

COMPARATIVE INSIGHTS INTO LABOUR PRODUCTIVITY TRENDS IN THE EUROPEAN UNION'S AGRI-FOOD SECTOR

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Abstract

The agri-food sector stands as a fundamental pillar of the European Union's economic framework, essential for sustaining the region's population and playing a significant role in the overall economic health and stability of the EU. This study offers a comprehensive analysis of labor productivity trends in the EU's agri-food sector over the past decade, focusing on a comparative assessment between Romania and top-performing EU economies. Using data from Eurostat and national databases, we explore the dynamics of labor productivity, considering factors such as turnover, number of enterprises, and employment levels in the agri-food industry. The research reveals significant disparities in productivity growth, with countries like the Netherlands, Denmark, and Belgium showing high productivity levels, while Romania, despite a notable improvement, remains below the EU average. The study underscores the importance of strategic investments and policy interventions in boosting productivity and competitiveness in the agri-food sector across Europe.

Key words: EU agri-food sector, labour productivity, economic performance, productivity trends

INTRODUCTION

Over the last decade, the European Union's agri-food sector has experienced significant transformations due to various factors, ranging from technological advancements to policy reforms. This sector, vital for sustenance and economic stability, has seen diverse degrees of growth and productivity changes. One fundamental aspect underpinning these changes is nature's role in supporting life on Earth, providing essential resources like food, shelter, and clothing. However, the human population's rapid growth has started to strain these resources, especially regarding food demands [24]. Even that, a significant aspect of the agri-food sector is its capacity to produce large quantities of food, which brings forth its own set of challenges, particularly in managing this abundance. The food industry, along with agriculture, often struggles with effectively managing food production, leading to substantial waste. Issues within the supply

chain, ranging from storage to distribution, contribute significantly to food waste, highlighting the need for more efficient management and sustainable practices in the sector [13].

These pressures have led to critical discussions on food security and the global population's ability to cope with hunger, a topic extensively covered in numerous studies [12]. Concurrently, the effects of global warming, such as increased air and ocean temperatures and melting snow and glaciers, have led to a rise in global sea levels, further impacting agricultural practices [6]. These environmental changes, coupled with the ever-increasing demand for sustainable and profitable agricultural practices, have transformed the global agricultural sector [21].

In this context, agriculture has become one of the most significant sources of pollution and greenhouse gas emissions, alongside sectors like transport and industry [10]. This environmental impact has brought to the

forefront the need for sustainable production, especially as cereals, a major component of the world's basic food, have always held an important place in the global food economy [26].

The agricultural sector, facing limited resources, encounters significant challenges in crop cultivation [8]. Romania, with its favorable climate and fertile soil, is particularly conducive to cultivating oleaginous plants like sunflower and rapeseed [2]. Despite its agricultural potential, Romania still faces a range of risks and challenges in crop management, common to many countries but with certain unique aspects [5].

Before 2020, EU farmers enjoyed a relatively stable market, but recent events, including the COVID-19 pandemic and geopolitical tensions, notably the conflict between Russia and Ukraine, have dramatically altered market dynamics [3]. The creation of the EU single market aimed to stimulate and intensify trade exchanges, benefiting the entire community [19]. However, with current trends in production and consumption, there is a growing concern that future generations will face increased environmental challenges, including pollution, climate change, and extreme weather events [20].

Agriculture's role extends beyond just food production; it encompasses broader socioeconomic and environmental priorities [23]. This is evident in the diversity of European agriculture, reflected in farm sizes and the choice between conventional and ecological systems. Organic farms, for example, tend to be larger than traditional farms, reflecting a shift in agricultural paradigms [9, 22].

The EU's rural population is aging, the age structure is not harmonized and also training level shows a large gap versus the urban area [14].

In the EU, labour productivity in agriculture varies from a country to another [16] and the efficiency of its utilization as well [18].

In 2022, approximately 11% of Romania's population worked in agriculture, underscoring its vital role in the national economy [11].

Labour productivity in Romania's agriculture is very small compared to the level register in other EU countries [15, 18].

Labour force has a deep impact on agricultural production in Romania [27].

The increase of labour productivity in agriculture will have important implications on farming system [1, 28].

In the EU it is a large variation of labour productivity in agricultural enterprises among the member states as affirmed by [7].

Agricultural companies need to be financially supported to grow labour productivity [25].

In this context, the present research offers a detailed examination of labor productivity trends in the European Union's agricultural and food sectors, with a special focus on Romania and a comparison with the EU's most successful countries in this area, is intended to offer an in-depth insight into these patterns.

This study is anticipated to reveal areas of growth, highlight the necessity for strategic investments, and identify possible strategies to improve productivity within the EU's agri-food sector.

This integrated text maintains the essence of each provided passage while creating a coherent narrative that logically connects the various aspects of the agri-food sector's challenges and transformations within the EU, with a special focus on Romania.

MATERIALS AND METHODS

This research utilizes a quantitative method to investigate labor productivity in the agricultural and food sectors of the European Union. It mainly draws data from Eurostat and various national statistical databases, ensuring a broad and thorough overview of the industry within the EU. The study concentrates particularly on companies involved in food production. This encompasses a wide range of activities such as processing and preserving of meat and meat products, fish, crustaceans and molluscs, fruits and vegetables; production of vegetable and animal oils and fats; manufacturing of dairy products, grain mill products, starches and starch products; and the preparation of

bakery and farinaceous products, condiments, tea, coffee, cocoa, as well as prepared animal feeds.

Key metrics analyzed encompass the turnover per person employed, the evolution of the number of enterprises, and employment figures in the agri-food industry from 2011 to 2020.

The comparative analysis focuses on the top 10 EU countries and Romania, with particular attention to annual growth rates, percentage changes over the decade, and the ratio of 2020 productivity to that of 2011. Additionally, the study examines the average productivity per employee, providing a broader perspective on the economic performance and trends within the sector.

A qualitative analysis complements the quantitative data, interpreting the economic strategies and market conditions that have influenced these trends. This approach ensures a multifaceted understanding of the variations in labour productivity across

different EU nations, offering valuable insights for policymakers and stakeholders in the agri-food industry.

The methodology of this study is designed to capture the dynamics of labour productivity, thereby facilitating a comprehensive understanding of the sector's progress and challenges. It provides a robust framework for analyzing productivity trends and identifying key drivers of growth and efficiency in the agri-food sector across the European Union.

RESULTS AND DISCUSSIONS

Over the last decade, the agri-food industry within the European Union has displayed diverse dynamics in terms of the number of active enterprises. Analyzing the top 10 EU member countries, in France, the number of enterprises consistently declined from 57,446 in 2011 to 50,320 in 2020, which represents a decrease of 6,126 units or a reduction of approximately 10.7% (Figure 1).



Fig. 1. Evolution of Agri-food industry enterprises in top 10 EU countries (2011-2020)
 Source: Own representation based on data available on Eurostat, 2024 [4].

Italy showed a similar trend, with a decrease from 55,203 enterprises to 50,177 during the same period, signaling a reduction of 5,026 enterprises, which is a 9.1% decrease in percentage terms.

On the other hand, Germany experienced a different trajectory, with a decrease noted in the early stages of the decade, followed by a

notable increase in 2018, and then stabilizing at 26,739 in 2020, down from 30,185 in 2011, indicating a total reduction of 3,446 enterprises, representing about 11.4%.

In Spain, a modest increase was observed from 23,165 to 24,654 enterprises, which is an increase of 1,489 units or 6.4%, suggesting a

potentially more resilient market or an expansion of the agri-food sector.

Poland and Romania have shown remarkable progress, with Poland's figures rising from 13,219 to 18,162 and Romania's from 7,508 to 10,215. These represent growth rates of 37.4% and 36.1% respectively, signaling a strong expansion in the agri-food sector. Greece, after an initial increase, saw a slight decrease, reaching 14,760 in 2020 from 14,882 in 2011.

The Czech Republic and Portugal showed fluctuations over the decade but both countries ended the period with a net increase, thus demonstrating adaptability and progress in the sector. Belgium, however, recorded an overall decline (Fig. 1).

Looking at the turnover expressed in millions of euros of the first 10 EU member countries over the years 2011-2020, we observe the following trends: Germany maintained its leading position throughout the analyzed period, with a steady increase in turnover, reaching a peak of 195,058.7 million euros in 2019, with a slight decrease in 2020.

France also showed an upward trend, especially starting in 2017, reaching a turnover of 181,660.6 million euros in 2020, the largest increase among the 10 countries. Italy had a moderate increase over the years, except for a small decrease in 2020 compared to 2019. Spain also recorded sustainable growth, except for a decline between 2019 and 2020, despite impressive growth in the period 2016-2019. The Netherlands had a relatively constant growth, with small fluctuations, but a generally positive trend. Poland showed remarkable growth between 2016 and 2019, before a slight decrease in 2020. Belgium had fluctuations throughout the decade, but the turnover generally increased, with a notable decrease in 2018. Denmark showed steady growth throughout the period, without major fluctuations. Austria had an overall upward trend, with significant growth starting in 2017. Sweden had a more variable evolution, with a decrease between 2013 and 2015 and then a recovery and gradual growth until 2020 (Table 1).

Table 1. Turnover of the top 10 companies in the agri-food industry for the period 2011-2020, (millions of euros)

Country	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020/ 2011
Germany	160,297.8	166,787.9	172,858.2	171,065.5	166,844.5	170,544.1	183,270.0	185,172.5	195,058.7	195,020.4	121.66
France	143,800.4	151,804.3	154,703.1	156,836.6	153,639.7	150,330.9	178,558.9	179,886	181,212.4	181,660.6	126.33
Italy	106,497.3	106,833.9	111,302.7	111,423.8	113,226.8	113,661.2	117,954.9	119,783.3	122,543.5	122,052.8	114.61
Spain	85,752.3	86,482.0	87,257.5	89,515.5	92,676.6	95,075.7	101,577.6	105,514.3	111,215.1	109,442.2	127.63
Netherlands	58,184.2	60,217.0	64,428.1	63,932.9	65,616.7	68,472.2	70,772.7	70,651.1	70,506.3	72,894.9	125.28
Poland	42,368.8	46,626.3	47,519.5	48,124.5	47,954.0	49,199.3	55,090.7	59,744.0	63,090.0	60,587.2	143.00
Belgium	38,150.6	39,219.9	41,069.9	40,628.4	40,838.4	41,932.0	44,692.9	39,893.2	41,846.8	42,589.2	111.63
Denmark	20,859.0	22,616.5	24,297.6	24,349.2	24,615.7	24,480.6	25,764.3	25,984.7	26,258.9	27,013.9	129.51
Austria	14,444.6	15,273.8	16,398.7	16,647.9	16,592.8	16,708.9	17,761.1	19,512.8	19,896.1	19,640.5	135.97
Sweden	16,140.7	16,886.1	17,454.4	16,354.5	16,201.7	16,735.0	17,197.8	16,709.4	16,465.0	17,238.0	106.80

Source: Eurostat, 2024 [4].

In a retrospective look over the last decade, the agri-food industry has shown a variety of economic trajectories among EU member nations. Germany recorded solid growth, consolidating its position as an economic powerhouse with an increase of over 21%. France surprised with its economic dynamics, highlighting a growth of over 26%, attributed to a combination of innovation and expansion in the sector. Italy and Spain followed upward trends, with Spain recording the highest growth of nearly 28%, and the Netherlands

also followed a positive course, with growth of over 25% (Figure 2).

Poland stands out particularly with the highest growth of 43%, a sign of remarkable economic development in this sector. On the other hand, Belgium had more tempered growth, reflecting a more stable market. Denmark and Austria also showed impressive increases, with Austria recording nearly 36%, resulting in a positive and sustainable development. Sweden, although with the most

modest growth, maintained a steady growth trajectory, with a more tranquil evolution.

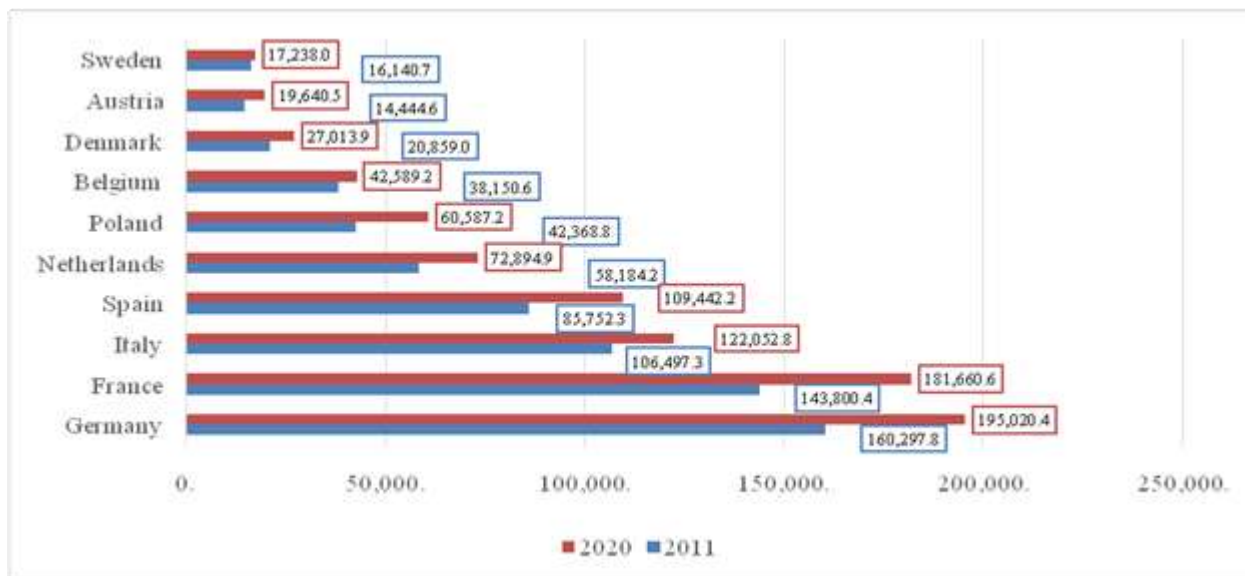


Fig. 2. Turnover of the top 10 companies in the agri-food industry for 2011 and 2020, (millions of euros)
 Source: Own representation based on data available on Eurostat, 2024 [4].

These patterns clearly indicate notable transformations in Europe's agri-food sector, where certain countries are rapidly advancing while others expand at a steadier rate. This reflects the variety of economic approaches and the adaptability to shifts in market dynamics across different European nations (Fig. 2).

The number of employees in the EU agri-food industry remained relatively constant in the early years, with a slight decrease between 2011 and 2015. After 2015, a significant increase is observed, reaching 4,000,000 employees in 2018 and maintaining this level in 2020. This indicates a general expansion of the sector in the second half of the decade.

Germany experienced steady growth in the number of employees, except for a minor decrease between 2013 and 2014. In 2020, Germany accounted for 21.02% of the total EU employees in this sector, being an industry leader. France had moderate fluctuations, but overall, an upward trend, representing 16.07% of the total EU employees in 2020. The greatest growth is observed after 2015.

Poland showed steady growth, except for a slight decrease between 2019 and 2020, accounting for 10.24% of the EU workforce in this sector. Spain also experienced overall

growth, contributing 9.62% to the EU workforce in this sector in 2020. The largest increase occurred between 2015 and 2020. Italy had a moderate and steady growth, representing 8.85% of the total EU employees in 2020.

In the case of Romania, a general stability in the number of employees is observed, with a slight decrease towards the end of the decade, representing 3.9% of the total EU employees in this sector. Romania thus occupies a modest position within the EU agri-food industry, having a smaller role compared to larger economies. The potential for development and growth in this sector remains an important aspect for the future of the agri-food industry in Romania.

The Netherlands, Greece, Hungary, Belgium showed moderate and steady growth throughout the decade, with minor variations from year to year.

Hence, the EU's agri-food industry has generally displayed an upward trend in employment numbers, with certain countries witnessing more substantial rises than others, indicative of the sector's expansion. Germany and France emerge as prominent leaders in this industry, whereas nations such as Poland and Spain are experiencing rapid and noteworthy growth (Table 3, Figure 3).

Table 3. Evolution of the number of employees in the agri-food industry during 2011-2020

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020%
UE 27	3,500,000	3,500,000	3,463,329	3,490,000	3,460,000	3,627,162	3,710,843	4,000,000	3,945,120	4,000,000	100.00
Germany	772,615	772,021	768,584	752,314	754,218	796,175	786,044	874,611	877,557	840,974	21.02
France	532,454	534,063	528,674	543,423	488,785	555,307	601,796	605,403	613,499	642,759	16.07
Poland	369,925	372,424	364,370	371,863	373,783	382,340	386,005	420,040	423,484	409,453	10.24
Spain	303,747	299,234	290,957	292,631	300,534	323,660	338,151	360,545	380,634	384,927	9.62
Italy	306,282	309,977	309,545	309,064	312,026	323,634	336,992	342,428	350,955	353,997	8.85
Romania	164,440	163,005	162,703	161,881	160,363	160,121	161,824	163,171	160,719	155,908	3.90
Netherlands	113,926	114,994	115,088	115,398	117,235	118,845	120,593	122,440	127,827	126,135	3.15
Greece	66,755	70,146	69,316	82,446	83,592	90,813	94,611	109,162	108,668	105,937	2.65
Hungary	86,314	87,364	87,032	87,952	91,074	90,008	89,951	95,147	91,593	91,647	2.29
Belgium	78,704	77,909	78,412	77,436	77,848	79,417	81,364	84,673	88,220	87,053	2.18

Source: Eurostat, 2024 [4].

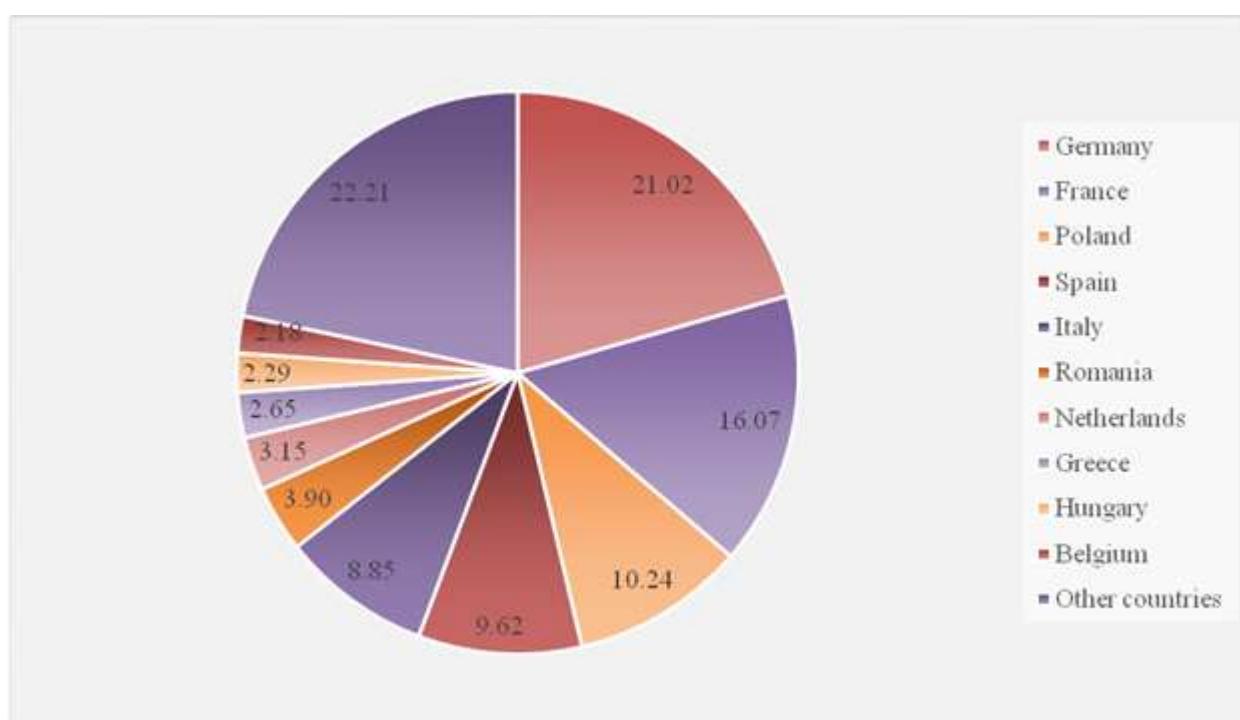


Fig. 3. Evolution of the number of employees in the agri-food industry for 2020 (%)

Source: Own representation based on data available on Eurostat, 2024 [4].

In terms of the evolution of the average number of employees in the agri-food industry for the top 10 countries, as well as Romania's position in comparison to these and its development relative to the EU average, all in the context of Malta's exclusion due to lack of data, the following observations can be made: Luxembourg, Denmark, and Germany have consistently remained in the top three for the number of employees throughout the decade, demonstrating a dynamic and resilient labour market in the agri-food sector.

Finland recorded a significant increase in 2020, while Ireland showed steady growth over the decade, culminating in a figure at the

end of the period almost identical to that of 2011.

On the other hand, Poland experienced fluctuations, but a general decrease was observed towards the end of the decade. Austria and Hungary maintained relatively stable employee numbers, with a slight upward trend in Austria.

Lithuania experienced a notable decline in its workforce across the analyzed period, while the Netherlands saw a steady decrease in its average number of employees throughout the decade (Table 4).

Romania, not featuring in the top 10 at any time during the decade, also observed a

gradual reduction in the average number of employees in its agri-food industry, dropping from 22.1 in 2011 to 15.4 in 2020.

Table 4. Top 10 EU countries by average employment, 2011-2020

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Luxembourg	33.0	35.8	37.7	37.8	40.2	42.8	42.2	43.8	45.5	44.9
Denmark	40.5	40.9	39.9	39.5	38.3	35.9	36.5	37.7	38.5	40.5
Germany	27.1	28.0	28.8	28.3	30.6	33.7	37.9	34.3	33.9	32.7
Finland	20.6	21.0	21.6	22.1	21.0	22.0	22.2	22.4	22.9	30.0
Ireland	28.6	27.8	26.9	27.4	27.6	27.7	26.2	28.0	29.8	29.9
Poland	29.3	28.4	31.3	30.8	28.2	29.2	28.0	23.8	24.1	23.4
Austria	19.7	20.6	20.7	21.0	21.1	21.5	21.8	23.0	22.8	22.7
Hungary	20.0	20.2	20.4	20.2	20.6	20.1	20.2	21.8	21.3	21.2
Lithuania	32.0	28.2	27.8	25.9	25.3	23.8	24.7	23.4	23.4	20.9
Netherlands	27.6	26.3	22.6	22.6	21.7	21.3	21.2	20.5	20.4	19.3
EU27	14.5	14.5	14.4	14.3	14.3	15.0	15.7	15.8	15.9	15.9

Source: Eurostat, 2024 [4].

This declining trend places Romania in a less favorable position relative to countries with the highest employee counts in the industry, ranking it 16th. The EU27 average shows slight fluctuations but generally an upward

trend towards the end of the decade, increasing from 14.5 in 2011 to 15.9 in 2020. Romania's figures are above the EU27 average at the beginning but fall below this average starting in 2018 (Table 4, Figure 4).

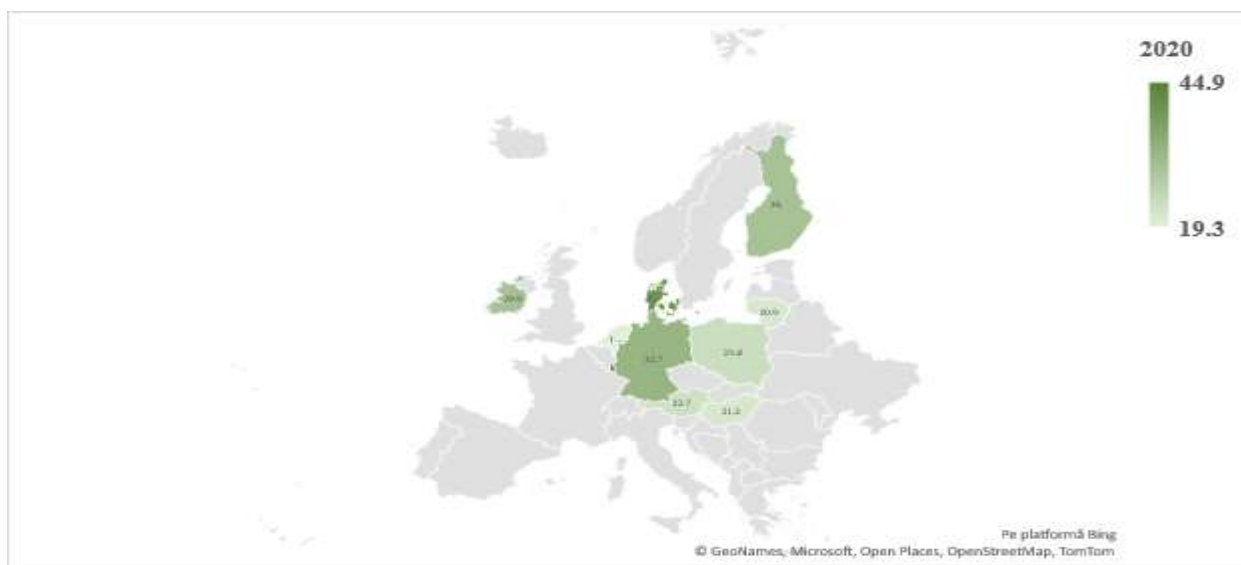


Fig. 4. Top 10 EU countries by average employment, 2020

Source: Own representation based on data available on Eurostat, 2024 [4].

Analyzing the labour productivity per employee, measured in thousands of euros, for the top ten EU member countries over the selected decade, it was found that throughout this decade, the Netherlands consistently led the ranking in labour productivity per employee, starting with an impressive productivity of 492.0 thousand euros in 2011 and increasing to 557.8 thousand euros in 2020. Denmark followed a similar upward trajectory, with an increase from 346.2

thousand euros to 491.7 thousand euros over the analyzed period. Belgium showed growth until 2017, followed by a slight fluctuation, but ended the decade with a value of 453.5 thousand euros per employee, thus demonstrating an ability to maintain high productivity despite economic challenges. Conversely, Ireland experienced a significant decline after a peak in 2012 of 650.8 thousand euros, dropping to 417.6 thousand euros in 2020. Among other top-performing nations

are Sweden, Italy, France, Spain, Finland, and Austria, each displaying varying levels of productivity, but generally maintaining a stable or slightly increasing trend over the decade.

Romania, on the other hand, started from a much lower base, with a productivity of 50.6 thousand euros in 2011, growing slowly but steadily to 68.5 thousand euros in 2020. Although this growth is a positive sign, indicating an improvement in efficiency and value-added generated by the agri-food sector, Romania remains below the EU27 average and far behind the countries with the highest productivity.

Regarding the EU27 average, it increased from 211 thousand euros in 2011 to 233 thousand euros in 2020, signaling a modest

but consistent rise in productivity across the union. This overall upward trend of the EU could be attributed to technological advancements, improvement in business practices, and an increasingly skilled workforce (Table 5).

