



## THE IMPACT OF AGRICULTURAL PERFORMANCE ON FOREIGN TRADE CONCENTRATION AND COMPETITIVENESS: EMPIRICAL EVIDENCE FROM ROMANIAN AGRICULTURE

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**Abstract.** Analysing the impact of agricultural performance on foreign trade concentration and competitiveness defines an important step in identifying the opportunities, challenges and proactive measures in designing a functional and marked based agricultural model. The scope of this study is to investigate the evolution of Romania's the foreign trade competitiveness and its concentration on main destinations during 2007–2016. In this context, in the paper are identified and investigated some of the competitiveness' mutations arisen from the Romania's trade flows concentration and re-structuration in relation with 26 of the European Union member states. It was used a unique dataset on agro -food trade output and concentration across EU countries to construct measures of trade competitiveness. The results obtained suggest the existence of a dual relationship of the Romanian agriculture competitiveness and its dependence on the EU economic area, by the concentration of the commercial relationships.

**Keywords:** trade competitiveness, trade flow, agricultural performance, Lorenz curve, Shannon entropy, ANOVA, convergence.

**JEL Classification:** C38, D4, F15, O24, Q17.

### Introduction

Agricultural trade represents in the functional and highly competitive contemporary economies a viable tool in the process of valuing the national agricultural potential from a larger

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perspective of extending business development in the field. During the time, under the influence of new economic developments, Romanian agriculture has developed a major component of the trade flows managing to design an efficient framework of business chains, becoming a generator of wealth in the economy and an outlet for valuing domestic economic potentials. As it is already developed in literature (Giordani et al., 2016; Viccaro et al., 2018; Yan & Deng, 2019), the multiplier effect of the agricultural trade flows accentuates the need of business development in the field.

An efficient agriculture in Romania, with a high level of competitiveness, requires a diversification of the intra- and extra-community commercial exchanges, against the background of an increasingly aggressive globalization of the agricultural markets. In agriculture, like in any other economic area or sector, the commercial exchanges should contribute significantly to the creation of real added value for the stakeholders. Although the proceeds from the agricultural trade are essential, both for supporting the measures to boost agricultural production, and for stimulating the farmers to obtain a high quality and competitive production, the requirements for ensuring a high level of food safety should also be considered.

As it was previously shown in literature (Ciutacu et al., 2015; Andrei et al., 2015a; Drăgoi et al., 2018; Turtoi et al., 2018; Popescu et al., 2018; Kideckel, 2019; Istudor et al., 2019), despite Romania's significant agricultural potential arising from quite a large stock of fertile land, climatic conditions favourable to a diversity of crops, and a large number of farmsteads (one out of three farms in the EU 28 is located in Romania) and farmers (20% of the number of active farmers in the 28 Member States live and work in Romania), the country's level of competitiveness on the EU market of agricultural produce and agro-food is still low by comparison to the other EU states and even by comparison to EU member states that boast a far lesser agricultural potential.

According to NIS (2018), the aggregate balance of Romania's trade with the other member states over the period 2007–2016 for Sections I, II, and III of the foreign trade nomenclature, respectively for livestock, animal produce, vegetal produce, vegetal and animal oils stood at –7.2 bn. euro, which was higher than the 6.9 bn euro representing the gross added value of the agriculture, forestry and fishing sector of Romania in 2016. For Section IV, food beverages and tobacco, the aggregate balance for the period 2007–2016 was in the region of –5.1 bn. euro, compared to the 7.5 bn. euro of gross added value for the food, beverages and tobacco industries of Romania in 2016. These trends argue of the low competitiveness of Romanian food and agricultural produce, and of their meagre share in the country's export, and, no less, of the loss by Romanian producers of a significant share of the domestic market.

The integration in the European Union (EU) generated, for the Romanian agriculture, a dual process of convergence, both in terms of agricultural production and in terms of orientation of the agricultural relationships (Rusali, 2013; Drost, 2013; Andrei, 2015b). In this regard, promoting an adequate commercial policy well-calibrated to the actualities of the Romanian agricultural economy, is an imperative tool in shaping the behaviour of the agricultural production structures, as well as in stimulating the domestic agricultural production and adjusting it to the requirements of a competitive market (Gavrilescu & Voicilas, 2014; Koppel & Kolencik, 2018; González, 2018; Popescu, 2018). And, as pointed out by various experts in their studies (Figiel et al., 2012; Polimeni et al., 2018), although Romania has a

long history in agriculture and benefits by a substantial agricultural potential, it still faces major agricultural imbalances, caused by under financing, the overpopulation of the rural areas and, last but not least, a high degree of fragmentation of the landed property.

Agricultural export is an essential component of a viable agriculture and the multifunctional development of the communities and rural areas in Romania as it is argued in Ciutacu et al. (2015), Popescu (2018), Feher et al. (2017). Starting from the fact that agriculture is the prevailing activity in the rural areas, the stimulation of the agricultural export and commercial relationships in the farming sector may represent an efficient tool for spurring the agricultural production and the harmonious development of the rural communities. If Romania pursues to achieve a sustainable economic growth, to respond to the requirements of a multifunctional economy, in the context of an excessive integration and globalization of the markets, and to attain agricultural competitiveness, Romania must put forth a well-articulated commercial policy, focused on the traditional markets, especially on the internal, common European Union (EU) market.

Agriculture and the food industry in the EU are protected by trade barriers and receive substantial financial support through a specific and dedicated policy – Common Agricultural Policy (CAP), which contributes both to the achievement of agricultural convergence in the European agricultural model, and to ensuring a favourable climate for agricultural performance. In the face of a growing diversity of the agricultural trade relationships, the Romanian agriculture cannot but adjust to the new conditions required by the convergence with the European agricultural model, and to the provisions of the Common Agricultural Policy (CAP).

Identifying the competitiveness potential of the Romanian agricultural products and an improved utilization of the same involves a comprehensive analysis of the existing agricultural trade relationships between Romania and the European Union (EU) member states, having in mind the fact that Romania has been an EU member state since 2007. A thorough analysis of the situation of Romania's intra and extra-community commercial exchanges may contribute, in a decisive way, to focusing the agricultural production on crops with a high demand for export, on the one hand, on reducing the country's dependence on agricultural imports, and raising the level of export competitiveness of the Romanian agricultural products, on the other.

A study of the relationship between the competitiveness of agricultural produce and agro-food on the EU common market, and of the degree of geographic distribution of the import/export flows, by country and groups of countries in the EU over a longer term (10 years) could throw a better light on the competitiveness differentials, on their causes, and could help Romanian experts identify the elements to formulate a strategy to promote Romanian products in the EU common market. Establishing and developing extension services in Romania represents a necessity in order to increase performance of agricultural exploitations (Sin, 2013).

An analysis of agricultural trade competitiveness is essential for assessing the impacts of agricultural development, particularly when studying the agricultural effectiveness and performance. In this regard, the research included in this study, is focused on reaching two main targets. The first one addresses the analysis of Romania's foreign trade concentration, by EU

country and cumulative schedule, for the period 2007–2016. The second target is to identify the mutations generated by the reconfiguration of Romania's trade flows concentration, for the same period, in its relations with 26 of the European Union member states, treated in this analysis, with a view to identify and increase the competitiveness of Romania's intra and extra-community commercial exchanges. In this context, the study was structured, besides Introduction, Research limits and further directions of research and References, to comprise the following sections: Literature review, Data and methodology, Results and discussions, and Conclusions. The section "Results and discussions" was in its turn restructured, bearing in mind: an analysis of Romania's foreign trade concentration by country and cumulative schedule, for the period 2007–2016, and an analysis of mutations and reconfiguration in trade flows concentration. Also it was included a subsection of overview on results discussion.

## **1. Literature review**

The concept of competitiveness is often used in economic literature and research from various perspectives, meanings and approaches, but there is little agreement on its significance (Porter, 1990; Krugman, 1994; Wijnands et al., 2007; Qineti et al., 2009). In this case, the agricultural trade performance is connected to national competitiveness, which presumes the existence of the comparative advantage. Still, there are numerous studies approaching both the relationship between the agricultural trade and its effects on the development of the agricultural sector in general (Fraser & Stringer, 2009; Rusali, 2014; Petrescu-Mag et al., 2018), and the impact of the agricultural trade policies on some issues such as land use, selecting the production methods, agricultural incentives and subsidies, or on the development of the rural communities (Carter et al., 1996) and eradication of poverty (Estrades & Terra, 2012). Hence van der Zanden et al. (2017) analysing the trade-offs of European agricultural abandonment, proves that the proper answer for the mitigation of the agricultural land abandonment process is closely related to the allotment and distribution of the agricultural land according to crop categories.

