



# Energy crops, the edible oil processing industry and land use paradigms in Romania—An economic analysis



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## ABSTRACT

The purpose of this research is to explore the issue of the land used for sunflower and its production as raw material for edible oil processing industry in Romania. The relations between consumption, as main component of demand, and production and import, as sources of supply, on the sunflower oil market are investigated. The case study of the edible oil market is discussed because of the alarming growth in imports after Romania's accession to the European Union and, furthermore, because of sunflower crop implications on land use in the context of the food vs. fuel competition. The research answers the issue of the factorial relations between sunflower oil production, import and consumption, as well as the issue of the extent to which the consumption requirements can be met by domestic production. In pursuing this, data regarding the sunflower oil consumption, production and import are computed to investigate their interdependence, using the regression model. The main findings reveal that a one-unit increase in sunflower oil consumption leads to a growth of 0.13 units in oil production, and of 0.19 in oil imports, respectively. The relevance of this study lies in its capacity to lead to better understanding of the interdependence among sunflower oil consumption, production and import, in predicting them, and, furthermore, in identifying investment opportunities in the Romanian sunflower oil processing industry, given the significant potential of sunflower seeds production of this country.

## 1. Introduction

Romania is one of the main producers of sunflower seeds and oil in the world. As [FAO \(2010, p.11\)](#) reports show, the Russian Federation, Ukraine and Argentina are the main world producers of sunflower seed and sunflower by-products, as well as suppliers to the global market. This ranking has changed since 2010; in 2014 two other main producers were acknowledged: Romania and China (data provided by [FAO, 2017](#)). Argentina, Ukraine and the Russian Federation accounted for 52 percent of the world production of sunflower and 40 percent of world exports of sunflower seeds, in 2010 ([FAO, 2010, p.14](#)). In 2014, the top five world producers rank Ukraine, the Russian Federation, China, Romania and Argentina, their sunflower seed production accounting for 61 percent of the world production. The fact that changes in the market situation of one of these countries have a great influence on the market situation in the other four countries, and affects the world market of sunflower seeds and sunflower by-products as well, leads to the need to investigate the areas cultivated with sunflower and edible oil market in Romania.

The edible oil processing industry in Romania plays a key role not

only on the world market, but also in the national economy. The food industry, in general, and the oil processing industry in particular, both play key roles within the Romanian economy. Food industry accounts for 9.8 percent of the total value of the industrial production ([NIS, 2015a](#)). 1129.8 thousand people work in manufacturing, out of which 14 percent are employed in food manufacturing ([NIS, 2015b](#)). The meat and meat product processing industry generated, in 2014, 32 percent of the total gross added value of the food industry, followed by bread and bakery industry with 27 percent, other industrial products with 11 percent, and milk and dairy products with 10.3 percent. The edible vegetal and animal oil generated, in the same year, a gross added value of 106 million euros, accounting for 7 percent of the total gross added value of the food industry in Romania ([NIS, 2015a](#)).

The sector of processing oilseeds holds a significant position within the food industry, accounting for about 8 percent of the total food production. Starting with the financial crisis of 2008–2009, the sector has been affected by dramatic restructuring processes and therewith higher levels of productivity have been recorded. This situation has manifested itself in decreasing the number of both processing units and employees, while the value of production remained the same ([Turek](#)

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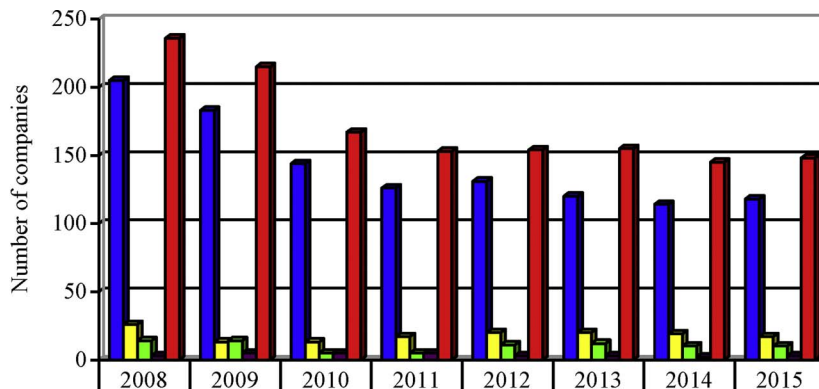


