of indicators ($i = 1,2,3, \dots n$), and in the columns – the numbers of enterprises ($j = 1,2,3, \dots t$).

For each indicator is the maximum value and is entered in the column of the conditional reference company (m + 1).

The initial indicators of the matrix a_{ij} are standardized as the ratio to the corresponding indicator of the reference enterprise by the formula [25]:

$$x_{ij} = a_{ij} / max\ a_{ij}, \quad (1)$$

where x_{ij} – standardized indicators of the state of the j-th enterprise.

The value of the rating of each enterprise of the regional complex:

$$Rj = \sqrt{(1 - x_{1j})^2 + (1 - x_{2j})^2 + \dots + (1 - x_{nj})^2} \quad (2)$$

where Rj is the rating of the J-th enterprise. The company with the lowest value of Rj has the highest rating. $x_{1j}, x_{2j}, \dots, x_{nj}$ – standardized indicators of the j-th enterprise.

Experiment

To conduct a rating assessment, the 60 largest enterprises of Ukraine in different regions and industries were surveyed according to the 2020 rating. Enterprises that had negative values on rating indicators were excluded from the rating.

The results of the rating assessment based on the results of 2020 by groups of enterprises of industrial complexes of the regions of Ukraine are shown in Table 3.

Table 3. Final rating assessment of the largest innovative enterprises of Ukraine for 2020p.
Source: calculated by the authors based on data [24].

Name of Company	Branch	Revenue, MUAH	Balance sheet profit, MUAH	Number of employees, persons	Assets, MUAH	Profitability of sales, %	Return on assets, %	Labour efficiency, %	Rating points, Rj	Place
Interpipe	metallurgy	29000.0	21400.0	2 420	2198.5	73.79	97.33	11.98	121.23	1
Roshen	food industry	24000.0	2500.0	10 000	3001.8	10.42	83.28	2 40	82.82	2
Carpathian Petrochemical	chemical industry	13600.0	1900.0	2693	2505.9	13.97	75.82	5.05	76.04	3
Ferrexpo	metallurgy	38900.0	10400.0	9000	15472.9	26.74	67.21	4.32	71.11	4
Ukrnaftoburnya	fuel and energy sector	84000	2800.0	169	9495.2	33.33	29.49	49.70	65.02	5
Metinvest	metallurgy	278000.0	8800.0	66000	13454.0	3.17	65.41	4.21	64.52	6
Amic	fuel and energy sector	8100.0	4200.0	2122	1055.3	51.85	397.99	3.82	63.93	7
«Yuzhniy Gok» Mining and Processing Plant	metallurgy	25200.0	8900.0	6500	22763.9	35.32	39.10	3.88	51.35	8
Carlsberg	alcohol and beer	8200.0	1400.0	1493	2862.3	17.07	48.91	5.49	50.73	9
Philip Morris	FMCG	25600.0	346.0	503	10571.4	1.35	3.27	50.89	49.94	10
Kernel	agro	93000.0	3200.0	14000	7664.4	3.44	41.75	6.64	41.21	11
Kyivstar	connection	22200.0	9000.0	3023	86957.0	40.54	10.35	7.34	41.12	12
Foxtrot	retail	13100.0	274.0	4623	679.4	2.09	40.33	2.83	39.38	13
Alliance Oil	wholesale trade. fuel and energy sector	7800.0	54.0	212	466.3	0.69	11.58	36.79	37.32	14
METRO Cash & Carry	retail	19800.0	1300.0	3200	3668.7	6.57	35.44	6.19	35.27	15
DTEK Energy	fuel and energy sector	76800.0	1800.0	44000	5011.2	2.34	35.92	1.75	34.95	16
JTI International Company	FMCG	14300.0	698.0	462	4038.6	4.88	17.28	30.95	34.30	17
new post	postal services	13500.0	783.0	27334	2288.0	5.80	34.22	0.49	33.56	18
Eridon	agro	21200.0	738.0	824	4200.3	3.48	17.57	25.73	29.87	19
Concern Galnaftogaz	fuel and energy sector	41100.0	2700.0	28000	9575.9	6.57	28.20	1.47	27.76	20
Farmak	pharma	6500.0	1000.0	2698	4046.2	15.38	24.71	2.41	27.76	20
Odessa Regional Energy Company	fuel and energy sector	7800.0	81.0	291	949.0	1.04	8.54	26.80	26.87	22
Kryukiv Carriage Building Plant	engineering	8500.0	829.0	5630	3278.0	9.75	25.29	1.51	25.82	23
Krivoj Rog's Iron-Ore Combine	metallurgy	6600.0	1600.0	7425	13062.0	24.24	12.25	0.89	25.81	24
BaDM	wholesale trade. pharma	35500.0	2900.0	2799	12737.3	8.17	22.77	12.68	25.72	25

International Airlines of Ukraine	transport	26900.0	1600.0	1 600	9225.7	5.95	17.34	16.81	23.26	26
Sandora	food industry	10400.0	548.0	3 230	2405.8	5.27	22.78	3.22	22.30	27
TEDIS Ukraine	wholesale. FMCG	49700.0	356.0	2 321	4492.3	0.72	7.92	21.41	21.55	28
MHP	agro	53100.0	5600.0	28 000	32468.8	10.55	17.25	1.90	18.86	29
Lemtrans	transport	14100.0	440.4	866	11308.8	3.12	3.89	16.28	15.69	30
ADM Ukraine	agro	23100.0	9.0	149	5867.3	0.04	0.15	155.03	15.40	31
Venta LTD	wholesale trade. pharma	13000.0	56.0	802	4923.9	0.43	1.14	16.21	15.22	32
Novokramatorsk Machine-Building Plant	engineering	6700.0	671.0	8475	5548.6	10.01	12.09	0.79	14.29	33
Eramov Systems	IT	8100.0	440.0	8300	3163.1	5.43	13.91	0.98	13.64	34
Kharkivnergozbut	fuel and energy sector	6800.0	31.0	520	2567.4	0.46	1.21	13.08	12.09	35
Optima-Pharm	wholesale trade pharma	31200.0	256.0	2420	11379.5	0.82	2.25	12.89	11.95	36
ATB	retail	104900.0	4400.0	49259	35652.1	4.19	12.34	2.13	11.83	37
Epicenter K	retail	45700.0	3700.0	25325	44525.4	8.10	8.31	1.80	10.22	38
Imperial Tobacco	FMCG	7700.0	167.0	700	6175.4	2.17	2.70	11.00	10.21	39
SoftServe	IT	7000.0	4.2	7193	38.7	0.06	10.82	0.97	9.86	40
Comfy	retail	13600.0	15.0	3267	4331.8	0.11	10.17	4.16	9.73	41
DniproAzot	chemical industry	7000.0	274.0	3412	2749.3	3.91	9.97	2.05	9.48	42
Eva	retail	12900.0	375.0	10420	4460.9	2.91	8.41	1.24	7.65	43
Mykolayiv.alumin a plant	metallurgy	8600.0	264.0	1500	5491.0	3.07	4.81	5.73	6.41	44
Nibulon	agro transport	27700.0	1400.0	6164	33840.8	5.05	4.14	4.49	6.2	45
Dniprospetsstal	metallurgy	8300.0	78.0	4800	2138.4	0.94	3.65	1.73	2.74	46
Tavria Plus	retail	7500.0	64.0	3922	2088.1	0.85	3.07	1.91	2.26	47
Bayadere	alcohol and beer	6600.0	22.0	4000	2913.4	0.33	0.76	1.65	0.96	48

According to the results of the calculations in Table 3 it is seen that the highest rating was received by enterprises: 1. Interpipe (metallurgy) Dnipropetrovsk region; 2. Roshen (food industry), Kyiv; 3. Karpatnaftohim (chemical industry) Ivano-Frankivsk region; 4. Ferrexpo (metallurgy) Poltava region; 5. Ukrnaftoburinnya (fuel and energy sector), Kyiv; 6. Metinvest (metallurgy) Donetsk region; 7. Amic (fuel and energy sector), Kyiv; 8. «Yuzhniy Gok» Mining and Processing Plant (metallurgy) Dnipropetrovsk region; 9. Carlsberg (alcohol and beer) Zaporizhzhia region; 10. Philip Morris (Fast Moving Consumer Goods), Kyiv. The obtained results confirm the level of investment and innovation attractiveness of the regions of Ukraine, where the priority ones are Kyiv, Donetsk, Dnipropetrovsk, Poltava and Zaporizhia regions Table 2.

According to Table 3, it is also appropriate to identify metallurgy as the most attractive industry. Next, we will assess the largest innovative enterprises in the metallurgical industry of Ukraine for 2020 Table 4. Table 4 shows that Interpipe Corporation has the highest value in terms of indicators in metallurgy, so relative to others, it has the highest rating and is a benchmark.

A similar calculation can be performed for other industries to obtain reference companies in the industry.

Among the priority sectors of Ukraine and regional delimitations, it is expedient to single out the resort and recreational sphere and tourism, agro-industrial complex, processing industry, etc., in more detail Table 5.

This division of industries by region allows potential investors to consider other industries as priorities for investment according to personal preferences.

Using this rating methodology concerning innovation-active and investment-attractive enterprises of specific regional complexes allows obtaining relatively objective and fair assessments, considering the leading performance indicators of enterprises, ensuring their differentiation by industry. The methodology uses official reporting materials and documents and is quite simple to perform calculations.

When applying the rating assessment methodology, it was established that it is necessary to apply the tax burden indicator for a comprehensive description of innovation and investment activities of a particular region complex. This is because an equal value of the rating of enterprises in one region may bear different tax burdens, skillfully using tax imperfections or benefits. There is no definition of a single tax burden and official statistical accounting of this indicator at the state and regional levels, nor is there a generally accepted methodology for determining

it. Only scattered measures indirectly give a partial idea of the total tax burden. Recently, other countries and Ukraine have begun to use a methodology for determining the share of taxes in GDP, which is quite simple, straightforward and can be widely used in economic calculations, but does not allow to study of the tax burden at the micro level when comparing enterprises different industries and sectors of the economy.

Table 4. Final rating assessment of the largest innovative enterprises of the metallurgical industry of Ukraine for 2020p. *Source: own development.*

Company	**Profitability of sales, %**	**Return on assets, %**	**Labour efficiency, %**	**Rating, points** $R_j = \sqrt{(1-x_{1j})^2+(1-x_{2j})^2+\ldots+(1-x_{nj})^2}$	**Place**
Metinvest	3.17	65.41	4.21	$\sqrt{(1-3.17)^2+(1-65.41)^2+(1-4.21)^2} = 64.52$	3
Ferrexpo	26.74	67.21	4.32	$\sqrt{(1-26.74)^2+(1-67.21)^2+(1-4.32)^2} = 71.11$	2
Interpipe	73.79	97.33	11.98	$\sqrt{(1-73.79)^2+(1-97.33)^2+(1-11.98)^2} = 121.23$	1
«Yuzhniy Gok» Mining and Processing Plant	35.32	39.10	3.88	$\sqrt{(1-35.32)^2+(1-39.10)^2+(1-3.88)^2} = 51.35$	4
Mykolayiv. alumina plant	3.07	4.81	5.73	$\sqrt{(1-3.07)^2+(1-4.81)^2+(1-5.73)^2} = 6.41$	6
Dniprospetsstal	0.94	3.65	1.73	$\sqrt{(1-0.94)^2+(1-3.65)^2+(1-1.73)^2} = 2.74$	7
Krivoj Rog's Iron-Ore Combine	24.24	12.25	0.89	$\sqrt{(1-24.24)^2+(1-12.25)^2+(1-0.89)^2} = 25.81$	5
Reference company – Interpipe (Dnipropetrovsk region)	73.79	97.33	11.98	121.23	

