

## THE CONTRIBUTION OF AGRICULTURE COMPARED WITH OTHER ECONOMIC SECTORS TO THE FORMATION OF ROMANIA'S GROSS DOMESTIC PRODUCT

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### Abstract

*Agriculture was and remains the support of human existence, representing the backbone of the Romanian rural economy. The gross domestic product represents a macroeconomic indicator of results, being the consequence of the efficient use of resources. In this context, the authors analyze the place that agriculture holds in achieving the gross domestic product in Romania compared to the European Union, as well as its dynamics. In this sense, the share of resources in the formation of the gross domestic product in the period 2000-2022 is presented. The main research methods used for this work are: analysis, synthesis, comparison and mathematical analysis. From the analysis carried out, conclusive ideas emerge, and the article becomes even more suggestive, in that it is accompanied by tables synthesized by the authors and relevant graphics that highlight and support the assessments that the authors make in the content of this article. At the end of the paper, the authors emphasize the fact that the GDP is the most complex indicator that reflects the transformations that the Romanian economy has gone through in recent years. From the point of view of the use of resources, it can be seen that the share of the agricultural sector has registered a downward evolution, which can be largely explained by the increase in the importance of industry and the service sector in the overall national economy.*

**Key words:** agriculture, GDP, Romania, evolution, economic sectors, EU

### INTRODUCTION

The history of world economic development demonstrates that, at all times, the well-being of a people was given by the level of the Gross Domestic Product (GDP), which represents "the gross value of the final production of goods and services produced during a period of time by the economic agents that carry out their activity within the national borders"[17].

The Gross Domestic Product is the main indicator of economic development and growth, representing the added value created in a calendar year to which taxes and customs duties are added. At the level of an economy, each economic branch contributes a certain weight to the formation of GDP [6].

The economic growth of a country is measured by the result indicator Gross Domestic Product [3, 4].

Developed countries are generally characterized by more advanced post-industrialised economies, meaning that the service (tertiary) sector has a higher share than the industrial (secondary) sector, in contrast to developing countries that are in the process of industrialisation or are pre-industrial and almost entirely agrarian, some of which may fall into the category of least developed country [18].

There are thus three situations:

- when the share with which the agricultural sector (PA) participates in GDP formation is less than 3-4% ( $PA \leq 3-4\%$ ) - the country is developed
- when the share with which the agricultural sector (PA) participates in GDP formation is between 5-15% ( $5 \leq PA \leq 15\%$ ) - the country is medium developed
- when the share with which the agricultural sector (PA) participates in GDP formation is

greater than 3-4% ( $PA \geq 3-4\%$ ) - the country is developing [9].

Gross domestic product (GDP) per capita is another macroeconomic indicator that measures the value of all final goods and services produced in the national economy during a year and is divided by the population of that country [10].

An important element in the economic development of a country is the successful use and exploitation of the advantage that economic resources represent.

From this point of view we find that on resources, in the branches of the national economy, the results are among the most contradictory [1,7, 8].

The issue of the place and role of agriculture in economic development is addressed in numerous economics articles, emphasizing the importance of agriculture in this regard. Therefore, the question of economic development cannot be raised without taking into account the effects of the development of the agricultural sector, which is closely related to other economic branches, especially industry.

In this context, the purpose of this paper is to highlight the importance and the need to know one of the most relevant problems of the structure and dynamics of Romania's economic evolution, through the prism of the main synthetic indicator - the GDP, and to emphasize the important role that agriculture plays in its formation.

## MATERIALS AND METHODS

The main research techniques applied in the preparation of this paper include analysis (especially structural analysis of GDP by resources), synthesis, comparison, mathematical analysis, graphical representation and interpretation.

The research starts with the bibliographic study using the specialized literature in the field both from the country and from abroad. Then follows the stage of statistical data collection, processing, graphical representation and interpretation. To determine the dynamics of the GDP in Romania, the authors use the

dynamic/chronological time series that highlight the temporal characteristic of the phenomena, being an important tool in the context of macroeconomic analyses.

Specific to dynamic series is the fact that they are defined for complex entities, characterized by a high level of variation in indicator data, including temporal structural variations.

