

Vegetable market analysis in Romania

Alexandra Diana Chirescu

Faculty of Agri-food and Environmental Economics, Bucharest, Romania.

Corresponding author: A. D. Chirescu, chirescualexandra18@stud.ase.ro

Abstract. Considering food security and safety, it is of most importance to analyse the components of the vegetable market in Romania. Therefore, this paper analyses the vegetable market from Romania between 2014-2018. The author also made a bibliometric research using the VOSviewer software in order to see the scientific interest in the field of vegetable market. The objectives of this paper are to (1) analyse the supply, the demand and the foreign trade of the vegetable market in Romania, and (2) to highlight the economic trend of this market during the specified period. This paper contributes to the studies conducted in this field through models for assessing the vegetable market in Romania. Thus, it has been observed that the trade balance is negative for most categories of vegetables, except for legumes. Expenditures for vegetables expressed in lei kg⁻¹ inhabitant⁻¹ increased by 40% in the period 2014-2018, and consumption for fresh vegetables increased by 9.81 p.p, while consumption for legumes increased by over 30 p.p in the same period. Also during 2014-2018, the average annual consumption per capita for vegetables increased by approximately 9.7%, while vegetable production decreased by approximately 0.14% in the same period.

Key Words: bidimensional analysis, demand, supply, trade balance, vegetables.

Introduction. Agriculture is one of the most important economic sectors worldwide, as it assures the food security and safety of the population (Tripathi et al 2021). According to the Department for Sustainable Development (2021), in 2021 Romania was on the 6th place in Europe regarding the dimension of the agricultural land. In this context, agricultural efficiency and waste management should be the top priorities for achieving sustainability (Kunz et al 2018). Furthermore, the European Green Deal highlights the importance of sustainable food systems for improving the health and quality of life, at the same time with taking care of the environment (European Commission 2021). By taking all these factors into consideration, decision makers should build up a holistic and sustainable-oriented policy for the agriculture sector (Aleksandrowicz et al 2016). Therefore, this paper aims to analyze the supply, the demand and the foreign trade for the vegetable market in Romania during 2014-2018.

Material and Method. In the first part of the paper, a bibliometric analysis was performed to determine the scientific interest in the field of vegetable market. In order to perform the bibliometric analysis, it was used the VOSviewer software (Malanski et al 2019). There were analyzed 2.000 documents published between 2000 and 2020 and retrieved from the Scopus database. Finally, an analysis of the main indicators of demand, supply and foreign trade in the vegetable market from Romania was performed. Thus, there has been analyzed data from the Food Balances for the period 2015-2018, published by the National Institute of Statistics and from Tempo Online database. After analyzing the data, it has been interpreted into charts and tables in order to offer a better view and understanding of the situation.

Results and Discussion

Quantitative analysis of scientific documents found in the Scopus database - bibliometric analysis performed in VOSviewer. A bibliometric analysis was performed in the field of vegetable market. Thus, approximately 2000 documents from the Scopus database were analyzed (Luo et al 2021). Figure 1 shows the analysis of the collaboration relations between the states.

