

Factors of the Development of Oilseed Rape Production in Poland on the Background of the World

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Abstract—The aim of the study was to investigate and evaluate the development factors of farms engaged in oilseed rape production in the world. The authors used secondary data from Rape Market. First of all the authors described the economic conditions of the development of oilseed rape production in the world. Second, we described the structure of oilseed production in the world and the level of production in the world. The authors used descriptive, tabular and graph methods to analyze the changes. The analysis proved that the market of oilseed rape production is developing well in the world.

Index Terms—oilseed rape, market, world

I. INTRODUCTION

Harvesting of rape is one of the most important lines of plant production in Poland. Vegetable fats are used extensively in the food industry as edible oil, margarine and butter. They are also used for confectionery and preserves. In a society with a view toward rational eating habits, consumption of vegetable oils is increasing. There is also increasing demand for oil and oil cake meal as high protein fodder with content in animal nutrition, particularly in relation to the ban in many countries of meat and bone meal [1].

Vegetable oils are also widely used for technical purposes, including the production of soaps, laundry detergents, paints and oils. However, the most important recent development has been processing rape esters for use as biofuel. In the season 2000-01 the EU processed more than 1 million tons of rapeseed oil, while in 2012 it reached 5.4 million tons. The growing biofuel industry has increased the demand for oilseed and at least 10% of liquid fuels should be bio-components by 2020, while the food demand for oil has remained relatively stable, averaging 2.6-3.3 million tons [1]. In Poland in 2013 the rate was 7.1%. In 2012, we processed 600,000t of esters

from rapeseed oil. The role of rape in the domestic food sector is stable and is approx. 1 million tons per year [1]. Undoubtedly, the worldwide role of oilseeds increases. In this century the world harvest of oilseeds has increased every year. This increase is due to greater demand for both food and renewable energy. The world's most important oil plant is the soybean, which is fourth in growing area in the world after wheat, rice and corn. The popularity of this oil crops is because it is such a valuable source of protein, its production costs are low, and the genetically modified varieties are resistant to pests. [2], [3].

Bearing in mind the dynamic development of the market for oilseed rape in the world, this article discusses factors having an impact on the development of oilseed rape production.

II. AGRICULTURE DEVELOPMENT IN THE HISTORY OF ECONOMIC THOUGHT

An important early theory of the economic role of the agricultural sector was Physiocracy [3]. The Physiocrats professed that the laws of nature govern economic laws and only agriculture produced an economic surplus above expenditures. The very notion of a quasi-pension is interpreted differently by economists. Most often these are defined as investment income, and are treated as constant in the short run [4], [5]. This meant that only agriculture generates revenue [6], [7].

There are natural laws, and man recognizes them and seeks to observe and to respect them. These rights remain the foundation of a market economy. Today, we call the laws of nature economic laws [8].

Another trend in the history of economic thought, which advocated changes in agriculture and land market development was agrarianism. This school of theory encouraged state intervention to help promote the development of agriculture [9].

Adam Smith studied the sources of land rent and proved that the most important source is the work of farm

laborers, wages and rent paid for the use of land. Human nature includes: selfishness, rationality of action and the propensity to exchange, trade [10].

In his book, "The Wealth of Nations" Smith also raised issues of pension, which is treated as a residual surplus, determined by the price. The pension also stems from the fertility and location of the plot. Economic progress causes an increase in cash annuities, both real and as a share of national income.

Ricardo's theory is very unusual because it describes the agricultural pension and does not consider the alternative use land. Ricardian theory, assumed the existence of differential rent and absolute defined pension [10], [11]. Capital and labor may displace one another, but the land has the same application.

Ricardo argued that the land rent can be taxed, which can be used to eliminate pension increase. John Stuart Mill also advocated this solution, which in turn contributed to the association for Land Reform in the UK. It was Mill that proposed to tax the pension increase. He believed that the sphere of manufacturing economics can be explained by analyzing rational decisions.

This article is organized as follows. First, the authors discuss land management in the history of economic thought. Then we present the data and analysis. The purpose is to estimate the factors influencing development of oilseed production. The next part of the paper describes the macroeconomic factors, particularly worldwide oilseed rape production. At the end the authors present conclusions.

III. MATERIALS AND METHODS

The aim of this study is to investigate the factors of the development of oilseed rape production in the world. For a thorough analysis of the situation of the cultivation of rape, the authors sought answers to the following questions:

- 1) What external factors contribute to the development of the rapeseed market in the world and what hinders this development?
- 2) What are the prices of oilseed rape in Poland?