The statistical analysis of time series should be based on a system of indicators that characterize the multiple quantitative relationships within the series and over the period to which the data refer (2000-2022).

For dynamic/time series indicators, the statistical data obtained from processing can be absolute, relative and average data which, together, make it possible to statistically characterize the development of the phenomena studied by interpreting the objective trend in their development at each given stage. In this paper relative indicators are determined.

Relative indicators have a very important place in the concrete analysis of the dynamics of socio-economic phenomena. Indicators are widely used in macroeconomic analyses in connection with establishing proportions and correlations between different activities and sectors of the national economy.

The relative measure, which shows how many times a phenomenon has changed over time, is called the dynamics index and can be calculated on a fixed and chain basis.

- **The dynamic index with a fixed base** is denoted by  $I_{i/0}$  and is calculated as the ratio between the level of each year ( $Y_i$ ) and the level of the year chosen as the base ( $y_0$ ); it is usually expressed as a percentage, according to the formula:

$$I_{i/0} = \frac{y_i}{y_0} \cdot 100, \dots\dots\dots(1)$$

- The chain-based dynamics index is noted with  $I_{i/i-1}$ :

$$I_{i/i} = \frac{y_i}{y_{i-1}} \cdot 100, \dots\dots\dots(2)$$

In order to determine how the main resources of the national economy are used to produce gross domestic product, the authors use the indicator GDP structure by main branches of

the national economy - P GDP<sub>r</sub> (agriculture, industry, services, other branches) which is calculated as the percentage ratio of gross domestic product (GDP) of the respective branch (GDP<sub>r</sub>) to total GDP (GDPT), based on the following mathematical formula:

$$P \text{ PIB}_r = (\text{PIB}_r / \text{PIB}_T) \times 100 \dots \dots \dots (3)$$

## RESULTS AND DISCUSSIONS

### Romania's place in the EU by GDP

Romania's economy in 2022 was 286 billion euros in current prices, ranking 12th in the European Union, out of the 27 member states. The share of the Romanian economy in the European GDP was 1.81% of the aggregate GDP of the EU (15,797 billion euros).

Table 1. Gross Domestic Product by EU member countries, 2022

No.	Specification	Total GDP (billion euros)	% of EU GDP
1	Germany	3,867	24.46
2	France	2,642	16.72
3	Italy	1,909	12.08
4	Spain	1,328	8.41
5	Netherlands	942	5.96
6	Poland	654	4.14
7	Sweden	557	3.53
8	Belgium	552	3.49
9	Ireland	502	3.18
10	Austria	447	2.83
11	Denmark	375	2.37
12	<b>Romania</b>	<b>286</b>	<b>1.81</b>
13	Czech Republic	276	1.75
14	Finland	266	1.69
15	Portugal	239	1.51
16	Greece	208	1.32
17	Hungary	169	1.07
18	Slovakia	107	0.68
19	Bulgaria	84	0.53
20	Luxembourg	78	0.49
21	Croatia	67	0.43
22	Lithuania	66	0.42
23	Slovenia	58	0.37
24	Latvia	39	0.25
25	Estonia	36	0.23
26	Cyprus	27	0.17
27	Malta	16	0.11
28	<b>UE-27</b>	<b>15,797</b>	<b>100</b>

Source: Own processing after [15].

The European economy continues to be dominated by Germany – which holds a quarter of the EU economy (€3,867 billion), France (€2,642 billion), Italy (€1,909 billion),

Spain (€1,328 billion) and the Netherlands (€942 billion). Cumulatively, the first five European economies have a share of approximately 65% of the aggregate GDP of the European Union (Table 1) [19].

Figures 1 and 2 presents the hierarchy of the EU member states based on the GDP level in the year 2022.

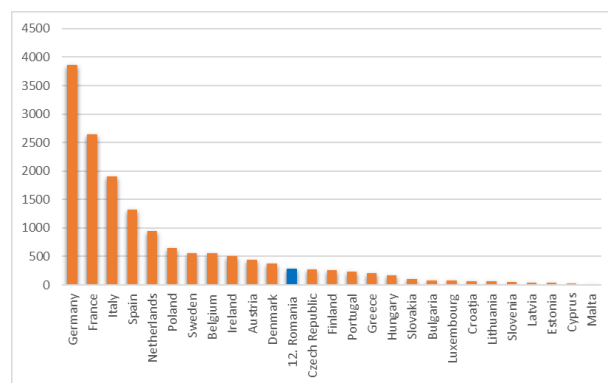


Fig. 1. Gross Domestic Product by EU countries, 2022 (billion euro)  
 Source: Own design based on the data from [15].

