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Review

Agri-Food Trade Competitiveness: A Review of the Literature

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Abstract: Being competitive in the international agri-food trade is an important aim of every country. It should be noted that this term has neither a commonly accepted definition nor a synthetized index to quantify it. The most commonly used indices in the international literature are the Balassa index and its modified versions (revealed trade advantage, revealed competitiveness, normalized revealed comparative advantage, and revealed symmetric comparative advantage) and different export and/or import-related indices (e.g., the Grubel–Lloyd index or the trade balance index). Based on a systematic review of the literature, these measurements were identified along with the major factors suggested for higher agri-food trade competitiveness. It seems that supportive legislation and/or (trade) policy is the most crucial factor, followed by higher value-added/more sophisticated goods, and high, efficient, and profitable production. Although the EU and its member states were overrepresented in the analyzed literature, the candidate countries, as well as other important trading partners of the EU, e.g., Canada, China, or the ASEAN countries, were also analyzed. Thus, some of these findings may be generalized.

Keywords: agri-food trade; competitiveness; raw material; processed product

1. Introduction

Competitiveness is a key element of the market economy regardless of the sector concerned. The term itself has undergone significant changes but there is still not a commonly accepted definition or synthetized index. Adam Smith's absolute advantage (cheaper production) was one of the first abstractions, followed by Ricardo's comparative advantage (price and cost differences), and the term was then finetuned by Heckscher and Ohlin based on efficiency [1]. Related to them, Balassa provided the theoretical background of comparative advantages, as well as the empirical verification of it [2]. The revealed comparative advantage (RCA), or simply Balassa, index is regularly used by researchers all over the world (Abbreviations contains the main abbreviations used in the text). As Cho and Moon [3] described in their book, Smith set up the trade theory where wealth was based on endowments, while Porter set up the competitiveness theory where wealth is created by choices. According to them, both theories involved the same steps, extension, and debate, which finally led to the national competitiveness report as a measurement of competitiveness. From this aspect, the Balassa index helps to combine international trade theories with competitiveness by using trade data for calculating revealed comparative advantages [4]. This index compares the national export share of a given product to the international export share of the same product in the reference group. When the RCA is above 1, the revealed comparative advantage is noted, while a value below 1 suggests a comparative disadvantage. Basically, the Balassa index transforms trade performance into competitiveness [5].

As competitiveness is one of the most frequently used words in international economics, a proper understanding of its meaning still represents an important research challenge. It can be differentiated between macro (regional or country level) and micro (firm level) level competitiveness. At the macro level, effectiveness and/or positive trade

balance are important, while at the micro level, profitability is key. Macro level competitiveness can also be measured by composite indices such as the IMD World Competitiveness Yearbook or the Global Competitiveness Report published by the World Economic Forum. Both use hundreds of indicators to set up country rankings and profiles. However, they concentrate on the whole economy and not on the agri-food sector itself. Micro level analyses require micro level data that are generally hard to collect and even harder to build a database for comparisons.

Regarding the agri-food sector, the RCA (and its variations such as relative trade advantage or revealed competitiveness) is a commonly used tool in competitiveness-related studies. In addition to the RCA index, Domestic Resource Cost (DRC), which is domestic resource cost divided by value added on border/reference price, is also a frequently used tool [6]. Similar to the RCA index, a value above 1 suggests world level competitiveness. As well as this, the index also has other variations (Bilateral Resource Cost (BRC) and Private Cost Ratio (PCR)). Moreover, the total factor productivity [7] and the operational competitiveness rating [8] should be mentioned.

Countries can be competitive in many ways. In the case of certain products, price competition dominates, while other products have nonprice competitiveness [9]. The latter is often called quality competitiveness. There is a consensus in the literature about the most important factors of competitiveness:

- competitive countries are generally productive ones as well, implying that these terms are positively related [10–12];
- products with higher value added (e.g., semi-processed or process goods) are generally more competitive and have higher revealed comparative advantages [10,13,14];
- the more export-oriented a country is, the more likely it is to preserve its competitive position [15–17].

