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THE EVALUATION OF THE COMPETITIVE POTENTIAL AND PERFORMANCE OF THE AGRICULTURAL SECTOR IN THE EU COUNTRIES BASED ON A SYNTHETIC INDEX[1]

Summary

Purpose – This paper presents the results of an assessment of the aggregated competitiveness of the agricultural sector in the EU member states. The authors sought answers to the following questions: What is the general level of competitiveness of the agricultural sector in the European Union? Which countries are leaders in the EU and which are outsiders in this area?

Research method – The analyses were based on a set of intentionally selected multi-criteria indicators and taxonomic methods. An aggregated Competitiveness Index (CI) was designed, which allowed evaluating and classifying EU countries into categories in terms of the studied phenomenon. The analysis draws upon data derived from the World Bank's and Eurostat statistical databases, and the assessment covered two years – 2004 and 2018.

Results – The mean CI in 2018 for all the evaluated countries was 0.1701, while in the base year it was 0.1942, which means that in the analysed years the general competitiveness level of agricultural sectors in the EU member states declined. Considering the possible range of CI (0.1), this level was very low in both analysed years. The general competitiveness level fell due to: the reduced use of fertilisers, decrease in the relative export orientation, smaller area of arable land and a decline in employment in agriculture.

Originality/value/implications/recommendations – The analysis of the agricultural sector presented in this paper, using a comprehensive index, is the approach that has not been previously applied, taking into account the selection of the components of a comprehensive index, which was made on the basis of

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the literature studies. The proposed index allowed classifying the countries of the European Union according to both their resources and performance in production and trade in the agricultural sector and comparing the position they occupied in 2004 and in 2018.

Keywords: agricultural sector, EU countries, competitive potential, competitive performance, international competitiveness, synthetic index, taxonomic methods

JEL Classification: F1, O13, Q17, Q18

1. Introduction

Defining and measuring competitiveness is not an easy task as no generally accepted, universal definition of competitiveness exists. This is due to the fact that attempts at defining this phenomenon were undertaken by the theoreticians of economy in at least three areas: international trade, economics and strategic management [Żmuda, Molendowski, 2016; Strojny, 2010]. Researchers use this term at several levels – from single businesses to whole economies. At the business level, competitiveness is defined as a capability to consistently and profitably manufacture products that satisfy the market requirements in terms of price and quality [Harvey et al., 2017; Domazet, 2021].

Respective researchers assess competitiveness in terms of different aspects and at different levels, analysing: 1) advantages held in terms of availability of basic production factors (competitive potential) – according to the neo-factor proportions theory [Fujita, Krugman, Venables, 1999], every country in the world has specific resources of land, water, labour, capital etc. at its disposal for rational management, for example, through setting adequate directions for the export and import specialisation contributing to increasing welfare in such countries; 2) the outcomes of competition (competitive performance); and 3) competition management processes determining the optimum operation and utilising the potential to achieve a specific competitive position [Adamowicz, 1999; Buckley, Pass, Prescott, 1988; Gorynia, 2000; Pawlak, 2013].

Many works concerning the agricultural sector focus on assessing the resources of production factors, outlays and their mutual relationship [Nowak, 2017; Poczta, Pawlak, 2010; Pawlak, Poczta, 2020]. In assessing outcome competitiveness, the productivity and efficiency of agriculture [Martin, Westgren, van Duren, 1991; Sharples, 1990; Sandrey, Scobie, 1994; Roe, 2000; Zawalińska, 2004] and the position in international agri-food trade [Kita, Adenauer, 2015; Popescu et al., 2017; Trivan et al., 2018; Andrei et al., 2020] are often analysed.

The basic assumption of the authors of this study was to comprehensively assess the competitiveness of the agricultural sector using a single synthetic measure taking into account the above-mentioned levels of competitive potential and performance. The design and application of synthetic measures in the analyses and assessments of the competitiveness of the whole economy is a responsibility of international research institutes such as the World Economic Forum (WEF) that designed the

Growth Competitiveness Index published in the cyclic Global Competitiveness Report [www 1], and the International Institute for Management Development (IMD) analysing and classifying countries in terms of their competence management to create long-term value. The results of the World Competitiveness Ranking are published every year in The World Competitiveness Yearbook [www 3]. However, few studies provide a comprehensive evaluation of a selected sector of the economy, among which it is worth mentioning research conducted by Rumankova et al. [2022] on the selected EU countries crop trade competititiveness from the perspective of the Czech Republic; Cheptea and Huchet [2018] on the competitiveness of French agri-food exports; Carraresi and Banterle [2015] on the agri-food competitive performance in the EU countries; Bojnec and Fertö [2009] on agri-food trade competitiveness of Central European and Balkan countries; and research by Andrei et al. [2020] evaluating the impact of agricultural performance on foreign trade concentration and competitiveness in Romania.