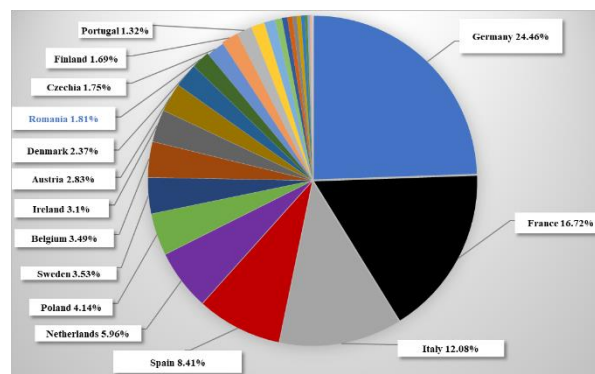


Fig. 2. Percentage share of European Union Gross Domestic Product (GDP) in 2022 by Member State  
 Source: Own design based on the data from [15].

On the other hand, although the national economy places Romania in the first part of the EU ranking, the low value of the GDP per capita indicator, of 15,040 euros/inhabitant, compared to the European average (37,257 euros/inhabitant), keeps Romania in the 26th position among the 27 EU member states, the only country with a lower performance being Bulgaria (Table 2) [5].

Luxembourg, Ireland, Denmark, the Netherlands and Sweden continue to hold the top spots as the richest countries in the European Union per capita.

At the same time, Bulgaria and Romania continue to remain on the last position with the lowest GDP per inhabitant (Table 2).

Table 2. Gross Domestic Product per capita by EU member countries, 2022

No.	Specification	GDP/capita Euro/capita
1	Luxembourg	119,230
2	Ireland	98,260
3	Denmark	63,540
4	Netherlands	53,260
5	Sweden	53,160
6	Austria	49,440
7	Finland	47,990
8	Belgium	47,250
9	Germany	46,150
10	France	38,590
11	Italy	32,390
12	Italy	31,790
13	Cyprus	29,600
14	Slovenia	27,980
15	Spain	27,910
16	Estonia	27,170
17	Czech Republic	25,830
18	Lithuania	23,620
19	Portugal	23,310
20	Latvia	20,720
21	Greece	19,670
22	Slovakia	19,590
23	Hungary	17,520
24	Poland	17,310
25	Croatia	17,240
26	<b>Romania</b>	<b>15,040</b>
27	Bulgaria	12,400
28	EU-27 average	37,257

Source: Own processing based on the data from [15].

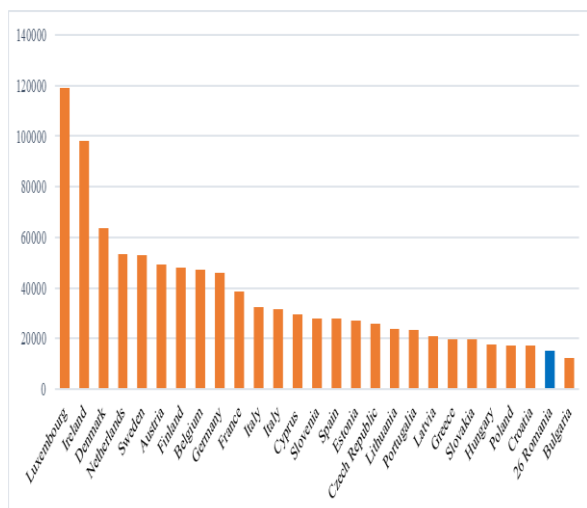


Fig. 3 Gross Domestic Product per capita by EU member countries, 2022

Source: Own processing based on the data from [15].

Also, Figure 3 reflects the the descending order of the EU member states for this

important indicator of the living standard which is GDP per inhabitant.

### GDP dynamics in Romania

If we analyze the evolution of Romania's GDP from 1990 to the level of 2022, we observe an important increase in both total GDP and GDP per capita.

