THE ROMANIAN VEGETABLE PROCESSING SECTOR BETWEEN PRODUCTIVITY AND ITS CAPACITY TO ENSURE SELF-SUFFICIENCY

Cornelia ALBOIU[8]

Abstract:

The purpose of this paper is to analyze the evolution of the vegetable processing sector and to calculate several indicators such as number of employees, value of production, gross value added, apparent labor productivity, investment rate and to make some comparisons with other EU countries. According to the representatives of the sector, the market of canned vegetables is not yet very well anchored, although it has an important potential, given that almost half of the canned vegetables are imported. At the same time, farmers complain that lower quality production is wasted as the opportunity to process it is quite limited. There are many vegetables basins that lack the presence of a processing company or processing cooperatives formed by farmers' themselves. The study concludes that the revitalization of the sector requires important investments in processing companies, in new production technologies and processing cooperatives/producer groups.

Keywords: *vegetable processing sector, productivity indicators, investments*

JEL classification: *Q13, Q19*

Introduction

This study analyzes the potential of vegetable processing industry to contribute to local economy development, based on sustainable development criteria, including economic indicators, placing the vegetable processing industry from Romania in a European context. In this sense, we adapted a conceptual analytical model based on Porter's diamond used to evaluate the position of companies, in order to position Romania's vegetable processing industry in a national and European context, with the aim of providing the best development prospects for this sector as well as to make a comparison with the main competitors from the EU.

Creating value added for agricultural products is known as one of the most important managerial operations in local sustainable economic development (Zhang, Li and Min, 2018). In fact, adding value to local agricultural products contributes to the achievement of rural economic development goals, directly by establishing an adequate base for improving job creation and local economy (Barbier, 2007). Some of the most important positive effects of economic development include: 1) ensuring food security, 2) increasing the contribution of exports to GDP and 3) improving the creation of sustainable jobs (Van der Velde, Green, Vanclooster and Clothier, 2007). It is worth

[8] *PhD, Institute of Agricultural Economics, Romanian Academy, Bucharest, Romania, e-mail:*

noting that the development of agro-industries has been known as an important contributor to local economic development. Consequently, the creation of value added can effectively help sustainable development in its economic and social dimensions.

For example, Spain holds a significant share of the world saffron market by developing the domestic packaging industry for this special product (Sanjuán-López & Resano-Ezcaray, 2020). As another example, Germany is a major exporter of natural extracts from horticultural crops through the development of processing industries. However, Germany's domestic production of horticultural crops accounts for about 0.27% of the global production. These economic achievements resulted from the development of the processing industries of local production of raw materials.

Local processing can be an important income and development source for the local community and this can be achieved through investments in processing at local level.

In addition, the lack or insufficiency of modern processing and packaging facilities limits the potential of adding value to the production of vegetables in established vegetable basins. To address these challenges, a series of policies and measures are needed to support the cultivation and processing of fruit and vegetables. These include subsidies to farmers, investments in modern processing and packaging facilities and promoting the processed products on local and world markets.

Some of the constraints to local economic development in the fruit and vegetable processing sector include 1) insufficient infrastructure and supply chain contracting 2) insufficient investments in the processing industry to create value added and 3) poor development of necessary infrastructures for export.

Methodology and Data

To solve these problems, many countries have developed medium and long-term initiatives for financing, establishing the necessary infrastructures for industrial development, creating jobs, expanding exports, reducing taxes and building educational infrastructures, most of which focusing on the development of local agro-processing industries (Ciani et al., 2020).

The paper is based on data sources from Eurostat, the National Institute for Statistics, as well as on the conclusions of some companies from Romania and the EU that conducted research in this field. The main indicators used are the number of companies, average number of employees per company, value of production, gross value added, gross operating surplus, apparent labor productivity, operating profit ratio, investment rate. These indicators were calculated to see where Romania's processing industry is positioned compared to other EU member states that are important competitors for the national fruit and vegetable processing industry. Data from the period 2011-2021 were used to calculate these indicators.

Results

The European imports of processed fruit and vegetables steadily increased from 2017 to 2021. About 26% of the total volume of imports of processed fruits and vegetables come from developing countries. Germany, the Netherlands, France, the United Kingdom, Italy and Belgium are the most important importers and provide the best opportunities for suppliers from developing countries. Covid-19 has not resulted in a lower demand. However, it has increased import prices, due to higher transport charges. The products with the higher potential in 2021 were cashews, peanuts, canned tropical fruit and vegetables, table olives and frozen berries. The products obtained in a sustainable and environment-friendly manner, which support a healthy lifestyle, will have better opportunities to be placed on the European market.