Fig. 1. Trends in the number of companies of vegetal oil and fat processing industry. Source: authors' own computation based on the NIS (2017)

	2008	2009	2010	2011	2012	2013	2014	2015
0-9 employees	205	183	144	126	131	120	114	118
10-49 employees	26	13	13	17	20	20	19	17
50-249 employees	14	14	5	5	11	12	10	10
over 250 employees	3	5	5	5	3	3	2	3
Total	236	215	167	153	154	155	145	148

Rahoveanu et al., 2015). The results are consistent with those found in FAO report (2010) showing that the global financial crisis seriously affected oilseed farmers, traders and processors through lower liquidity and increased cost of financing. As with many other commodity markets, the price of sunflower seed reached a peak in 2008 due to a poor sunflower seed crop in 2007 and overall global agricultural commodity price increased. The vegetal and animal edible oil industry accounts for 10.38 percent of the total turnover and 2.04 of the total number of employees in the food industry (NIS, 2017).

Data in Fig. 1 show the number of economic agents active in the vegetal oil and fat processing industry in Romania. The majority of companies are small businesses of up to nine employees (80 percent). The number of large companies increased to five in 2009–2011, and then it dropped to three, in 2015. In 2008, the number of companies was 236, down from 11027, in 2002, and it dramatically dropped to 148, in 2015. This fall in the number of companies was caused, in the early nineties, by state property privatization and fragmentation, and, after that, by numerous mergers and absorptions.

The top five companies of the oilseed processing industry in Romania account for 90 percent of the total revenues in this sector. In 2014, 2933 people worked in the oilseed processing industry. Data in Table 1 show the high level of sunflower oilseed processing activities concentration for five major market players.

Observing the alarmingly increasing trend of sunflower imports to Romania, despite the existing capability of covering consumption needs by the domestic sunflower oil production, the dependence relation among consumption, production and import is analysed in this paper, thus trying to answer the research questions on the inter-dependencies among production, import and consumption, and on the extent to which consumption can be satisfied by domestic production. Therefore, the objectives of this study are to identify the causes of sunflower oil

imports increase and to estimate the impacts of production and import on consumption. The final goal of the research is to identify whether there are opportunities for investment in sunflower oil industry, considering the high potential of sunflower seed production in Romania.

In the first part of the paper, a study of the existing approaches in the literature review, with particular attention to various approaches to regression analysis, is presented. In the second part, the methodology is described and the levels of sunflower oil production, consumption, imports and exports are presented. In the third part of the paper, the relations between consumption, production and import are investigated using the regression model, trying to identify the impact of production, on the one hand, and import, on the other hand, on changes in consumption. In the fourth part of the paper, the results are discussed in relation to the findings of other authors. For a detailed picture of the oilseed processing industry, upward stream analyses of the areas harvested, yields and total production of sunflower seeds have been carried out. Finally, consistent conclusions are drawn.

## 2. Literature review and study hypotheses

Literature has provided several conceptual and analytical models to better understand the relations among consumption, production and import (Hassouneh et al., 2012; Nazlioglu and Soytaş, 2011; Chen et al., 2012; Chen and Han, 2015; Andrei et al., 2016a,b). They have investigated the relations between import and consumption in different regions. Frone et al. (2010) analysed the level and intensity of the cause-effect dependences between consumption of food and prices. Radman-Funarić (2013) estimated the relations between the amount of production, imports, exports and the availability of electricity to its final consumption in Croatia, by applying the regression model. Econometric analysis of trade, exports, imports, and consumption were studied by Al-mulali and Sheau-Ting (2014). Amano and Wirjanto (1996) examined the importance of intertemporal substitution in the US import consumption using a model of permanent income that allowed for random preference shocks and additive separability of a utility function. Soderbery (2015) estimated the import supply and demand elasticity; Olper et al. (2014) discussed the import competition and productivity growth in the food industry in the European Union countries and found out that the European Union food imports were closer substitutes for domestic production than non-EU imports. Angus et al. (2009) investigated the demand for and supply of agricultural commodities, and the characteristics of the farming and food industries and

Table 1

Top five market players in vegetal oil and fat processing industry, in Romania. Source: authors' own computation based on the National Agency of Fiscal Administration.

Turnover (million euros)	Market share 2014 (%)
283.05	30.19
247.21	26.37
167.79	17.09
51.42	5.49
39.7	4.23

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