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## **MULTIDIMENSIONAL ASSESSMENT OF THE POTENTIAL AND DEVELOPMENT LEVEL OF UKRAINE'S ECONOMY WITH RESPECT TO ECONOMIC ACTIVITIES**

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**Summary:** The authors provide a general rating of economic activity types on the basis of the multidimensional mean, together with the estimation of their potential and development. In addition, they discuss main existent tendencies and directions of Ukraine's economy development with respect to the types of activity.

**Key words:** multidimensional mean, standardization, rating, profitability, typology.

### **1. Introduction and analysis of last publications**

Building a macro-level integrating assessment is one of the most complex issues in statistical methodology. Both national and international statisticians have studied and developed methodological support for a statistical assessment of multidimensional phenomena and processes. The works by Ayvazian, Bazhaeva, Staroverov [1974], Golovach, Yerina, Trofimov [1973], Yeliseeva, Semenova [1993], Kildyshev, Abolentsev [1993], Torgerson Warren [1972] are especially noteworthy. At present, there are quite a few methods for building multidimensional assessments: from very simple to rather sophisticated ones. These methods include: multidimensional scaling; discriminant, factor and cluster analysis; multidimensional regressive analysis; and canonical correlation analysis. In our view, the simplest and the most convenient method in terms of the interpretation of results at all the stages of multidimensional assessment is a method based on the calculation of the multidimensional median. The multidimensional median is an integrated assessment that allows for the action of every indicator that is part of a system describing a particular phenomenon or

process. Every indicator in this system is independent but, at same time, it is part of the integrated assessment. In addition, the applications of this method are almost unlimited, especially with regard to requirements of the homogeneity of the aggregate being analyzed. As a result, the application of the multidimensional median method provides a broad spectrum of possibilities for further analysis, i.e.:

- assessing and appropriately rating a phenomenon in its entirety;
- analysis of temporal variations in a phenomenon both in individual sets of indicators and across the entire system;
- typological classification by a level or condition in statics and dynamics;
- narrowing the feature space by calculating individual multidimensional medians (according to influencing factors).

## **2. Statistical estimation of reproductive potential of the potential and development level of Ukraine's economy by economic activities**

It should be noted that the use of any other multidimensional assessment method does not offer such possibilities either for a dynamic or spatial comparison. By using the multidimensional median method we tried to analyze the potential and development level of Ukraine's economy by economic activities during 2000–2009 with a view to determining a model of Ukraine's current economic development. To achieve this, a step-by-step approach was taken to calculate the multidimensional median.

At the first stage, aggregation was undertaken by individual indicators over the entire period. As a result, a multidimensional median at the first level of aggregation was obtained. At the second stage, based on the first level multidimensional estimates, they were aggregated into groups and subgroups and individual multidimensional estimates were made. This allowed rating economic activities by individual sets of indicators. At the third level of aggregation, on the basis of individual estimates, an integrated multidimensional estimate was made and used as a basis for a summary rating of economic activities.

To implement the first stage, we divided into groups and subgroups all economic indicators that could be calculated using official statistics (State Statistics Service of Ukraine) and that directly or indirectly allow assessing the potential and development level of Ukraine's economy:

1. Indicators that characterize the resource potential of enterprises of every type of economic activity. The following indicators were included in this group: capital-labor ratio (average annual value of fixed assets per employee), logistic potential of enterprises (average annual value of fixed assets per enterprise).

2. Enterprise development indicators broken down by economic activities. Two indicators were included in this group: chain indices of fixed assets and chain indices of the physical volume of gross value added (GVA).

3. Performance indicators. This group comprises a large number of indicators, which is why we created two subgroups to characterize various operational aspects of businesses:

3.1. General economic indicators of business performance broken down by economic activities, which allow characterizing general economic performance results:

- capital productivity ratio: GVA per unit of average annual fixed assets;
- actual production capacity: GVA per entity in the USREOI (unified state register of enterprises, organizations and institutions);
- profitability/unprofitability: the ratio of the financial performance to GVA;
- gross profit share in GVA;
- salary in GVA.

3.2) Indicators that characterize labor utilization results:

- labor productivity;
- average monthly salary.