As Anderson (2017) remarks, sometimes the trade measures are not only inefficient in diminishing the international food markets shocks but also become ineffective when many countries decide to respond by similar concomitant actions. More recently, Teignier (2018) referring to international trade in agricultural goods, finds that it can facilitate the structural transformation of agriculture by stimulating its competitiveness and reducing the food dependence, thereby enabling countries to reduce their import quotas.

The performance of agricultural holdings and the effects of trade support policies on improving the agricultural trade competitiveness are complex and controversial, particularly with regard to their significant differences of paradigm, land ownership structures, developing countries, and the intra-extra trade relations between countries as (Manoleli et al., 2004) states. The main argument in favour of increasing the agricultural trade competitiveness is that economic efficiency will grow and in the long run the whole national agricultural sector will improve its structure and internal functional mechanism.

As it is argued in literature (Collier & Gunning, 1999; Feler & Senses, 2017; Kanter et al., 2018), sometimes, in the case of small countries, the trade measures and interventions to

increase competitiveness may reduce their national economic welfare and gross investment rates by distorting domestic agricultural production against the backdrop of lower agricultural prices. Extrapolating this conclusion, it can be stated that agricultural trade policies may contribute to an increase in the level of land use and a decrease in the fragmentation of farmsteads. As Anderson (2010) noticed in his study, the high level of trading in agricultural products leads to an ever increasing differentiation of the agricultural market, especially for processed products. Also, making financial support to farming subject to production volumes distorts even further markets and trade, thereby affecting the availability for purchase and consumption (Bruinsma, 2009; OECD/FAO, 2010).

The evolution of today's agricultural system developed a high degree of dependence on the evolution of the agricultural productivity, therefore, the agricultural trade flows become in their turn dependent on this indicator, although in some expert studies (Winters et al., 2004; Hacche et al., 2017), the productivity sensitivity to the trade liberalization is often found as relatively ambiguous.

From this point of view, as Huang et al. (2011) pointed out, international trade plays an important role in offsetting, though only in part, the regional productivity fluctuations caused by climate changes. In this context, Bojnec and Fertó (2009) analyzing the agro-food trade competitiveness of Central European and Balkan countries reveal an interesting situation regarding the agro-food relative trade advantages which are proven to be highest for Hungary and Poland, similarly for Bulgaria, but with different products, which indicates their agro-food trade potentials in the EU markets. Current agricultural trade competitiveness researches need to expand their approaches and move beyond the identification of agro-food relative trade advantages towards the development of new tools that can assist effectively the decision makers to adopt the most effective trade policy and develop a competitive national agricultural sector.

Although, as an effect of Romania's entering the EU Accession Agreement and then effectively joining the EU bloc, its foreign trade exchanges have reoriented geographically, they are far from having gained the targeted efficiency, with export volumes below imports in most of Romania's EU bilateral relations (Albu et al, 2013).

This unsatisfactory evolution of agro-trade comes from the fact that the geographical re-orientation has not been paralleled by a thorough re-distribution of the exported farm goods inventory, or a better quality thereof. It also seems to have come from Romania's channelling its products towards the markets with which it had had free trade agreements prior to accession, even though the country could have found a higher demand for its products on other foreign markets, where the trading conditions would have been better under the bilateral and preferential agreements those countries have with the EU (Giurgiu, 2008).

There are theorists (Zaman & Georgescu, 2018) who caution that the high degree of Romania's commercial integration with the EU member states (70% of the country's commercial exchanges) makes it vulnerable. Its dependence on these EU markets comes along with a high exposure when such countries are affected by an economic crisis, like the one in 2008–2009. It is however difficult to estimate what would be the optimum share of Romania's trade flows with the other EU countries. To do this, the authors quoted above (Zaman & Georgescu, 2018) are of the opinion that the existing studies have not identified solutions,

and therefore deem that in-depth studies should be carried out to include an analysis of the "trade creation" and "trade diversion" generated by Romania's accession to the EU.

Trade flows concentration in the EU on its farm produce and agro-food industry markets has been tackled by numerous researchers, some of whom pointed out that only six of the member states have a leading role in the single market trade. Of these six, four belong to the group of countries with a relatively high GDP (Germany, France, Italy and Spain), and other two are traditionally export-oriented countries (The Netherlands and Belgium) (Carraresi & Banterle, 2015). The explanation of this state of affairs lies in the relationship between performance from the perspective of competitiveness, and each of these countries' export specialization or the general export-orientation of the country. "Indeed, in some cases good performance during the period analyzed seems to be linked with the export specialization in the sectors analyzed (agriculture and food industry) though this relationship needs an in-depth assessment."

An examination of the agro-food trade flows between the old and the new EU member states has shown that they have strengthened, albeit asymmetrically. They tend to improve the foreign trade balances of countries like Poland and the Czech Republic, but threaten to destabilize the foreign trade balances of countries like Romania, Bulgaria and Hungary (Antimiani et al., 2012). This has triggered differences in the trading patterns. Romania and Hungary have gradually lost previously good positions in the classification by degree of sophistication, as a consequence of exporting mostly unprocessed or roughly processed goods, also due to the relocation of production processes and export flows towards countries with a lower GDP per capita. At the other extreme, Poland and the Czech Republic have enhanced their export capacity for sophisticated products.

A scrutiny of trade by quality segments revealed that the main changes in the geographical intra-EU orientation has occurred almost exclusively in the segment of medium quality products, and to a much lesser extent in the segment of low-quality products. While in the category of high quality products, things have remained unchanged, with very few exceptions (Stehrer et al., 2016). These evolutions indicate the existence of a "climbing up" tendency of the less developed countries, which have climbed up the export ladder of medium quality products, to the detriment of the advanced countries.

A large volume of science literature on this topic attempts to identify the relation between trade concentration / trade diversion and trade, and other, competitiveness. From this perspective, export diversification may assume various forms: either by growing the range of exported products and services, increasing the number of economic sectors capable to produce for export, expanding to more geographical destinations, and by a combination thereof.

Analysing the theories regarding vertical and horizontal diversification as Ali et al. (1991), Samen (2010), it is upholding the positive reflection on economy of export diversification, which by providing a wider range of exportable product, can, implicitly, prevent revenue fluctuations caused by price drops on certain markets, it cannot but agree that diversification may improve the added value in the exporting economic sectors, and contribute, indirectly, to economic growth by way of various channels: "improved technological capabilities via broad scientific and technical training as well as learning by doing; facilitation of forward and backward linkages within output of some activities that then become inputs of other

activities; and increased sophistication of markets, scale economies and externalities” (Ali et al., 1991; Samen, 2010). Other studies recognize that the structure and the direction of trade flows also mirror the regional specialization and concentration in the EU (Hallet, 2002; Vochozka et al., 2018), others question to what extent understanding agro-trade should find its arguments in the comparative edge or the competitive edge (Moon & Pino, 2016).

Another sensitive aspect to consider when studying foreign trade is the size of the market (such as Romania is) that attracts foreign traders, which will specialize in the production of and trade in differentiated products and will take advantage of economies of scale. From this point of view, “for trade in agricultural products, a rising GDP had an expansive effect associated with the increase in the market size of both the exporting and importing country. Coinciding with previous research, this result implies, in the case of agricultural products, the emergence of the home market effect (an effect which exceeds the growth in the market size of the exporting country compared to that of the importing country)” (Vatn, 2002; Graessley et al., 2019).