The comparative analysis of these data illustrates a diversified economic landscape in the EU, where some countries have managed to maximize labour productivity in the agri-food sector, while others, such as Romania, although improving, still have much to do to align with European standards. This underscores the importance of investment in innovation, technology, and human capital development to increase productivity and competitiveness.

Table 5. Turnover per person employed between 2011-2020, thousand euro

Rank	Country	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 % EU	2020 / 2011
1	Netherlands	492.0	504.4	539.2	533.9	538.1	554.5	564.1	555.0	532.0	557.8	239.60	113.37
2	Denmark	346.2	379.1	418.7	420.0	440.3	461.4	481.8	470.1	489.6	491.7	211.21	142.03
3	Belgium	445.6	460.0	479.6	477.6	480.2	484.5	502.6	444.4	443.1	453.5	194.80	101.77
4	Ireland	590.0	650.8	586.0	557.1	540.8	495.3	500.3	445	390.2	417.6	179.38	70.78
5	Sweden	271.7	292.3	305.2	291.8	283.9	289.0	299.0	288.1	285.1	313.4	134.62	115.35
6	Italy	268.6	271.1	283.0	286.5	289.3	282.8	285.4	287.3	289.0	287.8	123.63	107.15
7	France	256.7	270.6	279.3	275.7	300.6	260.9	288.5	288.1	287.6	275.8	118.47	107.44
8	Spain	269.6	276.0	281.7	289.7	293.0	281.4	287.9	279.4	280.6	272.8	117.18	101.19
9	Finland	267.0	280.1	280.7	275.5	267.4	266.4	257.9	262.1	265.2	263.7	113.25	98.75
10	Austria	210.7	217.2	228.9	225.7	221.7	221.8	230.7	244.7	246.5	245.3	105.37	116.42
26	Romania	50.6	51.8	55.2	55.3	59.2	58.9	60.9	62.7	66.8	68.5	29.42	135.38
	EU ²⁷ average	211	220	229	228	230	223	236	234	231.6	233	100.00	110.33

Source: Eurostat, 2024 [4].

CONCLUSIONS

The past decade has witnessed a period of significant evolution within the EU's agri-food sector. This era has been characterized by a complex interplay of environmental, technological, and economic forces, reshaping the landscape of agricultural production and labour productivity across the Union.

Amidst the backdrop of these changes, environmental concerns, particularly those related to global warming, have emerged as critical drivers. The agricultural sector, while vital for feeding the growing global population, faces the dual challenge of mitigating its environmental impact and adapting to the changing climate. The increase

in temperatures, melting glaciers, and rising sea levels underscore the urgency of transitioning towards more sustainable farming practices.

In terms of labour productivity, the study reveals a tapestry of varying performances across the EU. While some nations exhibit high levels of productivity, reflecting advanced agricultural practices and efficient use of resources, others, like Romania, though improving, still lag behind. The journey of Romania, with its unique agricultural strengths and challenges, exemplifies the diverse economic trajectories within the EU. Despite its potential, Romania grapples with challenges in crop management, market dynamics, and environmental sustainability,

necessitating focused efforts to enhance productivity.

The creation of the EU single market has been a significant economic milestone, fostering trade and growth within the community. In recent years, external factors like the COVID-19 pandemic and geopolitical conflicts have significantly reshaped the agriculture and trade landscape. These events have brought new challenges and complexities, highlighting the importance of resilience and adaptability in agricultural and economic strategies. Looking to the future, it's clear that the agri-food sector in the EU, and particularly in Romania, stands at a crossroads. Embracing sustainable practices, investing in innovation and human capital, and adopting new technologies like the metaverse will be crucial in navigating the challenges ahead. The sector's future success will hinge on its ability to integrate environmental priorities with economic goals, reflecting a broader commitment to sustainability and resilience.

In summary, while the EU agri-food sector faces an array of challenges, it is also poised for transformative growth. For Romania, this represents an opportunity to leverage its unique advantages while embracing change and innovation. As the sector moves forward, it will increasingly reflect the broader socioeconomic and environmental priorities of our times, signaling a new era of sustainable, efficient, and integrated agriculture within the EU.

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