Since 2010, the global agri-food trade fluctuated between USD 14.2 (2010) and 18.0 (2018) billion per year and its share reached almost 10% of the global trade in 2020 [18]. The size of this market highlights the importance of being competitive; therefore, earning higher export revenues. The distribution of export and import is somewhat similar as the first three regions in terms of value are the same: Europe–Central Asia, East Asia–Pacific, and North America (Figure 1). This regional classification follows the system of the World Bank's World Integrated Trade Solution (WITS). Another remarkable piece of information from the figure is the trade balance of these regions. Latin America is the most significant net exporter of agri-food products (USD +123 billion), while East Asia–Pacific is the most significant net importer among the regions with a USD 115 billion trade deficit. Besides Latin America, Europe–Central Asia, South Asia, and Sub-Saharan Africa have a trade surplus; all the other regions were net importers of agri-food products in 2020.

The major aim of this article is to identify the most important factors of the competitive agri-food trade. Based on the properly selected international literature, it gives an overview of the applied methodologies, major results, and the identified success factors in the international agri-food trade. The article also aims to cover a wide range of agri-food related issues, especially the differences in measurements at regional and/or country and product level.

The paper is structured as follows. The introduction is followed by a description of materials and methods. The third part gives a structured overview of the measurements of agri-food competitiveness divided into two categories: country or regional level analyses and product level analyses. The final part contains the summary and conclusions.
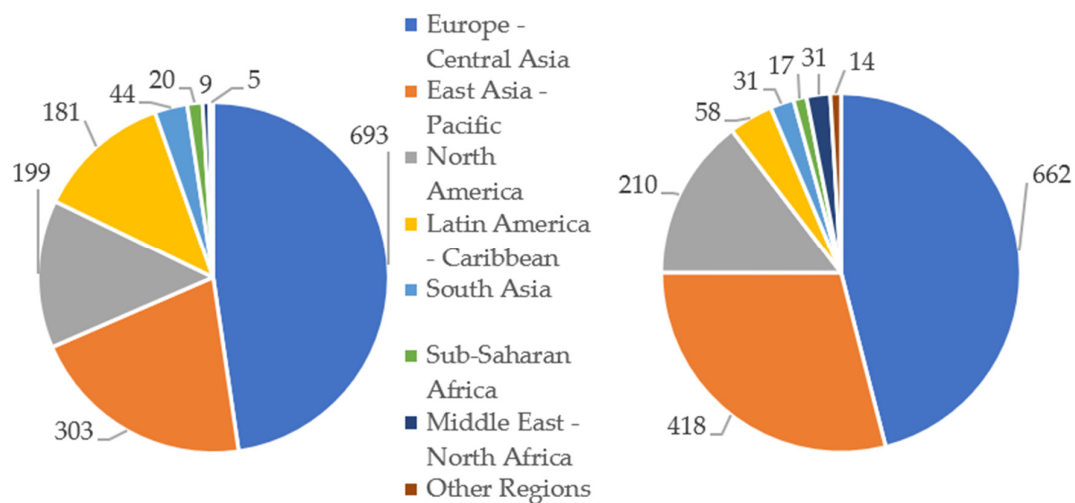
Figure 1. World exports (**left side**) and imports (**right side**) by region in USD billion. Source: Author's composition based on data in [18].

2. Materials and Methods

For the selection procedure, the Scopus and Web of Science (WoS) databases were searched. The keywords of the selection were agri-food, trade, and competitiveness with the Boolean operator AND between them. In order to obtain high quality articles, the selection was restricted to scientific and review articles. Besides the English language, no other restrictions were applied for the selection, e.g., there was no restriction on the date of publication. For the selection procedure, the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) method was used [19]. A total of 79 articles were identified in the Web of Science, while the Scopus database provided 56 potential articles. At the screening stage, 35 duplications and 36 non-relevant records were sorted out. The common characteristic of the non-relevant records was the lack of a proper analysis of one of the keywords. Most of them concentrated on different policy issues and sustainability. Although the language was restricted to English, 6 articles had only their abstracts in English. This resulted in 64 articles for the eligibility stage. By assessing their full texts, 13 more articles were excluded due to the following reasons:

- Eight contained only a trade analysis;
- Two contained a theoretical analysis;
- One had a pure agricultural policy analysis;
- One had a self-sufficiency analysis;
- One presented only the barriers in agri-food exports.

Figure 2 gives an overview of the article selection process.