Tabel 3. GDP evolution in Romania in the interval 1990-2022

Year	Total GDP Million lei	Fixed base dynamics index (%)	Chain dynamics index (%)	GDP/capita (lei)
2000	80,873.1	100	100	3,604.7
2001	117,391.4	145	145	5,238.7
2002	152,271.5	188	129	7,025.0
2003	191,917.6	237	126	8,895.6
2004	244,688.3	302	127	11,406.4
2005	286,861.9	354	117	13,455.3
2006	342,762.6	423	119	16,172.8
2007	425,691.1	526	124	20,384.6
2008	539,834.6	667	126	26,284.9
2009	530,894.4	656	98	26,065.8
2010	528,514.5	653	99	26,103.6
2011	558,889.9	691	105	27,739.7
2012	591,799.1	731	105	29,501.2
2013	634,967.8	785	107	31,766.3
2014	669,703.9	828	105	33,625.7
2015	711,929.9	880	106	35,915.7
2016	763,652.5	944	107	38,751.4
2017	857,895.7	1,060	112	43,786.0
2018	951,728.5	1,176	110	48,864.9
2019	1,058,190.3	1,308	111	54,613.9
2020*	1,066,780.5	1,319	100	55,361.2
2021*	1,187,402.4	1,468	111	62,089.4
2022**	1,409,783.9	1,743	118	74,000.0

Source: [13] \*[14]\*\* [11].

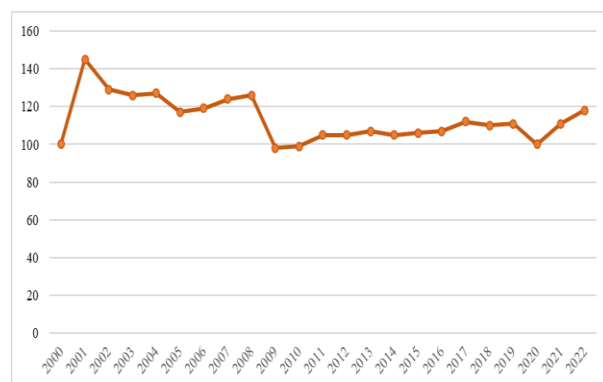


Fig. 4. GDP dynamics in Romania, according to the Chain Dynamics Index, in the period 2000-2022, %

Source: [13] \*[14]\*\* [11].

Regarding the dynamics of GDP, considering the crisis from 2007 which lasted until 2010-2012, as well as the subsequent evolution after 2012, with more pronounced increases starting from 2015, 2016, 2017, we can

appreciate that Romania's economy is on a positive trend (Figure 4).

As can be seen from this figure, the dynamic index of the gross domestic product and the gross domestic product/inhabitant had an ascending evolution.

### GDP structure by economic branches

Agriculture currently holds and will continue to hold a dominant position in the national economy through the natural resources at its disposal and through the contribution it has to the formation of the Gross Domestic Product.

The evolution of the weight with which agriculture participates in the formation of the GDP is a relevant indicator regarding the evolution of the Romanian economy.

Table 4. The evolution of the share of the main economic sectors in the formation of GDP in Romania, (%)

Year	Agriculture	Industry	Construction	Services	Net of taxes
2000	10.8	25.1	5.2	49.2	9.7
2001	13.2	26.6	5.7	45.2	9.3
2002	11.4	27.1	6.2	45.6	9.7
2003	11.9	25.7	6.3	45.3	10.8
2004	12.7	25.5	6.4	45.1	10.3
2005	8.6	25.2	7.0	47.9	11.3
2006	7.8	25.0	8.0	48.3	10.9
2007	5.5	24.7	9.6	49.3	10.9
2008	6.3	25.4	11.4	46.6	10.3
2009	6.1	25.7	10.7	48.4	9.1
2010	5.0	30.0	8.0	46.2	10.8
2011	6.2	32.4	6.3	43.0	12.1
2012	4.7	25.3	7.5	50.3	12.2
2013	5.4	25.4	7.0	50.4	11.8
2014	4.7	25.6	6.4	51.7	11.6
2015	4.2	24.2	5.9	53.5	12.2
2016	4.1	24.0	6.1	55.5	10.3
2017	4.3	23.7	5.2	57.3	9.5
2018	4.3	22.7	5.5	57.9	9.6
2019	4.1	21.2	6.1	59.0	9.6
2020*	3.8	19.6	6.6	60.3	8.8
2021*	4.5	20.6	6.2	59.1	9.6
2022**	4.5	22.5	6.3	57.7	9.0

Source: [13] \*[14]\*\* [11].

