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THE RASPBERRY COMMODITY EXCHANGE IN SERBIA: AN EXPLORATORY RESEARCH OF PRODUCERS' ATTITUDES

Berza maline u Srbiji - ispitivanje stavova proizvođača

Abstract

This paper analyzes the possibility of developing a commodity exchange in which raspberries produced in Serbia would be traded. Establishing a raspberry commodity exchange would provide for the determination of price for this fruit in the market, which would probably increase producers' satisfaction. For this purpose, the regulatory conditions for the development of commodity exchanges in Serbia and the volume of raspberry production in Serbia were analyzed. In order to assess the quality of refrigeration services and the perceived value of sales through a stock exchange, this paper also comprises an empirical research that has been conducted. Moreover, the connection of these variables with satisfaction and loyalty of raspberry producers to services of the owners of refrigeration facilities was analyzed, as well. Hence, the paper indirectly analyzes the readiness of raspberry producers to start trading in the commodity exchange. Statistical data processing and analysis were performed by using the statistical packages Microsoft Excel and SPSS. Higher perceived values of sales through a commodity exchange than the values of assessment of the quality of refrigeration services, as well as the negative influence of this perceived value on satisfaction with refrigeration services, indicate the willingness of raspberry producers to switch to selling in commodity exchanges.

Keywords: *raspberry, commodity exchange, quality of services of raspberry purchasers, perceived value of sales through commodity exchange.*

Sažetak

U radu je analizirana mogućnost razvoja robne berze na kojoj bi se trgovalo malinama proizvedenim u Srbiji. Osnivanjem berze malina obezbedilo bi se tržišno utvrđivanje cene ovog voća, što bi verovatno povećalo zadovoljstvo kod proizvođača. U te svrhe analizirani su regulatorni uslovi razvoja robnih berzi u Srbiji i obim proizvodnje malina koji se ostvaruje u Srbiji. U cilju ocene kvaliteta usluga otkupljivača maline (hladnjačara) i percepcije vrednosti prodaje preko berze, u radu je sprovedeno i empirijsko istraživanje. Takođe, analizirana je i povezanost ovih varijabli sa zadovoljstvom i lojalnošću proizvođača maline (malinara) uslugama hladnjačara. Na ovaj način, indirektno je analizirana spremnost malinara za prelazak na prodaju preko robne berze. Statistička obrada i analiza podataka izvršene su korišćenjem softverskih paketa Microsoft Excel i SPSS. Više ocene percipirane vrednosti prodaje preko berze od ocene kvaliteta usluga hladnjačara, kao i negativan uticaj te percipirane vrednosti na zadovoljstvo uslugama hladnjačara, indirektno ukazuju na spremnost proizvođača malina na prelazak na prodaju preko berze.

Cljučne reči: *maline, robna berza, kvalitet usluga otkupljivača maline, percipirana vrednost prodaje preko robne berze.*

Introduction

Commodity exchanges are places where standardized products are traded according to predefined rules. In practice, there is a large number of commodity exchanges through which agricultural products are successfully sold. For instance, corn, wheat and soybean are traded in the famous Chicago Mercantile Exchange. In the Multi Commodity Exchange of India Ltd, palm oil, cotton and black pepper are traded. Zhengzhou Commodity Exchange in China organizes trade in cotton, white sugar, apples, rapeseed and some other agricultural products. In the Izmir Commodity Exchange, cotton and raisins are traded.

The aim of this paper is to point out to the possibility of developing a raspberry commodity exchange in Serbia. The first step in this process was to analyze the regulatory framework of commodity exchanges' operations in Serbia. It defines the legal framework for establishing and the functioning of these institutions. In addition to this, in order to establish a commodity exchange, it is necessary to have a sufficient amount of raspberry so that this form of trading would be cost-effective and sustainable in the long run.

On the other hand, the willingness and interest of raspberry producers to trade through a commodity exchange is needed. One of the most efficient means of attracting customers of any services (in this particular case, the raspberry producers) is their satisfaction with the respective services. For the purpose of analyzing the satisfaction of raspberry producers with refrigeration services and their willingness to trade in a commodity exchange, an empirical research was carried out. It focuses on two main variables. The first variable is the quality of refrigeration services. The second variable is the perceived value of trading through a commodity exchange. The paper analyzes their impact on satisfaction and loyalty of raspberry producers to the owners of refrigeration facilities.

According to Zeithaml, Berry & Parasuraman [34], provision of high-quality service is considered to be the key strategy for success in today's competitive environment. The users' satisfaction with refrigeration services can be achieved through high quality of services. Within the scope of this paper, raspberry producers have assessed

the services provided by the owners of refrigeration facilities, based on their own experience in the use of such services. In order to raise the level of quality of the services aimed at satisfaction of their clients, many commodity exchanges in the world hire special agencies that are in charge of controlling the quantity and quality of goods, while older commodity exchanges have developed their own departments to handle such operations. In addition to the standardization of goods, commodity trading in the exchanges also places great importance on the way of storing goods. These tasks are fulfilled by authorized warehouses that handle the commodities in accordance with the standards of the exchange markets. For the purpose of evaluating the services of commodity exchanges in the paper, the perceived value is used – evaluated by raspberry producers based on information they have about commodity exchanges, and not on their own experiences, given that there is no commodity exchange for raspberry trade in Serbia. The aim of the empirical research is to examine the satisfaction of raspberry producers with the quality of refrigeration services and their loyalty to sales through refrigeration facilities, as well as the perceived value of sales through a commodity exchange and its influence on satisfaction with sales through refrigeration facilities. The final objective of the study is to examine the interest of raspberry producers in Serbia to switch to alternative ways of trading, i.e., their willingness to sell raspberries in a commodity exchange.

Regulatory framework for the operation of commodity exchanges in Serbia

The regulatory conditions for the operation of commodity exchanges in Serbia are very specific. The Law on Trade (Art. 22) defines commodity exchange as a separate market institution that organizes a meeting of customers and sellers of standardized and interchangeable goods. The same Law envisages that commodity exchange and stock exchange operations are regulated by a special law. However, goods and derivative securities based on goods in Serbia have been treated differently over time. The Law on Stock Exchanges, Stock Exchange Operations and Stock Brokers (applied from 1994 to 2002) defined commodities

as commodity market material, and commodity exchange as an institution which organizes trading in such market material. On the other hand, the Law on the Market of Securities and Other Financial Instruments (applied from 2002 to 2011) completely ignored goods and all market materials that derive from goods. The Law on the Capital Market that came into force in 2011 provided an opportunity to develop modern forward exchange markets [38]. It is also largely in line with relevant EU and IOSCO directives.

In accordance with the Law on the Capital Market, by mid-2019, the Law on Commodity Exchange was adopted in Serbia (to be applicable as of May 2020). The adoption of this Law brought about the fulfilment of important prerequisites for a more intensive commodity exchange development. The aim of this Law is the establishment of a fair, transparent and effective market of standardized materials and the protection of market integrity [47, Art. 3]. Since the development of commodity exchanges, agricultural producers in particular have experienced benefits, given that their income is traditionally conditioned by the product price and that they are largely exposed to risk of price changes. The system of trading in commodity exchanges ensures the most reliable model of impartial and transparent market promotion of commodities. At the same time, buyers also benefit from the commodity exchange. Trading through a commodity exchange includes the standardization of exchange materials, which involves a guarantee of quality and quantity of goods.

There is only one commodity exchange in Serbia, Produktna berza a.d. