

Measuring Competitiveness in the Meat Industry Market: Are There Any Oligopolies in Serbia?

Vladimir Mitic¹, Natasa Kilibarda^{*1}, Ivana Brdar¹, Marija Kostic¹, Danijela Sarcevic², Nedjeljko Karabasil³, Vule Mizdrakovic¹

Abstract: Production of meat and processing of meat products is a very significant part of the food industry. In order to secure economic growth and development, especially in the meat industry, it is very important to provide free competition for the business entities that operate within it. Therefore, the main purpose of this study was to measure market concentration using the Herfindahl-Hirschman Index (HHI), in order to determine the competition level in the Serbian market. Furthermore, the HHI should provide evidence of any business entities that hold monopolistic or oligopolistic positions on the market. Moreover, another aim of this study was to define to what extent business entities in the Serbian meat industry export products and goods to international markets. The 350 companies that reported the highest revenues during 2013–2017 and which are registered in this sector were studied.

Keywords: meat industry, perfect competition, Herfindahl-Hirschman index, revenues, market.

Introduction

According to the Serbian Chamber of Commerce and Industry, the food industry is one of the leading Serbian industries, since it registered a surplus in international trade of €894.1 million in 2016 (PKS, 2017). Compared to nearby countries' economies, the Serbian food industry has been in a difficult situation for a very long time, primarily as it does not have covenants with the European Union (EU) or with Central European Free Trade Association (CEFTA) countries.

The meat industry is an important segment of the food industry, which, according to the Chamber of Commerce and Industry of Serbia, employed 89,378 people in 2016 (PKS, 2017). In addition, the meat industry enables households and animal husbandry companies to plan production more easily and to be less sensitive to oscillations of supply and demand (Mirjanic, 2011). According to the Ministry of Agriculture, Forestry and Water Management, average meat consumption was previously 65 kg per capita per year, but today it has fallen to 42 kg of meat per capita per year (Vlahovic and Puskaric, 2011; Dokmanovic et al., 2014). Although meat consumption per capita has reduced, it remains a very important part of the consumer basket. We are currently

witnessing many debates on the quality of imported food, especially, around the presumption that imported meat and meat products are of lower quality. There is no doubt that developing the meat products and processing sector will both improve the quality of food and increase the confidence of consumers.

Serbian companies engaged in meat production and processing face numerous problems, such as expensive raw materials on the domestic market, constant price and livestock availability fluctuations, and serious competition from EU-based companies subsidized by their own countries. These factors have led to the fact that local meat industry companies are uncompetitive and exposed both on the domestic and world markets. According to the Chamber of Commerce and Industry of Serbia, in the last 15 years, meat exports increased only 2.5-fold, while imports increased approximately 30-fold. With the development of world trade, companies engaged in meat production and processing no longer operate locally, but globally, with many conducting business in several countries and in multiple locations to increase profits. Global meat companies include JBS, Marfrig, Tyson, Cargill, Danish Crown and Nippon Meat Packers (Belk et al., 2014). Petrovic et al. (2015) claim that due to the increased global demand for meat and the increase in meat

¹Singidunum University, Danijelova 32, 11010 Belgrade, Republic of Serbia;

²Institute of Meat Hygiene and Technology, Kacanskog 13, 11000 Belgrade, Republic of Serbia;

³University of Belgrade Faculty of Veterinary Medicine, Bulevar Oslobođenja 18, 11000 Belgrade, Republic of Serbia.

*Corresponding author: Natasa Kilibarda, nkilibarda@singidunum.ac.rs

consumption per capita, meat production will double by 2020. By becoming better and more efficient businesses, companies from this sector should be able to produce lower-priced products in order to be more competitive, and consequently Serbian consumers would benefit.

Based on these facts, we defined two research questions. Firstly: *What is the level of market competition in the Serbian meat industry?* We will also provide evidence if business entities hold monopolistic or oligopolistic positions on the market. Secondly: *To what extent do meat industry business entities export their products to international markets?*

National Legislation on Market Competition

In order to secure economic growth and development, it is very important to provide free competition for business entities operating within markets. Market structure explains how the market is organised, or how many sellers or buyers are active on the market. Perfect competition exists when there is equilibrium between the quantities of product and services demanded and supplied on a market. However, there are situations where business entities will exploit their competitive advantages, including too few or too many small sellers, a lack of substitutes and the presence of trade barriers (e.g. restricted access to resources, capital intensive operations, legal requirements). Therefore, market structures can indicate the existence of imperfect competition: monopoly (only one seller), monopolistic competition (large number of small sellers) and oligopoly (a few sellers that are relatively large). On those markets, one or a few sellers exploit their position in order to acquire extraordinary returns. Therefore, annual revenues can be used to measure market competition of a specified part of the economy.