As one can see, the indicators included in the system are normally represented in diverse dimension; moreover, nearly all of them are incentives (capital-labor ratio, logistic potential of enterprises, indices of fixed assets, indices of the physical volume of gross value added, etc.). What is of special interest is the unprofitability indicator: first, it is a disincentive, which should be taken into account during its standardization; second, usual standardization methods described in literature cannot be applied to it because they cannot yield a correct result. A peculiarity of this indicator is that some activities deliver a positive financial result that characterizes profitability, while others deliver a negative result that characterizes unprofitability, and these activities are represented by one vector of values: some of them are positive values, the others are negative. The question is how to perform the normalization in this case to prevent the multidimensional assessment from being ultimately distorted. The uniqueness of this task warranted a search for an unorthodox approach to the normalization procedure. To this end, we developed a special methodological technique allowing for the sign (positive or negative), both of the normalizing indicator and the one being normalized.

Standardization was performed at the economy level. If the indicator economy value was characterized by a positive number, all positive values of the indicator by economic activities were normalized at this level, while all the negative values (characterizing unprofitability) were normalized according to the following

formula:  $-\bar{o}'_{ij} = \frac{(-x_{ij} - \bar{x}_i)}{\bar{x}_i}$ . This made it possible to allow for a total distance at

which a loss on profit stands.

If the economy indicator was represented by a negative number, all negative indicators by economic activity types were normalized so that the result would be negative, using the formula:  $-\tilde{\delta}'_{ij} = -\frac{x_{ij}}{\bar{x}_i}$ . If the indicator value by activity type was positive, to obtain a positive results normalization was based on the following formula:  $\tilde{\delta}'_{ij} = \frac{(-\bar{x}_i - x_{ij})}{-\bar{x}_i}$ , which also allowed for a total distance at which a loss on profit stands.

Benchmark data for the normalizing procedure are presented in Table 1. These data were used to normalize the values of the profitability (unprofitability) indicators by types of economic activity.

**Table 1.** Profitability (unprofitability) indicators by types of economic activity in 2001–2009 (%)

Types of economic activity	2001	2002	2003	2004	2005	2006	2007	2008	2009
Economy	10.4	7.3	8.2	14.2	16.6	16.1	19.1	7.0	-4.0
Agriculture, hunting, forestry	3.1	-0.9	2.6	7.4	9.1	6.7	10.5	7.5	9.5
Industrial production	15.4	4.6	9.8	21.3	23.6	23.1	21.2	12.0	-1.9
Mining	...	2.6	0.4	23.6	34.0	24.3	25.7	44.0	6.4
Manufacturing	...	7.2	15.7	26.8	24.0	21.8	21.8	3.7	-5.4
Production and distribution of electricity, gas and water	...	-2.8	-5.9	-9.7	8.4	29.4	11.7	8.7	5.4
Construction	9.9	-0.5	0.1	5.3	5.3	7.6	7.3	2.5	-8.8
Trade, repair of motor vehicles, household appliances and personal demand items	10.5	17.7	1.8	16.9	16.9	15.1	17.1	-3.2	-1.8
Activity of hotels and restaurants	-2.3	-0.7	-4.6	-1.3	3.5	-1.2		-2.4	...
Activity of transport and communications	16.8	15.5	16.5	15.6	20.3	15.2	14.2	10.4	11.1
Financial activity	0.5	38.0	45.4	33.2	47.2	45.9	44.4	32.2	-52.3
Real estate activities, renting, engineering and provision of services to businessmen	-1.2	6.2	7.0	4.7	8.6	15.6	48.5	-3.5	-1.0
Education	...	0.9	0.8	0.8	0.7	0.3	0.2	0.1	0.2
Health care and provision of social aid	...	0.4	0.1	0.4	0.5	0.1	0.3	0.1	0.5
Provision of communal and individual services, cultural and sporting activity	...	2.0	-1.8	4.8	1.1	5.3	4.1	-2.0	...

Source: authors' own calculations based on the data of State Statistics Committee of Ukraine.

Thus, for instance, the following calculations were made for agriculture:

– in 2001 the normalized value was calculated as follows:

$$x'_{11} = \frac{x_{11}}{\bar{x}_1} = \frac{3.1}{10.4} = 0.294 ;$$

– in 2002 the normalized value was calculated according to the formula:

$$-x'_{21} = \frac{(-x_{21} - \bar{x}_2)}{\bar{x}_2} = \frac{(-0.9 - 7.3)}{7.3} = -1.119 ;$$

– in 2009 the calculation was performed according to the formula:

$$x'_{91} = \frac{(-\bar{x}_9 - x_{91})}{-\bar{x}_9} = \frac{(-4.0 - 9.5)}{-4.0} = 3.402 .$$

As a result, between 2001 and 2009 the multidimensional median for agriculture was  $\bar{x}'_1 = \frac{\sum x'_{i1}}{m} = \frac{0.294 + (-1.119) + 0.324 + 0.522 + 0.551 + 0.414 + 0.548 + 1.066 + 3.402}{9} = 0.667$  .