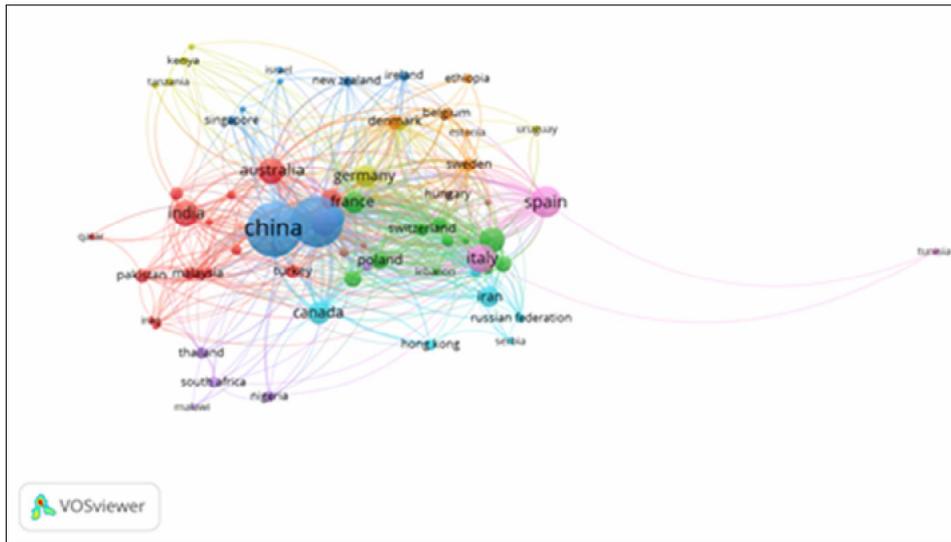


Figure 1. Analysis of the collaboration relations between states (own conceptualization based on data from Scopus).

The analysis was performed for 70 states. Thus, in the first place in terms of the number of collaborative relations between states is China with 49 links and 435 documents published in the field of vegetable market. On the second place is the United States with 51 links and 387 published documents. Figure 2 analyzes the keywords used by the authors in their scientific papers.

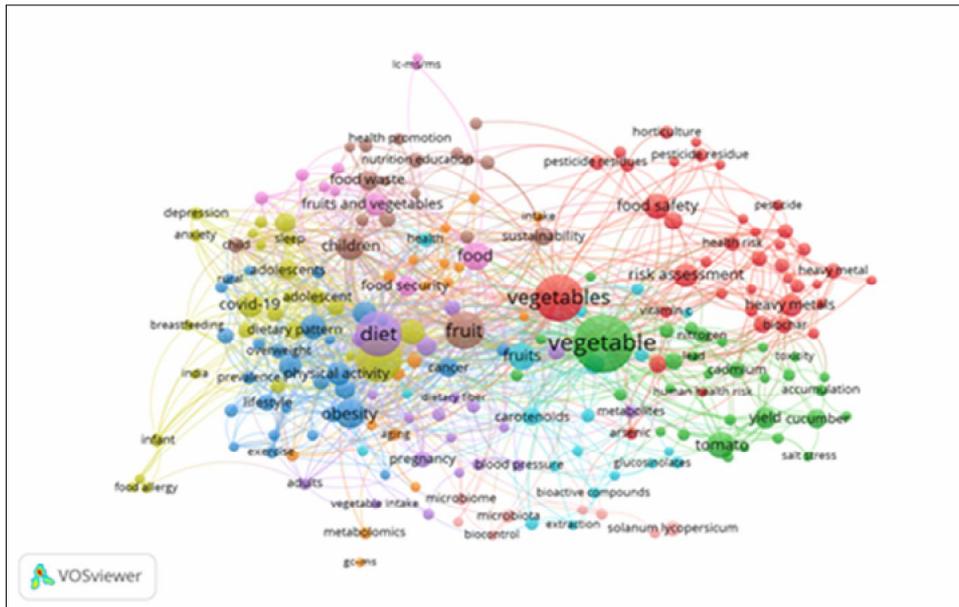


Figure 2. Keyword analysis (own conceptualization based on data from Scopus).

The most commonly used word is vegetables with 147 appearances, followed by diet with 89 appearances, nutrition with 86 appearances, food safety with 29 appearances, food waste with 18 appearances and others.

Analysis of the vegetable supply. The offer on the vegetable market consists of legumes and vegetable products. Figure 3 shows the evolution of the supply of legumes.