The analysis of the agricultural sector presented in this paper, using a comprehensive index, is the approach that has not been previously applied, taking into account the selection of the components of a comprehensive index, which was made on the basis of the literature studies. The proposed index allowed classifying the countries of the European Union according to both their resources and performance in production and trade in the agricultural sector and comparing the position they occupied in 2004 and in 2018. The outcomes can differ from simple, single-indicator competitiveness measurement methods, as shown in the Discussion. Such a cumulative approach based on resources and outcomes is reasonable due to the specific features and strategic nature of the agricultural sector and limited mobility of production factors used in agricultural production, and notably land.

2. Materials and Methods

The main aim of the study which was an evaluation of the competitive potential and the competitive performance of the agricultural sector in the countries of the European Union was achieved based on a set of intentionally selected multi-criteria indicators and taxonomic methods. The aggregated competitive index (*CI*) was designed, which allowed evaluating and assigning the EU countries to categories in terms of the analysed phenomenon.

The methods of designing synthetic measures for assessing multi-faceted phenomena were described in detail in scientific literature [Hellwig, 1968; *Metody oceny*..., 2006; OECD, 2008; Łogwiniuk, 2011; Grzebyk, Stec, 2015; Godlewska, Sidorczuk-Pietraszko, 2019; Kasztelan, 2021]. On this basis, the process of design and empirical verification of the *CI* consisted of the following stages:

– Selection of specific indicators of competitive capacity, outcome competitiveness and international competitiveness derived from the World Bank's databases or calculated based on Eurostat's databases;

- Standardisation of specific indicators according to their effects on the studied phenomenon (competitiveness of the agricultural sector in respective member states of the EU);
- Designing national competitiveness indices *(CI)* for agricultural sectors based on the median and standard deviation;
- Linear ordering of the EU countries based on *Cis*.

The selection of specific indicators was guided by substantive aspects of the existing definitions of competitiveness mentioned in the Introduction and access to data. Based on literature studies [Nowak, 2017; Hatzichronoglou, 1996; Frohberh, Hartman, 1997; Figiel, Kufel, 2013], the authors decided to assess three areas of competitiveness of the agricultural sector: 1) competitive capacity, 2) internal outcome competitiveness, and 3) external outcome competitiveness associated with the competitive position in international trade. In each of the analysed areas three indicators were selected and used in the studies as measures of the significance and competitiveness of the agricultural sector. Ultimately, nine indicators (Table 1) and 27 EU member states were selected for analyses (except Malta due to the lack of data regarding some indicators). The analysis covers the UK as it was the EU member state in the period under investigation.

Initially, the authors considered many more variables, and finally focused on 9. In the authors' opinion, such a number of variables seemed to be sufficient. The size of the land and labor resources in the analysis of the competitive potential was indicated, inter alia, by Adamowicz [1999], Buckley et al. [1988], Gorynia [2000], Pawlak, Poczta [2020]. As part of the evaluation of the resulting competitiveness, productivity and efficiency in agriculture are often analyzed. Such variables were used, among others, by Martin et al. [1991], Sharples [1990], Sandrey and Scobie [1994], Roe [2000], Zawalińska [2004]. The analysis of the competitive position, using TCR and REO indicators (explained under the Table1) and the share of a given country in the total EU agricultural exports, was performed by Kita and Adenauer [2015], Popescu et al. [2017], Trivan et al. [2018], Andrei et al. [2020].

Based on the characteristics of specific indicators from the databases of the World Bank and Eurostat, it was assumed that all the indicators are stimulants, that is, explanatory variables, and their increasing value contributes to an increase in the value of an explained variable (here the *CI*). In other words, the higher the value of a specific indicator, the better for the general assessment of the competitiveness level of the agricultural sector [Kasztelan, 2020].

