

DOI: [10.55643/fcaptop.6.53.2023.4208](https://doi.org/10.55643/fcaptop.6.53.2023.4208)

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Received: 09/10/2023

Accepted: 15/11/2023

Published: 31/12/2023

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# GROUPING OF EU COUNTRIES ACCORDING TO THE LEVEL OF ECONOMIC DEVELOPMENT AND STABILITY OF ECONOMIC PROCESSES BASED ON ABC-XYZ-ANALYSIS

## ABSTRACT

The study of economic development and the stability of economic processes of countries is a critically important task, as it helps to understand and analyze the processes taking place in the economic systems of countries. Countries differ significantly in terms of economic development, and their grouping according to certain parameters helps to better understand the general picture of the economic state of the country. The article proposes to group EU countries according to the level of economic development and the level of the economic processes' stability based on GDP and GDP per capita indicators using ABC and XYZ analysis. The study was conducted on the basis of the countries of the European Union (EU) for the period 2015-2022 since the EU is a large regional association of countries with common economic, political and social goals. The statistical data of the World Bank served as the information base. The existence of discrepancies for countries between the level of GDP and the level of GDP per capita was revealed. Ukraine was also ranked according to the level of economic development and the level of the economic processes' stability based on GDP and GDP per capita indicators since this country is a candidate for EU membership in 2022. The results of the study will help to understand the mosaic of the economic situation in different EU countries and highlight key conclusions for further research or decision-making. This information can be useful for understanding the main trends in the economy of the European region, identifying possible areas for cooperation and investment, as well as for developing strategies to improve development and stability in each of the EU countries.

**Keywords:** economic development, GDP, GDP per capita, stability of economic processes, ABC-analysis, XYZ-analysis, state, EU, Ukraine, management aspect

**JEL Classification:** C38, E01, O11, O40, O52

## INTRODUCTION

The study of economic development and the stability of economic processes of countries is a critically important task, as it helps to understand and analyze the processes taking place in the economic systems of countries. Economic development directly affects people's quality of life. Understanding the factors that contribute to economic growth and poverty reduction allows the implementation of policies and programs aimed at improving the living conditions of the population. A strong economy helps maintain stability and promotes political and social stability. Weak economic indicators can cause instability, dissatisfaction and even conflicts [32]. In general, the study of economic development helps to understand how the economy works, and what causes its growth or decline and allows the implementation of strategies and policies that contribute to the sustainable and balanced development of countries [47].

Countries differ significantly in terms of economic development, and their grouping according to certain parameters helps to better understand the general picture of the economic state of the country. One of the most important parameters used to classify countries is GDP (Gross Domestic Product).

Studying the dynamics of macroeconomic indicators, in particular GDP, is key to determining the economic health of countries [52]. GDP measures the volume of production

of goods and services in the national economy during a certain period. It allows you to compare the level of economic development between different countries and determine how many resources a country uses to meet the needs of its citizens. The change in GDP makes it possible to assess the growth or decline of production, which is the key to the implementation of effective economic strategies. The dynamics of GDP make it possible to assess the effectiveness of economic policies and measures adopted by the government. For example, GDP growth after the introduction of new stimulus measures may indicate the success of these policies.

GDP also makes it possible to compare economic indicators between different countries and regions. This helps to understand which countries have a higher level of development and allows you to find best practices to use in your own economic strategies. In general, the study of GDP dynamics helps to understand the essential aspects of the economy that affect people's lives and provides the basis for the development of effective economic policies and strategies for the country's development.

## LITERATURE REVIEW

Assessment, calculation and identification of trends in the dynamics of macroeconomic development of countries are complex tasks that various scientists and economists are engaged in. These tasks are performed using various methods and models that allow for analyzing economic processes and identifying key trends.

To estimate and calculate macroeconomic indicators, such as GDP, inflation, unemployment, etc., economists use official statistics provided by national governments. For example, the World Bank, the International Monetary Fund (IMF), the US State Department, and other organizations publish statistical data that help analyze macroeconomic trends at the country level and globally.

Various methods and approaches are used to identify trends in the dynamics of macroeconomic development of the country based on GDP: econometrics [3; 36], time series analysis [1; 40], modelling of economic systems [12; 21; 31], scenario analysis [50], calculation of macroeconomic indicators and indices [26; 37], etc.

In general, economic analysis and assessment of the dynamics of macroeconomic development is a complex and multi-faceted process that requires the use of various tools and methods [11]. These studies help to understand economic trends and use this knowledge to develop effective economic policies and strategies for the development of countries [43; 49].

One of the effective tools for grouping economic objects of research is the methods of ABC [46] and XYZ analysis [2]. Its name comes from two main components: ABC analysis, which is used to classify economic objects according to importance (profitability) [28], and XYZ analysis, which is used to classify economic objects according to the predicted stability of demand [45].

Scientists use methods of ABC and XYZ analysis for the purpose of research, assessment and optimization of management of stocks and current assets in enterprises and organizations [8; 44]. This method is an effective tool for analyzing the dynamics of the circulation of goods or services and the effective use of resources, which helps to achieve a number of specific goals: optimizing inventory management, making more effective management decisions, reducing risks, improving the level and quality of customer service, planning and forecasting, etc.

In general, the ABC-XYZ-analysis method helps scientists and enterprises to use resources more effectively, increase the efficiency of activities and reduce risks [19], which helps to achieve better results and ensures stable development of the organization. Scientists do not pay enough attention to the application of the ABC-XYZ-analysis method for research and grouping of countries. Their works are mainly focused on the research of an industrial enterprise in the mechanical engineering sector (Scholz-Reiter et al. [45]); a grouping of regions of Ukraine according to the profitability/risk level of the tourism industry (Dutka et al. [10]); determination of groups of regions with high, medium and low levels of potential utilization efficiency (Parshyna M. [34]), etc.

At the same time, despite the availability of scientific publications, aspects of the application of ABC and XYZ analysis methods and their use for evaluating and analyzing the features of the economic development of countries on the basis of the macroeconomic indicator of GDP require further study. This, in turn, will make it possible to better structure and group countries with the aim of further differentiating management decisions aimed at the economic development of one or another group (cluster) of countries. Grouping of countries helps to determine the economic potential of individual regions or groups of countries. It can be useful for investors, businesses and organizations looking for new opportunities for development and cooperation.

## AIMS AND OBJECTIVES

The aim of the article is to group EU countries according to the level of economic development and the level of stability of economic processes based on GDP and GDP per capita indicators using ABC and XYZ analysis. By combining both methods, you can get a clear idea of what decisions need to be made to ensure the further development of each group of countries.