Restrictions to free market competition cause increased prices and consequently, decreased quality of products and services. Those effects directly cause damage to consumers and indirectly infringe their basic human rights. Therefore, competition is regulated by law with the aim of enabling business entities to compete on the market by offering high quality products and services at fair prices – in a free and correct manner. The benefits of such an approach are numerous: gaining new consumers and improving their living standard; decreasing the business entity's costs and increasing their business efficiency, and; enabling start up businesses.

The basic legal act regulating and protecting market competition Serbia is the Law on Protection

of Competition (Serbia, 2009; Serbia, 2013). The Law lists three forms of competition infringement, defined as “acts or actions of undertakings that as their purpose or effect have or may have a significant restriction, distortion, or prevention of competition”:

1. Restrictive agreements, which as their purpose or effect have a significant restriction, distortion, or prevention of competition. The law allows agreements of minor importance, e.g. “agreements between undertakings whose total market share in the relevant market of products and services on the territory of the Republic of Serbia, do not exceed:
 - 10% of market share, if the parties operate at the same level of production and distribution chain (horizontal agreements);
 - 15% of market share, if the parties operate at the different level of production and distribution chain (vertical agreements)...”;
2. Abuse of a dominant position, where “the dominant position holds an undertaking that because of its market power in the relevant market can substantially independently operate in relation to actual or potential competitors, customers, suppliers or consumers”. Abuse of a dominant position is relevant for the undertakings whose market share on the defined relevant market is higher than 40%, or who have advantages in accessing the sourcing and distribution markets or who have significant purchasing power, etc. The law also stipulates that abuse of a dominant position exists if a collective dominance is formed. In article 15, it is defined that a dominant position can be held by “two or more legally independent undertakings...if they are economically linked in such a way that in the relevant market they jointly perform or act as one participant”.
3. Concentration of undertakings in cases of mergers, acquisitions or joint ventures, where “two or more transactions between the same undertakings were concluded during the period of less than two years...”. However, in accordance with article 19 of the law, concentrations are permitted “unless they significantly restrict, distort or prevent competition in the market of the Republic of Serbia or its part...”. Decisions on the rights and obligations of undertakings in accordance with the law, as well as monitoring and analysis of competition conditions in individual markets and sectors are in the power of the Commission for the Protection of the Competition of the Republic of Serbia.

Further research in this study will calculate the market share of Serbian meat industry business entities in the market concentration or overall competition. On the basis of this research and the aforementioned law, the situation on the domestic meat market will be determined and qualified as positive or negative accordingly.

Literature Review

Food or meat industries have been a subject of research in many countries. For food markets in European countries, *McCorriston* (2002) and *Wann and Sexton* (1992) concluded that economists need to pay more attention to imperfect competition, because in these markets, oligopolies usually dominate. The same authors argued that the market power of food sellers is growing in many countries. *Lopez et al.* (2002) similarly found that with an increase of market concentration within the food industry, oligopolies' power increases. That leads to the improvements regarding cost efficiency, but it will also increase selling prices of food. Specifically, the authors studied the association between oligopoly and efficiency, as well as their impact on selling prices in 32 food industries. They noted that in 26 (81%) of the food industries, the strength of the oligopoly increased significantly with an increase of market concentration. Likewise, the market power of food sellers is growing in many countries; hence, more attention should be paid to this problem (*McCorriston*, 2002). *Andres* (2008) conducted a study on the market power of oligopolies in the German food industry, including specific details on the German meat market and the European crisis. Prices due to oligopoly were 11% higher for beef and 2.7% higher for pork, compared to prices that would be set in the case of perfect competition (*Andres*, 2008).

The situation in the Serbian meat industry market is conditioned by meat production. As *Maletic and Popovic* (2016) stated, Serbian livestock production is decreasing by 2–3% per year. According to *Aleksic et al.* (2007), the number of cattle was decreasing in the decade prior to 2007 (by about 18%). An additional problem is the small number of slaughterhouses that have EU certificates. As a result, meat production is in constant decline (in Serbia, 69,000 tons were produced, while only 21,000 tons were produced in Vojvodina). *Aleksic et al.* (2007) emphasized that solutions would include the rapid and efficient transformation of cattle production, the consolidation of land holdings, and the creation of specialized farms for production of milk and meat. Since the mid-1980s, pig production

in Serbia has decreased, especially in Vojvodina. Poultry production underwent the fastest growth of all livestock production. Serbia produces just over 26 million birds, and numbers of poultry are relatively stable (*Maletic and Popovic*, 2016).