TABLE 1

Indicators selected for the *CI* calculation

Indicator Symbol	Indicator Group	Indicator Name	Unit
x_1	Competitive capacity (competitive potential)	Arable land	% of country area
x_2		Employment in agriculture	% of total employment
x_3		Fertiliser consumption	kg per hectare of arable land
x_4	Outcome competitiveness (competitive performance)	Cereal yield	kg per hectare
x_5		Agriculture, forestry and fishing value added	annual % growth
x_6		Agriculture, forestry and fishing value added per worker	constant 2010 U.S. dollars
x_7	International competitive position	Trade Coverage Ratio (TCR)[a]	%
x_8		Relative Export Orientation (REO)[b]	%
x_9		Share of respective countries in the EU's agricultural export	%

Notes:

[a] $TCR=\frac{X_j}{M_j}$ x 100,

X_j, M_j, –export/import of agriculture, forestry and fishery products of EU "j" country

[b] $REO=(\frac{X_j}{Q_j} \div \frac{X_{EU}}{Q_{EU}})$x100,

X_j – export of agriculture, forestry and fishery products of EU "j" country,
Q_j – value of production of agriculture, forestry and fishery sector of EU "j" country,
X_{EU} – export of agriculture, forestry and fishery products of all EU countries,
Q_{EU} – the value of production of agriculture, forestry and fishery sector in all EU countries.

The values of variables (Xj, j = 1,2, …, m) describing the studied objects (EU countries) (Oi, i = 1,2,…, n) are presented as a matrix of observations in the following form:

$$X = \begin{bmatrix} x_{11} & \cdots & x_{1m} \\ \vdots & \ddots & \vdots \\ x_{n1} & \cdots & x_{nm} \end{bmatrix}$$

for example, x_{12} – means the value of indicator x_2 (employment in agriculture) in country 1 (Austria).

Since the set of specific indicators contained variables that could not be directly aggregated (different units of measure), they were standardised using zero unitarization for stimulants [Kukuła, 2000; Kijek, 2013; Fura, Stec, Miś, 2020]:

$$z_{ij} = \frac{x_{ij} - \min(x_{ij})_i}{\max(x_{ij})_i - \min(x_{ij})_i}$$

where:

z_{ij} – the normalised value of the *j*-th variable in the *i*-th country,
x_{ij} – the initial value of the *j*-th variable in the *i*-th country,
min $(x_{ij})_i$ is the minimum value of x_{ij},
max $(x_{ij})_i$ is the maximum value of x_{ij}.

This method is the only one to satisfy all seven postulates regarding the variables standardisation procedure [Jarocka, 2015]. After scaling, all z_{ij} values fell into the [0;1] range and were deprived of units; thus, they could be added and compared. Values closer to 1 mean that the specific variable (indicator) is better and – by contrast – values closer to 0 mean that the specific indicator is worse, so the *CI* for the given country is lower.

At a subsequent stage of analyses, the medians and standard deviations for the standardised values of specific indicators were calculated for each country [Kasztelan, Nowak, 2021]:

$$Me_i = \frac{z_{\left(\frac{m}{2}\right)i} + z_{\left(\frac{m}{2}+1\right)i}}{2}$$

for an even number of observations (m), or:

$$Me_i = z_{\left(\frac{m}{2}+1\right)i}$$

for an odd number of observations (m), where:
$z_{i(j)}$ is the *j*-th statistical ordinal for the vector
$(z_{i1}, z_{i2}, \ldots, z_{im})$, $i = 1, 2, \ldots, n$; $j = 1, 2, \ldots, m$

$$Se_i = \sqrt{\frac{1}{m}\sum_{j=1}^{m}(z_{ij} - \overline{z})}$$

where:
$\overline{z}$ is the mean value for z_{ij}

In the last step, based on the following formula (6), the competitive position indices (CI_i) of the agricultural sector were calculated for each of the EU member states in 2004 and 2018:

$$CI_i = Me_i(1 - Se_i)$$

The values of *CI* closer to 1 imply a relatively higher competitiveness of the agricultural sector of the specific country. Estimated synthetic measures made it possible to conduct a comparative analysis of the EU countries in the analysed years and evaluate changes that occurred in 2018 in comparison to the base year. It was also possible to assign respective countries to four groups featuring a similar competitive potential of the agricultural sector, using the following key:

group I: $CI_i \geq \overline{CI} + S$ high level,

group II: $\overline{CI} + S > CI_i \geq \overline{CI}$ medium–high level,
group III: $\overline{CI} > CI_i \geq \overline{CI} - S$ medium–low level,
group IV: $CI_i < \overline{CI} - S$ low level,

where $\overline{CI}$ is the mean value of competitiveness indices for 27 member states and S denotes the standard deviation of such indices.