Europe is the largest market in the world for processed fruit and vegetables, absorbing almost half of global deliveries. In the last three years, the European imports of processed fruit and vegetables steadily increased. In 2020 and the first half of the year 2021, the value of imports increased by a higher rate than the average due to the effects of Covid-19 pandemic. Production decline and frequent bottlenecks led to higher prices in certain major groups of products, mainly in those originating from Asia. In 2021, the volume of imports decreased by 3.3. on year. The increase of home consumption and demand for convenient and easy-to-prepare vegan foods are the main drivers of market growth.

The market of preserved products ready for retail sale is limited in the European Union. Almost 80% of this category of products is produced and marketed in Europe, mostly by large multinational companies. Only 23% of preserved fruit and vegetables come from developing countries. Germany, France, the United Kingdom and the Netherlands together account for 55% of all imports in this segment. Poland and Belgium are the fastest growing markets, with average annual growth rates of 9% and 6% respectively. The products with the fastest import growth rates in the last five years were pickled cucumbers (6.4% annual rate), Agaricus mushrooms (5.4%), shell beans (3.4%) and mixed vegetables (2.9%). There are better opportunities for the products that can be supplied in bulk packaging (such as cans) than for products ready for retail sale, as there is less competition for bulk products.

In the EU, the value of processed fruit and vegetables amounted to 51.5 billion EUR, or 6.5 % of the total value of food industry production. Fruit and vegetable processing take place across the EU, but five member countries were responsible for over two-thirds (69.1 %) of total production value in 2021; these were Italy (22.3 %), Spain (15.1 %), Germany (11.8 %), France (10.2 %) and the United Kingdom (9.8 %), which shows quite a high concentration.

In addition to being consumed directly and traded as raw commodities, fruit and vegetables are also processed into a wide range of food products. These can be grouped into frozen, dried and preserved fruit and vegetables (canned vegetables, jams, fruit jellies and dry fruits) (72.5 % of sold production), juices (19.6 %), tomato ketchup (3.2 %), fruit and vegetable preparations (4.1 %) and dehydrated group of dried fruits and homogenized fruit and vegetables (1.3 %).

As regards the specific products, the highest production values were for non-concentrated orange juice (frozen exclusively) accounting for 4.2 % of total processed fruit and vegetables, followed by tomato ketchup (3.2 %) and apple juice (2.9 %).

Overall, the EU was a net importer of processed fruit and vegetables, but some member states had trade surpluses, including Spain and Italy.

In Romania, according to an analysis **conducted by KeysFin** in 2020, the turnover of fruit and vegetables increased by 17.4% compared to 2019 and reached a historic maximum of 24.4 billion

RON. By sub-segments, trade recorded the highest increase, by 19%, with a turnover of 20.8 billion RON, the processing activity was up by 12% (1.4 billion RON turnover), while the turnover of fruit and vegetable producers increased by 5% from 2019, to 2.1 billion RON in 2020. For the next years, the above-mentioned study estimated a continuation of the increasing trend that began in 2014, to reach a record level of 28 billion RON as a result of increasing consumption, as well as of inflationary pressures of about 10% in 2020 and 2021.

Value of fruit and vegetable processing industry

The production value of the fruit and vegetable processing industry had an increasing evolution from 2011 to 2020, with a +36.6% growth rate compared to 2011 and annual growth rates of about +4% compared to 2019 and 2020. However, compared to the other member states with which the comparison was made, Romania has the lowest production value, half of that of Hungary and 10 times lower than the value of production from the fruit and vegetable processing factories in Poland. This denotes the need to improve the valorization of production in Romania and the use of the growth potential provided by the production of raw materials and by the growing demand of the population.

Table 1

Value of production in the fruit and vegetable industry 2011-2020, compared to other EU member states

	2011	2015	2016	2017	2018	2019	2020	2020/ 2011 dynamics	2020/2015 dynamics
Italy	9,927.9	10,529.1	10,745.7	11,450.8	11,774.0	11,861.9	12,579.2	26.7	19.5
Hungary	712.6	749.6	850.1	926.9	848.0	849.9	921.3	29.3	22.9
Poland	3,467.9	3,979.5	4,117.9	4,451.2	4,568.6	4,550.3	4,597.9	32.6	15.5
Romania	**332.9**	**437.1**	**369.1**	**436.1**	**457.4**	**406.0**	**454.7**	**36.6**	**4.0**
France	7,076.4	7,187.8	7,399.9	7,422.3	:	8,266.9	7,928.0	12.0	10.3