Analyses conducted on the impact of accession to the EU in various member states (Csaki & Jambor, 2009) came to the conclusion that the countries with stronger landed properties (such as Poland and Slovenia) were able to adapt much faster and efficiently to the single market requirements of the EU, if compared to the countries that underwent far more complex changes in the land use pattern, as is also the case of Romania. Some of the causes behind the discrepant speeds of agricultural development in the member states after accession, lying at the roots of such states’ unequal input of exported agricultural products to Europe’s single market are: the initial resources of the agricultural sector, the structure of farmsteads, the level of development of each country’s upstream and downstream economic sectors, the supportive or less supportive nature of the legal framework governing agriculture, etc.

## 2. Data and methodology

Analyzing the impact of agricultural performance on foreign trade concentration and competitiveness of the Romanian agriculture represents a further step in understanding the sectional transformation under the exigencies of the new agricultural paradigm transformation and developing a functional agricultural model. For achieving the main aims proposed to be researched during this study, it was proposed, designed and used as main leading indicator the value of Romania’s agricultural export (FOB) on EU countries and sections, according to the Combined Nomenclature in the period 2007–2016, as described in (NIS, 2018). The characteristics of the variables analyzed and taken into account in this study are described in Table 1.

The analysis of the Romanian agricultural trade relationships performance was underlain by the existing economic relationships and trade flows between Romania and the other 26 (EU) member states. Croatia was excluded from this analysis, because it accessed EU much later, and the data series have no continuity, which renders the analysis more difficult. So, for each variable from the six presented in Table 1, a series was built and used in the form  $X = \{x_i\}_{i=1,n}^{-1}$  where  $x_i$  is the weight of the value for each country in the cumulative value.

Table 1. Summary list of variables included in the research  
(source: authors based on NIS (2018) and NIS (2019))

TOTAL_EXP	Total exports (mil. euro)
TOTAL_IMP	Total imports (mil. euro)
T_E_LAVFO	Total exports of Live animals and animal products, vegetable products, vegetable or animal fats and oils (mil. euro)
T_I_LAVFO	Total imports of Live animals and animal products, vegetable products, vegetable or animal fats and oils (mil. euro)
T_E_FBT	Total exports of Food, beverages and tobacco (mil. euro)
T_I_FBT	Total imports of Food, beverages and tobacco (mil. euro)

Although in the literature (Harrison, 1996; García-Alvarez-Coque, 2002) different methods and models have been used to explain the contribution of international trade in the economic development of a state, in this case, in order to emphasize the importance and role of the intra- and extra-community agricultural trade exchanges have in case of Romania, in this study it was opted for the calculation of the: Gini Coefficient (GC), Strük Coefficient (SC) and Shannon entropy (SE) as in (Jaba, 2002):

$$GC = \sqrt{\sum_{i=1}^n g_i^2}, \quad GC \in \left[ \sqrt{\frac{1}{n}}, 1 \right], \quad g_i = \frac{x_i}{\sum_{i=1}^n x_i}; \quad (1)$$

$$SC = \sqrt{\frac{n \sum_{i=1}^n g_i^2 - 1}{n-1}}, \quad SC \in [0, 1]; \quad (2)$$

$$SE = \sum_{i=1}^n g_i \ln \frac{1}{g_i}, \quad SE \in [0, \ln n]. \quad (3)$$

Given the fact that  $n = 26$  the value ranges of the used coefficients are:

$$GC \in [0.36, 1], \quad SC \in [0, 1], \quad SE \in [0, 0.13]. \quad (4)$$

In order to achieve extra information on the way the analysed states were grouped according to the variables considered, as well as on the way they were restructured in the period 2007–2016, cluster analyses were conducted during the extreme interval limits, respective for years 2007 and 2016, on both the import and export intensities of Romania with the 26 EU states. For this purpose the hierarchical clusters methodology was used, starting from the analyzed data series included in the matrix,  $Y = \left\| y_{ij} \right\|_{i=1, n, j=1, m}$  where  $m = 7$  (number of data series), and  $n = 27$  (the number of states included in the analysis.) For the hierarchical clusters methodology, initial data were normalized with the z-score method (Jaba, 2002; Rotariu et al., 2006; Zaharia et al., 2017):



$$z_{ij} = \frac{y_{ij} - \bar{y}_j}{\sigma_j}, \quad \text{where} \quad \bar{y}_j = \frac{\sum_{i=1}^n y_{ij}}{n}, \quad \sigma_j = \sqrt{\frac{\sum_{i=1}^n (y_{ij} - \bar{y}_j)^2}{n-1}}. \quad (5)$$

For generate Proximity Matrix  $(W = \|w_{ij}\|_{i=1,n, j=1,n})$  was used Euclidian distance (Zaharia et al., 2017):

$$W = \|w_{ij}\|_{i=1,n, j=1,n}, \quad w_{ij} = \sqrt{\sum_{i=1}^n (z_{ik} - z_{ij})^2}, \quad j = \overline{1, m}, \quad k = \overline{1, m} \quad j \neq i, \quad k \neq i, \quad w_{ii} = 0. \quad (6)$$

Therefore, the hierarchical clusters methodology has been used, and for checking the statistical significance of the variables affiliation to clusters and of the relevance of the average values obtained, the ANOVA methodology was used as main methodology.

- $H_{1_0}$ : The analyzed variable is not significant in terms of affiliation to the cluster
- $H_{1_1}$ : The analyzed variable is significant in terms of affiliation to the cluster

Applying the ANOVA methodology to test the representativeness of the averages of the groups involves checking the Homogeneity of Variance (Levene Test) with the hypotheses:

- $H_{2_0}$ : the data series distribution is not significantly different
- $H_{2_1}$ : the data series distribution is significantly different

In case that following the application of the Levene Test the null hypothesis ( $H_0$ ) is rejected, instead the ANOVA methodology the Robust Tests of Equality of Means was used, with the hypotheses:

- $H_{3_0}$ : the averages of the variables corresponding to each cluster are not significantly different
- $H_{3_1}$ : the averages of the variables corresponding to each cluster are significantly different

Pursuant to the analyses conducted for the year 2007, according to the characteristics of the Romania's import flows, the 26 states were grouped in 8 clusters, and in terms of export characteristics they were grouped in 7 clusters. For the year 2016, according to the characteristics of the Romania's import flows, the 26 states were grouped in 7 clusters, and in terms of export characteristics they were grouped in 6 clusters.

### 3. Results and discussions

#### 3.1. Analysis of Romania's foreign trade concentration and competitiveness, on countries and cumulative schedule

Despite the shrinkage, agriculture continues to hold in Romania a substantive share of the country's gross added value and of the economically active population, in comparative terms among other EU states. According to Eurostat database (Eurostat, 2019), in 2018, agriculture contributed 4.8% of the total gross added value (compared to the 1.6% EU average), and provided jobs to 23.0% of total employment (as against the 4.3% EU average). For the entire period 2007–2016, the aggregate balance of agro-produce traded with the other EU 27 countries was -12.3 bn. euro, deriving from exports in the worth of 26.1 bn. euro and imports in the worth of 38.4 bn. euro.

The trade in agro and food products in the reference timeframe 2007–2016 stood at 8.41% of total export, and at 9.51% of Romania’s total imports from the other 26 EU member states considered in this study. This ten-year analysis of the level of geographic concentration of Romania’s import and export flows, by member state, encompassing the time interval 2007–2016, includes the variables the characteristics of which are described synthetically in Table 1.

The degree of concentration of the variables used in the analysis is demonstrated by means of the Gini Coefficient (GC), Strúk Coefficient (SC) and Shannon entropy (SE) calculations, and illustrated in graph form, by type.

If it is considered the limits of the defining ranges of the concentration indicators demonstrated in Eq. (4), in the case of the values of variables TOTAL\_EXP and TOTAL\_IMP recorded in the reference time frame, the values of the Gini Coefficient (0.361), Strúk Coefficient (0.309), respectively Shannon entropy (0.1303) show a significant degree of concentration. The fact is substantiated by the shapes of the Lorentz Curve (Figure 1), which indicates that some 10% of all the countries considered for this analysis account for 55% of the TOTAL\_EXP flows, respectively over 50% of the TOTAL\_IMP flows.