## METHODS

The method of ABC and XYZ analysis was chosen for the research. As the results of the scientific sources research show, the ABC-XYZ-analysis method is not a typical tool for researching economic development and grouping of countries, but it can have some advantages and practical significance, in particular:

1. The ABC-XYZ-analysis method is based on simple principles and is easy to apply, which can make it a convenient tool for a quick overview of countries on some key parameters.
2. Using of the ABC-XYZ-analysis method can help to conduct a primary review of the economic condition of countries and to distinguish several groups of countries according to their importance and projected stability of development.
3. Grouping of countries using the ABC-XYZ-analysis method can help determine potential priority areas of cooperation, investment or development for certain categories of countries that have proven to be the most important or stable.
4. The grouping of countries by the ABC-XYZ-analysis method can help reveal some main trends in the development of different countries and find out whether there are similarities or differences between countries in different groups.
5. XYZ-analysis can help identify countries with high variability of indicators, which can become the object of increased attention and risk when developing international economic strategies or investment decisions.

Given these advantages, the use of ABC-XYZ analysis can be a useful additional approach for rapid overview and conditional grouping of countries.

GDP (gross domestic product) was chosen as the resulting macroeconomic indicator of the country's development. GDP allows you to measure the economic development of the country over a certain period. An increase in GDP indicates an increase in economic activity, while a decrease may indicate an economic recession. GDP makes it possible to compare economic productivity between different countries. Countries with higher GDP usually have higher output and a higher standard of living [24]. GDP serves as a benchmark for assessing the country's economic health [13]. A high GDP can indicate stability and prosperity, while a low GDP can indicate economic problems.

The countries of the European Union (EU) were chosen for the study because the EU is a large regional association of countries with common economic, political and social goals [18; 51]. Researching EU countries can be an interesting and important task for several reasons:

1. The EU is the largest economic union area in the world, and the study of its countries can reveal the peculiarities of their economic integration, trade and investment relations.
2. The EU has a significant influence on the world economy and politics, and the study of its countries helps to understand their role in the world and influence on the global stage.
3. EU countries have similar living standards, but may also differ in terms of development, culture, economic models and other aspects, which allows for comparative studies.
4. The study of EU countries helps to understand and analyze common European policies, such as monetary policy, trade, migration and others, and their impact on the economy and society.

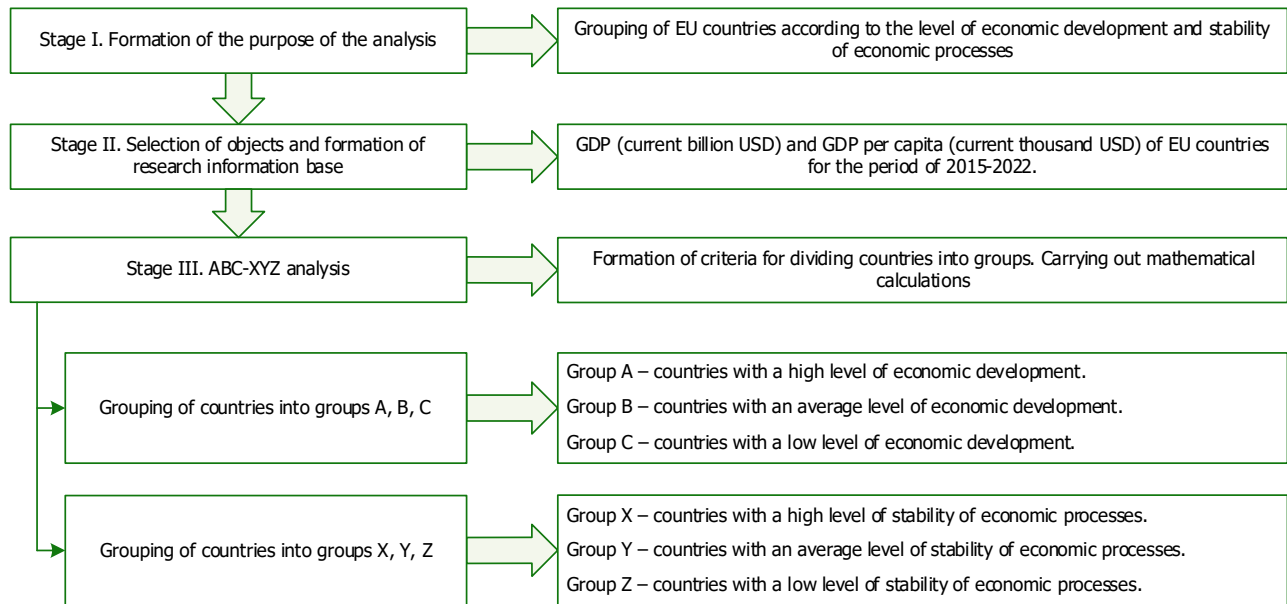
Ukraine is also included in the study. Its economic development and social aspects can complement and enrich the analysis. Comparing Ukraine with EU countries can show similarities and differences in economic and socio-cultural aspects. It helps to find out what features and challenges this country has compared to other European countries. Studying Ukraine alongside EU countries can provide valuable insights into its economic and social dynamics, facilitating a better understanding of its unique characteristics and challenges within the European context.

The statistical data of the World Bank served as the information base, which is an excellent approach since the World Bank is one of the leading international institutions for the collection and publication of economic data. The research period is 2015-2022. Two macroeconomic indicators were chosen for analysis:

GDP (current USD) represents the sum of value added by all its producers. Value added is the value of the gross output of producers less the value of intermediate goods and services consumed in production, before accounting for consumption of fixed capital in production. The United Nations System of National Accounts calls for value added to be valued at either basic prices (excluding net taxes on products) or producer prices (including net taxes on products paid by producers but excluding sales or value-added taxes). Both valuations exclude transport charges that are invoiced separately by producers. Total GDP is measured at purchaser prices. Value added by industry is normally measured at basic prices [14].

GDP per capita (current USD) is gross domestic product divided by midyear population [15].

A generalized methodological approach to the grouping of EU countries according to the level of economic development and stability of economic processes based on ABC-XYZ analysis is presented in Figure 1.



**Figure 1. Methodical approach to the grouping of EU countries according to the level of economic development and stability of economic processes based on ABC-XYZ-analysis.**

ABC-XYZ-analysis makes it possible to divide the studied countries into nine groups depending on the level of economic development (ABC) and the level of stability of economic processes (XYZ). The final matrix of the ABC-XYZ-analysis will have the following form, which is presented in Table 1.