Source: author's calculations based on Statistics Eurostat (europa.eu) data

Evolution of the number of enterprises

According to Eurostat data, in the year there were 818 registered enterprises for the processing and preservation of fruit and vegetables, with a turnover of 199 million EUR, with 1794 employees, which obtained a profit of 16.7 million EUR. This places Romania at half the number of enterprises in Italy, Poland and France, but above the number of enterprises in Hungary. The top five enterprises cumulated 40% of the turnover in the subsector and accounted for 32% of employees,

obtaining 52% of profit, in other words the top five enterprises covered almost half of the fruit and vegetable processing sector.

Table 2

Number of enterprises in the fruit and vegetable processing industry

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020/ 2011 dynamics	2020/ 2015 dynamics
Italia	**1,788**	**1,738**	**1,778**	**1,753**	**1,726**	**1,775**	**1,768**	**1,741**	**1,646**	**1,749**	**-2.2**	**1.3**
Hungary	**534**	**533**	**515**	**536**	**544**	**559**	**578**	**554**	**534**	**537**	**0.6**	**-1.3**
Poland	**952**	**1,050**	**928**	**976**	**1,085**	**1,127**	**1,220**	**1,472**	**1,435**	**1,416**	**48.7**	**30.5**
Romania	**249**	**266**	**284**	**319**	**365**	**411**	**478**	**619**	**682**	**818**	**228.5**	**124.1**
France	**1,176**	**1,235**	**1,361**	**1,397**	**1,282**	**1,388**	**2,550**	**1,447**	**1,593**	**1,689**	**43.6**	**31.7**

Source: author's calculations based on Statistics Eurostat (europa.eu) data

The distribution by sub-segments reveals a relatively balanced market: thus, 43% of companies were active in trade, in primary production respectively, and the rest in fruit and vegetable processing.

The number of enterprises in the category *Processing and preservation of fruit and vegetables* increased each year in the analyzed period, also as a result of the development of units that manufacture perishable food preparations from fruits and vegetables (such as salads, peeled or cut vegetables) also included in this category. On the other hand, the average number of employees per enterprise decreased, which suggests that many newly-established enterprises are smaller in size. Comparatively, Romania has the lowest number of employees, i.e. 7.5 employees / enterprise, less by half compared to the other analyzed countries.

At the same time, an analysis of the sector made by Finkeys reveals that the number of employees increased by 1.9% compared to 2019, and was by 21% above the level of 2016, to reach 27.5 thousand employees in the entire sector in 2020. Thus, the labor force in the trade and processing sector increased by 7% in each segment, reaching 15.7 thousand employees and 4.3 thousand employees respectively in 2020, while primary producers had by 10% fewer employees than in 2019, respectively 7.5 thousand in 2020.

Table 3

Number of employees per processing enterprise

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020/2011 dynamics	2020/2015 dynamics
Italy	16.5	16.3	16.3	16.9	17.3	17.7	18.6	19.3	20.9	20.8	26.1	20.2
Hungary	14.6	14.8	15.0	15.1	15.0	15.1	15.3	15.6	15.6	15.7	7.5	4.7
Poland	34.3	31.4	34.1	33.0	30.3	30.9	29.6	26.8	27.8	28.2	-17.8	-6.9
Romania	22.7	20.7	19.3	17.2	15.8	11.9	10.7	8.8	8.5	7.5	-67.0	-52.5
France	21.4	19.3	18.2	16.5	19.7	18.4	10.4	19.0	17.3	16.6	-22.4	-15.7

Source: author's calculations based on Statistics Eurostat (europa.eu) data

The number of employees per enterprise in the fruit and vegetable processing industry had a negative trend in the period 2011-2020, with the largest decrease compared to the other analyzed countries (-67% as compared to 2011 and -52% as compared to 2015). The processing industry in Romania also had the lowest number of employees per enterprise, which denotes that most enterprises are small-sized in terms of number of employees.

Apparent labor productivity

The apparent labor productivity is calculated as ratio of gross value added to the number of employees. Labor productivity in the fruit and vegetable processing industry is the lowest compared to the analyzed countries, even though in the last 10 years an important growth rate was noticed, higher than that of Italy and France, for instance (by +36% compared to 2011 and 26% compared to 2015), Table 4. The apparent labor productivity in the fruit and vegetable processing and preservation industry is three times lower in Romania than in France and almost twice lower than in Poland, but the investment rate and the operating profit rate have comparable values (even higher, but we should not forget that the gross value added is lower in Romania).