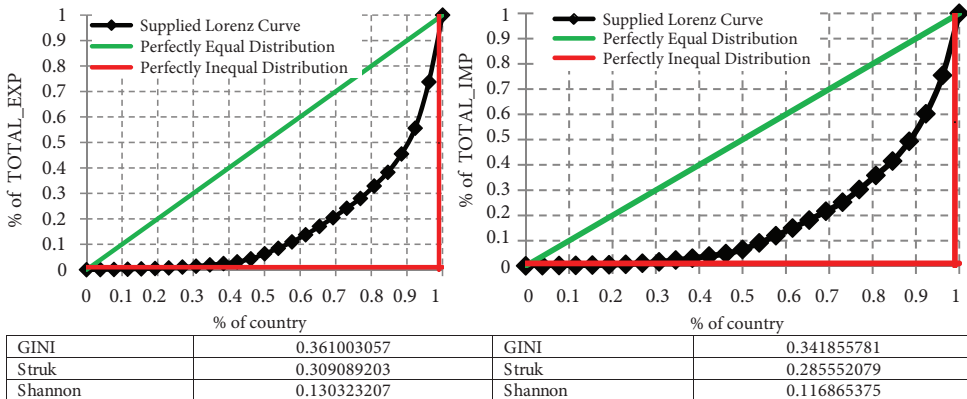


Figure 1. Concentration graph of Total exports and Total imports of Romania in EU, cumulated values, 2007–2016 (source: authors’ own computations)

The main destinations for the TOTAL\_EXP flows (54.53%) are Germany (26.27%), Italy (18.15%), and France (10.11%). Following them is Hungary with 7.21%. The sources of TOTAL\_IMP (50.66%) are Germany (24.58%), Italy (15.19%), and Hungary (10.89%). Coming forth is France with a ratio of 10.11%. These four countries are at the top of agricultural exports to Romania (Figure 2), covering 59.84% of Romania’s overall import-export transactions of agricultural produce and food in the period considered. A common trait to Romania’s import-export relations with these countries is the negative balance. The deficits range from 21,642 mn euro in the relation with Hungary, to 144 mn. euro in the trade with France. These statistic figures express a high degree of geographic concentration of Romania’s intra-community trade flows in a small number of member states, which renders the country sensitive to any fluctuations affecting the relations with them. At the opposite end are 11 of the 26 countries analysed herein, with less than 1% of Romania’s import-export transactions. These are Slovenia (0.83%), Denmark (0.61%), Ireland (0.55%), Portugal (0.54%), Finland

(0.37%), Cyprus (0.19%), Lithuania (0.13%), Luxemburg (0.12%), Estonia (0.09%), Malta (0.08%) and Latvia (0.06%). Once again, with the exception of Cyprus, Estonia and Malta, the trade balances of Romania with the other eight countries are negative, with deficits ranging from 1,937 mn. euro (with Ireland), and 11 mn. euro (with Latvia). Of all the 26 countries analysed herein, with 20 of them Romania has had negative trade balances, the only exceptions being the three states referred to above, plus Bulgaria, UK and Sweden. The total deficit has soared to 92,070 mn. euro.

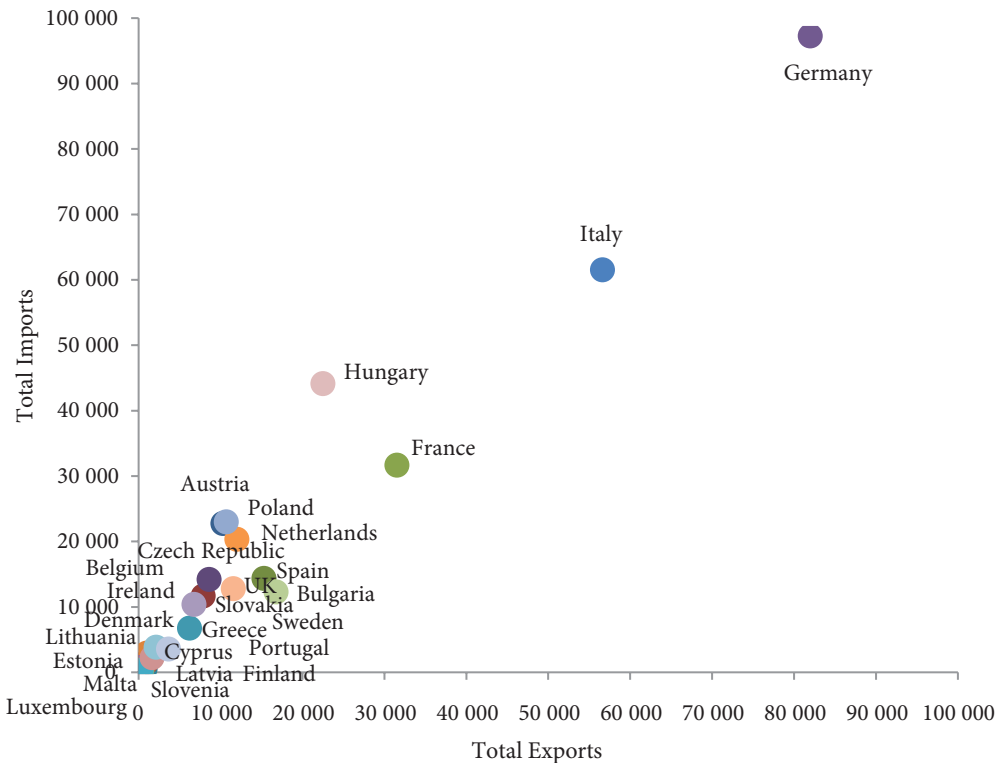
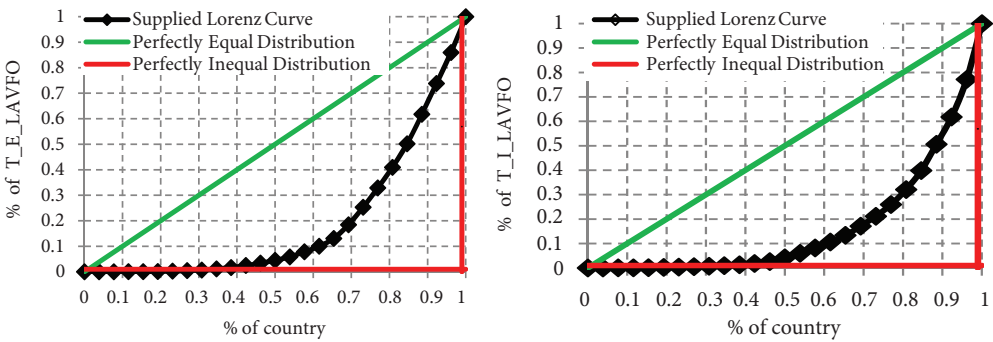


Figure 2. Romanian’s total exports and total imports with 26 countries of EU, in 2007–2016 (mil. euro) (source: authors’ own design)

A similar geographic concentration appears, over the same reference time, in the total worth of the import-export flows for livestock and animal products, vegetable products, vegetable or animal fats and oils. The levels of concentration of total exports and total imports of livestock and animal products, vegetable products, vegetable or animal fats and oils of Romania in the EU, in aggregate values over the period 2007–2016, are also high. The values of Gini Coefficient (0.305 for T\_E\_LAVFO and 0.3429 for T\_I\_LAVFO), and the Lorentz Curves (Figure 3) demonstrate that in this case the level of concentration of the import flows T\_I\_LAVFO is higher than the level of concentration of the export flows (T\_E\_LAVFO). This reveals that some 10% of the states considered for this analysis account for 50% of Romania’s import flows for livestock and animal products, vegetable products, vegetable or animal fats and oils, while the export flows are covered by 10% of the states, which cover some 40% of total flows.

The main sources of the T\_I\_LAVFO flows (49.40%) are Hungary (22.87%), Germany (15.36%) and Bulgaria (11.17%). Coming next are The Netherlands with a share of 10.75%, and Italy with 7.76%. The main destinations of the T\_E\_LAVFO flows (38.28%) are Italy with 14.04%, Spain with 12.13%, and the Netherlands with (12.10%). Following suit is Hungary with 11.54% and Bulgaria with 9.25%.