Table 1. The final matrix of the ABC-XYZ-analysis of countries.			
Groups	X	Y	Z
<b>A</b>	AX – high level of economic development and high level of stability of economic processes	AY – high level of economic development and average level of stability of economic processes	AZ – high level of economic development and low level of stability of economic processes
<b>B</b>	BX – average level of economic development and high level of stability of economic processes	BY – the average level of economic development and the average level of stability of economic processes	BZ – average level of economic development and low level of stability of economic processes
<b>C</b>	CX – low level of economic development and high level of stability of economic processes	CY – low level of economic development and average level of stability of economic processes	CZ – low level of economic development and low level of stability of economic processes

## RESULTS

The ABC analysis method is a data analysis tool that helps determine the level of importance or priority of elements, objects or data. This method gets its name from the first three letters of the alphabet (A, B and C) and is used to divide objects into three groups depending on their importance. The basic idea is that some objects have more importance and meaning, so they need more attention and control. In our case, the role of those countries with a higher GDP value will

be significant. Countries with high GDP are usually more attractive to foreign investors because they represent the potential for high profits and an increased consumer market.

The process of carrying out the ABC analysis method usually consists of the following steps:

1. Data collection. First, it is necessary to collect relevant data about the objects or elements to be analyzed. The initial data for the ABC analysis of EU countries by level of economic development based on GDP and GDP per capita are presented in Table 2-3.
2. Ranking by importance. Each object is ranked by importance in accordance with the investigated indicator (Table 2, 3).
3. The division into groups. After ranking the objects, they are divided into three groups named "A", "B" and "C". Usually "A" group consists of the most important objects, which are small in volume but have the highest importance. Group "C" includes the least important objects, which may be large in volume, but have low importance. Group "B" is objects that are between "A" and "C" in terms of importance.

ABC analysis is based on the Pareto principle "80 for 20" [20], which reflects that 80% of the result is achieved with the help of only 20% of the stocks or resources of the enterprise. In the literature, the following gradation is used to divide objects using the ABC analysis method [20; 23]:

- Group A – this group consists of objects that bring about 75-80% of the total result, while they occupy only 10-20% of the total volume of objects.
- Group B – this group consists of objects that bring approximately 10-15% of the total result, and they occupy 30-40% of the total volume of objects.
- Group C is a group of objects that bring approximately 5-10% of the total result, and their volume is 40-50% of the total volume of objects.

This approach helps to identify the main objects (countries) that make the biggest contribution to the overall result and also shows that a smaller number of countries can have a significantly greater impact on the result.

The results of the division of EU countries into groups A, B and C by GDP are presented in Table 2, and according to the indicator of GDP per capita in Table 3. A graphical representation of the results of the ABC analysis is presented in Figures 2-3.

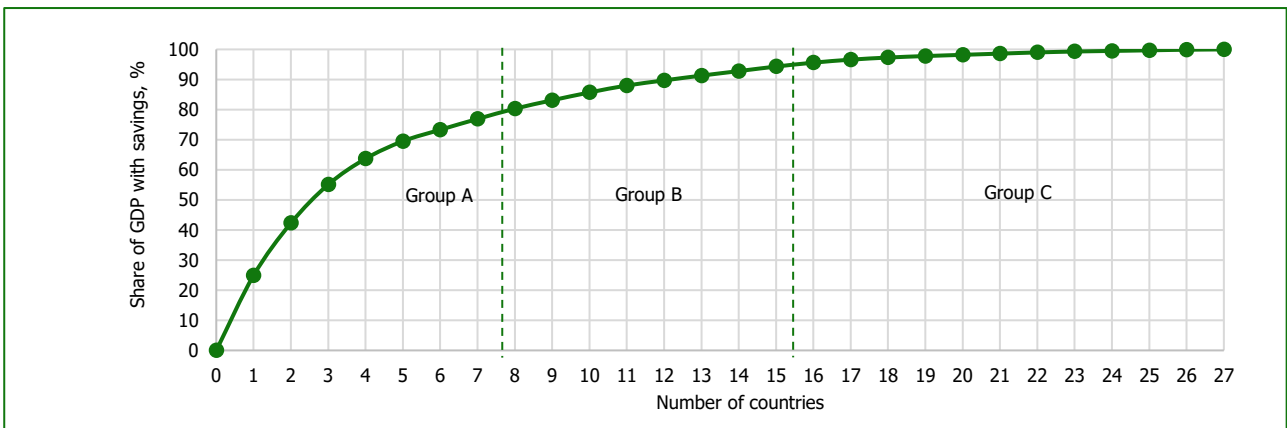
4. Analysis and management. After carrying out ABC analysis, it is possible to draw conclusions about resource management, and analyze and make decisions about the assignment of priorities for different groups of objects.

**Table 2. Initial data for ABC-XYZ analysis of EU countries by level of economic development based on GDP.** (Source: compiled based on [14])