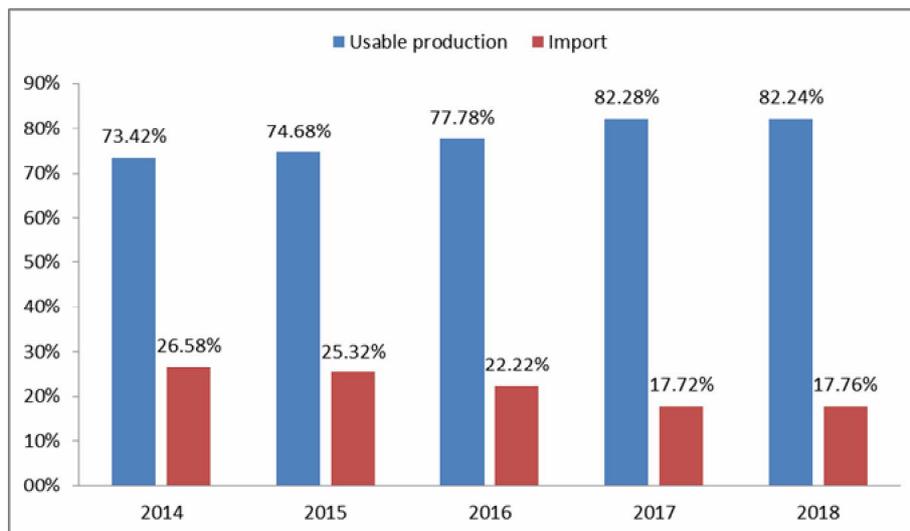


Figure 3. Dynamics of the structure of total resources of peas (tons) (Source: Food Balances, 2015-2018, INS).

According to the Figure 3, in the period 2014-2018 the share of usable vegetable production increased. Therefore, the highest value of usable production (domestic production) was recorded in 2017, respectively 82.28%. Also in the same year there was the highest level of imports of legumes, about 18%.

Figure 4 presents the evolution of the structure of total resources in terms of vegetables and vegetable products.

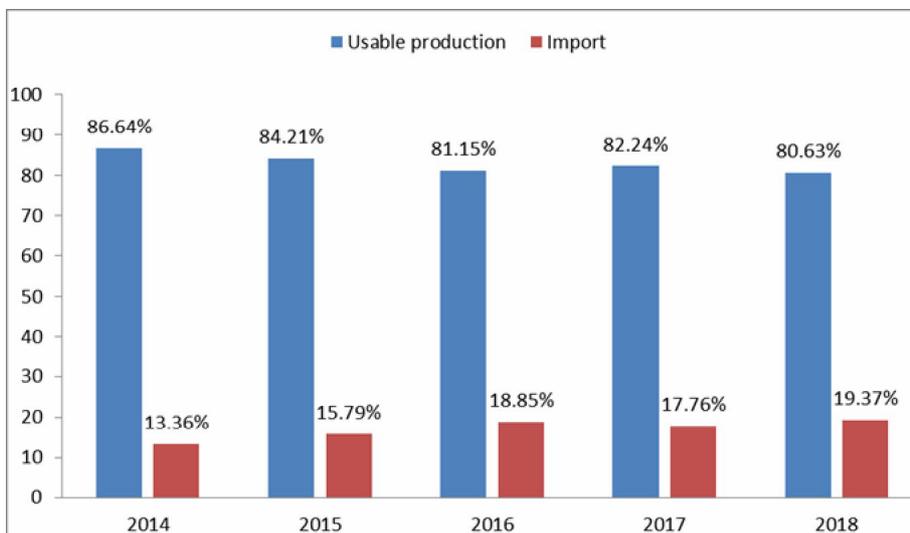


Figure 4. Dynamics of the structure of total resources of vegetables (tons) (Source: Food Balances, 2015-2018, INS).

During the analyzed period, the usable production experienced a downward trend, respectively a decrease of 6 percentage points. On the other hand, imports increased by approximately 5.7 percentage points.

The evolution of the structure of total resources for onions is presented in Figure 5.