Unlike for TOTAL\_EXP and TOTAL\_IMP, where the flow intensity did not make much difference in the classification, when are analysed T\_I\_LAVFO and T\_E\_LAVFO, the classification notches are wider apart. Hungary holds the top position with a share of 22.86% in the T\_I\_LAVFO flows, and Italy comes fifth with 7.76%, while for the T\_E\_LAVFO flows, Italy jumps to the first place with a share of 14.04%, and Hungary follows fourth with 9.25%. Similarly, significant differentials between the import-export flows of livestock and animal products, vegetable products, vegetable or animal fats and oils were recorded in the relations with Germany (15.36% for T\_I\_LAVFO and 7.56% for T\_E\_LAVFO), and Spain (4.07% for T\_I\_LAVFO and 12.13% for T\_E\_LAVFO).



GINI	0.305116363	GINI	0.342946741
Struk	0.238369114	Struk	0.286909334
Shannon	0.093095995	Shannon	0.117612467

Figure 3. Concentration graph of Total exports and Total imports of live animals and animal products, vegetable products, vegetable or animal fats and oils of Romania in EU, cumulated values, 2007–2016 (source: authors' own computations)

The level of geographic concentration is visibly higher in the case of livestock, and animal products, vegetable products, vegetable or animal fats and oils. Figure 4 shows the places held by the 26 states considered in the analysis in relation to the import-export volume of livestock and animal products, vegetable products, vegetable or animal fats and oils of Romania. Four of the 26 states (Germany, The Netherlands, Bulgaria and Italy) account for 62.42% of total flows, with shares from 18.22% (Hungary) and 10.34% (Italy). On the other hand, it was determined the case of 10 states (Cyprus, Sweden, Slovenia, Ireland, Lithuania, Malta, Estonia, Latvia, Luxemburg and Finland) of the 26 states examined in this survey, where the intensities of the import export flows of Romania for livestock and animal products, vegetable products, vegetable or animal fats and oils are under 1%.

Romania's trade balances for the transactions with livestock and animal products, vegetable products, vegetable or animal fats and oils in the relations with ten states (Belgium, Cyprus, France, Ireland, Italy, Portugal, UK, Slovenia and Spain) were on the plus, with excess balances between 1,035 mn. euro (Spain) and 52 mn. euro (Ireland). However, the overall

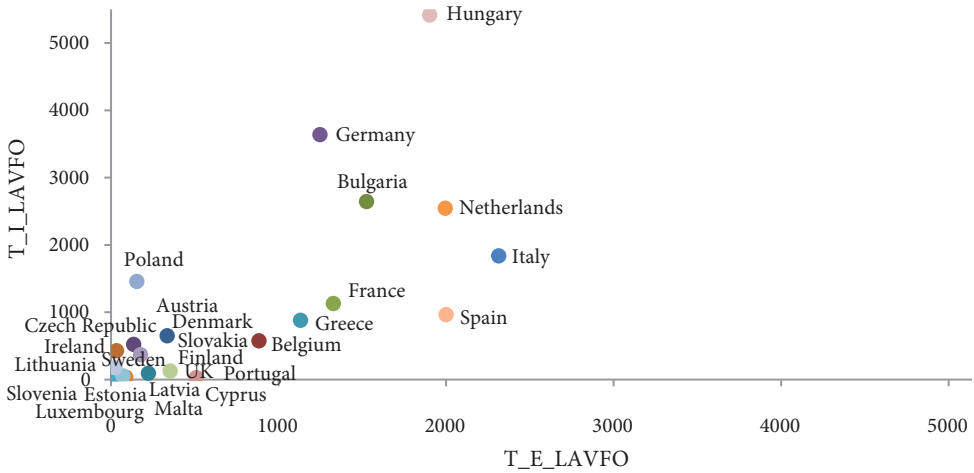
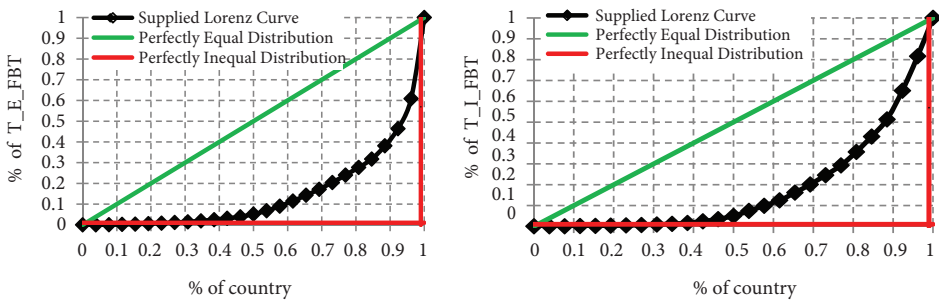


Figure 4. Romanian’s Total exports and Total imports of live animals and animal products, vegetable products, vegetable or animal fats and oils with 26 countries of EU, 2007–2016 (mil. euro) (source: authors’ own design)

trade balance with the 26 countries is negative, with a total deficit for Romania in the worth of 7,198 mn. euro, of which almost half (3,513 mn. euro) with Hungary.

The intensities of the import and export flows of Romania for food, beverages and tobacco show similar disparities between trade partners. (Figure 5). It is worth noticing that the highest level of concentration appears in the T\_E\_FBT, in comparison with all the other flows analysed above. Pointing to it are the values of the Gini Coefficient (0.44), and the shape of the Lorenz Curve (Figure 5a). They show that approximately 10% of the states are the recipients of 61.87% of Romania’s exports of food, beverages and tobacco. These states are Italy (39.15%), Bulgaria (14.46%), and Germany (8.26%). As for the T\_I\_FBT, the level of concentration is lower than not only the T\_E\_FBT, but also compared to T\_I\_LAVFO and TOTAL\_IMP. The Lorenz Curve (Figure 5b) indicates that some 10 % of the analysed countries are the sources for 48.66% of total flows of T\_I\_FBT. First in this hierarchy is Germany (18.36%), followed by Hungary (16.53) and Poland (13.77%).



	(a)		(b)
GINI	0.440238665	GINI	0.325357743
Struk	0.401948362	Struk	0.264748877
Shannon	0.193810082	Shannon	0.105857661

Figure 5. Concentration graph of Total exports (a) and Total imports (b) of Food, beverages and tobacco of Romania in EU, cumulated values, 2007–2016 (source: authors’ own computations)

The same five countries are, again, placed at the top of the ladder with regard to the total import-export flows of Romania for food, beverages and tobacco, as represented in Figure 6. More exactly, Italy, Germany, Hungary, Bulgaria and Poland cover 57.56% of the overall flows for T\_I\_FBT and T\_E\_FBT. At the other extreme, 11 states (Cyprus, Estonia, Finland, Ireland, Latvia, Lithuania, Luxemburg, Malta, Portugal, Slovenia and Sweden) cover only 2.68% of total flows for T\_I\_FBT and T\_E\_FBT, with worth of exchanges between 0.51% (Portugal) and 0.03% (Malta).

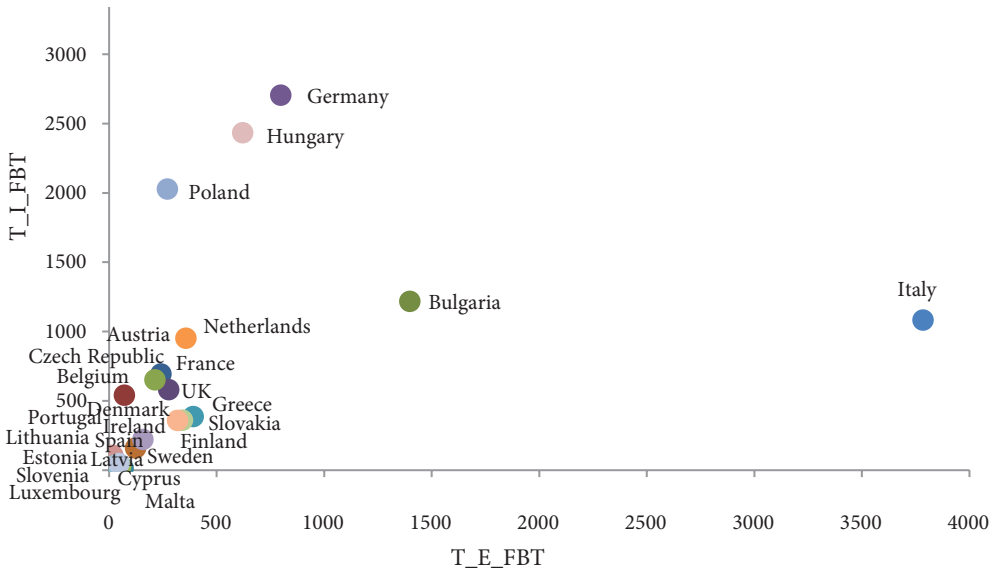


Figure 6. Romania's Total exports and Total imports of Food, beverages and tobacco with 26 countries of EU in 2007–2016 periods (mil. euro) (source: authors' own design)

Romania has a positive trade balance for food, beverages and tobacco, with 7 states (Bulgaria, Cyprus, Estonia, Greece, Italy, Latvia, Lithuania), with excess balances ranging from 4 mn. euro (Greece), to 2,701 mn. euro (Italy). With Malta the trade balance is zero, and the balances with the other 16 states the balances are negative, with deficits between 1,907 mn. euro (Germany) and 1 mn. euro (Finland). This compounds a total negative trade balance with all 26 states, the total deficit for food, beverages and tobacco standing at 5,062 mn euro, of which more than half comes from the trade flows of T\_I\_FBT and T\_E\_FBT with Germany and Hungary.