The most frequent year was 2019 when 7 articles were published followed by 6 articles in 2018. The most frequent journal was the Agricultural Economics published in the Czech Republic with 8 articles. This was followed by the Bulgarian Journal of Agricultural Science (4) and Agris On-line Papers in Economics and Informatics (3). A total of 2 articles were published in the British Food Journal, Ekonomika Poljoprivreda-Economics of Agriculture, Post-Communist Economies, Studies in Agricultural Economics, Scientific Papers-Series Management Economic Engineering in Agriculture and Rural Development, and Sustainability. The remaining 24 articles were published in 24 different journals.
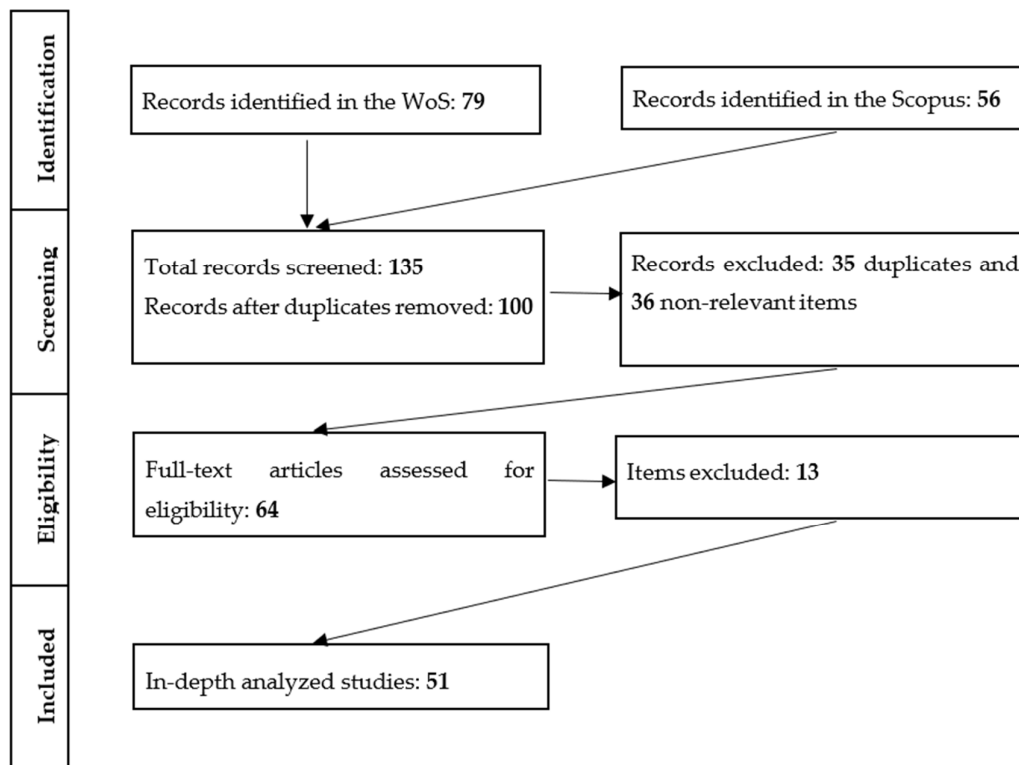
Figure 2. The article selection process.

3. Measurements of Agri-Food Competitiveness

Basically, there were two types of articles that dealt with the measurements of agri-food competitiveness. Although both were based on product groups, some of them focused on a region or a country, while the others gave an overview of the international market of one agri-food product. The next two subsections are organized by this characteristic.

3.1. Regional and Country-Level Analyses

A frequently analyzed issue in the literature was the impact analysis of the EU accession. Antimiani et al. [20] applied the PRODY index which combines the RCA with the per capita GDP of the given country. They analyzed one period before the accession (1996–1997) and another one after that (2006–2007). They pointed out that the higher share of sophisticated (higher value-added) agri-food products resulted in a higher trade competitiveness in the case of Poland and the Czech Republic, while Bulgaria, Hungary, and Romania performed worse. Bojnec and Fertő [21] analyzed 23 countries accounting for 60% of the global agri-food trade. Surprisingly, they found out that economic development, a (higher) share of agricultural employment, and differentiated agri-food products had no significant positive impact on comparative advantages. Moreover, this was the same with the global economic crisis which was measured by a dummy variable. On the contrary, agricultural land abundance, agricultural support, and export diversification reduced the likelihood of failure and of losing comparative advantages between 2000 and 2011. Bojnec and Fertő also carried out a similar analysis on the EU member states where the Netherlands, France, and Spain were the most successful nations in terms of comparative advantages [11]. According to their results, the accession has not increased the EU's overall agri-food export competitiveness. The authors' two main explanations were the relatively short time period after the accession, i.e., the new member states need more time to catch up, and the export structure of the EU, i.e., the most competitive products do not represent a significant share of their export. However, when Bojnec and Fertő analyzed the duration of comparative advantage of the EU's agri-food exports, they found that not only population and GDP