Barkema et al. (2001) researched changes in the United States (US) meat industry and concluded that over time, in order to achieve economies of scale and cost savings, the companies in this industry merged or were acquired. Additionally, they described how large stores bought others, and as they eventually transformed into large retail chains, expanded their business to other cities and countries. Since 1980, the number of slaughterhouses in the US has been steadily decreasing (from 600 to around 170 for cattle and from 500 to around 180 for pigs). Moreover, the number of meat processing companies has declined, while the remaining companies in this sector have increased their market share (*Barkema et al.*, 2001).

Vlahovic et al., (2014) analysed the international pork market in the period from 2008 to 2012. During this period, average global pork production was 9.8 million tons with an annual growth rate of 3.65%, while the annual value of exports was about 27 billion US\$. The world's largest pork exporter is the EU, which accounts for 65% of the world's total exports. Additionally, the EU is the second largest producer of pork immediately after China. The largest pork exporting country in the world is Germany, with average annual exports of 1.5 million tons, accounting for 15.6% of total world exports. Next to Germany, the world's largest exporters are the US, Canada, Denmark and Spain, which together account for about 2/3 of total world exports. The world's largest importer is also the EU, accounting for around 50% of total world imports. Germany is the world's largest pork importing country, taking 956,000 tons, which constitutes about 10% of total world imports. In addition, other big importers are Japan, Italy, the Russian Federation and Poland, and with Germany, they account for over 40% of the world's total imports of pork (*Vlahovic et al.*, 2014).

Materials and Methods

Numerous indicators could be used to measure market competition level, including Concentration ratio of leading companies (CR_n), Herfindahl-Hirschman index (HHI), Lorenz curve (concentration curve), Gini coefficient and Entropy index (*Mihajlovic et al.*, 2016). HHI has been used the most to measure market competition level and to determine if there are any oligopolies in meat

industry markets. HHI has been proven as a good instrument of measuring market competitiveness (market concentration) and was used for this research. HHI is calculated according to:

$$HHI = \sum_{i=1}^n X_i^2$$

where, X_i is the market share of i company (Mihajlovic et al., 2016). HHI values can range from 0 to 10,000. Low values of this indicator are desirable because they indicate significant competition in the analysed market, i.e. no monopoly. A HHI value of 10,000 means there is a monopoly in the market, i.e. only a seller is present on the market and possesses full market power. A HHI value closer to 0 would represent perfect competition, meaning a large number of companies each with a small market share operates on the market (no single company dominates the market). Perfect competition occurs when enterprises are so small they cannot affect the market price (Samuelson and Nordhaus, 2005).

In order to draw a conclusion on the degree of concentration in the Serbian meat industry, the following scale to interpret HHI values was used:

- If the index ranges from 0 to 1,000, the concentration on the market is low;
- If the index ranges from 1,000 to 1,800, the concentration on the market is moderate;
- If the index ranges from 1,800 to 10,000, the concentration on the market is high.

The subjects of this research were the financial statements for the reporting periods between 2013–2017, for companies registered in the meat production and processing. For research purposes, the financial statements of companies from the analysed meat and meat products sector were downloaded from the Serbian Business Registers Agency in order to measure the market concentration, i.e. the level of competition in the market. Altogether, 2,243 companies were engaged in production and processing of meat and meat products in 2017. This survey

was conducted on a sub-set of those companies, i.e. the 350 companies in this sector that reported the highest revenues in 2013–2017. We focused on this sub-set of companies because the remainder had extremely low market share and some of them did not show any income in 2017 due to bankruptcy, blockade or suspension of operations as shown in the financial statements.

With the help of HHI, an analysis of the Serbian meat and meat products market was conducted to see if it is closer to perfect competition or operates as an oligopoly. This study can be used for deeper analysis of this sector, as well as for wider competitiveness research on the meat and meat products market in Serbia. Also, in order to respond to the second research question, the total export revenues were calculated, as was the market share for all major meat exporters in Serbia.

Results and Discussion

In order to answer the first research question and determine the competition level in the meat and meat products market in Serbia, the annual total HHI for each reporting year was calculated (Table 1).

It is clear the competition level in the Serbian meat and meat products market is classified as low, something that could not have been expected. All reporting years were marked by HHIs lower than 1,000, and additionally, values generally decreased over the observed period (Table 1). Having in mind that total revenues increased, we suspect that more entities entered the market, which suggests that barriers to entrance are low. Along with the competition level being low, some entities had higher HHI values than other entities. Table 2 shows the ten top-ranked business entities from 2015 to 2017, while Table 4 in the Appendix shows the values for 2013 and 2014.