Table 5. Distribution of industries by region. *Source: own development.*

Industry	**Regions**
Heat energy	Donetsk, Kharkiv, Kyiv, Ivano-Frankivsk, Lviv, Zaporizhzhya, Odesa regions
Electricity	Donetsk, Luhansk regions
Coal industry	Zaporizhzhya, Donetsk, Ivano-Frankivsk regions
Chemical Industry	Donetsk, Ivano-Frankivsk, Zakarpattya regions.
Mining and chemical industry	Zaporizhzhya, Poltava, Kherson, Chernihiv, Dnipropetrovsk regions
Automotive industry	Kyiv, Lviv, Sumy, Kharkiv, Odesa regions
Sewing industry	Kharkiv, Ivano-Frankivsk, Lviv, Odesa regions
Fur industry	Kyiv, Kharkiv, Poltava, Odesa, Luhansk, Lviv regions
Meat industry	Donetsk, Kharkiv, Chernihiv, Lviv, Chernivtsi, Rivne regions.
Cement industry	Odesa, Zaporizhzhya, Zakarpattya regions.
Resort and recreational sphere and tourism	Maritime: Odesa, Nikolaev, Donetsk regions. River: Kyiv, Dnipropetrovsk, Zaporizhzhya regions. City public: Kyiv, Dnipropetrovsk, Kharkiv regions
Transport infrastructure	Chernivtsi, Kharkiv, Ivano-Frankivsk, Dnipropetrovsk, Donetsk, Lviv, Cherkasy, Volyn, Zaporizhzhya, Mykolayv, Kherson, Odesa, Chernihiv, Sumy, Poltava, Kirovograd regions
Machine-building complex (manufacture of computers, electronic and optical products, machinery and equipment, electrical equipment, vehicles)	Dnipropetrovsk, Zaporizhzhya, Kirovograd, Luhansk, Mykolayv, Odesa, Poltava, Sumy, Kharkiv, Kherson, Cherkasy regions

Results and discussion

Thus, the assessment of the regional rating showed that the allegations of "local growth points" are currently not valid at the regional level. Differentiation of rates of local, central, and regulatory taxes in part directed to regional budgets can be considered as reserves of the development of innovation and investment processes in regions.

In developing this methodology, we tried to consider the shortcomings, in our opinion, of the existing methods [9,15–22].

All methods for determining the assessment of the investment attractiveness of the region, shown in Figure 1, contribute to obtaining the corresponding economic result. However, they are cumbersome, since they require, for calculation, the collection of a large amount of information from various aspects of activity and grouping according to the impact on the investment attractiveness of the regions.

Firstly, it has already been noted that the presented methods, except for [9], do not consider the innovative component.

Secondly, while applying the rating assessment methodology, it was established that the tax burden indicator should be used for a comprehensive description of the innovation and investment activity of a particular complex of the region. This is because an equal value of the rating of enterprises in one region may bear different tax burdens, skillfully using tax imperfections or benefits. There is no definition of a single tax burden and official statistical accounting of this indicator at both the state and regional levels, nor is there a generally accepted methodology for determining it. Only scattered measures indirectly give a partial idea of the total tax burden.

Recently, other countries and Ukraine have begun to use a methodology for determining the share of taxes in GDP [26], which is quite simple, straightforward and can be widely used in economic calculations, but does not allow for to study of the tax burden at the micro level when comparing enterprises different industries and sectors of the economy.

Third, improved indicators, thereby eliminating heterogeneity [13,15], cumbersome set of indicators [9] or vice versa, excessive simplicity [18], paying attention only to internal indicators [16,17] or disregard for sectoral and sectoral priorities [22], separating only the investment attractiveness [19] and the dependence of models on the direction of trends in indicators [20,21].

Groups of methods not included in the demonstrative figure are based on conducting surveys and questionnaires among economic entities in a particular region. Such surveys can be grouped according to the sectoral affiliation of the surveyed subjects; however, they require significant labor and financial resources.