per capita but also the enlargement of EU positively influenced this duration, while the contribution of the new member states to the EU's export competitiveness was larger than that of the old member states [15]. This process was supported by the higher economies of scale of the specialized products. Not surprisingly, higher trade costs negatively impacted the duration of international competitiveness [15]. By using the export market share (EMS) and different RCA indices, Carraresi and Banterle [22] found that Germany and the Netherlands were the largest beneficiaries of the enlargement, while France experienced decreasing competitiveness. They also noted that competitive performance and export specialization are interlinked, although a high EMS does not necessarily mean high RCA values. Similar to Bojnec and Fertő [15], they also pointed out that the new member states profited from the accession too, especially their agriculture sectors.

In addition to the EU accession, the global financial crisis in 2008 also significantly impacted the EU's agri-food trade. Based on the normalized revealed comparative advantage index (NRCA), Bojnec and Fertő [14] pointed out that the economic crisis negatively influenced the duration of the comparative advantage of the EU-28's agri-food trade. However, this negative impact was significantly smaller for the differentiated products. By applying the revealed competitiveness index, Crescimanno et al. [23] analyzed the competitiveness of France, Italy, Spain, and Turkey and paid special attention to the global financial crisis. The agri-food sector itself turned out to be crisis resistant. Turkey had the highest competitiveness among the analyzed countries which only slightly decreased after the crisis. This is partly explained by the country's lower structural dependence on foreign markets. In general, competitive sub-sectors performed well, while uncompetitive sub-sectors faced large disadvantages. The key factors of competitiveness are agri-food production, prices, incomes, and food consumption.

By calculating price and quality competition, Bojnec and Fertő [24] concluded that the majority of the EU's agri-food trade shows successful competition, and quality is even more significant than price. This implicates the export of higher value-added products, particularly in the case of the Netherlands (old member state) and Poland (new member state). It should also be noted that the duration of the competitive performance is generally longer for the old member states compared to the new member states [25].

Not only the EU but its member states' agri-food trade was also frequently analyzed. Huan-Niemi et al. [26] applied the Global Trade Analysis Project (GTAP), a general equilibrium model, and the Delphi method to evaluate the impacts of policy changes on the competitiveness of the Finnish agri-food sector. In the case of less or no CAP subsidies, Finnish agriculture would suffer a huge decline in its competitiveness, especially in the beef sector. The major production problems they identified were high land prices and high support dependency of the farms. They also noted that lower subsidies would result in lower land prices that would make entering this market easier for new entrants. By using the RCA and the export similarity indices, Majkovic et al. [27] analyzed the Slovenian agri-food export trade and noted that Slovenia has experienced decreasing competitiveness compared to the other nine new member states that accessed the EU in 2004. Similar results were found when they applied an intra-industry trade (IIT) analysis [28]. Based on those results, the best option to increase the competitiveness of the Slovenian agri-food sector in the competitive single market would be higher product quality. This can be based on human, physical, and technological capital. Majkovic et al. [29] also found decreasing quality and price competitiveness in the Slovenian agri-food trade on the Croatian market. By using the revealed symmetric comparative advantage (RSCA) and the trade balance index (TBI), Smutka et al. [30] found that the Czech agri-food sector has a higher competitiveness on the European markets (EU-28, the other European countries, and the Commonwealth of Independent States (CIS)) compared to the other countries. The major problem they identified was the low value-added products. Stankaitytė [31] used the international competitiveness index (LIIC) and found that Lithuanian dairy products are competitive on the EU markets, and they have shown an increasing trend. When this was applied to the third countries' markets, however, it differed from country to country, e.g.,