Clearly, there are four major contributors to the total HHI in this industry. One of them holds a dominant position with the highest market share

Table 1. Herfindahl-Hirschman index for total revenues from 2013 to 2017

Reporting period	Total revenues in Republic of Serbia dinars	Index
2013	734,734,902	751
2014	754,185,441	649
2015	736,632,818	687
2016	789,069,042	647
2017	909,702,350	554

Table 2. The structure of the ten top-ranked business entities with the highest Herfindahl-Hirschman index for total revenues 2015–2017

Business entity	2015	Business entity	2016	Business entity	2017
I	364	I	324	I	297
II	87	IV	89	IV	66
III	72	III	64	VII	50
IV	58	II	61	II	37
V	19	VII	22	VIII	17
VI	18	V	18	V	17
VII	11	VI	10	XI	11
VIII	11	X	10	IX	11
IX	9	IX	10	VI	9
X	9	XI	9	XII	8

and HHI. However, that percentage of the market is not high enough to consider that the entity holds a monopoly over the market, as is the situation in the Serbian dairy and milk market where only one entity holds almost 40% of the market (Mihajlovic et al., 2016). The other three have similar market shares which could suggest they are working as a group, but since their structure and market share changed over the observed time, that is unlikely. Therefore, in contrast to the US and EU meat industry markets, we can conclude that there are no oligopolies on Serbian meat industry market. Unlike the situation in Serbia, in the US meat market, the decrease in number of entities on the market has led to an increase of

individual market share (Barkema et al., 2001). The US market concentration was indicated by the measured HHIs of 1,936 (high concentration) for the beef processing market, while the pork processing market was 1,036 (moderate concentration) (Barkema et al., 2001). Also, in Malaysia the meat industry market concentration was high in the late 1990s to moderate in the 2000s (Mohamed et al., 2015). Finally, in markets in nearby countries and the EU, the situation varies from country to country, but it can be concluded that concentration in the meat production and retail market is relatively moderate (Einarsson, 2008). For example, research covering 2008–2013 on Romanian business entities showed that HHI had