The study used a comparative method. Tabular and descriptive methods were used to analyze the results.

The subjects of the study were the characteristics of development of oilseed rape production in the world.

IV. DEVELOPMENT OF OILSEED MARKET IN POLAND

The main Polish oil plant is rape, which suits the country's climatic and soil conditions. Its share of oilseeds is estimated at 97% in Poland. Spring oilseed rape, which has lower yields, is planted because of high losses of winter rape. Other oilseeds, such as sunflower, soybean, poppy, and mustard are also grown, but, not on a large scale [12]-[14]. In terms of area planted to oilseed rape, Poland ranks third among European countries, behind France and Germany. The rapeseed harvest is in fourth place in Europe. Poland has a 11% share of EU rapeseed production of and 9% of the production of

rapeseed oil and meal [1]. The development of rape production depends mainly on its cost-effectiveness relative to cereals. In recent years the area of rape in Poland has increased. The largest acreage was recorded in 2013 in the following provinces: Dolnośląskie (130.7 thous. ha), Wielkopolskie (117.6 thous. ha), Kujawsko-pomorskie (115.3 thous. ha), Zachodniopomorskie (82.6 thous. ha), Dolnośląskie (75.7 thous. ha), Warmińsko-Mazurskie (75.7 thous. ha), Lubelskie (71.4 thous. ha) and Mazowieckie (39 thous. ha). These provinces are in northern and western Poland [13].

The information presented in Table I show that the area of rapeseed production increased in the years 2007-2015 (17%). This was the effect of increasing demand for rapeseed in nutrition, petrochemical and the fodder industry.

TABLE I. ACREAGE, YIELDS AND HARVEST OF RAPESEED IN POLAND

| Years | Acreage in thousand hectares | Yields in dt/ha | Harvest in thousand tones |
|-------|------------------------------|-----------------|---------------------------|
| 2007 | 796,6 | 26,7 | 2129,8 |
| 2008 | 771,7 | 27,3 | 2105,8 |
| 2009 | 810,0 | 30,8 | 2496,8 |
| 2010 | 946,1 | 23,6 | 2228,7 |
| 2011 | 830,1 | 22,4 | 1861,8 |
| 2012 | 720,3 | 25,9 | 1865,5 |
| 2013 | 920,7 | 29,1 | 2677,7 |
| 2014 | 951,1 | 34,4 | 3275,8 |

The level of yields is another factor influencing the harvest and production of rape, since it increases steadily [14]. Moreover, the yields of rapeseed increased in the 2007-2014 from 26,7 dt/ha to 34,4 dt/ha. Harvest of rapeseed also increased from 2129,8 thousand tons in 2007 to 3275,8 thousand tones in 2014.

Other causes of the development of the rapeseed market in Poland, in Europe, and in the world are the level of prices and the relationship between rapeseed and wheat prices. The analysis conducted by one of the authors shows that despite the increase in the price of rapeseed acreage, the crop still remains competitive with cereals [15].

Most of the prices of rapeseed increased in the analyzed period. Rapeseed prices on the Polish market depend on the prices on the German market and worldwide. Poland is a member of the global trading system and therefore prices depend on the Polish market price changes on global markets.

The information presented in Fig. 1 shows that the prices of rape were characterized by high volatility, which had a negative impact on farm incomes. The price risk in rape crop is very high, although generally more periods in the past decade has been driven by an increase in prices of rape than its decline. Over the last ten years the most detrimental effects on the market price of rape occurred in 2008-2009 and 2012-2013. The fall in prices of rape Poland should be seen in the increased harvest of rape and turnip rape 2105.8 thousand. tonnes in 2008 to 2496.8 thousand. tonnes in 2009 (an increase of 18.6%).