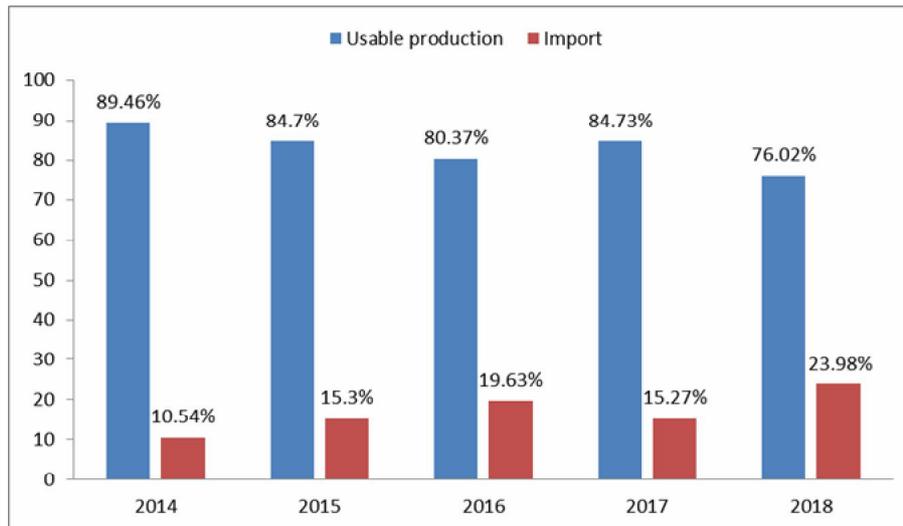


Figure 5. Dynamics of the structure of total resources of onion (tons) (Source: Food Balances, 2015-2018, INS).

During the period under review, usable onion production decreased by 13.4 percentage points, while imports increased by 13.4 percentage points.

Figure 6 shows the dynamics of the structure of total cabbage resources.

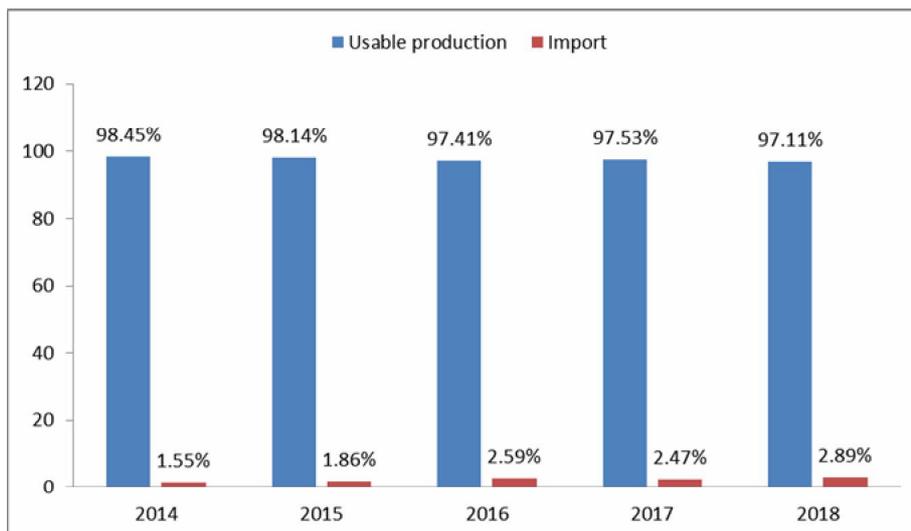


Figure 6. Dynamics of the structure of total resources of cabbage (tons) (Source: Food Balances, 2015-2018, INS).

During the analyzed period, the domestic production of cabbage decreased by 1.3 percentage points, and the import increased by 1.34 percentage points. Thus, cabbage is the vegetable product with the highest rate of self-sufficiency. The evolution of the total resource structure for edible roots is presented in Figure 7.

Roots accounted for the highest share of imports, of all vegetables. In the period 2014-2018, the domestic production of edible roots decreased by 12.9 percentage points. However, imports increased by 12.6 percentage points.