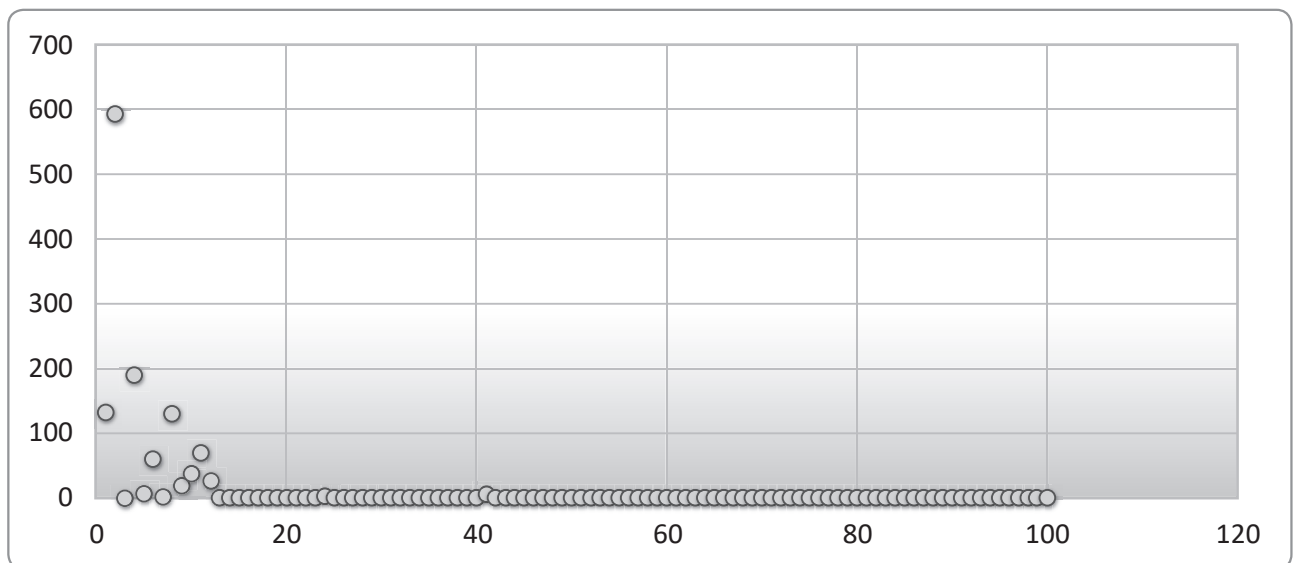


Figure 1. Herfindahl-Hirschman index for total revenue from export in 2017

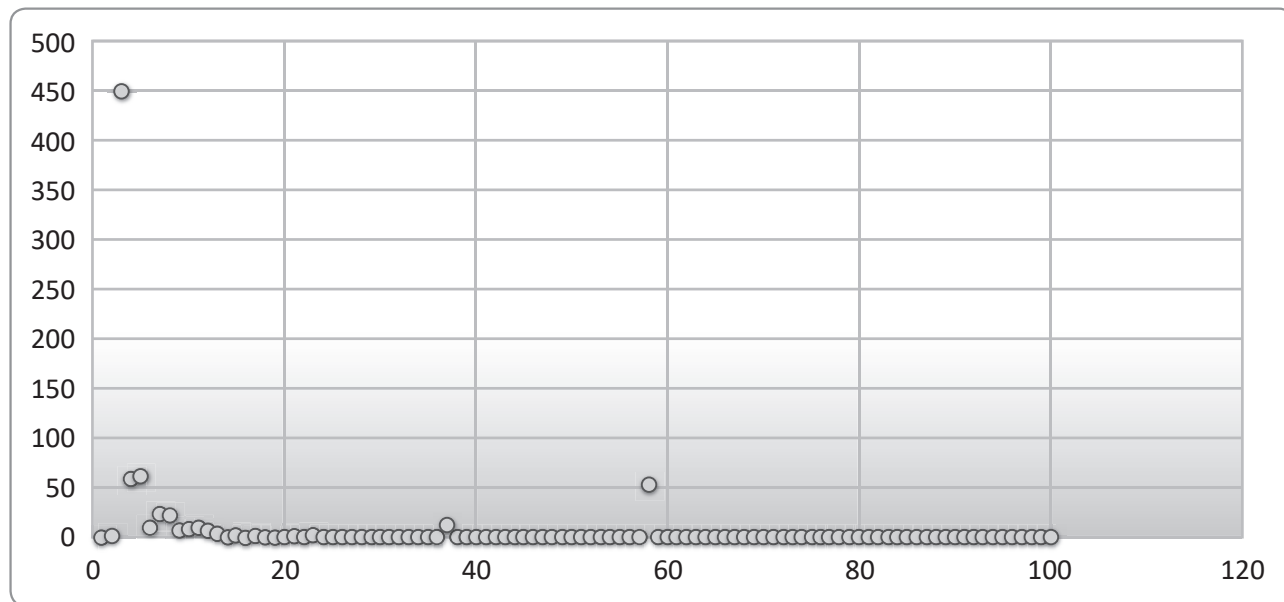


Figure 2. Herfindahl-Hirschman index of total revenues in 2013

a balanced evolution, with relative stability in the sector (Stanciu et al., 2015). Similar results were reported for the pork production sector in the same period (Popescu, 2016).

Since it has been hinted that Serbian business entities have to change their business strategy and focus on export, we analysed HHI for total revenues from the meat and meat products export sector in 2017 (Figure 1).

The situation is different when it comes to export. Only 102 Serbian business entities actually export their meat or meat products, which is an extremely low percentage of the total number of entities in this industry. The total HHI for the meat

export industry in 2017 was 1,257, more than double the HHI for total revenues (HHI of 554). We conclude the concentration of meat exporters on the market is moderate since the HHI is higher than 1,000. Just as for the meat and meat products industry as a whole, there are four major sellers in the export industry. However, their structure is not the same as for the total revenues.

It is interesting to note that the average percentage of total revenues earned from export by the ten top-ranked exporters is about 13% (Table 3). In addition, the top competitor on the market is not concurrently the main exporter. We concluded that total revenues from export are rather moderate, especially