it dropped remarkably on the Russian markets due to the import ban. Szczepaniak [32] applied the Grubel–Lloyd (GL) index to analyze the competitiveness of the Polish food sector. According to her findings, the Polish agri-food sector performed competitively during the analyzed period (2001–2011), especially after the EU accession. The major source of the country's competitiveness is the intense intra-industry trade driven by the high demand of the common market, the economies of scale resulting from specialization, and the increasing purchasing power of Polish consumers. The same results were received for the period of 2004–2017 when the RCA and the TBI were used [33]. Their increasing values indicated the increasing competitiveness of the Polish agri-food products on the international markets. This process is led by the appropriate transformations of the sector. By applying the RCA index, Ubrežiová et al. [34] found worsening competitiveness in the Slovak agri-food sector. They suggested modernization, investments into the production factors, and the reform of the national legislation to lower administrative burdens and to improve market access. As Mirela [35] pointed out, the underdeveloped processing industry is one of the major bottlenecks of the Romanian agri-food sector too, which results in a low unit value index (UVI). This means the exportation of raw materials and the importation of processed goods with high value added. Measuring the competitiveness of the Hungarian agri-food sector in the '90s with Balassa indices, Fertő and Hubbard [36] revealed comparative advantages for 22 product groups, although they discovered a slight decrease over the analyzed years. Government interventions have an important role in this process; however, they are inversely related to competitiveness, as it is not always the most competitive sectors that are the major beneficiaries of the different supports. By applying the constant market share analysis, Juhász and Wagner [37] examined the competitiveness of the Hungarian agri-food export. According to their results, cereals, oilseeds, and poultry are the most important and competitive export products. The major problem they identified was the Hungarian transport infrastructure, which is much weaker than its competitors.

Country-level comparisons between the EU or one of its member states and one or some of its trading partners were also of importance. Qineti et al. [38] analyzed the Slovak and the EU agri-food trade with Russia and Ukraine. They found that the EU has lost its competitiveness on these markets since the enlargement, while Slovakia performed the same on the Russian market but slightly increased its position on the Ukrainian market. Verter et al. [39] examined the agri-food trade between the EU-28 and Nigeria. Most of the Nigerian products had either no comparative advantage or they showed a decreasing trend. Their proposals were the promotion of agri-food value chains and a more protective trade policy to increase self-sufficiency. Zdráhal et al. [40] used a product mapping tool to assess South Africa's agri-food trade with the EU. South Africa turned out to be more competitive on the African markets compared to the EU-28 market. The African export trade is more diversified and provides opportunities for those players that are not competitive on the EU markets. They also identified the improved production and export of higher value-added products as key factors of competitiveness. Measuring competitiveness with the Constant Market Share (CMS) model, Guo et al. [41] distinguished short and long-term impacts. Both the CAP reform in Germany (1999) and the WTO accession in China (2001) caused negative short-term impacts in the Germany–China relationship; however, there were positive long-term impacts on their agri-food trade. They emphasized the influence of exchange rate changes on competitiveness.

The EU plays a pull role in the market for other countries' agri-food trade. Coretchi and Gribincea [42] linked competitiveness to low productivity and economic growth. In the case of Moldova, they emphasized organic production and higher product quality as solutions. Based on different Balassa indices and the GL index for intra industry trade analysis, the Moldavian agri-food sector had competitive products, although two-thirds of them were raw materials. The sector is hindered by low state support and the lack of long-term financial resources [43]. Therefore, Cimpoies [43] highlighted the need for complex reform that could provide a stable political environment. As export competitiveness is related to production, different support programs, investments, and high-quality products

would be essential. Senyshyn et al. [44] suggested lots of different measures to increase the competitiveness of the Ukrainian agri-food sector, for example, a broader export commodity structure, strict quality and food security management, international marketing, a higher compliance with international standards, information sharing, and cooperation.

Markovic et al. [45] analyzed the Serbian agri-food export to the EU with the net trade (NTI) and the GL indices. In general, they found that the Serbian agri-food sector is competitive; however, its values are low and decreasing. Instead of concentrating on quantity, they proposed export restructuring and product differentation. Based on their results, they suggested further exports of fruits and vegetables as the best example of quality competitiveness. Besides product quality, processing would also be important. Matkovski et al. [46] also pointed out the revealed comparative advantages of the Serbian agri-food products, although the majority of these products are raw materials or minimally processed goods, e.g., Serbia's major export product is cereals. Trade agreements with the EU and the CEFTA (Central European Free Trade Agreement) countries significantly helped a further expansion of the export trade. They highlighted that the sector's performance depends on its ability to respond to the demand of these foreign markets, especially in terms of product security and quality. Based on Matkovski et al.'s study [47], the export of cereals is particularly important in the Vojvodina region. They also added that there is a lower competitive pressure, i.e., quality and quantity, on the CEFTA markets that also makes them important. Having a higher competitiveness requires significant actions, such as innovations, knowledge transfer, and investments into the processing phase of agricultural products. Matkovski et al. [48] identified the competitiveness of South-East Europe as a policy challenge, which is an even larger problem for those countries that are advanced in the integration process with the EU. Remarkable steps should be taken in the fields of cooperation and infrastructure (transport, storage, finance, institutions, etc.).