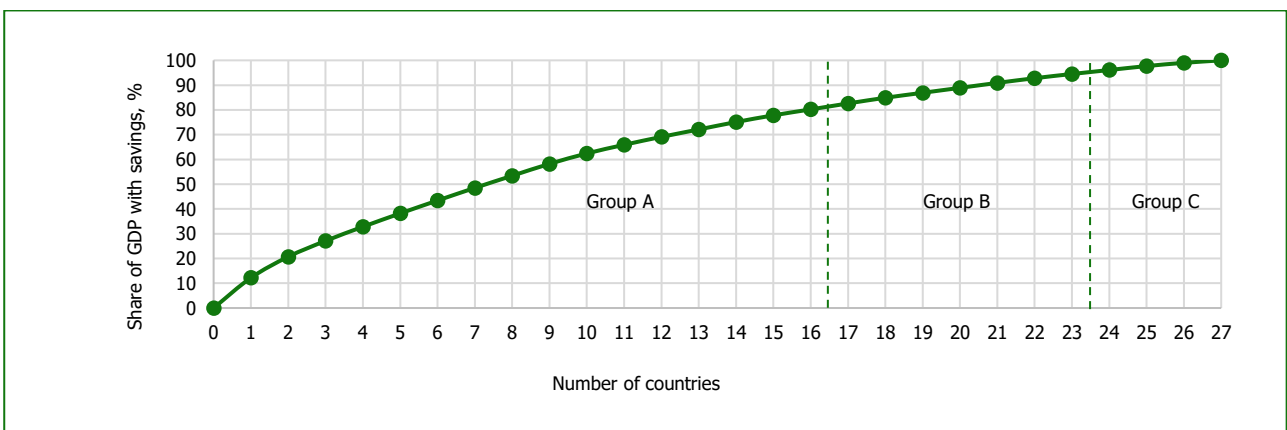
N	European Union	GDP (current billion USD)							GDP 2015-2022, total	Share in structure, %	Share with savings, %	Group	
		2015	2016	2017	2018	2019	2020	2021					2022
1	Germany	3357.6	3469.9	3690.8	3974.4	3888.2	3889.7	4259.9	4072.2	30602.7	24.9	24.9	A
2	France	2439.2	2473.0	2595.2	2791.0	2728.9	2639.0	2957.9	2782.9	21407.1	17.4	42.3	A
3	Italy	1836.6	1877.1	1961.8	2091.9	2011.3	1897.2	2114.4	2010.4	15800.7	12.8	55.1	A
4	Spain	1196.2	1233.6	1313.2	1421.7	1394.3	1277.0	1427.4	1397.5	10660.9	8.6	63.7	A
5	Netherlands	765.6	784.1	833.9	914.0	910.2	909.8	1011.8	991.1	7120.5	5.8	69.5	A
6	Poland	477.1	470.0	524.6	588.8	596.1	599.4	679.4	688.2	4623.6	3.8	73.3	A
7	Sweden	505.1	515.7	541.0	555.5	533.9	547.1	636.9	585.9	4421.1	3.6	76.9	A
8	Belgium	462.3	476.1	502.8	543.3	535.9	525.2	594.4	578.6	4218.6	3.4	80.3	B
9	Austria	382.0	395.8	417.3	455.0	444.6	435.2	480.4	471.4	3481.7	2.8	83.1	B
10	Ireland	291.8	299.1	336.4	385.7	399.3	425.9	504.2	529.2	3171.6	2.6	85.7	B
11	Denmark	302.7	313.1	332.1	356.8	346.5	355.2	398.3	395.4	2800.1	2.3	88.0	B
12	Finland	234.5	240.8	255.6	275.7	268.5	271.9	296.4	280.8	2124.2	1.7	89.7	B
13	Czech Republic	188.0	196.3	218.6	249.0	252.5	246.0	281.8	290.9	1923.1	1.6	91.3	B
14	Portugal	199.4	206.4	221.4	242.3	240.0	229.0	254.0	251.9	1844.4	1.5	92.8	B
15	Romania	177.9	185.3	210.1	243.3	251.0	251.4	285.4	301.3	1905.7	1.5	94.3	B
16	Greece	195.7	193.1	199.8	212.0	205.3	188.9	214.9	219.1	1628.8	1.3	95.6	C
17	Hungary	125.2	128.6	143.1	160.6	164.0	157.2	182.3	178.8	1239.8	1.0	96.6	C
18	Slovak Republic	88.9	90.0	95.6	106.1	105.7	106.7	118.7	115.5	827.2	0.7	97.3	C
19	Luxembourg	60.1	62.2	65.7	71.0	69.8	74.0	85.5	82.3	570.6	0.5	97.8	C
20	Bulgaria	50.8	54.0	59.3	66.4	68.9	70.4	84.1	89.0	542.9	0.4	98.2	C
21	Croatia	50.7	52.4	55.9	61.3	61.3	57.6	68.8	71.0	479.0	0.4	98.6	C
22	Lithuania	41.4	43.0	47.8	53.8	54.8	56.9	66.4	70.3	434.4	0.4	99.0	C
23	Slovenia	43.1	44.8	48.6	54.2	54.3	53.7	61.7	62.1	422.5	0.3	99.3	C
24	Cyprus	19.9	21.0	22.9	25.6	25.9	25.0	28.4	28.4	197.1	0.2	99.5	C
25	Estonia	22.9	24.1	26.9	30.6	31.1	31.4	37.2	38.1	242.3	0.2	99.7	C
26	Latvia	27.3	28.1	30.5	34.4	34.3	34.6	39.7	41.2	270.1	0.2	99.9	C
27	Malta	11.1	11.7	13.5	15.3	15.9	15.0	17.7	17.8	118.0	0.1	100	C
	<b>Total</b>	<b>13553.1</b>	<b>13889.3</b>	<b>14764.4</b>	<b>15979.7</b>	<b>15692.5</b>	<b>15370.4</b>	<b>17188.0</b>	<b>16641.3</b>	<b>123078.7</b>	<b>100</b>	<b>-</b>	<b>-</b>

**Table 3. Source data for ABC-XYZ analysis of EU countries by the level of economic development based on GDP per capita. (Source: compiled based on [15])**

N	European Union	GDP per capita (current thousand USD)								GDP per capita 2015-2022, total	Share in structure, %	Share with savings, %	Group
		2015	2016	2017	2018	2019	2020	2021	2022				
1	Luxembourg	105.5	106.9	110.2	116.8	112.6	117.4	133.6	126.4	929.4	12.2	12.2	A
2	Ireland	62.1	62.9	70.0	79.3	80.9	85.4	100.2	104.0	644.8	8.5	20.7	A
3	Denmark	53.3	54.7	57.6	61.6	59.6	60.9	68.0	67.0	482.7	6.4	27.1	A
4	Sweden	51.5	52.0	53.8	54.6	51.9	52.8	61.1	55.9	433.6	5.7	32.8	A
5	Netherlands	45.2	46.0	48.7	53.0	52.5	52.2	57.7	56.0	411.3	5.4	38.2	A
6	Austria	44.2	45.3	47.4	51.5	50.1	48.8	53.6	52.1	393.0	5.2	43.4	A
7	Finland	42.8	43.8	46.4	50.0	48.6	49.2	53.5	50.5	384.8	5.1	48.5	A
8	Belgium	41.0	42.0	44.2	47.5	46.6	45.5	51.3	49.6	367.7	4.9	53.4	A
9	Germany	41.1	42.1	44.7	47.9	46.8	46.8	51.2	48.4	369.0	4.8	58.2	A
10	France	36.7	37.1	38.8	41.6	40.5	39.1	43.7	41.0	318.5	4.2	62.4	A
11	Italy	30.2	31.0	32.4	34.6	33.7	31.9	35.8	34.2	263.8	3.5	65.9	A
12	Malta	24.9	25.6	28.8	31.6	31.5	29.2	34.2	33.9	239.7	3.2	69.1	A
13	Cyprus	23.5	24.7	26.7	29.4	29.4	28.0	31.6	31.3	224.6	3.0	72.1	A
14	Spain	25.8	26.5	28.2	30.4	29.6	27.0	30.1	29.4	227.0	3.0	75.1	A
15	Slovenia	20.9	21.7	23.5	26.1	26.0	25.5	29.3	29.5	202.5	2.7	77.8	A
16	Czech Republic	17.8	18.6	20.6	23.4	23.7	23.0	26.8	27.6	181.5	2.4	80.2	A
17	Estonia	17.4	18.3	20.4	23.2	23.4	23.6	27.9	28.3	182.5	2.4	82.6	B
18	Portugal	19.3	20.0	21.5	23.6	23.3	22.2	24.6	24.3	178.8	2.3	84.9	B
19	Greece	18.1	17.9	18.6	19.8	19.1	17.7	20.2	20.7	152.1	2.0	86.9	B
20	Lithuania	14.3	15.0	16.9	19.2	19.6	20.4	23.7	24.8	153.9	2.0	88.9	B
21	Slovak Republic	16.4	16.6	17.6	19.5	19.4	19.6	21.8	21.3	152.2	2.0	90.9	B
22	Latvia	13.8	14.3	15.7	17.9	17.9	18.2	21.1	21.9	140.8	1.9	92.8	B
23	Hungary	12.7	13.1	14.6	16.4	16.8	16.1	18.8	18.5	127.0	1.7	94.5	B
24	Croatia	12.1	12.6	13.6	15.0	15.1	14.2	17.7	18.4	118.7	1.6	96.1	C
25	Poland	12.6	12.4	13.8	15.5	15.7	15.8	18.0	18.3	122.1	1.6	97.7	C
26	Romania	9.0	9.4	10.7	12.5	13.0	13.0	14.9	15.9	98.4	1.3	99.0	C
27	Bulgaria	7.1	7.6	8.4	9.5	9.9	10.2	12.2	13.8	78.7	1.0	100	C
	<b>Total</b>	<b>819.3</b>	<b>838.1</b>	<b>893.8</b>	<b>971.4</b>	<b>957.2</b>	<b>953.7</b>	<b>1082.6</b>	<b>1063.0</b>	<b>7579.1</b>	<b>100</b>	-	-