The results of the linear ordering of the EU countries in 2004 and 2018 are discussed in detail in the following section of this study.

3. Results and Discussion

The competitiveness indices (*CI*) calculated for 27 member states of the European Union in 2004 and in 2018 are presented in Figure 1 and in Table 2. The shades used in the chart illustrate allocation of the EU countries to four groups featuring different levels of competitiveness of their agricultural sectors.

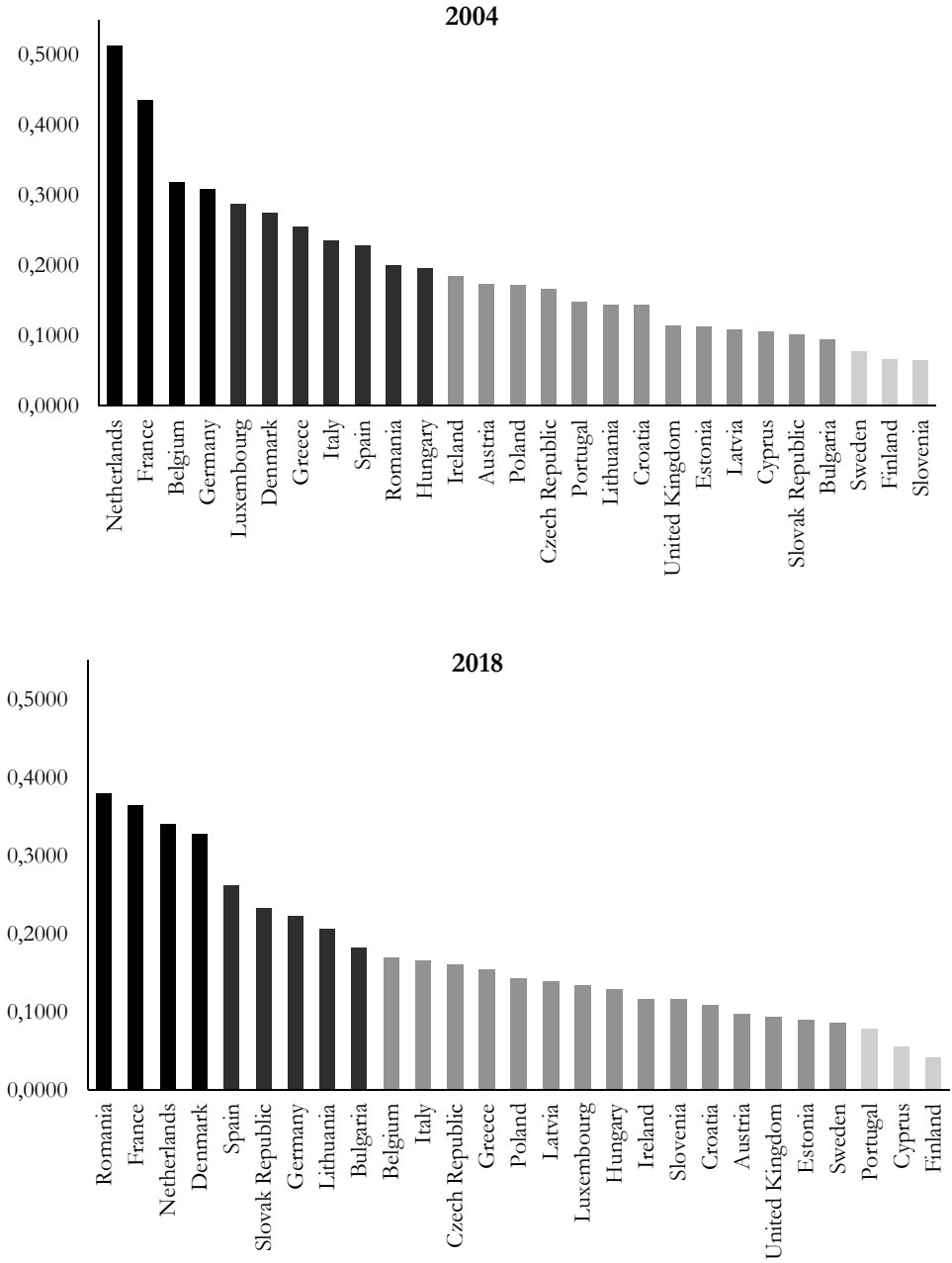
The average *CI* in 2018 for all the analysed countries was 0.1701, and in the base year it was 0.1942, which means that in the analysed years the general competitiveness level of agricultural sectors in the EU member states declined. Considering the possible range of *CI* (0,1), this level was very low in both analysed years. Standard deviations of the indices for the EU member states (0.0922 in 2018 and 0.1076 in 2004) testify that the competitiveness of the analysed branches varies from country to country.