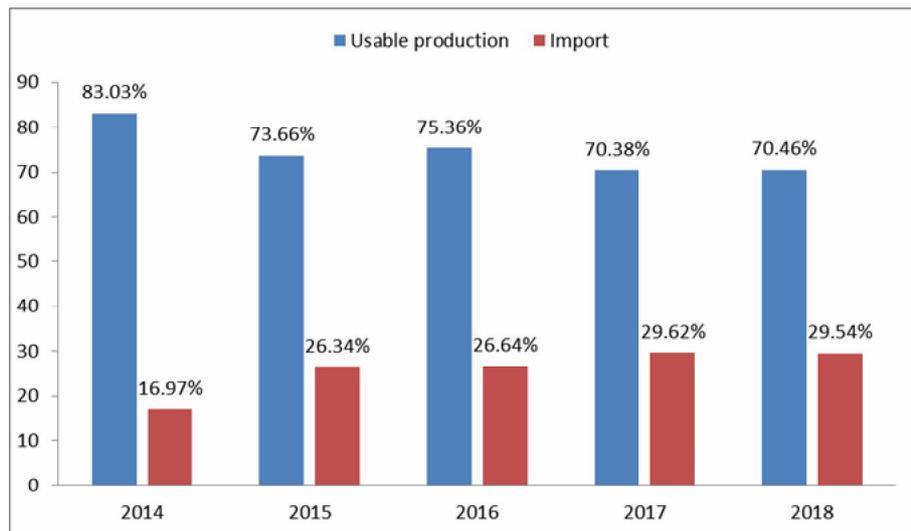


Figure 7. Dynamics of the structure of total resources of roots (tons) (Source: Food Balances, 2015-2018, INS).

Analysis of demand on the vegetable market. In this chapter it will be presented the analysis of the demand characteristic to vegetable market in Romania between 2014-2018. Thus, Table 1 shows the demand for vegetables expressed in lei / person / day.

Table 1
The evolution of the demand for vegetables expressed in lei / person / day

Areas of residence	2014	2015	2016	2017	2018	2018/2014
Urban	19.31	19.04	19.87	22.38	25.56	132.37%
Rural	7.39	7.9	8.66	9.42	11.55	156.29%
Total	26.7	26.94	28.53	31.8	37.11	138.9%

Source: own conceptualization based on data from Tempo Online database.

There is an upward trend in demand for vegetables, both in rural and urban areas. The highest increase in demand for vegetables was recorded in rural areas, respectively 56.29%, being the result of the value registered in the year 2018 vs the value registered in 2014. The highest level of expenditure on vegetables was recorded in 2018.

Next, the dynamics of vegetable consumption expressed in kilograms / inhabitant / year is presented in Table 2.

Table 2
Evolution of vegetable consumption expressed in kg / inhabitant / year

Agro-food products	2014	2015	2016	2017	2018	2018/2014
Legumes	3.1	3.2	2.1	2.4	4.1	132.26%
Fresh vegetable	158	158.5	155.8	162.1	173.5	109.81%
Onion	20.6	21	20.4	19.9	22.7	110.19%
Cabbage	44.1	42.1	41.1	42.6	44.5	100.91%
Root	13.6	14.2	13.5	14.4	15.5	113.97%

Source: own conceptualization based on data from Tempo Online database.

Vegetable consumption expressed in kg / inhabitant / month experienced an upward trend in the period 2014-2018. The highest increase was recorded for legumes, respectively 32.2%, followed by roots with 13.9%, onions with 10.1% and others.

Analysis of foreign trade in the vegetable market. Table 3 presents the evolution of foreign trade on the market for legumes. Trade balance represents the difference in value

between a country's exports and imports. Thus, in the period 2014-2018 the import increased considerably, by 14.75 times. This value represents the report between the export value for the year 2018 vs the import value for the year 2014. The trade balance is negative, except for the period 2014-2015.

Table 3

Evolution of foreign trade on the Romanian market for legumes (tons) during 2014-2018

<i>Legumes</i>	2014	2015	2016	2017	2018	2018/2014
Export	25,835	25,683	28,370	64,966	41,345	160.03%
Import	4,676	3,554	63,023	197,037	69,000	1475.62%
Trade balance	21,159	22,129	-34,653	-132,071	-27,655	-130.7%

Source: own conceptualization based on data from Tempo Online database.

Table 4 highlights the evolution of foreign trade in the market for vegetables and vegetable products.

Table 4

Evolution of foreign trade on the Romanian market for vegetables (tons) during 2014-2018

<i>Vegetable products</i>	2014	2015	2016	2017	2018	2018/2014
Export	76,272	59,837	43,654	54,799	61,842	81.08%
Import	504,306	585,794	669,178	666,344	771,829	153.05%
Trade balance	-428,034	-525,957	-625,524	-611,545	-709,987	165.87%

Source: own conceptualization based on data from Tempo Online database.