Table 4

Apparent labor productivity, thousand EUR

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020/2011 dynamics	2020/2015 dynamics
Italy	56.8	49.4	53.6	57.1	58.8	61.6	60.7	61.1	61.2	60.7	6.9	3.2
Hungary	19.5	18.9	20.1	21.8	20.2	21.8	21.6	22.7	23.5	27.3	40.0	35.1
Poland	23.0	23.7	23.7	24.4	26.6	25.6	26.2	30.5	32.1	33.1	43.9	24.4
Romania	**13.0**	**14.4**	**15.1**	**14.3**	**14.0**	**12.7**	**16.4**	**15.5**	**16.3**	**17.7**	**36.2**	**26.4**
France	56.9	59.9	58.8	63.0	64.3	61.2	63.7	:	69.6	67.7	19.0	5.3

Source: author's calculations based on Statistics Eurostat (europa.eu) data

Gross value added per employee in the fruit and vegetable processing industry

Although the gross value added had an increasing evolution in the investigated period, this remains far below the values of France and Italy, and even compared to Poland and Hungary. This is due to insufficient production capacities and to the fact that very small amounts of vegetables intended for processing are produced in Romania, processing being based on semi-processed imported products (from the Asian area inclusively). According to the representatives of the Interprofessional Fruit and Vegetable Organization, less than half of the raw materials grown in Romania are destined to processing factories. Although there are no official data on the degree of coverage of the processing capacity from the food industry, according to the representatives of the sector, this is 60-70% in summer and below 40% in winter, the largest deficit being found in tomatoes for processing. Romania covers only 10% of the sales of tomato paste and *zacusca* (vegetable stew), as against 60-70% in the 1990s. As China benefits from the advantage of large productions and cheap labor, it massively exports tomato paste in Romania, generally of poor quality, according to the statements of the representatives of the sector. The total fruit and vegetable processing capacity is approximately 160,000 tons/year (ProdCom

Interprofessional Fruit and Vegetable Organization). Tomato paste, vegetable hotchpotch, soup vegetables and frozen vegetables have the highest share in the vegetable processing sector.

Investment rate

The investment rate calculated as ratio of investment value to value added to the cost of factors. This ratio refers to the investments of enterprises in fixed assets (buildings, equipment, etc.) to the value added created during the production process. For this indicator, the enterprises in the fruit and vegetable processing sector had a very good dynamics, with a 90% growth rate in the period 2020/2015, the highest among the other analyzed countries. This reveals a position of confidence regarding the possibility of business development in this field and adaptation to market requirements.

Table 5

Investment rate, percentages

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020/2011 dynamics	2020/2015 dynamics
Italy	**26.0**	**48.0**	**23.7**	**30.4**	**23.2**	**24.4**	**25.3**	**27.4**	**28.1**	**22.2**	**-14.6**	**-4.3**
Hungary	**21.3**	**22.1**	**21.4**	**29.0**	**28.9**	**22.1**	**27.3**	**31.6**	**33.5**	**30.7**	**44.1**	**6.2**
Poland	**22.2**	**25.0**	**27.1**	**27.5**	**25.5**	**25.9**	**25.2**	**21.8**	**25.1**	**21.2**	**-4.5**	**-16.9**
Romania	**36.4**	**29.6**	**28.6**	**39.3**	**24.7**	**34.4**	**39.9**	**28.1**	**44.6**	**47.9**	**31.6**	**93.9**
France	**27.4**	**19.1**	**25.7**	**19.7**	**22.7**	**18.7**	**23.3**	**:**	**20.0**	**22.4**	**-18.2**	**-1.3**

Source: author's calculations based on Statistics |Eurostat (europa.eu) data

As regards the production capacity, as very small quantities of vegetables intended for processing are produced in Romania, processing is based on semi-processed products from import (from the Asian area inclusively). According to the representatives of the Interprofessional Fruit and Vegetable Organization, less than half of the raw material grown in Romania is destined to processing factories. Although there are no official data on the degree of coverage of the processing capacity from the food industry, according to the representatives of the sector, this is 60-70% in summer and below 40% in winter, the largest deficit being found in tomatoes for processing. Romania covers only 10% of the sales of tomato paste and *zacusca* (vegetable stew), as against 60-70% in the 1990s. As China benefits from the advantage of large productions and cheap labor, it massively exports tomato paste in Romania, generally of poor quality, according to the statements of the representatives of the sector. The total fruit and vegetable processing capacity is approximately 160,000 tons/year (ProdCom Interprofessional Fruit and Vegetable Organization). Tomato paste, vegetable hotchpotch, soup vegetables and frozen vegetables have the highest share in the vegetable processing sector.