### 3.2. Mutations and restructuring in the concentration of the trade flows

The review of the analysed states grouping according to the values of the variables analysed in the years 2007 and 2016 offers extra information meant to give a picture as good as possible of the concentration of the Romania's analysed trade flows with 26 of the EU states. Taking into account the import intensities TOTAL\_IMP, T\_I\_LAVFO and T\_I\_FBT for the year 2007, as well as the significance conditions of the average values at group level, the 26 states has been grouped in 8 clusters. In order to test the statistic significances of the average values of Romania's import volumes at the EU states group level, the Test of Homogeneity

of Variances (Levene test) has been used. Given the fact that for all the three variables the null hypothesis  $H_{2_0}$  is accepted, for checking the statistical significance of the affiliation of the variables to clusters and of the relevance of the average values achieved, the ANOVA methodology was used.

Table 2. The results of testing the statistical significance of Romania's import volumes average values in the year 2007, at EU states group level (source: authors' own computations)

	Test of Homogeneity of Variances			ANOVA		
	Levene Statistic	Significance	Accepted Hypothesis	F	Significance	Accepted Hypothesis
TOTAL_IMP	0.571	0.575	$H_{2_0}$	134.864	0.000	$H_{1_1}$
T_I_LAVFO	2.564	0.105	$H_{2_0}$	273.389	0.000	$H_{1_1}$
T_I_FBT	1.670	0.216	$H_{2_0}$	89.597	0.000	$H_{1_1}$

The results obtained (Table 2) lead to the acceptance of the alternative hypothesis  $H_{1_0}$  and consequently the average values of the variables T\_I\_FBT, T\_I\_LAVFO and TOTAL\_IMP, achieved in 2007 and corresponding to each of the eight clusters are relevant (statistically significant). The structure of the clusters and the average values of the variables are shown in Table 3.

Table 3. EU states grouping according to the average volume at group level of Romania's imports (FOB) in 2007 (thousands euro) (source: authors based on NIS, 2018)

Cluster	Country	T_I_FBT	T_I_LAVFO	Total_Imp
A	Austria, France	44,251	66,623	2,871,650
B	Belgium, Bulgaria, Czech Republic, Denmark, Greece, Spain	33,065	50,859	817,027
C	Cyprus, Estonia, Finland, Ireland, Latvia, Lithuania, Luxembourg, Malta, Portugal, United Kingdom, Slovakia, Slovenia, Sweden	4,482	5,720	261,414
D	Germany	149,898	238,025	8,845,449
E	Italy	70,651	134,321	6,529,160
F	Netherlands	83,497	207,881	1,858,336
G	Poland	103,787	79,764	1,732,403
H	Hungary	194,004	320,781	3,566,110

Total imports of Food, beverages and tobacco (T\_I\_FBT) scores the highest average value for Hungary, a member of group H with euro 194,004 mil., followed by Germany (group D) with 149,898 mil. euro and Poland, in group G, with 103,787 mil. euro. The lowest average value of total imports of Food, beverages and tobacco is 4,482 mil. euro corresponds to the thirteen countries of group C.

A similar hierarchy is also seen for T\_I\_LAVFO only that, instead of Poland, the third standing is occupied by Netherlands. The average values of the total imports of live animals and animal products, vegetable products, vegetable or animal fats and oils for the first three standings varies between euro 320,781 mil. and 207,881 mil. euro, while the last standing in

the group C ranking scores an average value of 5,720 mil. euro.

Total imports (Total\_Imp) bring in forefront Germany (group D) with euro 8,845,449 mil. euro, followed by Italy (group E) with euro 6,529,160 mil. euro and Hungary with 3,566,110 mil. euro, all that to make the lowest average value of the indicator for group C with euro 261,414 mil.

The economic and social developments occurred in the period 2007–2016, in both each member state and EU as a whole, led to some mutations in the group's structure. In case of the 2016's data series, the significance conditions listed above led to the grouping of the 26 states in 7 clusters. Given the fact that the significant differences between the scatterings of the analysed variables did not allow the application of the ANOVA methodology, in order to check the statistical significance of the variables affiliation to the clusters and of the relevance of the average values achieved, the Robust Tests of Equality of Means were used (Table 4).

The results obtained highlight the fact that the grouping in 7 clusters ensures the representativeness of the average value obtained at the level of each cluster (Table 5).

Table 4. The results of testing the statistical significance of Romania's import volumes average values in the year 2016, at EU states group level (source: authors' own computations)

	Test of Homogeneity of Variances			Robust Tests of Equality of Means			
	Levene Statistic	Significance	Accepted Hypothesis	Statistic <sup>a</sup>		Significance	Accepted Hypothesis
TOTAL_IMP	1.264	0.305	H <sub>2_0</sub>	W	2.878	0.026	H <sub>3_1</sub>
				B-F	7.112	0.002	H <sub>3_1</sub>
T_I_LAVFO	25.693	0.000	H <sub>2_1</sub>	W	5.003	0.000	H <sub>3_1</sub>
				B-F	5.851	0.000	H <sub>3_1</sub>
T_I_FBT	3.618	0.047	H <sub>2_1</sub>	W	2.394	0.016	H <sub>3_1</sub>
				B-F	1.983	0.028	H <sub>3_1</sub>

Note: a. Asymptotically F distributed.

W Welch statistic; B-F Brown-Forsythe statistic.

Table 5. EU states grouping according to the average volume at group level of Romania's imports in 2016 (thousands euro) (source: authors based on NIS, 2018)

Cluster	Country	T_I_FBT	T_I_LAVFO	Total_Imp
A	Austria, Belgium, Czech Republic, France, Greece, Spain	81,543	121,634	2,041,281
B	Bulgaria, Netherlands	142,052	352,019	2,428,648
C	Cyprus, Denmark, Estonia, Finland, Ireland, Latvia, Lithuania, Luxembourg, Malta, Portugal, United Kingdom, Slovakia, Slovenia, Sweden	9,889	14,286	390,866
D	Germany	449,733	514,663	13,830,156
E	Italy	168,897	270,895	6,911,389
F	Poland	344,206	287,247	3,459,644
G	Hungary	350,279	749,560	5,057,900

The average values of the variables included in analysis induced, first of all, a change



in the number of groups created, meaning that Netherlands, a member of group F in 2007 becomes integral part of group B in 2016, therefore one group is abolished. Furthermore, Germany, Italy, Poland and Hungary remain as sole countries which are members of one group each. The first group A, besides Austria and France, members in 2007, shall include in 2016 Belgium, Czech Republic, Greece, Spain, which in 2007 were part of group B.