Ignjatijevic et al. [49] analyzed a "mixed" region where EU member states and candidate countries were also involved. With the Balassa, the Lafay (LFI), and the GL indices, they analyzed the trade competitiveness of the Danube region. They noted that the RCA values increased for most of those countries that had comparative advantages at the beginning of the analyzed period. They highlighted the importance of cooperation (cost-efficient production, quality standards, common transportation channels, etc.). This requires not only legal but also monetary measures.

Other parts of the world were also analyzed with similar methodological tools. The case of the Association of Southeast Asian Nations (ASEAN) countries showed that productivity is only one potential source of competitiveness, but not an exclusive one [4]. A lack of adequate processing capacities seems to be a common barrier to higher competitiveness, as not only the ASEAN but also the CIS suffer from this [4,13]. However, these country groups show a common characteristic: significant agri-food producers have higher comparative advantages and a better trade performance [13,50].

Chen et al. [51] used the CMS to investigate China's export competitiveness and found that trade policy reforms may lead to decreasing agri-food export competitiveness. However, it is not always easy to separate the impacts of other changes, e.g., world and regional demand. Xue and Revell [52] analyzed China's vegetable sector with the export specialization index (XSP). Most of the Chinese foreign markets are price sensitive; therefore, efficient and cost-effective logistics are extremely important. This seems to be the basis of competitiveness, especially in the absence of economies of scale.

In addition to the RCA and the NRCA, Sarker and Ratnasena [53] applied the Heckscher–Ohlin–Vanek (H–O–V) model to analyze the competitiveness of the Canadian wheat, beef, and pork sectors. They received interesting results. While wheat was internationally competitive during the whole analyzed period, pork was not. The North American Free Trade Agreement (NAFTA) improved the performance of the beef sector rapidly, but this was turned over due to the bovine spongiform encephalopathy (BSE). Since that, this sector has not been able to fully recover. Regarding the major influencing factor of trade competitiveness, the authors identified the following items:

- Seed cost and the Western Grain Stabilization Act had a significant negative impact on the competitiveness of the wheat sector, while the Western Grain Transportation Act had a positive impact. This implies that different policy measures may have completely different impacts;
- Meat processing costs negatively impacted both the pork and the beef sectors;
- The decoupled safety net program and the National Tri-Partite Stabilization Program favored the beef sector but had a negligible impact on the pork sector;
- Unlike the beef sector, the Canada–US exchange rate negatively impacted the wheat and pork sectors.

Fertő [10] carried out a global agri-food trade competitiveness analysis. He distinguished between gross and value-added exports and measured competitiveness with the NRCA index. One of his results was the difference between the two NRCA rankings. In the case of agriculture, China had the highest value for gross exports but the lowest one for value-added exports. Regarding value-added exports, Brazil performed the best. The NRCA values for the food sector were generally higher with Brazil (gross export) and Thailand (value-added export) at the top.

3.2. Product-Level Analyses

Due to the accession, Benus et al. [54] noted that the Slovak producers faced increased rivalry on the common European market and their competitiveness declined significantly in the case of the spirit industry. Only liqueurs and cordials products were able to increase their competitiveness, while vodka products could keep some of theirs from 2004 to 2018, based on their Balassa type indices. Benus [55] also used Balassa-type indices to analyze the Czech meat industry. Fresh, chilled, or frozen poultry meat performed the best, although every index indicated a decreasing trend, especially after the accession. In contrast, the meat of bovine animals (fresh or chilled) had no relative export advantage at the beginning of the analyzed period, but all their indices showed an increasing trend. The author also highlighted that the competitiveness of the meat industry is closely related to the profitability of the livestock farms.