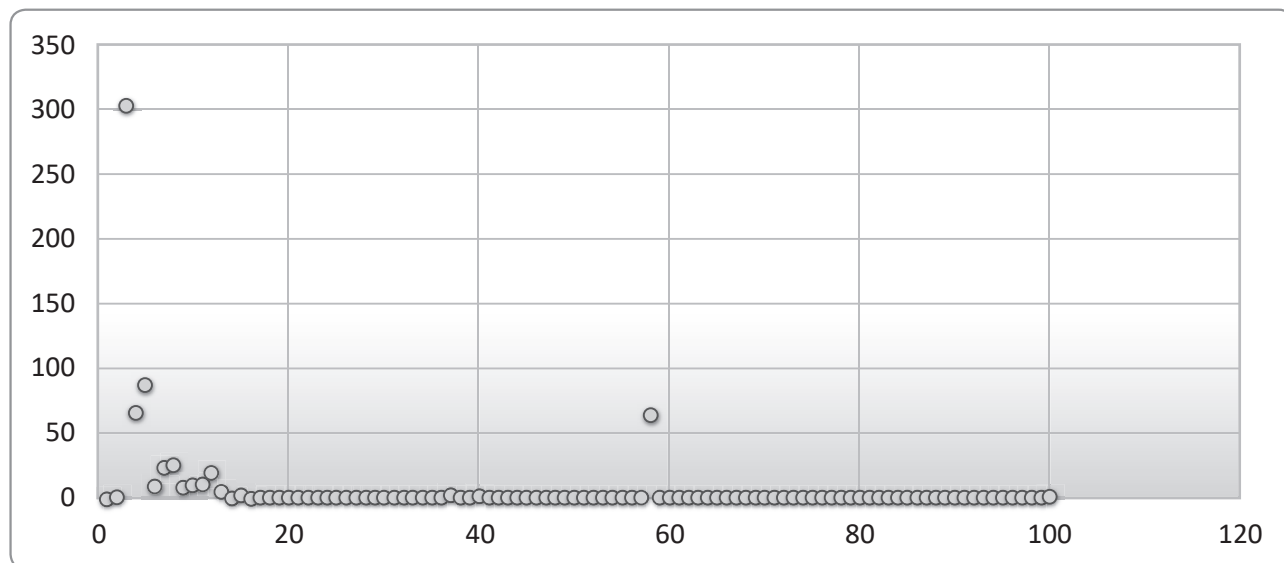


Figure 3. Herfindahl-Hirschman index of total revenues in 2014

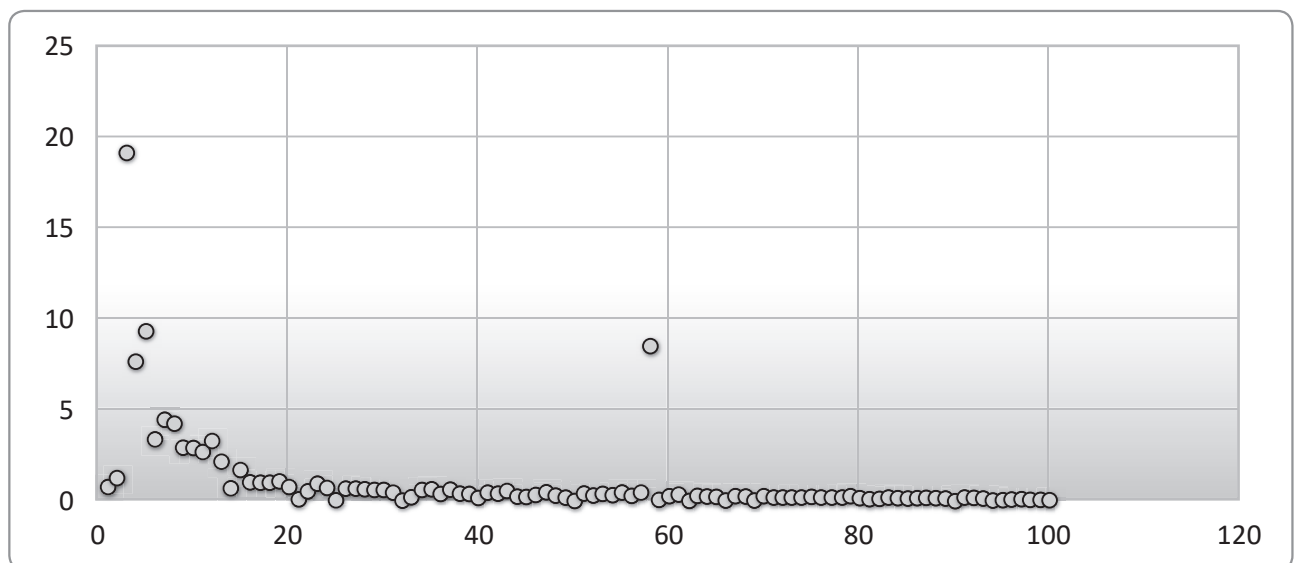
Table 3. The structure of the ten top-ranked business entities with the highest Herfindahl-Hirschman index for total revenue from export

Business entity	Total revenue in Republic of Serbia dinars from export	Index	Share of revenue from export in total revenue
VII	18,849,119	592	11%
IX	10,634,779	188	14%
IV	8,904,633	132	13%
XIII	8,782,319	128	15%
XIV	6,386,746	68	16%
VI	5,933,983	59	15%
V	4,665,928	36	15%
X	3,880,177	25	12%
XI	3,143,948	16	11%
XV	1,928,740	6	7%

considering how much world exporters earn from selling meat products. Average global pork production is approximately 10 million tons, while the annual value of exports was near 30 billion US\$. As explained previously, the biggest pork exporter is the EU, with more than a half of the world's total exports, but leading exporting countries are Germany, the US, Canada, Denmark and Spain (Vlahovic *et al.*, 2014). Our recommendation for all Serbian business entities is to work on their business strategies, focus their operation activities on fulfilling requirements for export, and increase their market share on the world market.