Narrowing the analysis to the first three clusters, with regard to Romania's import flows of livestock and animal products, vegetable products, vegetable or animal fats and oils in the two marginal years, 2007 and 2016, has led to the following conclusions:

- three of the member states feature in both years in the first three clusters. These are Hungary, Germany and The Netherlands, which increased their average exports to Romania 2.3, 2.2 and respectively 1.7 times;
- Bulgaria, a member of Cluster B in 2007, which ranked seventh among clusters in respect of average flows, has moved up to the third cluster, as an effect of a seven-fold growth of its exports to Romania over the decade examined. There, it pairs up with The Netherlands;
- the ratio between the average size of the export flows to Romania for the first and the last clusters in respect of this indicator continues to be high, although with a slight decrease from 56:1 to 52:1;
- the states belonging to the clusters with the highest exports of livestock and animal products, vegetable products, vegetable or animal fats and oils to Romania were, in 2016, with few exceptions, among the countries with the highest average values per ton of exports to Romania for this class of products, more exactly: Hungary – 487 euro, Germany – 462 euro, Bulgaria – 460 euro, The Netherlands – 364 euro, Poland – 532 euro.

In the category of Romanian imports of the same class of products, food, beverages and tobacco, the comparative analysis, by cluster, of the two lateral years, 2007 and 2016, has brought us to the following conclusions:

- Clusters D (Germany), H (Hungary), and G (Poland) continued to rank among the top clusters, with an important share of the average flows;
- as an effect of a faster increase of Romania's import flows, as is the case of Germany (three times), Cluster D leapt ahead of Cluster H (Hungary), which inflated only 1.8 times);
- although Poland's average flows in Cluster F have a record growth of 3.3 times, it keeps the same third place in the classification;
- the ratio between the average size of import flows of Cluster D (ranking first) and Cluster C, placed last, is still high, with a growing tendency from 43:1 to 45:1;
- in 2016, there are great differences between the average flows of the states in the top clusters, expressed in average worth per ton of FBT, respectively: 612 euro/ton for Hungary, 848 euro/ton for Bulgaria, 2,142 euro/ton for Germany, 1,712 euro/ton for The Netherlands, 1,713 euro/ton for Poland, and 1,882 euro/ton for Italy.

In a similar approach the structural mutations experienced in 2007–2016 have been also analysed, in what concerns Romania's exports to the 26 states analysed.

Taking into account the characteristics of the data series T\_E\_FBT, T\_E\_LAVFO and TOTAL\_EXP, as well as the significance conditions of the average values obtained (Table 6), for Confidence level 95% ( $\alpha = 0.05$ ), for 2007 a structuring in 7 clusters has been obtained

(Table 7).

Table 6. The results of testing the statistical significance of Romania's import volumes average values in the year 2007, at EU states group level (source: authors' own computations)

	Test of Homogeneity of Variances			ANOVA		
	Levene Statistic	Significance	Accepted Hypothesis	F	Significance	Accepted Hypothesis
TOTAL_EXP	1.751	0.199	H <sub>2_0</sub>	80.683	0.000	H <sub>1_1</sub>
T_E_LAVFO	2.669	0.094	H <sub>2_0</sub>	167.609	0.000	H <sub>1_1</sub>
T_E_FBT	1.111	0.349	H <sub>2_0</sub>	103.690	0.000	H <sub>1_1</sub>

Table 7. EU states grouping according to the average volume at group level of Romania's exports in 2007 (thousands euro) (source: authors' own computations)

Cluster	Country	T_E_FBT	T_E_LAVFO	Total_Exp
A	Austria, Belgium, Czech Republic, Cyprus, Denmark, Estonia, Finland, Ireland, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, United Kingdom, Slovakia, Slovenia, Sweden	2,800	3,266	251,927
B	Bulgaria, Hungary	42,495	58,436	1,315,861
C	Greece, Netherlands, Spain	8,076	47,921	596,201
D	France	4,415	26,934	2,272,275
E	Germany	34,053	41,981	5,008,680
F	Italy	82,715	122,771	5,032,590

The highest concentration rate of the countries in terms of export is noticed in group A, which includes 18 EU member states (Austria, Czech Republic, Cyprus, Denmark, Estonia, Finland, Ireland, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, United Kingdom, Slovakia, Slovenia, Sweden). In 2007 this group has the lowest average values for all the three variables included in analysis: total exports of food, beverages and tobacco (2,800 mil. euro), total exports of live animals and animal products, vegetable products, vegetable or animal fats and oils (3,266 mil. euro) and total exports (251,927 mil. euro).

As for imports, also for exports, two countries (Germany and Italy) form one group each alone (E and F), scoring very high average values of the variables. Therefore, first in the ranking is Italy, for each individual variable: 5,032,590 mil. euro for Total Export, 122,771 mil. euro for total exports of live animals and animal products, vegetable products, vegetable or animal fats and oils, and 82,715 mil. euro for total exports of food, beverages and tobacco. Germany, with the value of 5,008,680 mil. euro is the second biggest exporter group (TOTAL\_EXP) out of all the six groups formed at European level and third biggest group in total exports of food, beverages and tobacco, with 34,053 mil. euro. France is another country which, in case of export, represents alone group D in 2007. It stands third in Total Export (Total\_Exp) with the value of 2,272,275 mil. euro.

Group B, formed by Bulgaria and Hungary occupies the second standing for total ex-

ports of food, beverages and tobacco (T\_E\_FBT) with 42,495 mil. euro and total exports of live animals and animal products, vegetable products, vegetable or animal fats and oils (T\_E\_LAVFO) with a value of 58,436 mil. euro.

The third group (C), which includes three member states (Greece, Netherlands, Spain) stands third with 47,921 mil. euro, in what concerns total exports of live animals and animal products, vegetable products, vegetable or animal fats and oils (T\_E\_LAVFO). For the data series analyzed for the Romania's exports in 2016 a 7 cluster grouping was also obtained, with significance conditions being shown in Table 8.

Table 8. The results of testing the statistical significance of Romania's export volumes average values in the year 2016, at EU states group level (source: authors' own computations)

	Test of Homogeneity of Variances			F	Significance	Accepted Hypothesis
	Levene Statistic	Significance	Accepted Hypothesis			
Total_Exp	2.749	0.088	H <sub>2_0</sub>	80.683	0.000	H <sub>1_1</sub>
T_E_LAVFO	0.666	0.525	H <sub>2_0</sub>	167.609	0.000	H <sub>1_1</sub>
T_E_FBT	0.749	0.486	H <sub>2_0</sub>	103.690	0.000	H <sub>1_1</sub>

In 2016 (Table 9), compared to 2007, the exports developed significantly for each country included in the analysis. This is confirmed by the high average values as compared to 2007, but which led to the creation of six groups as well.

Table 9. EU states grouping according to the average volume at group level of Romania's exports (FOB) in 2016 (thousands euro) (source: authors' computations based on NIS, 2018)

Cluster	Country	T_E_FBT	T_E_LAVFO	Total_Exp
A	Austria, Czech Republic, Cyprus, Denmark, Estonia, Finland, Ireland, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, United Kingdom, Slovakia, Slovenia, Sweden	18,882	20,768	582,447
B	Belgium, Greece	40,039	168,430	932,732
C	France, Netherlands, Spain, Hungary	53,991	246,092	2,574,077
D	Bulgaria	187,068	190,171	1,850,294
E	Germany	124,641	177,873	12,325,202
F	Italy	541,512	266,585	6,671,822

Cluster A comprises almost the same EU states as in 2007. The only exception is Belgium, which, in 2016 went down to Cluster B. Italy, sole member of Cluster F, continues to keep a dominant position in Romania's total exports of food, beverages and tobacco (T\_E\_FBT), and total exports of livestock and animal products, vegetable products, vegetable or animal fats and oils (T\_E\_LAVFO). The third cluster, C, which in 2007 was occupied by the Netherlands and Spain, received in 2016 two new occupants, France and Hungary. Cluster B, with Belgium and Greece, comes last but one for all the variables considered in this analysis.

The analysis of the first three clusters in respect of Romania's average values of export

flows of LAVFO, in 2007 and 2016, revealed a diminished level of geographic concentration, and also changes in the average values by country, which brought along a reshuffle in the structure of clusters. In brief:

- placed at the top in both reference years is Italy, cluster F;
- the second place held in 2007 by Cluster B, comprised of Bulgaria and Hungary, was taken, in 2016, by Cluster C, formed of France, The Netherlands, Spain and Hungary;
- Cluster C, formed of Greece, The Netherlands and Spain, and placed third in 2007, was overtaken in 2016 by Cluster D, which includes Belgium;
- the ratio between the average flows of the best positioned cluster and the worst positioned cluster shrank dramatically from 37,5:1 to 12,8:1;
- the average value per ton of LAVFO exported by Romania fluctuated between the most important destination countries from 296 in Italy, to 369 euro in France, 270 euro in the Netherlands, 201 euro in Spain, 626 euro in Hungary, 518 euro in Bulgaria, and 465 euro in Germany.