The decrease in the contribution of agriculture to the formation of total GDP is based on the structural transformation of the Romanian economy and the transition from an economy based mainly on agriculture and industry to one dominated by services (Table 4).

Regarding the contribution of each economic sector to the formation of GDP, we can see that the share of agriculture in Romania's GDP gradually decreased, being below 10% after 2005, a fact due to the accelerated economic growth that Romania had before

2007. The decreasing trend is maintained in, after 2012, the contribution of agriculture being below 5% (Table 4, Figure 5).

The tendency to reduce this share is an important result from the perspective of diminishing the contribution of agricultural supply to GDP fluctuations, against the background of increasingly unstable climatic conditions and the reduced capitalization of farms [16].



Fig. 5. Evolution of the share of agriculture in Total GDP, in Romania, (%)

Source: [13] \*[14]\*\* [11].

Table 5. Share of agriculture in Total GDP, at EU level, 2022

No.	Country	% of agriculture in Total GDP
1	Austria	1.4
2	Belgium	0.6
3	Bulgaria	3.9
4	Croatia	3.1
5	Cyprus	1.6
6	Czechia	1.9
7	Denmark	1.2
8	Estonia	2.5
9	Finland	2.3
10	France	1.9
11	Germany	0.9
12	Greece	3.8
13	Hungary	3.2
14	Ireland	1.1
15	Italy	1.8
16	Latvia	5.0
17	Lithuania	4.0
18	Luxembourg	0.2
19	Malta	0.9
20	Netherlands	1.5
21	Poland	2.8
22	Portugal	1.9
23	Romania	4.5
24	Slovak Republic	2.2
25	Slovenia	1.8
26	Spain	2.3
27	Sweden	1.5
28	EU	1.7

Source: Own processing based on the data from [20].

Even if the share with which agriculture participates in the formation of GDP registers a downward trend, the value of the indicator

remains relatively high, compared to the EU average, being a source of instability of GDP values, considering the influence of changes in climatic factors, the low level of endowment technical-material and under the conditions of an insufficiently developed and diversified economy (Table 5, Figure 6).

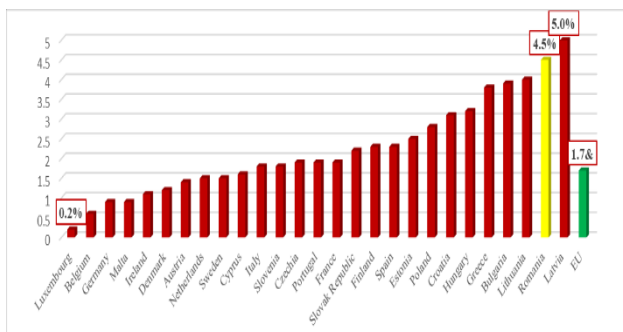


Fig. 6. Share of agriculture in Total GDP, at EU level, 2022  
 Source: [20].

Table 6. GDP structure by activity subsectors year 2000 compared to year 2021

Specification	2000		2021	
	Mil. lei	%	Mil. lei	%
Agriculture	8,777.9	10.8	53,619.0	4.5
Industry	20,253.5	25.0	243,830.7	20.6
Construction	4,221.5	5.2	73,538.2	6.2
Trade, transport, HoReCa	14,816.8	18.3	221,599.1	18.6
Information and communications	3,961.3	4.9	74,496.3	6.3
Financial intermediation and insurance	3,278.5	4.0	32,765.7	2.7
Real estate transactions	5,926.0	7.3	92,271.8	7.8
Professional, scientific and technical activities	1,973.7	2.4	82,272.4	6.9
Public administration and defense; social security from the public system, education, health and social assistance	7,600.7	9.4	167,064.8	14.0
Performing, cultural and recreational activities	2,217.1	2.7	31,602.8	2.7
Net taxes on the product	8,329.6	10.0	115,095.1	9.7
Total GDP	80,873.1	100.0	1,1874,02.4	100.0

Source: Own processing according to [13, 14].  
 \*We analyzed the year 2021, because neither the Statistical Yearbook 2022 nor Romania in figures 2023, Statistical Brief contain the GDP structure by economic subsectors, but only by main sectors.