Conclusions

The aim of this study was to measure the market concentration using the HHI and to determine the degree of competition and the existence of oligopolies in the meat industry in Serbia. By analysing the value of HHI for total revenues in the period from 2013 to 2017, it can be concluded that the market concentration is low. More precisely, although revenues are increasing on average, HHI is generally decreasing from year to year. Therefore, the Serbian meat industry has almost perfect competition. However, a more detailed analysis has shown

**Figure 4.** Herfindahl-Hirschman index of total revenues in 2015

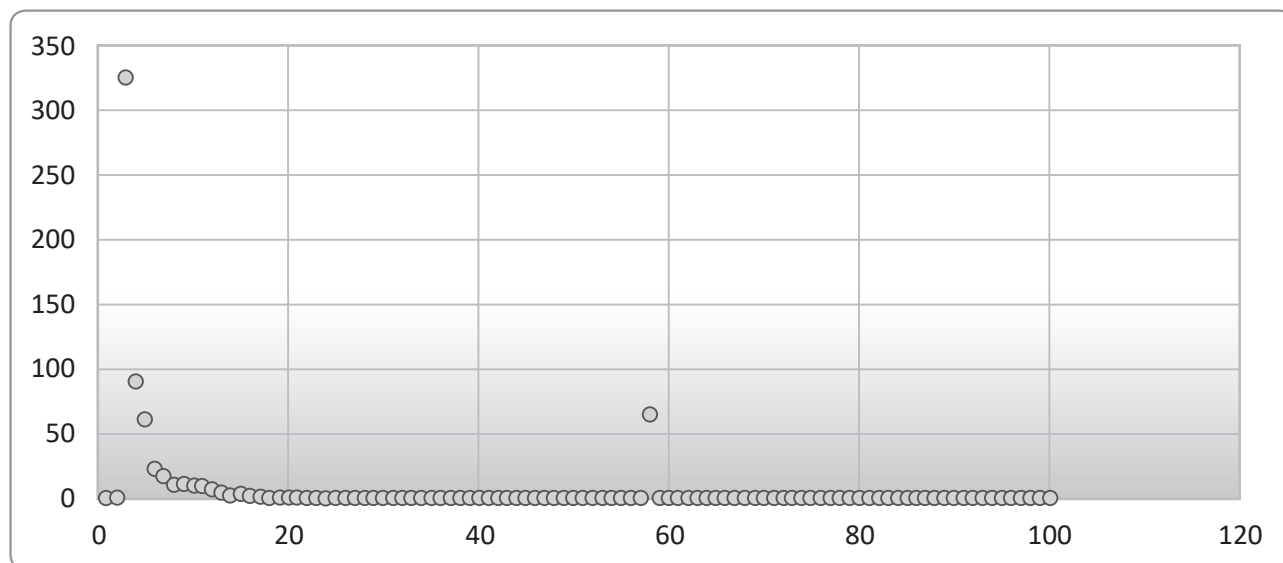


Figure 5. Herfindahl-Hirschman index of total revenues in 2016

that four companies have the largest market share. One of them has the highest revenues in this sector, and it has the largest HHI as well; the HHI for this company constitutes almost half of the total HHI in the entire Serbian meat and meat products industry. This suggests the better positioning of this company and its potential to further increase its market dominance in the future. Also, key results have shown there is no monopoly in the Serbian meat industry, and no company is dominant in the market, while

at the same time, there are no oligopolies. When it comes to the export of meat and meat products, the competition is greater, as the annual HHI of 1,257 in 2017 indicates. Less than 10% of all business entities export their products, and that is something that should be changed in the future. In the upcoming period, the recommendation is to compare HHI of meat and other food industries in order to obtain a complete picture and analysis of the Serbian food industry.

Appendix

Table 4. The structure of the ten top-ranked business entities with the highest Herfindahl-Hirschman index for total revenues

Business entity	2013	Business entity	2014
I	450	I	301
II	62	II	87
IV	59	IV	66
III	54	III	64
V	24	VI	25
VI	23	V	24
XVI	13	VIII	19
XI	10	XI	11
VII	10	IX	10
IX	9	VII	10

Merenje konkurentnosti na tržištu industrije mesa – da li u Srbiji postoje oligopoli?

Vladimir Mitić, Nataša Kilibarda, Ivana Brdar, Marija Kostić, Danijela ŠarČević, Nedjeljko Karabasil, Vule Mizdraković

A p s t r a k t: Proizvodnja mesa i mesnih prerađevina je veoma značajan deo prehrambene industrije. Da bi se postigao ekonomski rast i razvoj, posebno u mesnoj industriji, veoma je važno obezbediti slobodnu konkurenciju za privredna društva koji posluju u njoj. Stoga, glavni cilj ovog rada je da se, pomoću Herfindahl-Hirschman indeksa (HHI), izmeri koncentracija tržišta, kao i da se utvrdi nivo konkurencije na srpskom tržištu, ali i da se utvrdi da li postoje subjekti koji na tržištu imaju poziciju monopola ili oligopola. Drugi cilj ovog rada je da se definiše u kojoj meri poslovni subjekti iz srpske mesne industrije izvoze svoje proizvode i robu na međunarodnom tržištu i da li je nivo koncentracije isti. U istraživanju je korišćen uzorak od 350 privrednih društava registrovanih u ovom sektoru, a koja su obelodanila najviše prihode u izveštajnom periodu od 2013. do 2017. godine.