Romania is a net importer of processed products, the Romanian processing factories only partially covering their need for raw materials from domestic production. In 2019, the processing and preservation of fruit and vegetables represented a low percentage of the value added of the food sector, of about 3%, by sectors such as meat and meat products, flour products and dairy. The distribution of fruit and vegetables also represents a very low percentage of the gross value added of the food sector, i.e. 5%. Consumer services account for around 1%. This denotes a sector where the formation of value added on the food chain is very low and unbalanced and highlights the need for chain reorganization. Therefore, the supply of fresh and processed fruit and vegetables has quite a low value added, mainly due to the poor organization of producers (under 1% degree of association, compared to 45% the EU average, or over 100% in the Netherlands,

which has producer organizations, association of producer organizations and cross-border cooperatives) (Alboiu, 2022).

The processing industry representatives claim that "the market of canned fruit and vegetables in Romania is not very well crystallized, although its potential is significant, taking into account that almost half of the canned fruit and vegetables are produced outside the country". The strength of the most important producers in the processing industry is that they produce their own raw material or they have concluded firm, long-term contracts with farmers from Romania; these contracts also include their financial support (for the purchase of inputs), a model that is followed by the most important companies (Alexandri C, Luca L, Ionel I, Leonte J., 2023).

The lack of temperature controlled warehouses in the proximity of vegetable basins, as well as of processing centers or the insufficiency of packaging for transport put pressure on local producers, who have to sell their production immediately after harvesting. At the same time, farmers consider that they can no longer bear the increased costs of energy and fertilizers, whether they produce vegetables intended for fresh consumption or for processing. This adds to other uncertainties, such as climate change, problems related to workforce, difficulties in maintaining contractual relations and in understanding the functioning of the EU common market organization by the Romanian fruit and vegetable sector at a level similar to that in the other EU member states.

Conclusions

In Romania, the processing industry has significantly grown in recent years, although it still does not have the full ability to adapt to the market, and is not fully anchored yet to primary producers' needs, on the one hand, and to consumers' demand, on the other hand.

The gross value added per employee in the fruit and vegetable processing industry has relatively good growth rates compared to the countries with which the comparison was made (Italy and France), yet slightly below that of Hungary.

An important increase has been also noted in the investment rate in recent years, which reveals the industry's potential for growth and adaptation to the market.

Production value continues to remain at a low level compared to the other four analyzed countries, up to ten times lower in 2020 compared to Poland, for example. This denotes the need to improve production valorization in Romania and the use of the growth potential offered both by the production of raw materials and the increasing demand of the population.

In conclusion, important investments are needed to reach the objective of this industry to contribute to local development and for a better valorization of local raw materials. The National Strategic Plan provides such opportunities, and the investments in off-farm conditioning, storage and processing of agricultural and horticultural products is one of the measures of the National Strategic Plan that will contribute to the consolidation of enterprises in food industry, by providing non-refundable public support for modernization investment projects of up to 3 million EUR per project (this value can increase up to 7 million EUR in the case of projects for setting up processing companies and even 10 million ER for the new investments in fruit and vegetable processing.

Bibliography

Van der Velde M. et al. (2007). Sustainable development in small island developing states: Agricultural intensification, economic development and freshwater resources on the coral atoll of Tongatapu, Ecological Economics, 61, (2-3).

Ciani A. et al. (2020). Large Firms Make Distinct Contributions to Development Making It Big: Why Developing Countries Need More Large Firms

Barbier E.B. (2007). Frontiers and sustainable economic development, Environmental and Resource Economics

Luca, L., Alexandri C., Ionel I., Leonte M.J.C (2023). Securitatea alimentară, ca element al politicii agricole comune și agriculturii României în context european. Provocări 2023-2027

*** Towards a Greener Europe: how preserved fruit and vegetables help to sustain

our food supply , https://profel-europe.eu/product-advantages/sustainability/

*** The fruit and vegetable sector in the EU - a statistical overview https://ec.europa.eu/eurostat/statistics-explained/index.php?title=The_fruit_and_vegetable_sector_in_the_EU_-_a_statistical_overview

*** Institutul National de Statistică, Bilanțuri Alimentare