Similar calculations were performed for all indicators, after which standardized values of relevant indicators were consolidated into subgroups or groups and used as a basis for building a summary rating of economic activities that characterizes their development level, which allowed reaching conclusions as to the current state, trends and the model of the Ukrainian economy. Let us examine the results of these calculations more closely.

We will start with the indicators from the first group, which, as was mentioned earlier, characterize the resource potential of economic activities. The analysis of the capital-labor ratio dynamics for enterprises of different economic activity showed that over 2001–2009 the resource potential had tripled. The highest resource level was in the mining industry, which is nearly 15 times as high as the overall level across the economy. In the production and distribution of power, gas and water, the resource level is 11 times as high as the overall level across the economy. The lowest resource potential is in the construction industry – almost twice as low as the general economy level, in activities associated with the provision of utilities and individual services, and in the area of culture and sports – almost thrice as low, as well as in trade, repairs of vehicles, household goods and items of personal use – almost four times as low.

The second group of indicators allowed assessing the development of economic activity enterprises in 2001–2009. The calculations allowed drawing the following conclusions:

1. Businesses engaged in financial activities, trade, vehicle repairs as well as construction are leaders in terms of production capacity development, i.e. their growth outruns general economy growth by 15.1%, 9%, 4.5%, respectively.

2. The highest production growth rate was among businesses engaging in financial activities – the 1st place, the 2nd place – hotels and restaurants, the 3rd place – real estate operations, lease, engineering and services for entrepreneurs. These businesses outrun general economy growth rates by 11.1%, 10.7%, 8%, respectively.

3. By and large, in terms of development businesses engaging in financial activities intensity ranked first (13.1% lead), trade and vehicle repairs (7% lead), hotel and restaurant business (6.1% lead), i.e. activities not associated with the manufacturing of goods. The mining industry ranked 9th, the processing industry ranked 7th and the agricultural sector ranked only 10th.

As already noted, it was proposed to assess performance according to two groups of indicators: general economic indicators and labor utilization indicators. Let us start with the first subgroup of indicators – general economic. One of the most important ones is the capital productivity ratio that characterizes the efficiency of capital resources utilization; and linking it to indicators of resource potential status and dynamics will make it possible to draw conclusions as to whether existing resources are utilized efficiently.

The highest resource efficiency was demonstrated by businesses:

- engaged in trade and repair of vehicles, household goods and items of personal use (capital productivity ratio is 5.1 times higher than the general economic level);
- engaged in financial activities (capital productivity ratio is 4.3 times higher than the general economic level);
- engaged in construction (capital productivity ratio is 2.3 times higher than the general economic level).

The lowest resource efficiency is in the area of real estate operations, lease, engineering, services for entrepreneurs (capital productivity ratio is almost thrice as low as the general economic level), for enterprises that produce and distribute electric power, gas and water – twice as low, for transportation and telecommunications companies – 25% as low.

Additionally, the correlation of economic activity ranks was analyzed for resource potential and efficiency, and a nonrandom inverse correlation was discovered: Spearman's rank correlation coefficient – ( $-0.714$ ) with a materiality level – 0.006. Thus, it can be argued that at the current stage of Ukraine's economy there is a gap between the accumulated resource potential and resource efficiency: the higher the potential is, the lower resource utilization efficiency. This may indicate both a technological gap and latent activity in all the areas of the economy. The analysis of the rank correlation between the activity resource potential and activity absolute results has shown that there is a close connection between the distribution of economic activities by resource potential and volumes of production (rank correlation coefficient – 0.84 with a materiality level – 0.03%). Thus, the absolute result corresponds to existing resources, while the relative results do not. It may be assumed that in general resource potential growth outruns production volume growth, which reduces resource efficiency, and this may in turn confirm the hypothesis about existing latent economic activities.