Balogh and Jámbor [16] analyzed the European cheese market and found that factor endowments measured by GDP per capita, the protected designation of origin (PDO), and the EU accession positively influenced trade competitiveness by leading to higher RCA values. However, the impact of foreign direct investment turned out to be negative because most of the cheese producer companies are in national hands. At the country level, the Netherlands, Denmark, Cyprus, and Luxemburg are the most competitive cheese producers in the EU [56]. Based on different Balassa indices and the unit value difference (UVD), Török and Jámbor [57] analyzed the competitiveness of fruit spirits labelled with geographical indications in six Central and Eastern European countries. Most of these spirits had a comparative advantage, as well as being competitive. However, they had experienced a decreasing trend of competitiveness and worsening market positions since the accession. Török and Jámbor also analyzed the European ham market [17]. Their results, based on the RSCA, showed that four member states were competitive (Portugal, Spain, Italy, and Slovenia); however, only Portugal was able to increase its competitiveness during the analyzed period. Regarding the major elements of competitiveness, and in line with the literature, factor endowments, geographical indication, and the EU accession had a positive impact, while the FDI negatively influenced it. In the case of the Italian wine sector, specialization and product quality are important to answer the diversified consumer demand [58]. The first is more important on the new markets, while the second is essential for keeping traditional export partners. By using the export and import market share, and the relative trade advantage (RTA), Crescimanno and Galati [58] identified the increased competitiveness of the Italian wine sector between 2000 and 2011. El Chami et al. [59] used the RTA and the revealed competitiveness (RC) to analyze the Lebanese wine industry and revealed a comparative advantage. As it was more competitive, they highlighted the importance of a long-term and stable sectoral policy.

In relation to spices, it seems that countries with the highest comparative advantages (Guatemala, Sri Lanka, and India) concentrate on the most competitive products (cardamoms, cloves, dried pepper, and cumin seeds) and the positive determinants of their trade competitiveness are land and labor productivity [12]. In the peanuts market, Nicaragua and Senegal show the highest, as well as stable, competitive potential; however, the survival test indicated intense competition [60].

de Oliveira et al. [61] found a decreasing competitiveness in the Portugal tomato industry. As the international tomato market is highly competitive, product differentiation is crucial to ensure a lower dependence on prices. Besides product quality, they also noted that the use of good agricultural and environmental practices can also be an important factor for their traditional markets. As climate change is a serious threat, collaborative research and development actions are essential at both at the production and processing levels.

3.3. Used Methodologies and Recommendations

Although the selected articles were divided into two groups, they had many common characteristics in terms of methodology and the identified factors of higher agri-food trade competitiveness. Table 1 gives a summary of them.

Table 1. Summary of the methodology and the recommendations for higher agri-food trade competitiveness *.

Methodology	Identified Factors of Higher Agri-Food Trade Competitiveness
Balassa type indices (RCA, RTA, RC, RSCA, NRCA)	- supportive legislation and/or (trade) policy [22,34,36,39,43,44,47,49,50,53,54,59] - higher value-added/more sophisticated goods [4,15,20,21,30,39,47,48,50,54,57] - high, efficient, and profitable production [23,34,43,44,47,49,53,55,56] - innovation and investment [21,22,34,43,47,50,61] - EU accession/membership [15–17,22,33,36] - factor endowments [12,16,17,21] - developed/efficient infrastructure [15,21,48,49] - cooperation [44,49,61] - product differentiation [14,61] - geographical indication [16,17] - R&D [49] - export orientation [22] - exchange rate [53]
Export and/or import-related indices (PRODY index, GL index, NTI, LFI, EMS, UVI, UVD, TBI, XSP)	- higher value-added/more sophisticated goods [20,24,30,35,39,40,45,47,48] - supportive legislation and/or (trade) policy [39,40,43,47,49] - high, efficient, and profitable production [43,47,49] - innovation and investment [43,47,61] - developed/efficient infrastructure [48,49,52] - product differentiation [45,61] - EU accession/membership [32,33] - cooperation [49,61] - R&D [49] - focused market strategy [58]
CMS	- policy reform [41,51] - WTO accession [41] - exchange rate [41] - developed/efficient infrastructure [37]

Table 1. *Cont.*

Methodology	Identified Factors of Higher Agri-Food Trade Competitiveness
IIT	• cooperation [28] • innovation and investment [28]
Trade equation model	• factor endowments, product diversification, and organic products [42]
GTAP, Delphi method	• profitable production [26]

* Articles were found in two rows when the Balassa-type and export and/or import-related indices were simultaneously applied in the same article.

According to the analyzed literature, the most commonly suggested factors of higher agri-food trade competitiveness were supportive legislation and/or (trade) policy (12), higher value-added/more sophisticated goods (11), and high, efficient, and profitable production (9). These are the fundamentals of the competitive agri-food trade. As the included articles covered not only the EU but also other parts of the world, these findings may be generalized. However, it should be noted that these factors are interrelated, as supportive policies encourage all the stakeholders to invest in their production and became more efficient and/or process their products more.