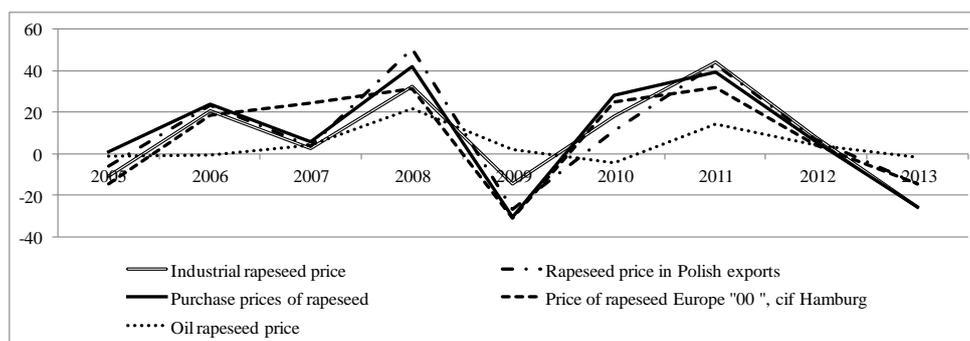


Figure 1. Rapeseed price changes coefficient in the years 2004-2013

An important factor in the development of the oilseed-rape market in Poland is the state of oil industry. The fatty industry's competitiveness depends on many factors, including the sources of financing, and financial costs or volatility of rapeseed prices [16].

Rape is also an important raw material for biofuel production, and competition for agricultural raw materials between the food and biofuel industries will affect the profitability of Poland's rapeseed production [17].

According to Franciszek Kapusta [18], the strengthening role of rape is mainly due to the increased share in the crop acreage from 3.5% in 2000 to 10.9% in 2013 and the increased share of oilseed rape in all oilseeds from 97.8% in 2000 to 99.1% in 2013.

The rapeseed deal had an important role in the development of rapeseed market prices. The entry into the Common Agricultural Policy (CAP) regulated the level of prices of agricultural products. Countries belonging to the European Union (EU) all have the same tools to stabilize prices of agricultural products and also the same tariffs relative to non-member countries, which means that the price differences between countries should progressively disappear [19]. The price developments in the market of oilseed rape were particularly important. The increase in demand in the last decade resulted from the increased use of this raw material in the petrochemical industry and for feed. The increase in demand for oilseed rape has caused rising prices and increased crop acreage. After the Polish integration with the EU, the share of oilseed rape acreage grew from 4 to 9%. In addition, since 2004 there has been almost a doubling of yields [20], [21]. The rapid rapeseed production growth caused a fall in rapeseed prices in 2013. The decline in prices in 2014 was further influenced by low world prices [22], [23].

V. FACTORS OF THE DEVELOPMENT OF OILSEED RAPE IN THE WORLD

The decisive factor in the development of oilseed market is supply. The most important oilseeds in the world that are grown on a large scale include soybeans, oilseed rape, sunflower, cotton, peanuts, and copra. In the season 2014/15 the collection of seeds and fruits of oilseeds increased once again by 6.8% relative to the previous year (from 487.2 million tonnes in the 2013/14 season to 520.5 million tonnes in the 2014/15 season).

The biggest increase was in soybean production - in the 2014/2015 season, the collection amounted to 318.6 million tons, which was 13% higher than the prior year. Thus, soybeans occupy more than 60% of the world's oilseed. The increase in yield was also observed in the cultivation of palm kernel by 4.8% and cotton by 0.7%. In contrast, rapeseed production fell by 0.9% and sunflower fell by 5% (see Fig. 2) [13]. Reduced rapeseed production will reduce its exports. The biggest exporters of oilseed rape seeds are: Canada, Australia, Ukraine, and the main importing countries are China, EU-28, Japan and Mexico [22], [23].

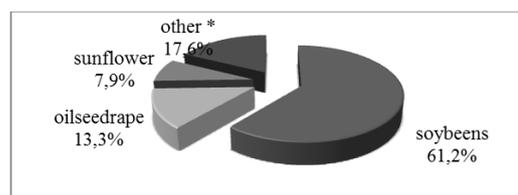


Figure 2. The structure of world production of oilseed plants in the season 2014/2015

The oilseeds market is characterized by large players, which is due to high spatial differentiation of oil production, especially soya, 80% of which is concentrated in America. The highest share of global trade in the oilseed market is soybeans - 40% of the harvest, with rape in second place at 20% of the harvest, followed by sunflower approx. 15% [2], [24].

The global oil market is competitive, since the different types of oils are somewhat substitutable. Therefore, any changes in world soybean production have an impact on the European rapeseed market. Competition in the oil occurs not only between individual oil producers, but the same oil products from different countries [25].

Soybeans occupy the largest area of production and has been steadily increasing, by ten percent per year since 2000. The harvest in the 2014/2015 season was higher for all key producers: the United States by 18.2%, Brazil 10.5%, Argentina 15.7%, China 1.7% and Canada 13% (Fig. 3). The largest exporters of soybeans remain consistent: the United States, Brazil and Argentina and importers China and the European Union [23], [13].