The assessment of the economic component, which characterizes the effectiveness of activities on the basis of profitability indicators in 2001–2009,

shows that the mining industry is far ahead of other activities in terms of profitability (profitability level is almost twice as high as the general economy level), as well as transportation and telecommunications companies (higher by 67.4%) and financial activities (higher by 40%). The least profitable sectors include education, health care, production and distribution of electric power, gas and water. In addition, the highest level of unprofitability is shown by hotels and restaurants, utility companies and the construction sector, which is quite odd given the attractiveness of these activities, especially in view of a high capital productivity ratio (ratings: construction – 3, utilities – 7, hotels and restaurants – 9) and salaries in GVA (ratings: construction – 3, utilities – 4, hotels and restaurants – 8).

To adequately assess the distribution of economic activities in terms of the effectiveness of Ukrainian businesses by general economic indicators in 2001–2009, a rating was created without taking into account the absolute indicator, i.e. actual production capacity. This is primarily due to the fact that values of standardized production capacity indicators differ from others (sometimes the difference is tenfold), which may result in the distortion of a rating score, and as a consequence, erroneous conclusions. Therefore, the final ratings look as follows: the 1st place – companies engaged in financial activities and trade with their indicators being twice as high as the general economic level; at rather a considerable distance from them there are the mining industry (1.3 times as high) and the agricultural sector (higher by 15%). Surprising as it may seem, companies that produce and distribute electric power, gas and water come last in the rating (their indicators is 1.5 as low as the general ones), as well as hotels and restaurants – twice as low as the general level .

The second subgroup of performance indicators includes labor productivity and average monthly salaries. Let us start with labor productivity.

It is common knowledge that labor productivity is a key indicator of the performance of any economic system, which is why labor productivity analysis allows determining the most efficient activities and those with low labor productivity in order to develop appropriate programs to boost labor productivity. The highest labor productivity has been shown by organizations engaged in financial activities (2.5 times as high as the average level across Ukraine); in trade (higher by 2.3 times) and by transportation and telecommunications companies (higher by 1.5 times). Education and health care sector traditionally have low indicators.

As far as salaries are concerned, the highest salaries are paid in organizations engaged in economic activities – almost twice as high as the average salary level across the economy. Trade enterprises rank second at a considerable distance (salary levels are higher by 58.2%) as well as transportation and telecommunications companies – 40% as high. Very low salary levels (twice as low) are in the agricultural, education and health care sectors.

### 3. Statistical typology and positioning of economic activities

Based on previous calculations, economic activities were categorized by productivity and salary levels in 2001–2009. This allowed making a typology of economic activities by dividing them into five groups: low, below average, average, above average and high labor productivity and salary levels (see Table 2 and 3).

**Table 2.** Typology of economic activities by labor productivity in 2001–2009

Labor productivity level	Score	Number of economic activity types	Types of economic activity
Low	0.000–0.199	2	Education (0.123) Health care and provision (0.147)
Below average	0.200–0.399	2	Provision of communal and individual services, cultural and sporting activity (0.229) Construction (0.387)
Average	0.400–0.599	5	Production and distribution of electricity, gas and water (0.403) Manufacturing (0.418) Mining (0.428) Activity of hotels and restaurants (0.445) Agriculture, hunting, forestry (0.431)
Above average	0.6–0.799	2	Activity of transport and communications (0.602) Real estate activities, renting, engineering and provision of services to businessmen (0.625)
High	0.800–1.000	2	Trade, repair of motor vehicles, household appliances and personal demand items (0.913) Financial activity (1.000)

Source: author's own calculations based on the data of State Statistics Committee of Ukraine.

To identify groups, the multidimensional assessment of labor productivity was maximally normalized again. This allowed juxtaposing the groupings of economic activities according to different characteristics. This approach limited the rating variation from above and from below and made it possible to obtain groupings with equal intervals. The assessment thus normalized varies between 0 and 1. The interval width is 0.2 units. In addition, this methodology makes it possible to interpret the content of obtained indicators. For example, labor productivity in the construction sector is only 39% of labor productivity in the financial sector, and in trade – 91% (see Table 2). As for salary levels, salaries in the agricultural sector are 5 times as low as in the financial sector; and salaries in the education and health care sectors are 4 times as low. Industrial sector salaries average two-thirds of salary levels in the financial sector (see Table 3).