In 2018, the highest *CI* was recorded in Romania (0.3792), and the lowest in Finland (0.0409). In 2004, the Netherlands did the best – 0.5134, and the lowest ranked country was Slovenia (0.0656).

The analysis of the four groups of countries shows that, in 2018, Group I – featuring the highest level of competitiveness of the agricultural sectors – consisted of four member states, that is: Romania, France, the Netherlands and Denmark. In comparison to 2004, no change in quantity occurred. The first top positions were the Netherlands, France, Belgium and Germany. Group IV, including countries with the lowest *CIs*, in 2018 consisted of Portugal, Cyprus and Finland. In 2004, these were Sweden, Finland and Slovenia. It should be emphasised that in the analysed years the number of countries in group III, featuring average low competitive levels, increased (from 13 in 2004 to 15 in 2018). At the same time, this change decreased the number of countries with average high competitiveness levels, classified in group II.

FIGURE 1

The EU countries ranking based on *CI* in 2004 and 2018



Source: own calculation.

TABLE 2

Competitiveness of agricultural sectors in the EU countries

EU countries	2004		2018		Ranking change 2004 vs. 2018
	CI level (Group)	EU countries ranking	CI level (Group)	EU countries ranking	
Austria	III	13	III	21	-8
Belgium	I	3	III	10	-7
Bulgaria	III	24	II	9	**+15**
Croatia	III	18	III	20	-2
Cyprus	III	22	IV	26	-4
Czech Republic	III	15	III	12	+3
Denmark	II	6	I	4	+2
Estonia	III	20	III	23	-3
Finland	IV	26	**IV**	**27**	-1
France	I	2	I	2	0
Germany	I	4	II	7	-3
Greece	II	7	III	13	-6
Hungary	II	11	III	17	-6
Ireland	III	12	III	18	-6
Italy	II	8	III	11	-3
Latvia	III	21	III	15	+6
Lithuania	III	17	II	8	+9
Luxembourg	II	5	III	16	**-11**
Netherlands	**I**	**1**	I	3	-2
Poland	III	14	III	14	0
Portugal	III	16	IV	25	-9
Romania	II	10	**I**	**1**	+9
Slovak Republic	III	23	II	6	**+17**
Slovenia	**IV**	**27**	III	19	+8
Spain	II	9	II	5	+4
Sweden	IV	25	III	24	+1
United Kingdom	III	19	III	22	-3

Source: own elaboration.

In the ranking of the EU countries, only 10 moved up in the study years and 15 – moved down, while two countries maintained their *status quo* (Table 2). The highest advancement in the ranking was noted for Slovakia (+17 ranks) and Bulgaria (+15). By contrast, Luxembourg recorded the largest drop (-11).

Which factors decreased the general competitiveness level of agricultural sectors of the EU countries? A deeper analysis of mean values of the synthetic measures of

detailed indicators in the study years leads to a conclusion that these values decreased for 7 of them (77.8%). Negative changes mostly referred to indicators such as:

- the use of fertilisers: 0.3423 in 2004 vs. 0.1037 in 2018 (-70%);
- relative export orientation (REO): 0.2257 vs. 0.1080 (-52%);
- arable land: 0.4078 vs. 0.3417 (-16%);
- employment in agriculture: 0.2119 vs. 0.1813 (-14%);

For several years we have observed a greening trend in European agriculture, manifested in the decreasing us of fertilisers and other chemicals used for protecting plants against pests and diseases, and increasing the area in which green agriculture is practised. Since MacSharry's reform a shift from the quantity orientation towards quality orientation can be observed in the European agriculture, which is associated with the growing demand for sustainable food. Recently, this trend has become very intensive, which is reflected in the so-called European Green Deal [European Commission, 2019].