The second largest area planted after soybeans is rape. In the season 2014/2015 the harvest declined slightly by 0.9% to 69.0 million tonnes. In the EU countries, where

most production is concentrated, rape collections increased by 14.8%, but declined in the remaining countries: in Canada by 14.9%, in China by 7%, in India 11.9%, in Australia 7%, and in Ukraine by 5.7% (see Fig. 3).

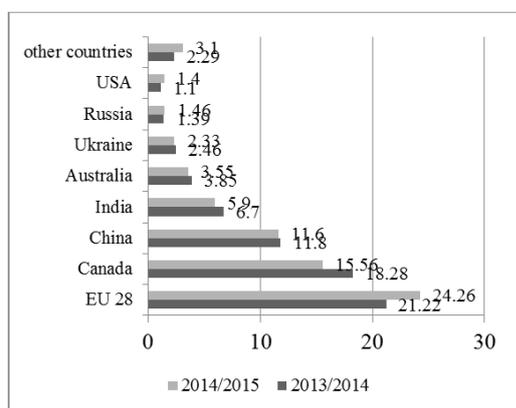


Figure 3. Production of oilseed rape in the world (mln ton)

Among the most important factors affecting the relationship of supply and demand in the global oil market is the demand for food and the prices for means of production. [10], [5]. Boczar [25] shows that the highest costs of production per 1 ha of crops are in the cultivation of oil palm - 1850 USD / ha, and rapeseed in France and Germany - 1650-1850 USD / ha. Much lower growth in production costs occurred for soybeans in the US - \$ 900 /ha and Argentina - only \$ 400 / ha. The relatively low cost of the cultivation of oilseed rape were recorded in Canada and Australia - between 550 and 650 USD / ha. In summary, 1 ha of oil palm cultivation and rape in Germany and France is much more expensive than the cost of growing soybeans in Argentina or rapeseed in Canada and Australia. Differences of costs are due to the plant cultivated and the technology used, which depends on the prevailing regional climatic and soil conditions [25], [14].

Meanwhile, prices on the world market are low, because of the bumper harvests and a large reserve of oil seeds at the end of the 2012/2013 season. The reduced demand for vegetable oils also contributed to the decline in oil prices. At the beginning of the 2013/2014 season some higher prices of oilseeds and their products still prevailed. By April, the price of European and American rape were respectively 30 and 23% lower than in the corresponding time in the previous year. Vegetable oils prices were much lower. In the season 2013/2014 soybean oil price was 25% lower, rapeseed by 27%, sunflower by 11%, while palm was as much as 29% below the 2012/2013 season. According to forecasts [16] in the 2015/2016 season, a slight increase in prices of oilseeds can be expected because of the decreased world production [13]. Among the most important factors limiting the growing area in Poland are: the declining soil quality and the fragmentation of agrarian land and are an acceptable part of rape in the structure of sowing [26], [27].

Only on very good and good soils, it is possible to achieve a relatively high yield of oilseed rape. Poland has

a total of about 7.5 million hectares of such soils, which constitutes over 50% of the total arable land [28], [29].

VI. CONCLUSION

The research and analysis of the literature allows to draw the following conclusions:

1. The oilseeds market is very highly diversified spatially in production and constitutes a large share of the international agricultural trade.

2. The most important oil plants are soybeans and oilseed rape. Soybeans consists of 62,1% and oilseed rape 13,3%. Such a situation creates the possibility of market position development for these plants.

3. The decisive factor in the price of oilseeds rape on the world and European markets is the need to increase renewable energy. Growth in demand for rapeseed oil has created favorable conditions for the production of rape and caused a rise in prices. However, increased production led to falling prices in recent years.

4. Rape seed cultivation is concentrated in households with larger scale production. Small-scale rapeseed producers (up to 10 ha) have difficulty keeping up in the market due to the high quality and quantity requirements.

5. The most important producers of oilseed rape are EU, Canada, China and India. However the production in the 2014-2015 season increased only in the EU, Russia and the USA compared to the 2013-2014 season.

6. Rapeseed production, cultivation and yields increased in recent years in Poland. This is a result of different factors. The prices of rapeseed increased because of demand for renewable energy. There is a strong competition for rapeseed between nutrition and petrochemical industry.

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