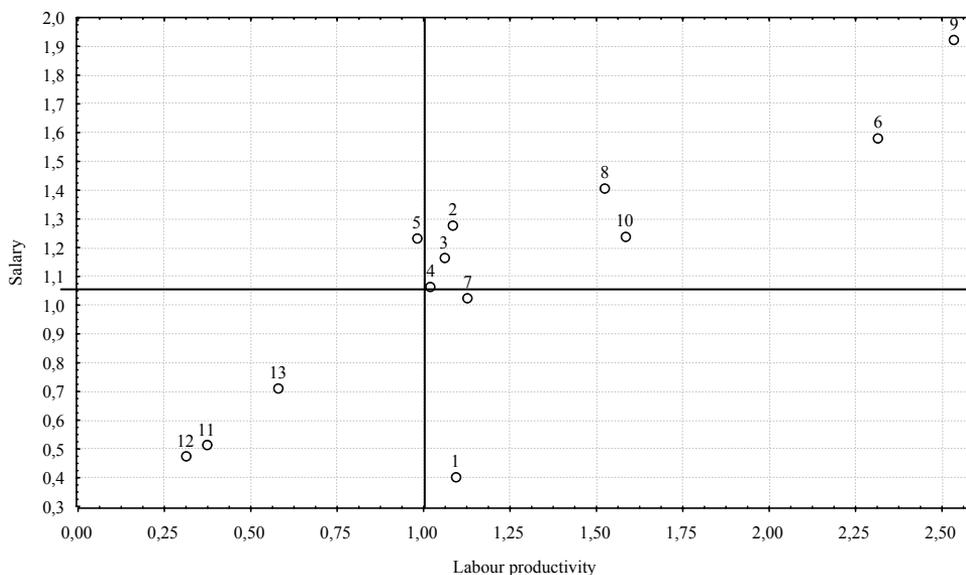
The comparison of the economic activity ratings by salary and labor productivity levels showed that there was a nonrandom close correlation (Spearman's rank correlation coefficient – 0.725 with materiality level – 0.005), which essentially means that low salaries are determined by low labor productivity.

**Table 3.** Typology of economic activities by salary levels in 2001–2009

Salary level	Score	Number of economic activity types	Types of economic activity
Low	0.000–0.199	0	x
Below average	0.200–0.399	4	Agriculture, hunting, forestry (0.209) Health care and provision of social aid (0.246) Education (0.267) Provision of communal and individual services, cultural and sporting activity (0.369)
Average	0.400–0.599	2	Activity of hotels and restaurants (0.534) Production and distribution of electricity, gas and water (0.554)
Above average	0.6–0.799	5	Manufacturing (0.605) Construction (0.641) Mining (0.664) Real estate activities, renting, engineering and provision of services to businessmen (0.645) Activity of transport and communications (0.732)
High	0.800–1.000	2	Trade, repair of motor vehicles, household appliances and personal demand items (0.824) Financial activities (1.000)

Source: authors' own calculations based on the data of State Statistics Committee of Ukraine.

In the coordinate space Figure 1 illustrates the distribution of economic activities by labor utilization indicators. As we can see, it is a linear and direct connection in its form and direction. The plot clearly shows a conglomeration of activities that form 4 groups: with high (transportation and communications, real estate operations) and very high indicators (financial activities, trade), average and above average (mining and processing industries, construction, production and distribution of electric power, gas and water, hotel and restaurant business), below average and low (utilities, culture and sports, education, health care). The agricultural sector occupies a special position, which evidences the mismatch between labor remuneration (which constitutes only 40% of the average across the economy) and the actual productivity – 110% of the average across the economy.