**Figure 2. Graphic presentation of the results of the ABC analysis by the GDP indicator.**



**Figure 3. Graphic presentation of the results of the ABC analysis by GDP per capita indicator.**

So, the distribution of EU countries by GDP indicator made it possible to distinguish the following groups:

- group A – 7 countries (25.9%), form 76.9% of the total GDP;
- group B – 8 countries (29.6%), form 17.4% of the total GDP;
- group C – 12 countries (44.5%), form 5.7% of the total GDP.

The distribution of EU countries by GDP per capita made it possible to distinguish the following groups:

- group A – 16 countries (59.3%), form 80.2% of the total GDP per capita;
- group B – 7 countries (25.9%), form 14.3% of the total GDP per capita;
- group C – 4 countries (14.8%), form 5.5% of the total GDP per capita.

The basis of the XYZ analysis is the calculation of the coefficients of variation followed by the grouping of research objects according to their growth. The coefficient of variation is a statistical measure used to measure the level of variation or diversity of data relative to its average value. In other words, it is an indicator that allows you to assess how much diverse data deviates from its average value [35].

The coefficient of variation is calculated according to the formula:

$$\text{Coefficient of variation} = \frac{\text{standard deviation}}{\text{average value}} \cdot 100\% \quad (1)$$

where the standard deviation is a measure of the dispersion of the data around its average value; average value is the arithmetic average indicator of all values.

The coefficient of variation is measured as a percentage and allows you to compare the level of dispersion (scatter) between different data sets, regardless of their scale. This is particularly useful when comparing variation in large and small data sets, where the absolute values of the standard deviation can be very different.

The division into groups X, Y and Z is based on the following values of the coefficient of variation [6; 17; 25]:

- group X – countries characterized by a high level of stability of economic processes, low risks, minor fluctuations and high accuracy of their forecast. The value of the coefficient of variation is in the range from 0 to 10%;
- group Y – countries that are characterized by an average level of stability of economic processes, an acceptable level of risks, fluctuations, as a rule, of a seasonal nature and an average accuracy of their forecast. The value of the coefficient of variation is in the range from 10% to 25%;
- group Z – countries characterized by a low level of stability of economic processes, high risks, significant fluctuations and low accuracy of their forecast. The value of the coefficient of variation is more than 25%.

The results of the division of EU countries into groups X, Y and Z by GDP and GDP per capita indicators are presented in Table 4.

**Table 4. Distribution of EU countries into groups X, Y and Z according to the level of stability of economic processes based on GDP and GDP per capita.** (Source: calculated by the authors based on [14; 15])

European Union	GDP (current billion USD)					GDP per capita (current thousand USD)				
	Average value	Dispersion	Average square deviation	Variation coefficient, %	Group	Average value	Dispersion	Average square deviation	Variation coefficient, %	Group
Austria	435.2	1067.11	32.67	7.51	X	49.1	9.68	3.11	6.33	X
Belgium	527.3	1864.39	43.18	8.19	X	46.0	11.02	3.32	7.22	X
Bulgaria	67.9	159.59	12.63	18.62	Y	9.8	4.51	2.12	21.59	Y
Croatia	59.9	46.06	6.79	11.34	Y	14.8	4.43	2.10	14.18	Y
Cyprus	24.6	8.71	2.95	11.98	Y	28.1	7.57	2.75	9.80	X
Czech Republic	240.4	1210.22	34.79	14.47	Y	22.7	10.95	3.31	14.59	Y
Denmark	350.0	1049.86	32.40	9.26	X	60.3	24.29	4.93	8.17	X
Estonia	30.3	26.89	5.19	17.12	Y	22.8	14.07	3.75	16.44	Y

(continued on next page)