The European Union is the largest exporter and importer of agri-food products featuring a positive balance of trade (excluding intracommunity trade), but a clear decline can be observed in the export orientation measured by REO. The growing internal demand of the EU countries for varied, high-quality food, and the increasing requirement for many products from a temperate climate zone, also outside the season, contributes to an increase in the share of imports in consumption for most of the EU countries. Some countries, such as the United Kingdom, have always featured a high share of import in consumption. The UK is a net importer [*Brexit: How might UK...*, 2019]. According to the Report of the European Commission, the United Kingdom, Germany, Italy and Spain are the largest importers of agri-food products [European Commission, 2009]. Major exporters of agricultural products in the EU are: the Netherlands, Spain, France, Belgium, Italy, and Germany. The total share of these countries in the EU's overall export of agricultural products was 76% in 2011. As regards food products, Germany ranked first, accounting for 18.8% [Carraresi, Banterle, 2015].

In many regions of the world agricultural abandonment is an important land use process and a dominant process of the change in the use of land in Europe [Zanden et al., 2017]. Studies concerning agricultural abandonment in the EU showthat this process occurs mainly in less productive, remote and mountainous areaswith advanced soil erosion and in areas with an unfavourable climate for agriculture [Rey Benayas et al., 2007]. Secondary factors leading to agricultural abandonment include depopulation of rural areas and specific regional factors related to land ownership and taxation systems [Keenleyside, Tucker, 2010]. Agricultural land is often abandoned in areas where the productivity of land does not provide farmers with adequate income. Even with the use of grants such as support for less favoured areas (LFA) and agri-environmental payments being apart of the rural areas development pillar under the Common Agricultural Policy (CAP), agriculture in those areas is often uncompetitive [Renwick et al., 2013].

The decreasing share of employment in agriculture should be associated with the high (the Netherlands) and still increasing productivity of agriculture, in particular in

countries such as Germany, France and Denmark. Countries admitted to the EU after 2004 also noted a fixed increase in productivity associated with the movement of workers from the agricultural to the industry and services sector. The studies corroborated the convergence of productivity in Central and Eastern Europe with reference to the so-called EU-15 [Kijek et al., 2019].

The results should be compared with previous studies in that area. However, it should be highlighted that many studies contain separate analyses devoted to the resource potential of the agricultural sector in countries of the European Union, performance of this sector measured as productivity and efficiency and the position of the respective EU member states in international agricultural trade. Some authors seek relations between respective competitiveness components [Figiel, Kufel, 2013; Jarosz-Angowska, 2018]. Their studies support the thesis that productivity is a basic factor for building competitive advantage in agricultural trade. Correlations between export competitiveness and use of land for certain agricultural products were found by studies concerning the competitive position in trade in Romania [Popescu et al., 2017].

High competitiveness of countries such as the Netherlands and France is irrefutable and supported by many studies, irrespective of how it is measured [Wijnands, Verhoog, 2016; Cheptea, Huchet, 2018]. Also Denmark, Germany, and Belgium are highly competitive countries. For Belgium, the *CI* designed in this study points to a considerable decrease in competitiveness, which is also corroborated by studies conducted by Rumankova et al. [2022].

A relatively low competitiveness of the United Kingdom, Ireland, Sweden, Finland and Austria, demonstrated using the *CI* designed in this study, mainly stems from the design of the partial indicators employed in designing the synthetic index, namely: the percentage of arable land in the total area of the country and the share of employment in agriculture in overall employment, as well as a considerable share of import in internal consumption. The above-indicated countries, given small land resources and a small share of employment in agriculture, are characterised by very high productivity and the agri-food industry is a prosperous branch of production with a high level of research and development investment and expenditure. Sweden has a considerable share of export of agricultural products in its total export. The Swedish agricultural sector employs about 5000 workers [Trivan et al., 2018]. According to some researchers who emphasize the high competitiveness of the Swedish agricultural sector [Ferro, Otsuki, Wilson, 2015], this is a result of innovation and increasing R&D investment. According to the US Department of Commerce, in the United Kingdom the agri-food sector is also the most prospective industrial sector [www 2]. Considerable tax incentives for the development of innovation made Ireland the main country investing in the agricultural sector. Seven out of ten of the largest agricultural corporations are based in Ireland [Trivan et al., 2018].