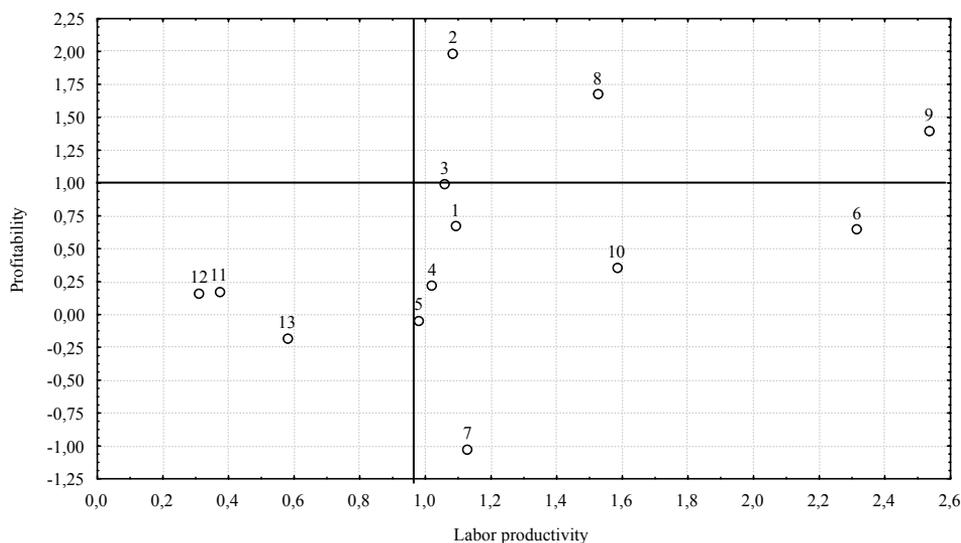


**Figure 1.** Dot plot of multidimensional assessment of economic activities by salary and labor productivity levels

Source: authors' own calculations based on data of State Statistics Committee of Ukraine.

If we place economic activities in the same context and look at profitability, we will get the following picture (see Figure 2). There is a mismatch between profitability and labor productivity levels of economic activities, except for transportation and telecommunications companies, where all indicators absolutely match, and financial activities – a partial match between indicators: labor utilization ranks highest and profitability ranks above average, and salary levels in the financial sector are far above profitability, which may evidence the existence of latent activity.

1	Agriculture, hunting, forestry
2	Mining
3	Manufacturing
4	Production and distribution of electricity, gas and water
5	Construction
6	Trade, repair of motor vehicles, household appliances and personal demand items
7	Activity of hotels and restaurants
8	Activity of transport and communications
9	Financial activity
10	Real estate activities, renting, engineering and provision of services to businessmen
11	Education
12	Health care and provision of social aid
13	Provision of communal and individual services, cultural and sporting activity



**Figure 2.** Dot plot of multidimensional assessment of economic activities for profitability based on labor productivity

Source: authors' own calculations based on the data of State Statistics Committee of Ukraine.

Trade may be a vivid example of existing latent activities. Labor productivity in the trade sector is 2.3 times as high, salaries are 1.6 times as high, and profitability is only 65% of the overall economy level. If we look at the absolute data (see Table 1), the trade sector has sustained losses for the last two years. Interestingly, all the enterprises engaged in activities “successful” in terms of labor utilization (except for the industry) have low profitability levels (construction, production and distribution of electric power, gas and water) or make losses (hotel and restaurant business).

All in all, in terms of performance all economic activities present the following picture (see Table 5). Trade and financial sector businesses stand at a considerable distance from other business activities. Performance indicators of transportation and telecommunications companies only account for 61.7% of the achievable maximum. Industrial and construction enterprises stand rather close to them but in a different group. Agricultural enterprises do not achieve even half of the trade and financial sectors' performance levels. Why is this happening? In Ukraine trade and financial sector companies are leaders in terms of development and performance. At the same time, basic business activities that are critical to the existence and normal development of any economy are in the other half of the rating, while the education and health care sectors rank last, which has been traditional for Ukraine for a decade.

**Table 4.** Typological grouping of economic activities based on 2001–2009 performance results

Performance results	Score	Number of economic activity types	Types of economic activity
Low	0.000–0.199	0	x
Below average	0.200–0.399	4	Health care and provision (0.302) Education (0.314) Provision of communal and individual services, cultural and sporting activity (0.341) Activity of hotels and restaurants (0.376)
Average	0.400–0.599	6	Production and distribution of electricity, gas and water (0.414) Agriculture, hunting, forestry (0.457) Real estate activities, renting, engineering and provision of services to businessmen (0.504) Manufacturing (0.514) Construction (0.518) Mining (0.591)
Above average	0.6–0.799	1	Activity of transport and communications (0.617)
High	0.800–1.000	2	Trade, repair of motor vehicles, household appliances and personal demand items (0.935) Financial activity (1.000)

Source: authors' own calculations based on the data of State Statistics Committee of Ukraine.

At the last stage, an attempt was made to build a general rating of economic activities across all the groups of indicators. However, before that it was necessary to check ratings in the indicator groups and subgroups for coherence using Spearman's rank correlation coefficients, because already at the interim stages there emerged contradictions between indicators inside the groups and subgroups.