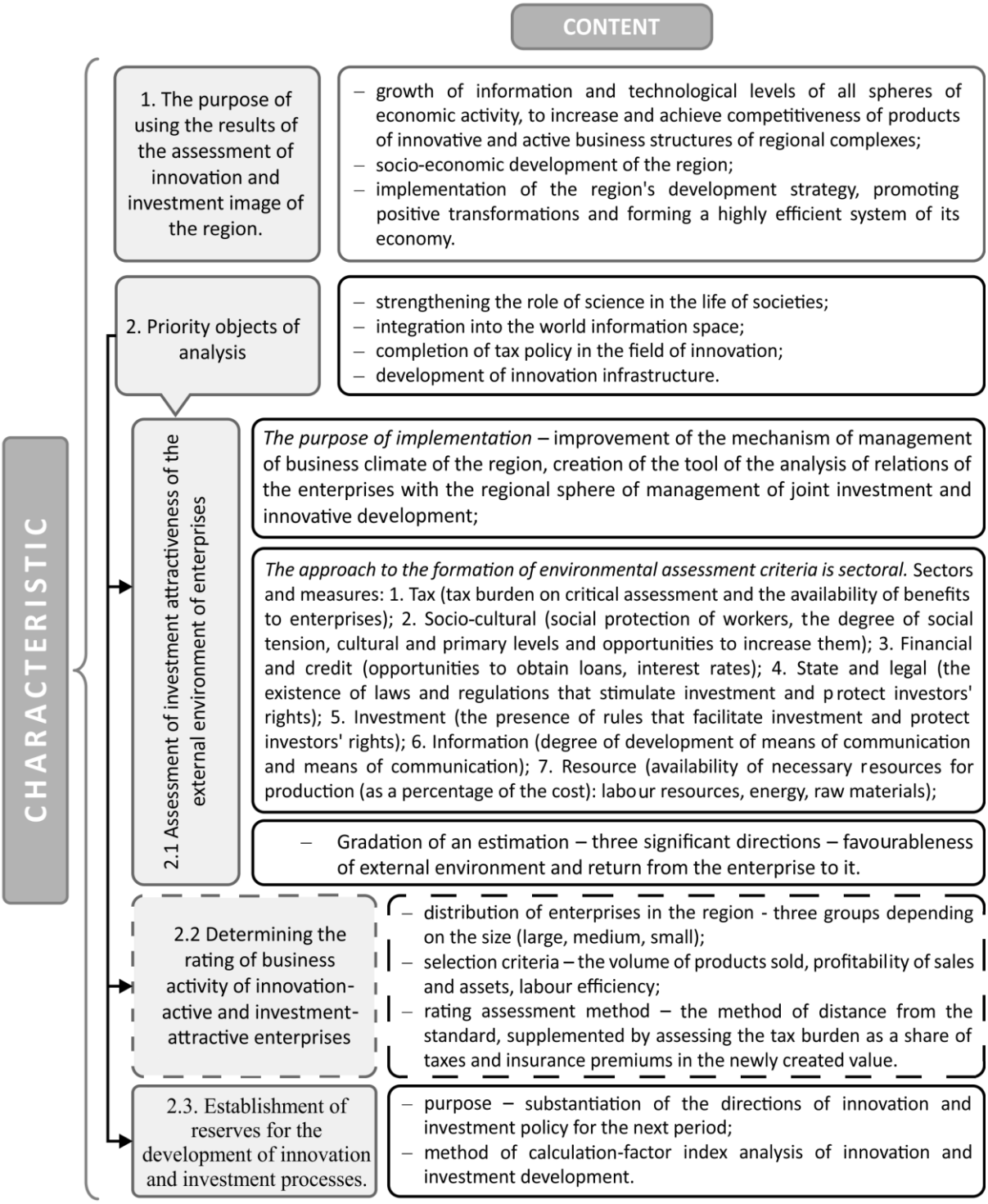
The method proposed by our authors bypasses the listed shortcomings of the methods listed above, since it is based on the officially recognized Forbes Rating, including all significant indicators of enterprises and does not require cumbersome calculations and resource costs.