Spain ranks best in Southern Europe. Its ranking improved from number 9 to 5. The agri-food industry significantly contributes to the added value of the whole Spanish economy (about 3%). Employment in the agri-food industry in Spain has

increased continually over the past few years and accounts for about 19% of employment in the whole industrial production [Montoriol-Garriga, 2019]. Other South European countries (Italy, Greece, and Portugal) do not perform that well, judging by the index designed in this study. Italy and Greece moved from group II to III, and Portugal – from III to IV. Their competitiveness, measured with the competitiveness index (*CI)*, has materially declined compared to other EU countries. Italy is a net importer of agricultural products. The agri-food sector in that country, similarly to Greece and Portugal, is extremely fragmented. In these countries, traditional food production is of huge importance, and they have local systems for agri-food production [Mantino, 2014].

Among the countries of Central and Eastern Europe, Bulgaria, Romania, Slovenia, Slovakia, the Czech Republic, Lithuania and Latvia improved their position. By contrast, Hungary, Estonia and Croatia experienced a drop in the ranking. The expansion of the EU in and after 2004 exerted pressure on the new member states to increase their competitiveness. The possibilities of export to the common market increased, which countries like Poland took advantage of. By contrast, the Czech Republic, Croatia, Slovenia and Slovakia became net importers of agri-food products from the EU market [Bielik, Qineti, 2009; Bojnec, Ferto, 2009]. Many countries of Central and Eastern Europe, for example Poland, rank high in the international trade of agri-food products and successfully sell their products on foreign markets [Kita, Adenauer, 2015; Kasztelan et al., 2021] despite a low level of competitiveness measured by the *CI* designed in this study (group III, rank 14), which can imply that this country has a competitive potential. Romania, having moved from group III to a leading position between 2004 and 2018 despite its poor performance in international trade, deserves attention. This suggests that the huge competitive potential of that country was used, mainly to improve management efficiency, as mentioned by Andrei [Andrei et al., 2020] in his competitiveness studies.

4. Conclusions

The evaluation of competitiveness of selected sectors of the economy, and particularly the possibility of comparing the results of such evaluation at an international level, is a complex issue that requires the application of advanced methods. This paper proposes the use of multi-faceted analysis based on intentionally selected, multi-criteria indicators in order to design synthetic competitiveness indices for the agricultural sectors of the EU member states.

The added value of the study is the developed method for evaluating the competitiveness of a specific sector of the economy. The analysis of the agricultural sector performed in this article using a comprehensive index is a new approach that had not been employed before. This allowed classifying the countries of the European Union according to both their resources and performance in production and trade in the agricultural sector and comparing the positions they occupied in 2004 and in 2018.

The informational value of the CI should enhance integration and actions such as monitoring, planning and implementing measures to improve the competitiveness of the agri-food sectors in the member states of the EU. Based on the identification, analysis and improvement of factors directly responsible for competitiveness, appropriate corrective measures can be initiated.

In response to research questions formulated in this work, it should be concluded that compared to the base year, in 2018 the general level of competitiveness of the agricultural sector in the member states of the EU declined. Moreover, considering a possible range of CI (0,1), this level should be deemed very low in both analysed years. In response to the second question, among the 27 member states, relatively high levels of competitiveness of the agricultural sector were recorded in Romania, France, the Netherlands and Denmark. In contrast, Portugal, Cyprus and Finland scored lowest.

The results of the surveys should contribute to redefining certain assumptions of the European competitiveness policy and the Common Agricultural Policy. Ultimately, specific measures should focus on: supporting green agriculture and production of high-quality food, improving the productivity of agriculture, allowing low-income earners leaving employment in agriculture for employment in services and production sectors related to agriculture (e.g., promoting tourism, conservation of rural heritage, biodiversity and rural landscape), and increasing expenditure on research and development in the agri-food industry.

The analyses were subject to certain limitations that somehow open a way to future directions of research. First of all, the index was designed based on nine indicators, despite initially identifying 12 indicators for evaluating the competitiveness of the agricultural sector. This was due to the existing information gap in reporting this data by certain countries of the European Union. Secondly, the last available data concerning most of the detailed indicators came from 2018, so it was impossible to establish what changes occurred in 2019–2021. At that time, the EU member states faced exceptional challenges – mostly related to the need for fighting the COVID-19 pandemic. Without any doubt, these phenomena had a crucial impact on the competitiveness of the agricultural sectors in the countries of the European Union. Thirdly, an interesting line of future studies can be the evaluation of the competitive position of the agricultural sector in other parts of the world in order to compare the results with those of the EU countries.

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