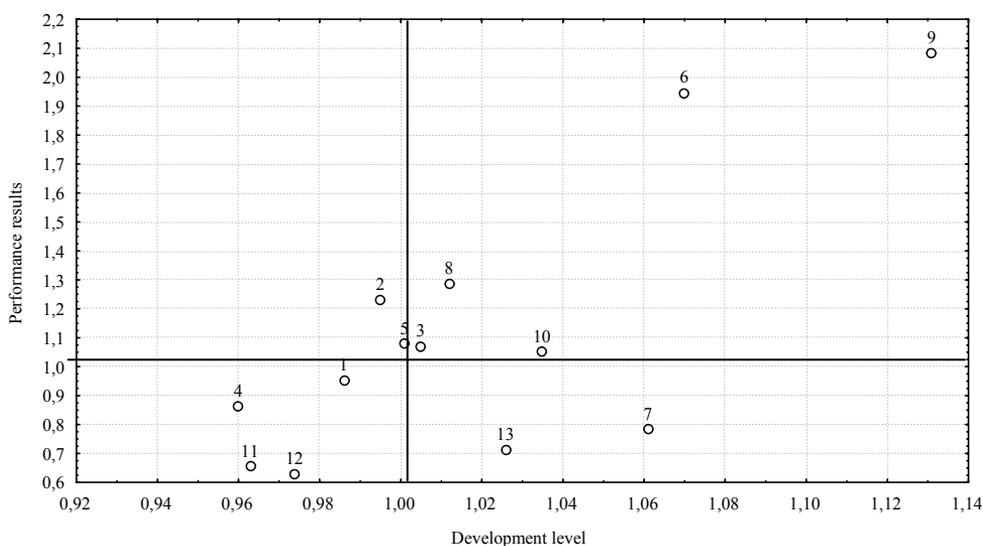
If we analyze the values of rank correlation coefficients by the indicator groups and subgroups of indicators, total coherence can be found in the ratings of:

- development and performance indicators;
- development and labor utilization indicators;
- performance and general economic indicators;
- performance and labor utilization indicators.

There are obvious contradictions in the distribution of economic activities by development and resource levels: those types of activity that are better resourced develop at the slowest pace (mining industry, transportation and communications, production and distribution of electric power, gas and water), as well as by resource provision and efficiency: the higher resource provision is, the lower the capital productivity ratio (production and distribution of electric power, gas and water, mining industry, transportation and communications, real estate operations).

This gives grounds for concluding that in this case building a composite rating of economic activities according to all the indicators is statistically incorrect

because the ratings are not coherent by the groups of indicators. However, it is possible to build a composite rating for two groups of indicators: development and performance results. This will make it possible to identify a typology of the distribution of economic activities.



**Figure 3.** Dot plot of multidimensional assessment of economic activities based on performance results and a development level

Source: authors' own calculations based on the data of State Statistics Committee of Ukraine.

To begin with, let us look at the distribution of economic activities by the two groups of indicators. According to Figure 3, all the types of economic activity fall into four groups that can be identified as:

I. Developed and efficient – financial activity, trade, transportation and communications, real estate operations, processing industry.

II. Developed and inefficient – hotel and restaurant business, utilities, culture and sports.

III. Poorly developed yet efficient – mining industry, construction.

IV. Poorly developed and inefficient – production and distribution of electric power, gas and water; education; health care.

Let us create a composite rating of economic activities by making a summary multidimensional assessment of development level and performance results (see Table 6). Based on the rating results, the leaders are enterprises engaged in financial sector and trade. Education, health care and social welfare come last in the rating.

**Table 5.** Summary multidimensional assessment of economic activities based on development and performance indicators in 2001–2009

Types of economic activity	Summary estimation	Rank	Summary normalized estimation
Construction	1.039	6	0.647
Production and distribution of electricity, gas and water	0.911	10	0.567
Activity of hotels and restaurants	0.922	9	0.574
Activity of transport and communications	1.148	3	0.715
Mining	1.112	4	0.693
Provision of communal and individual services, cultural and sporting activity	0.868	11	0.540
Real estate activities, renting, engineering and provision of services to businessmen	1.042	5	0.649
Education	0.808	12	0.503
Health care and provision of social aid	0.802	13	0.499
Manufacturing	1.037	7	0.646
Industrial production	1.023	x	0.637
Agriculture, hunting, forestry	0.969	8	0.603
Trade, repair of motor vehicles, household appliances and personal demand items	1.508	2	0.939
Financial activity	1.606	1	1.000
Economy	0.986	x	0.614

Source: authors' own calculations based on the data of State Statistics Committee of Ukraine.