The large share of agriculture in the formation of the GDP of 4.5% in 2022 compared to 1.7%, which is the average of the EU and other member states, ranks Romania in 2nd

place after Latvia, which has a share of 5.0% (Table 6).

Going in more detail in the analysis, i.e. following the structure of the GDP by activity subsectors, by comparing the year 2000 with the year 2021, (Table 6) it stands out the way in which the structure of the Romanian economy has transformed - in the last period of time.

this reflects the reversal of some trends who decided to change the development model: from one based on agriculture and industry, to one based on consumption and the presence of the state, currently.

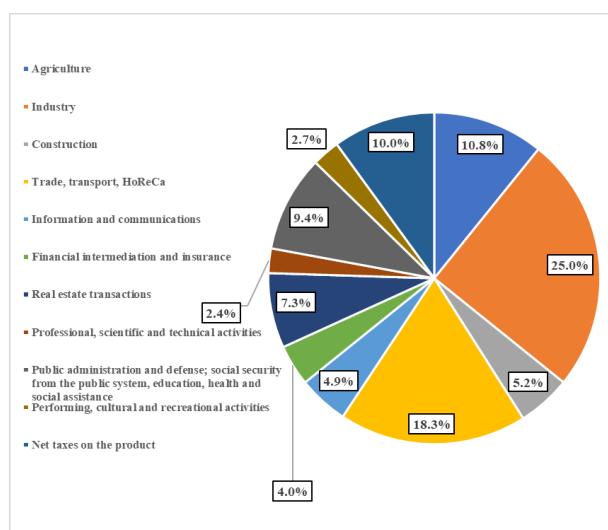


Fig. 7. GDP structure by branch in 2000, %  
 Source: Own design based on the data from [12].

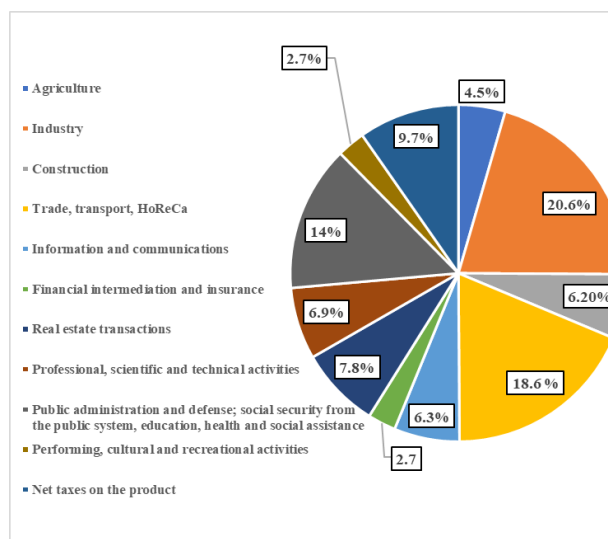


Fig. 8. GDP structure by branch in 2021, %  
 Source: Own design based on the data from [11].

Although the year 2021 brought a slight increase in the share of industry in the

Romanian economy, from 19.6% in 2020 to 20.6%, the share of industry in GDP recorded a sharp decline (after agriculture) in the economic branches, of about 4.4 percentage points in GDP.

The construction sector also lost ground, its weight decreasing by almost two percentage points.

## CONCLUSIONS

Following the analysis, the authors drew a series of conclusions. Thus, although over time, it has undergone some conceptual methodological changes, taking into account the economic system Romania has gone through, the Gross Domestic Product has always been a complex indicator of the results of the Romanian economy.

Regarding the GDP structure by economic branches, there is a decrease in the weight with which agriculture participates in the formation of total GDP, followed by industry and the growth of the service sector.

However, the share with which agriculture participates in the formation of the Total GDP is still high compared to the EU average, indicating the poor performance of the other two sectors, especially industry.

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