Unlike LAVFO, for the FBT class of products the changes are less spectacular, respectively:

- in both reference years the first notch is taken by Cluster F, with Italy as sole occupant, as an effect of a 6.5 times growth of the average export flows of Romania to this country;
- in 2007, Cluster B (Bulgaria and Hungary), came second, while in 2016, pursuant to a 4.4 times increase of Romania's export flows to Bulgaria, this country maintained its second position in the classification. This placed Bulgaria in Cluster D, while the slow growing rate of Romania's exports to Hungary, 1.3 times, placed Hungary in Cluster C;
- in both reference years, Germany came third, with a multiplication of 3.3 times of Romania's exports;
- the ratio between the value of the average flows of the cluster holding the first place and the cluster holding the last place is relatively constant (29:1);
- in 2016, the average values of one ton of FBT exported by Romania oscillated, depending on their structure and the average prices per product, between 1,446 euro for Italy, 747 euro for Bulgaria, 3,095 for Germany, and 667 euro for Hungary.

The average value per ton of imported and exported product of Romania varied significantly from one class of products to another. For example, in the case of livestock and animal products (Group 0 SITC), the ratio between the average value of one ton of imported and one ton of exported goods by Romania fluctuated from 3,1:1 with Hungary, 3,5:1 with Bulgaria, 14,5:1 with The Netherlands, and 25,6:1 with Germany. Another feature of Romanian exports is the high volume of raw, unprocessed goods, as is the case of grain wheat and grain corn, to quote just two examples, not to mention the import, in parallel, of products with an elementary level of processing and low added value, such as wheat flour, maize flour, etc. These findings should trigger a signal of alarm on the need to design a strategy of trade competitiveness for Romania.

### 3.3. Overview on results discussion

Developing the competitiveness degree of Romanian agriculture is fundamental in diversifying the financing mechanism of agriculture and in enhancing the balanced sustainable de-

velopment of the rural communities. The synergies created by agricultural trade relations are important in reorienting agricultural production to those crops with high yields. The analysis underlines that Romania's commercial exchanges have developed a high dependence on the community area, where a significant part of them goes. As is argued in literature (Vlad et al., 2012; Niculae & Costache, 2015) Romania has been described as a net importer country on various agricultural products. Arghiroiu et al. (2015), analyzing the Romanian external trade in 2007–2013 identifies that Romania has a conjectural self-sufficiency, with a surplus to only 5 of the 24 groups of agro-food products. On the other side (Rusali, 2014), reviles that Romania has a weak competitiveness on processing sector which is heavily dependent of imports, with an unbalanced trade relation developed by the quality of exports and trade inefficiency caused by the cheaper exports than imports.

Therefore the volume of Romania's agricultural trade requires an increase in the competitiveness of the Romanian agricultural sector and a diversification of the food processing industry. Romania has the capability to augment the competitiveness of its agro-food industries and make them attractive for the intra-community markets. The developments described above in section 3.1 and 3.2 have manifold causes: some of them stem from mismanaged strategies for the promotion of Romanian products, some from the insignificant subsidies allocated to the Romanian farmers, much below those received by their counterparts in the other members states, some from the diminutive size of the largest number of farmsteads (90%), and, no less, from the absence of a legal and institutional framework designed to stimulate the export of high value-added products.

The structure of farmsteads in Romania, consisting of a large number of small, subsistence, farms (Bozek et al., 2018) requires national strategies to compensate for the diminutive financial support they receive at present from the current Common Agricultural Policy. One such strategy would be to provide incentives to associative patterns of organization, to clusters formed along value chains that may become the drive for a move up and forward from the current status of Romanian agriculture. Small farmers could be encouraged, including through access to domestic funding or European funds, to focus their production on bio and organic food, for which there is a rising demand on an expanding market, which can find a most welcoming soil in Romania, and the production of which could create niche opportunities for exports to a wider range of destinations.

As it is shown in literature (Swinnen et al., 2005; C. Burja & V. Burja, 2016; Popescu et al., 2016; Ciutacu et al., 2015; Muntean et al., 2018), Romania's competitive edge has been, for decades, the cheap labor combined with the country's geographic location and soil and climate conditions favorable to farming. So far, Romania has not been able to set up and develop the infrastructure required for the storage and processing of its agricultural produce, for the irrigation of its crops which is why its agro-food exports are at the mercy of weather conditions, not to mention the low levels of farm technology, productivity and efficiency. As identified in (Vasile & Ungureanu, 2014; Bojnec & Fertő, 2015), Romanian agriculture is competitive to some agricultural productions, which are highly visible in intra EU trade.

The ratios between the average value of a ton of exported products and a ton of imported products indicating, for most of the product groups, a lack of competitiveness on the EU markets of Romanian products, make it necessary for decision-makers to conduct a careful

scrutiny of the main trade flows. For this purpose, and as a follow-up to this research, parallel studies on the level of geographic concentration, and on the concentration by products and classes of products, could shed more light on the causes behind Romania's trade deficits. This approach should also consider the average values per ton of imported and exported products. As (Jing, 2018; Wagan et al., 2018) argues, certainly, the development of the agricultural trade relationships is affected by the intensity and determination to the European Economic Area. The modernization of the agricultural undertakings, doubled by the increase in the utilization rate of the national agricultural potential is essential in building a sustainable national agricultural sector, with a strong viability, in order to face the new challenges enforced by the increased globalization and competitiveness of the agricultural markets.

## Conclusions

Attaining an efficient and highly competitive agriculture in Romania involves a sustainable domestic agricultural policy and a sustainable domestic agricultural sector from the economic, social and environmental perspective, which contributes significantly to an increased competitiveness of the agricultural sector. From the analysis conducted is hard to anticipate the extent in which the agricultural trade policies affect the agricultural sector as a whole, as well as how to adapt the policies and agricultural production to the new prerequisites and convergence with the European agricultural model.

The survey over a ten year span (2007–2016) of Romania's import and export flows of agricultural produce and food products with the other EU member states revealed not only the tendency to chronic trade balance deficits, but also a high degree of geographical concentration in a small number of states. Both import-wise and export-wise, less than 10% of the member states cumulate 50–60% of all trade flows. This shows a high degree of exposure and sensitivity to the ups and downs of these markets.

An important target is the recapture of the domestic market with its considerable absorption capacity. In assessing trade deficits by groups of products or geographical destinations, it should be taken into account that any quantitative and qualitative increase in agricultural production may represent a potential gain for export but, directly and / or indirectly, through domestic processing, constitutes, in the at the same time, a way of substitution of imports.

Export competitiveness can only be attained through increased efficiency, and efficiency is contingent on policies aimed at a thorough restructuring of agriculture and ensuring the functioning of market mechanisms in this sector, by increasing the level of taxation and extending contractual relationships between partners, including by reducing self-consumption and subsistence farms. Vertical integration of farm work with food industry activities would be one of the mandatory steps. Reducing the share of exported raw materials would be another step towards making Romanian agricultural products competitive in the European common market, as well as more effective integration into the international value added chains. The results hereof could be further used to refine the analysis and develop functional models in order to simulate performance based on foreign trade concentration and competitiveness criteria for Romanian agriculture. The conclusions arrived at based on the analyses herein may work as arguments for measures favoring a competitive edge for Romania in its

commercial exchanges with the other EU member states, as starting points for the future national export strategy 2021–2026.

### **Future research possibilities and research limitations**

The authors accept that this current study has some minor limitations drawn from the research topic characteristics, employed methodology, selected time horizon, datasets availability, variables' limitation, and of the software used in datasets analysis. For the future, applying a mix of research methods may improve the technical limitations of the outcome of this analysis. Also, a comparison between Romania with any other EU-28 country which has a compatible benchmark similarity could be the topic of further research.

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### **Author contributions**

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The authors declare that they have no competing financial, professional, or personal interests from other parties.

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