**Table 6.** Typological grouping of economic activities based on 2001–2009 development and performance results

Development and results of activity level	Score	Number of economic activity types	Types of economic activity
Low	0.499–0.599	5	Health care and provision (0.499) Education (0.503) Provision of communal and individual services, cultural and sporting activity (0.54) Production and distribution of electricity, gas and water (0.567) Activity of hotels and restaurants (0.574)
Below average	0.600–0.699	5	Agriculture, hunting, forestry (0.603) Manufacturing (0.646) Construction (0.647) Real estate activities, Renting, engineering and provision of services to businessmen (0.649) Mining (0.693)
Average	0.700–0.799	1	Activity of transport and communications (0.715)
Above average	0.8–0.899	0	x
High	0.900–1.000	2	Trade, repair of motor vehicles, household appliances and personal demand items (0.939) Financial activity (1.000)

Source: authors' own calculations on the basis of the data contained in Table 6.

Calculating a maximally standardized value will allow creating the final grouping of economic activities according to development level and performance results (see Table 6). As the lowest rating is 0.499, and the maximum rating is 1, it is possible to distinguish five groups with an interval width of 0.1. Discrepancies between economic activity types are so substantial that as a result of grouping a gap in indicators appeared between financial activities and trade and enterprises engaged in other activities. Only transportation and telecommunications enterprises fell into the group with average results; a group of economic activities with above average development and performance results is non-existent altogether.

All this gives grounds for arguing that in the absence of economic activities with average and above average results there is a considerable stratification of enterprises engaged in various economic activities by their potential and capacities to efficiently operate and develop. Such a considerable differentiation of economic activities leads to serious disproportions in the economy, which in turn prevents its balanced and gradual development. As a matter of fact, the disproportionate distribution indicates the imminence of another economic crisis, which may have grave consequences eventually bringing about the collapse of the entire economic system.

#### **4. Conclusions**

The scientific and practical results obtained in the course of the study can be formulated as follows:

1. The authors developed an approach to standardizing indicators, which, depending on a direction, can be both incentives and disincentives.

2. A system of indicators was build and the indicators were typologized, which makes it possible to characterize the achieved potential, development and performance of enterprises of various economic activities at the macro-level.

3. A methodology was developed for repeat maximum normalization of the multidimensional assessment, which makes it possible to compare the groupings of economic activities by various characteristics and limit the ratings variation from above and from below, and build a grouping with equal intervals.

4. A methodological approach was developed to building a composite rating of economic activities on the basis of their coherence across different groups of indicators.

5. Economic activities were positioned according to the following indicators: labor productivity, labor remuneration and profitability, development and performance levels.

6. It was concluded that performance results of enterprises of different economic activity did not correspond to existing resources, which evidenced technological drawbacks, low resource efficiency and a gap between resource growth and production growth rates.

7. As a result of rating the economic activities, it was concluded that enterprises of different economic activity are considerably stratified, which leads to disproportions in the economy and prevents its efficient development.

8. Ukraine's modern model of economic development can be characterized as both ineffective and inefficient, and oriented toward the virtual product. The most effective and developed economic activity sectors are those that provide immaterial services, financial activities and trade. At the same time, economic activities on which efficient functioning and stable development of the economy and society as a whole depend (agriculture, processing and mining industries, construction) have below average development and performance indicators, which inevitably gives rise to new crises, which may cause the collapse of the economic system.

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## WIELOWYMIAROWA OCENA POTENCJAŁU I ROZWOJU GOSPODARKI UKRAINY NA PODSTAWIE POZYCJONOWANIA RODZAJÓW DZIAŁALNOŚCI EKONOMICZNEJ

**Streszczenie:** W artykule przedstawiono zbiorczy ranking rodzajów ekonomicznej działalności Ukrainy, który został zbudowany na podstawie wielowymiarowej średniej. Ponadto w artykule zaprezentowano również ocenę potencjału rozwoju poszczególnych działalności, poziomu i intensywności ich rozwoju, a także pewne tendencje i kierunki rozwoju gospodarki Ukrainy.

**Słowa kluczowe:** wielowymiarowa średnia, standaryzacja, rating, zyskowność, typologia.