**Table 4.** *Continued.*

European Union	GDP (current billion USD)					GDP per capita (current thousand USD)				
	Average value	Dispersion	Average square deviation	Variation coefficient, %	Group	Average value	Dispersion	Average square deviation	Variation coefficient, %	Group
Finland	265.5	376.50	19.40	7.31	X	48.1	11.18	3.34	6.95	X
France	2675.9	26512.43	162.83	6.08	X	39.8	4.85	2.20	5.53	X
Germany	3825.3	80414.25	283.57	7.41	X	46.1	9.81	3.13	6.79	X
Greece	203.6	105.57	10.27	5.05	X	19.0	1.11	1.05	5.53	X
Hungary	155.0	394.44	19.86	12.82	Y	15.9	4.50	2.12	13.37	Y
Ireland	396.5	6782.28	82.35	20.77	Y	80.6	215.56	14.68	18.22	Y
Italy	1975.1	8829.35	93.96	4.76	X	33.0	3.22	1.79	5.44	X
Latvia	33.8	22.05	4.70	13.91	Y	17.6	7.53	2.74	15.59	Y
Lithuania	54.3	93.25	9.66	17.78	Y	19.2	12.52	3.54	18.39	Y
Luxembourg	71.3	71.48	8.45	11.85	Y	116.2	82.32	9.07	7.81	X
Malta	14.8	5.49	2.34	15.88	Y	30.0	10.64	3.26	10.89	Y
Netherlands	890.1	7033.73	83.87	9.42	X	51.4	17.52	4.19	8.14	X
Poland	578.0	6003.07	77.48	13.41	Y	15.3	4.33	2.08	13.64	Y
Portugal	230.6	359.10	18.95	8.22	X	22.4	3.36	1.83	8.20	X
Romania	238.2	1724.71	41.53	17.43	Y	12.3	5.33	2.31	18.76	Y
Slovak Republic	103.4	106.83	10.34	10.00	X	19.0	3.55	1.88	9.90	X
Slovenia	52.8	43.31	6.58	12.46	Y	25.3	8.80	2.97	11.72	Y
Spain	1332.6	7102.30	84.28	6.32	X	28.4	2.71	1.65	5.80	X
Sweden	552.6	1544.52	39.30	7.11	X	54.2	8.78	2.96	5.47	X

So, the distribution of EU countries by GDP indicator made it possible to distinguish the following groups:

- group X – 13 countries (48.1%);
- group Y – 14 countries (51.9%).

The distribution of EU countries by GDP per capita made it possible to distinguish the following groups:

- group X – 15 countries (55.5%);
- group Y – 12 countries (44.5%).

The results of the division of Ukraine into groups according to the indicators are presented in Table 5-6.

**Table 5.** *Initial data for ABC-XYZ analysis of Ukraine by level of economic development based on GDP and GDP per capita. (Source: compiled based on [14; 15])*

Country	Value of the indicator by year								Total	Share in the EU structure, %	Group
	2015	2016	2017	2018	2019	2020	2021	2022			
Ukraine	<b>GDP (current billion USD)</b>								1099.4	0.8	C
	91.0	93.4	112.0	131.0	154.0	157.0	200.0	161.0			
	<b>GDP per capita (current thousand USD)</b>								26.8	0.3	C
2.1	2.2	2.6	3.1	3.7	3.8	4.8	4.5				



**Table 6. Distribution of Ukraine into groups X, Y and Z according to the level of stability of economic processes based on GDP and GDP per capita.** (Source: calculated by the authors based on [14; 15])

Country	GDP (current billion USD)					GDP per capita (current thousand USD)				
	Average value	Disper-sion	Average square deviation	Variation coeffi-cient, %	Group	Average value	Disper-sion	Average square deviation	Variation coeffi-cient, %	Group
Ukraine	137.3	1229.93	35.07	25.55	Z	3.4	0.91	0.95	28.44	Z

The positioning of EU countries and Ukraine by the level of economic development and the level of stability of economic processes based on the GDP indicator in the form of an ABC-XYZ matrix is presented in Table 7, and based on the GDP per capita indicator in Table 8.

**Table 7. The results of the positioning of EU countries and Ukraine in the ABC-XYZ matrix by the level of economic development and the level of stability of economic processes based on the GDP indicator.**

Groups	X	Y	Z
A	Germany, France, Italy, Spain, Netherlands, Sweden	Poland	–
B	Belgium, Austria, Denmark, Finland, Portugal	Ireland, Czech Republic, Romania	–
C	Greece, Slovak Republic	Hungary, Luxembourg, Bulgaria, Croatia, Lithuania, Slovenia, Cyprus, Estonia, Latvia, Malta	Ukraine

**Table 8. The results of the positioning of EU countries and Ukraine in the ABC-XYZ matrix by the level of economic development and the level of stability of economic processes based on the GDP per capita indicator.**

Groups	X	Y	Z
A	Luxembourg, Denmark, Sweden, Netherlands, Austria, Finland, Belgium, Germany, France, Italy, Cyprus, Spain	Ireland, Malta, Slovenia, Czech Republic	–
B	Portugal, Greece, Slovak Republic	Estonia, Lithuania, Latvia, Hungary	–
C	–	Croatia, Poland, Romania, Bulgaria	Ukraine

According to the results of the ABC-XYZ-analysis for the studied period of 2015-2022, we can single out the following groups of countries and draw the following conclusions regarding the economic development and stability of the EU countries:

1. Countries of the "AX" group. These are stable countries with high GDP and GDP per capita. The countries included in this group can be recognized as stable and influential players in the economic field of the EU. This group includes countries such as Germany, France, Italy, Spain, Netherlands, and Sweden based on the two analyzed indicators, and also countries such as Luxembourg, Denmark, Austria, Finland, Belgium, and Cyprus based on the GDP per capita indicator. These are countries with a high level of economic development, which also demonstrate the stability and predictability of economic processes. Usually, a high level of economic development and stability translates into a high quality of life for the population. People in these countries often have access to quality services, social support and opportunities. The countries of this group can have a significant influence on international affairs, as their stable economies make them interesting for international partners.
2. Countries of the "AY" group. Countries with high GDP (Poland) and GDP per capita (Ireland, Malta, Slovenia, Czechia), but with moderate predictability. These countries have a significant influence on the EU economy, but economic processes are sometimes impulsive. Countries in this group can be attractive to investors and businesses due to their high economic status and more predictable economic conditions. Moderate volatility may indicate that these countries may be less vulnerable to large market fluctuations, which may contribute to more stable development.
3. Countries of the "BX" group. These are countries with a moderate level of economic development and high stability of economic processes. Belgium, Austria, Denmark, Finland, and Portugal belong to this group according to the GDP indicator, and Portugal, Greece, and Slovak Republic according to the GDP per capita indicator. Combining a moderate level of economic development with high stability of economic processes makes the countries of this group important

participants in economic cooperation because their conditions can be less susceptible to negative changes, which creates a more attractive economic climate for investors and businesses.