4. Summary and Conclusions

Measuring competitiveness, and agri-food competitiveness within, is still a challenge. There are many opportunities for this and all of them provide advantages and disadvantages. The choice of the available methodological tools depends on the available datasets, as well as on the choice of the researcher. From a purely methodological point of view, there are basically export and export–import-related indices to measure and analyze agri-food competitiveness. Table 2 gives an overview of the most commonly used indices of the analyzed articles.

Table 2. Competitiveness-related indices and data needs for their calculation.

Data Need	Name of the Index
export	CMS, EMS, LIIC, NRCA, RCA, RSCA, XSP
export and import	GL, IIT, LFI, NTI, RC, RTA, TBI, UVD, UVI
export, GDP per capita	PRODY index

As can be seen from the table above, the vast majority of the indices used in the selected articles were based on trade data. Simpler indices use only export data, while more sophisticated indices also take import data into consideration. The only exception is the PRODY index which uses the RCA index and weights its values with GDP per capita.

The selected articles were grouped into two categories. Most of them dealt with regional or country level issues, while a smaller number of articles analyzed the competitiveness of one agri-food product or product group. The country and regional level analyses can be divided into two parts. First, most of the included articles analyzed the competitiveness of either the EU or one of its member states. They evaluated the three significant agri-food trade-related events of the last 15 years: the EU accession, the global financial crisis, and the Russian embargo. At the country level, the results suggest that the old member states generally have a more favorable trade structure with a higher share of processed goods. This seems to be one of the most important elements of agri-food

trade competitiveness. The high share of the EU-related articles can be explained by the composition of the authors, most of whom were from a European country.

Second, a similar methodology (Balassa-type indices and export and/or import-related indices) was applied to other counties too. Some of them were closely related to the EU, e.g., the candidate countries, while the others were also important trading partners of the EU, e.g., Canada, China, or the ASEAN countries.

As the basis of any trade activities is agricultural production, strengthening this sector seems to be an advisable strategy for most of the countries. This can be realized by more efficient or profitable production, horizontal and vertical cooperation, research and development (R&D), innovation and investment, developed/efficient infrastructure including logistics, and supportive legislation and/or (trade) policy. This partly overlaps with the list of the most important identified factors: supportive legislation and/or (trade) policy; higher value added; and high, efficient, and profitable production. This list was the same in the case of the Balassa-type indices and the export and/or import-related indices as well.

The impact of the EU accession on the agri-food trade at the product level was also a frequently analyzed topic in the international literature. At the product level, the success factors of agri-food trade competitiveness are basically the same as what was found at the country/regional level. It should be noted that it is easier and faster to increase agri-food competitiveness at the product level with targeted supports and policies compared to the country-level competitiveness. The most important and efficient product-level measures were product differentiation, the use of different geographical indications, and organic production.

In relation to future research paths, there are many potential options. Adding endowments to the current analysis may lead to different conclusions. The use of different keywords would result in a different sample, and therefore, different results. Another option could be a focused analysis of each of the major indices, as they can be used to analyze other sectors of the economy too.

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Abbreviations

ASEAN	Association of Southeast Asian Nations
BRC	Bilateral Resource Cost
BSE	Bovine spongiform encephalopathy
CAP	Common Agricultural Policy
CEFTA	Central European Free Trade Agreement
CIS	Commonwealth of Independent States
CMS	Constant Market Share
DRC	Domestic Resource Cost
EMS	Export market share
EU	European Union
GDP	Gross Domestic Product
GL	Grubel–Lloyd
GTAP	Global Trade Analysis Project

H-O-V	Heckscher–Ohlin–Vanek
IIT	Intra-industry trade
LFI	Lafay index
LIIC	International competitiveness index
NAFTA	North American Free Trade Agreement
NRCA	Normalized revealed comparative advantage
NTI	Net trade index
PCR	Private Cost Ratio
PDO	Protected designation of origin
PRISMA	Preferred Reporting Items for Systematic reviews and Meta-Analyses
R&D	Research and development
RC	Revealed competitiveness
RCA	Revealed comparative advantage
RSCA	Revealed symmetric comparative advantage
RTA	Relative trade advantage
TBI	Trade balance index
USD	United States dollar
UVD	Unit value difference
UVI	Unit value index
WITS	World Integrated Trade Solution
WoS	Web of Science
WTO	World Trade Organization
XSP	Export specialization index

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