Accordingly, the use of the results of the assessment of the innovation and investment image of the region in the context of sustainable transformations should be aimed at solving specific problems. The main essential characteristics of the proposed method of assessing the innovation and investment image of the region are shown in Figure 3.

Thus, the main advantage of the proposed method is:

- introduction of the division of enterprises in the region into three groups depending on the size (large, medium, small), which facilitates perception and is understandable to all stakeholder groups
- definition of selection criteria: the volume of products sold, profitability of sales and assets, labour efficiency
- application of the rating assessment method - the method of distance from the standard, which, unlike others, is supplemented by the assessment of the tax burden as a share of taxes and insurance premiums in the newly created value.

The use of this method of assessing the innovation and investment image of the regions allows domestic and foreign investors to evaluate and choose the region for which the investment proposal will consider the features and priorities of economic development and trends in the industry.



**Dashed line highlights the block that concerns our development*

Figure 3. Proposed method of assessing the innovation and investment image of the region.
Source: own development.

Impact

Economic Impact

It is determined that the allegations of "local growth points" currently have no good basis at the regional level. Differentiation of rates of local, central, and regulatory taxes in part directed to regional budgets can be considered as reserves for the development of innovation and investment processes in regions. The main essential characteristics of the assessment of innovation and investment image of the region are offered.

Most often, five indicators are distinguished for rating:

1. coefficient of manoeuvrability (normative value 0.1)
2. the coefficient of total solvency (regulatory value 2.0)
3. direct turnover ratio of invested capital (regulatory value > 2.5)
4. the coefficient of profitability of sales (normative value is determined by the discount rate of NVU)
5. the coefficient of return on invested capital (coefficient of economic profitability is not limited by standards).

The study selected the profitability indicators of sales, return on assets, and labour efficiency for the rating assessment.

The return on assets is calculated as the ratio of profit from ordinary activities to taxation and the average annual value of assets. Calculating the return on assets (used assets of the enterprise) is the opposite indicator of return on equity (used liabilities of the enterprise). In contrast to those proposed by the authors is considered appropriate because the return on assets is formed under the influence of all internal and external factors; reserves to increase the rate can be found in all business areas.

The labour efficiency indicator is calculated as the ratio of the volume of tangible and intangible goods produced and the amount of labour expended. This indicator was chosen because it means an increase in the number of goods produced without increasing labour costs, i.e., implies the degree of self-improvement of economic workers and is responsible for increasing actual product and income; therefore, it is a significant indicator of economic growth in general.

Regional Impact

The article has a significant regional impact: the level of investment and innovation attractiveness of regions is determined, and those that are not attractive to foreign investors are identified. The main directions of the formation of innovation and investment image of the regions of Ukraine are determined, which consider the existing environment, its transformational changes, and existing trends in the region. A method for determining the rating of business activity of innovation-active and investment-attractive enterprises, which considers their territorial and sectoral affiliation, has been developed.

Conclusion

The high level of innovation and investment attractiveness indicates the positive development of both the region and the country. Investments can be attracted only if investors are confident in the stability and economic growth. Today, such investment conditions have not been created, so their involvement remains low and, in some regions, even absent.

The development of production and infrastructure of the region is the primary goal of the policy in the strategic direction of creating and applying innovations, providing socio-economic and legislative guarantees for the constant reproduction and effective use of the scientific and economic potential of the region. This is considered by the proposed assessment. The use of the proposed method for assessing the region's investment and investment image allows investors to evaluate and select a region in which the corresponding investment project considers the region's specifics and critical areas of development and the development trends of the relevant industries.

From this point of view, the assessment of the innovation and investment image of the region in the conditions of sustainable transformation becomes a logical component of the sustainable policy of innovation and investment development of the region, and the proposed method of its implementation is quite convenient and transparent.

Conflict of interest

There is no conflict of interest to declare.

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