Ključne reči: mesna industrija, savršena konkurencija, Herfindahl-Hirschman indeks, prihodi, tržište.

Disclosure statement: No potential conflict of interest reported by authors.

References

- Aleksic, S., Petrovic, M., Sretenovic, Lj., Pantelic, V., Tomasevic, D. & Ostojic-Andric, D. (2007). Cattle Production: Current Situation and Future Directions of Development in Republic of Serbia. *Biotechnology in Animal Husbandry*, 23, (1), 1–10.
- Anders, S. (2008). Imperfect Competition in German Food Retailing: Evidence from State Level Data. *Atlantic Economic Journal*, 36 (1), 441–454.
- Barkema, A., Drabentstott, M. & Novack, N. (2001). The New U.S. Meat Industry. *Economic Review*, 2 (1), 33–56.
- Belk, K., Woerner, D., Delmore, R., Tatum, J., Yang, H., & Sofos J. (2014). The Meat Industry: Do We Think and Behave Globally or Locally? *Meat Science*, 98(3), 556–560.
- Dokmanovic, M., Lukic, M., Baltic, M., Ivanovic, J., Markovic, R., Grbic, S. & Glamoclija N. (2014). Analysis of Beef Production Volume in Serbia from 1985 to 2011. *Tehnologija Mesa*, 55(1), 73–80.
- Einarsson, A. (2008). The Retail Sector in the Nordic Countries: A Description of the Differences, Similarities, and Uniqueness in the Global Market. *Journal of Retailing and Consumer Services*, 15, 443–451
- Maletic, R., & Popovic, B. (2016). Production capacity of family farms in Serbia and EU countries. *TEME*, XL(2), 807–821.
- McCriston, S. (2002). Why Should Imperfect Competition Matter to Agricultural Economists. *European Review of Agricultural Economics*, 29(3), 349 - 371.
- Mihajlovic, M., Krstic, S., Segrt, S., Pavlovic, D., Jovanovic, D. & Simeunovic, T. (2016). Economic Analysis of the Influence of Milk Market Concentration on Procurement Efficiency in the Defense System. *Economics of Agriculture*, 3(1), 973–985.
- Mirjanic, S. (2011). *Agroprivreda Vojvodine*. Društvo agrarnih ekonomista Vojvodine.
- Mohamed, Z., Kasron, N., AbdLatif, I., Sharifuddin, J, Reza, G. & Terano, R. (2015). Structure, Conduct and Performance of the Malaysian Meat and Meat Preparation Industry. *Pertanika Journal of Social Science and Humanities*, 23(S), 47–62.
- Petrovic, Z., Djordjevic, V., Milicevic, D., Nastasijevic, I., & Parunovic, N. (2015). Meat Production and Consumption: Environmental Consequences. *Procedia Food Science*, 5(1), 235–238.
- PKS. (2017, April). *Bilten – Udruzenje za prehrambenu industriju*. Retrieved from Chamber of commerce and industry of Serbia: [http://www.pks.rs/SADRZAJ/Files/Bilten%20Prehrambena%2C%20april%202017\(1\).pdf](http://www.pks.rs/SADRZAJ/Files/Bilten%20Prehrambena%2C%20april%202017(1).pdf)
- Popescu, A. (2016). Research on Concentration of Pork Production in Romania. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, 16(1), 405–410.
- Samuelson, P. & Nordhaus, W. (2005). *Economics*. McGraw-Hill.
- Serbia. (2009). Law on Protection of Competition. Official Gazette of the RS, 51.
- Serbia. (2013). Law on Protection of Competition. Official Gazette of the RS, 95.
- Stanciu, S., Rizea, D. & Ilie, G. (2015). Study on the Competitiveness of the Romanian Meat Processing Industry, *Amfiteatru Economic Journal*, Vol. 17(9), 1331–1345.
- Vlahovic, B. & Puskaric, A. (2011). Meat Consumption in the Republic of Serbia – Comparative Analysis. *Savetovanje o biotehnologiji sa međunarodnim ucescem*. Cacak: Faculty of Agronomy Cacak.

Vlahovic, Puskaric & Mazic. (2014). Medjunarodno trziste svinjskog mesa – stanje. *XXVIII savetovanja agronoma, veterinara, tehnologa i agroekonomista*, 20 (4), 267–279.

Wann, J., & Sexton, R. (1992). Imperfect Competition in Multiproduct Food Industries with Application to Pear Processing. *American Journal of Agricultural Economics*, 74(4), 980–990.

Paper received: 25.10.2018.

Paper corrected: 9.11.2018.

Paper accepted: 5.11.2018.