Table 4 shows the analysis of foreign trade in the market for vegetables and vegetable products. It is observed that exports decreased by approximately 20%, while imports increased by 53%. These values were obtained by reporting the values of the export, respectively the import from the year of 2018 vs the values for the year 2014. However, the trade balance is negative in all the analyzed years.

Table 5 presents the evolution of foreign trade for onion.

Table 5

Evolution of foreign trade on the Romanian market for onion (tons) during 2014-2018

<i>Onion</i>	2014	2015	2016	2017	2018	2018/2014
Export	2,921	1,663	666	1,368	1,520	52.04%
Import	45,584	63,856	79,396	63,455	110,427	242.25%
Trade balance	-42,663	-62,193	-78,730	-62,087	-108,907	255.27%

Source: own conceptualization based on data from Tempo Online database

It is found that exports decreased by about 50% during the period considered. This value was obtained by reporting the export value for the year 2018 vs the import value for the year 2014. On the other hand, imports doubled during the same period. Thus, the trade balance for onion is negative.

Furthermore, Table 6 presents the evolution of foreign trade for cabbage.

Table 6

Evolution of foreign trade on the Romanian market for cabbage (tons) during 2014-2018

<i>Cabbage</i>	2014	2015	2016	2017	2018	2018/2014
Export	1,617	1,792	1,424	2,061	2,090	129.25%
Import	17,643	20,173	26,426	25,993	31,676	179.54%
Trade balance	-16,026	-18,381	-25,002	-23,932	-29,586	184.61%

Source: own conceptualization based on data from Tempo Online database.

Imports increased by 79% during the period considered, while exports increased by 29%. These values were obtained by reporting the export, respectively import values from the year 2018 vs the values from the year 2014. The trade balance for cabbage is negative.

Table 7 presents the evolution of foreign trade for edible roots.

Table 7

Evolution of foreign trade on the Romanian market for edible roots (tons) during 2014-2018

<i>Edible roots</i>	<i>2014</i>	<i>2015</i>	<i>2016</i>	<i>2017</i>	<i>2018</i>	<i>2018/2014</i>
Export	3,701	1,634	273	565	1,026	27.72%
Import	51,423	81,192	71,672	91,692	97,605	189.81%
Trade balance	-47,722	-79,558	-71,399	-91,127	-96,579	202,37%

Source: own conceptualization based on data from Tempo Online database.

Exports for edible roots decreased by about 72% between 2014-2018. Imports increased by about 90%, which makes the trade balance negative. These values were obtained by reporting the export, respectively import values from the year 2018 vs the values from the year 2014.

Conclusions. This paper analyzed the vegetable market, whose offer consists of legumes and fresh vegetables. The objectives of this paper to (1) analyse the supply, the demand and the foreign trade of the vegetable market in Romania and (2) to highlight the economic trend of this market during the specified period were met. It has been observed that the trade balance is negative for most categories of vegetables, except for legumes in the year 2014 and 2015. Expenditures for vegetables expressed in lei / kg / inhabitant increased by 40% in the period 2014-2018, and consumption for fresh vegetables increased by 9.81 percentage points, while consumption for legumes increased by over 30 percentage points in the same period. Last but not least, through the bibliometric analysis, the scientific interest for the vegetable market, worldwide, was highlighted. Thus, regarding the scientific papers, the countries with the highest interest in the vegetable market are China and USA. On the other hand, one limitation of this study may be that the data was taken from the website of the National Institute of Statistics, while other variables with a significant connotation for the study could have contributed to the study. The results of this research contribute to future studies in this field through the methodological framework that can be easily replicated for any data set.

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Author:

Alexandra Diana Chirescu, Faculty of Agri-food and Environmental Economics, Bucharest University of Economic Studies, Cernisoara Street, number 43, 061013 Bucharest, Romania, e-mail: chirescualexandra18@stud.ase.ro
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