4. Countries of the "BY" group. These are countries with moderate stability and moderate GDP and GDP per capita. Ireland, Czechia, and Romania belong to this group according to the GDP indicator, and Estonia, Lithuania, Latvia, and Hungary according to the GDP per capita indicator. These countries can be perceived as stable but with some degree of uncertainty. In the countries of this group, one can observe the presence of resources and potential for economic growth, but their economic conditions may be influenced by external factors and internal dynamics. This may include changes in macroeconomic conditions, various political factors, as well as fluctuations in international market conditions.
5. Countries of the "CX" group. Countries with low GDP and GDP per capita. Can be perceived as countries with stable, but less developed economies. This group includes only two countries by GDP (Greece and Slovak Republic), which can be a source of potential opportunities for investors and economic development.
6. Countries of the "CY" group. The main characteristics of this group are lower GDP and GDP per capita compared to more developed countries, as well as moderate predictability of economic changes. This group includes 10 countries by GDP (Hungary, Luxembourg, Bulgaria, Croatia, Lithuania, Slovenia, Cyprus, Estonia, Latvia, Malta), and 4 countries by GDP per capita (Croatia, Poland, Romania, Bulgaria). These countries are the countries where opportunities for growth may be limited by a lower level of economic development, but at the same time, they may prove to be stable in terms of managing economic risks. As this group combines lower economic power with medium predictability, countries may be able to focus on attracting investment, developing their domestic market and strengthening their economic foundations.
7. Countries of the "AZ" group. These countries have significant economic influence, but economic conditions can change rapidly. This may indicate the instability of economic processes, which requires careful analysis and possible correction of strategies. None of the EU countries is included in this group.
8. Countries of the "BZ" group. These are countries with a moderate level of economic development and high variability in economic processes. These countries can have a significant impact on the economy, but their economic conditions can change quickly. Members of this group are in a moderate state of economic development, but due to various factors such as changes in the global market, political events, technological gaps or other influences, their economic performance can vary significantly. The changing nature of their economic environment may require flexibility in development strategies to adapt to change and maintain stability in the face of uncertainty. None of the EU countries is included in this group.
9. Countries of the "CZ" group. These are countries with low stability and low GDP and GDP per capita. These countries can be perceived as countries with low economic development and high instability in terms of economic processes. These countries need special attention and can be the subject of support programs to achieve stability and reduce uncertainty. None of the EU countries is included in this group, only Ukraine.

The results of grouping countries according to ABC-XYZ-analysis provide a systematic structure for a better understanding of various aspects of economic development and stability of economic processes among countries. Combining the results of both analyses helps determine which countries may be high-risk, where there may be the greatest growth opportunities, and which countries are showing resilience and predictability. This helps to understand the mosaic of the economic situation in different EU countries and highlights key findings for further research or decision-making.

ABC analysis and XYZ analysis are commonly used together to classify and manage inventory and other resources in an enterprise. Just as these two types of analysis are used to classify goods, they can also be used to classify inventories or other resources based on their importance and predictability of demand. This helps businesses focus on those resources that have the most impact and require the most attention.

Using both analyses together allows you to get a more accurate classification and a better understanding of the company's resources. ABC analysis determines the importance of resources in terms of volume of use or value [28], while XYZ analysis helps account for the predictability and variability of demand for those resources [19]. This allows businesses to optimize their inventory management strategy, production planning and other aspects of resource management to reduce costs and ensure greater efficiency.

## DISCUSSION

In general, the majority of scientific works are aimed at researching the features of the ABC-XYZ-analysis application at the micro level, the level of enterprises [2; 8; 19]. However, ABC-XYZ analysis can be applied not only to grouping goods or resources but also to grouping regions or countries based on their strategic importance and predictability of demand. In particular, Parshina M. [34] identified groups of regions with high, medium, and low levels of potential utilization efficiency using ABC analysis and conducted a study of the stability of potential utilization processes using XYZ analysis, and Kuznichenko V. [27] proposed to use the XYZ method for the analysis of regression-correlation models in forecasting the volume of filling local budgets. Another group of scientists Dutka et al. [10] proposed to group the regions of Ukraine according to income from the provision of tourist services using ABC analysis, and according to the level of risk of the tourism industry using XYZ analysis.

The analysis of scientific works confirms that more and more scholars apply ABC-XYZ-analysis, departing from its classical application, in particular for grouping regions and countries in order to study and analyze their strategic importance and predictability in the context of global activities. This helps to understand which regions or countries should focus more attention and resources, and how to better manage their activities at the international level. Adhering to the general logic and principles of the proposed method, in our study the ABC-XYZ-analysis is presented as follows:

### 1. ABC analysis of countries:

Groups of countries "A, B, C" were determined on the basis of their strategic importance. In our study, countries in group "A" are those that generate the highest amount of GDP (or have the highest level of economic development), while countries in group "C" generate the least amount of GDP, and are less important in terms of strategic importance.

### 2. XYZ-analysis of countries:

The groups of countries "X, Y, Z" were determined on the basis of the economic processes stability. For our study, countries of group "X" are those where economic processes are almost always stable, while the economic processes of countries of group "Z" are characterized by significant variability.

To systematize countries according to their economic development, the grouping technique developed by specialized organizations such as the United Nations (UN) [4], the World Bank (WB) [14; 15] and the International Monetary Fund (IMF) [16] is widely used, which classify countries by the level of GDP per capita on low, middle and high-income countries. However, the ABC-XYZ-analysis method proposed in the article for the classification of countries according to the level of economic development and stability of economic processes differs in orientation and methodology. Although both approaches are used to classify countries, they serve different purposes and are based on different criteria and methodologies. ABC-XYZ analysis is used in practice for resource management and strategic planning at the enterprise level, while the UN, IMF and WB classification is a tool for comparing the level of economic development of countries at the international level and is used in more general economic and financial research. These approaches can complement each other, depending on the specific tasks and needs of the research. Also, the difference is that the ABC-XYZ analysis allows you to group countries depending on the importance and predictability of a certain indicator (in our case, GDP), while the classification according to the IMF and the World Bank divides countries according to the level of their economic development on the basis of an even distribution of the evaluative indicator.

Grouping countries by the level of economic development using ABC-XYZ-analysis is useful for understanding the interrelationships in global trade and for making strategic decisions. This approach helps determine which markets should focus more attention and resources.

Thus, in the research of scientists Mangushev et al. [29], in order to identify the most attractive and promising countries importers of Ukrainian services, the ABC analysis was carried out, which made it possible to classify the country data into three groups A, B and C, in order to identify, which countries are most interested in maintaining and developing strong and transparent trade relations with Ukraine, namely in the service sector. We agree that using ABC-XYZ analysis to group countries helps businesses optimize their international operations, as well as make informed decisions about resources and strategy regarding the various markets and regions where they operate.

The presence of discrepancies between the level of the country's GDP and the level of GDP per capita (which we observe in Table 7-8 of the classification of countries into different groups) may indicate some features of the economic development of this country. Here are some conclusions [9; 22; 38; 39; 53]:

1. Uneven distribution of income – a high value of GDP per capita can mean that, on average, each citizen receives a large income. However, this does not mean that income is distributed evenly. If the gap between rich and poor is wide, then high GDP per capita can hide social inequality.
2. Sectoral structure of the economy – a large GDP with a low GDP per capita may be the result of a significant sector of resource-saving industry or export activity that brings income to the country as a whole, but does not necessarily lead to a high standard of living for each citizen.
3. Infrastructure and public services – GDP per capita can be low, even if total GDP is large if a significant portion of economic growth is directed to infrastructure, public services, health care, and education. This may improve the overall standard of living, but will not necessarily affect GDP per capita.
4. Economic growth and employment – sometimes a high GDP can be the result of active economic growth, but this does not always mean that the unemployment rate is low or that all citizens have an adequate level of income. This may be the result of using large numbers of low-skilled labour or other factors.
5. External factors – geopolitical or trade circumstances can also affect the relationship between GDP and GDP per capita. For example, a country may have a high GDP due to a large volume of exports, but this may be the result of a predominantly resource-dependent economy.

If we group and compare the EU with Ukraine using the ABC-XYZ-analysis method (Table 7-8), we can conclude that the EU is a group of stable countries with high GDP and GDP per capita, which are influential players in the European market. Ukraine is included in the "CZ" group as a country with low economic development and high instability in terms of economic processes, which is due to such factors as [5; 7; 30; 33; 41; 42; 48]:

1. Historical circumstances – Ukraine has gone through various historical events, including colonization, the Soviet era, and separation from the Soviet Union. These events left their mark on the development of the economy and society and also affected the country's institutional base.
2. Problems with corruption and insufficient reform of the legal system.
3. Political changes, instability and lack of a stable long-term strategy.
4. The annexation and occupation of Crimea by Russia and the war with Russia, starting from 2014.
5. Dependence on raw materials from other countries.
6. Insufficient infrastructure development and low level of education.

Conducting the ABC-XYZ analysis for grouping countries is useful, but its adequacy depends on the specific situation and the purpose of the analysis. In particular, countries have different economic, political and socio-cultural characteristics that lead to significant variability in their functioning [32; 43]. This variability can make it difficult to define the ABC and XYZ categories. ABC-XYZ analysis does not take into account the cultural or historical characteristics of countries that can affect business success [45]. Some countries are important from the point of view of localization and adaptation of business processes. It is important to consider the geopolitical aspects that can give countries strategic importance, regardless of their economic importance.

## CONCLUSIONS

According to the results of the ABC-XYZ-analysis for the research period of 2015-2022, groups of countries were distinguished and conclusions were drawn regarding the economic development and stability of the EU countries. The conclusions drawn on the grouping of countries will help to better understand the dynamics of different groups of countries in the EU and provide a basis for further analyses, work on economic policies and determination of priorities for joint action.

Based on the results of the analysis, it can be concluded that the economic situation in different EU countries is diverse and includes different levels of development and degree of stability. This information can be useful for understanding the main trends in the economy of the region, identifying possible areas for cooperation and investment, as well as for developing strategies to improve development and stability in each of the countries.

The practical significance of the study lies in the fact that the grouping allows to understand the difference in the levels of economic development, stability and growth potential between different countries. This makes it possible to better navigate the conditions of the global economy and determine the most attractive areas of cooperation. The grouping helps to

identify countries with high potential for investment, where there may be favourable conditions for business and development. Investors can use this information to determine optimal investment objects. Different groups of countries may require different approaches to economic cooperation, trade, infrastructure development, etc. Grouping helps to develop appropriate strategies for different categories of countries. The analysis helps to identify countries with balanced economic indicators and stable dynamics, which may be less vulnerable to economic fluctuations and changes in the external environment. Grouping allows better planning of resources, such as investments, human resources, and materials, in particular, taking into account different stability and development potential in different countries.

It is worth noting the existing limitations of the study. In the article, GDP and GDP per capita were selected as the analyzed indicators. Choosing other indicators may lead to a change in the classification of countries. The results of the analysis may change according to changes in the input data. Our research analyzes the period of 2015-2022. If the analysis is conducted on data for another time period, the results may be different, for example, due to taking into account crisis situations of previous years.

Future research can be directed at many interesting aspects, as this approach can help to better understand the diversity and dynamics of the global economy. In particular, it is advisable to expand the analysis, taking into account other economic and social indicators. This will help to get a more comprehensive picture of the situation in each country.

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## ADDITIONAL INFORMATION

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## **ГРУПУВАННЯ КРАЇН ЄС ЗА РІВНЕМ ЕКОНОМІЧНОГО РОЗВИТКУ ТА СТАБІЛЬНІСТЮ ЕКОНОМІЧНИХ ПРОЦЕСІВ НА ОСНОВІ АВС-XYZ-АНАЛІЗУ**

Дослідження економічного розвитку та стабільності економічних процесів країн є критично важливим завданням, оскільки воно допомагає розуміти й аналізувати процеси, що відбуваються в економічних системах. Країни суттєво відрізняються за економічним розвитком, і їх групування за певними параметрами допомагає краще розуміти загальну картину економічного стану держави. У статті запропоновано групувати країни ЄС за рівнем економічного розвитку та рівнем стабільності економічних процесів на основі показників ВВП й ВВП на душу населення за допомогою АВС- та XYZ-аналізів. Дослідження проведене на базі країн Європейського Союзу (ЄС) за період 2015-2022 рр., оскільки ЄС є великим регіональним об'єднанням країн зі спільними економічними, політичними та соціальними цілями. Інформаційною базою слугували статистичні дані Світового банку. У процесі дослідження виявлено наявність розбіжностей для країн між рівнем ВВП і рівнем ВВП на душу населення. Також проведене позиціонування України за рівнем економічного розвитку та рівнем стабільності економічних процесів на основі показників ВВП й ВВП на душу населення, з урахуванням того, що країна з 2022 року є кандидатом на членство в ЄС.

Результати дослідження допоможуть зрозуміти мозаїку економічної ситуації в різних країнах ЄС та виділити ключові висновки для подальших досліджень або ухвалення рішень. Ця інформація може бути корисною для розуміння основних тенденцій в економіці європейського регіону, визначення можливих сфер для співпраці та інвестицій, а також для розробки стратегій покращення розвитку й стабільності в кожній із країн ЄС.

**Ключові слова:** економічний розвиток, ВВП, ВВП на душу населення, стабільність економічних процесів, АВС-аналіз, XYZ-аналіз, держава, країни ЄС, Україна, управлінський аспект

**JEL Класифікація:** C38, E01, O11, O40, O52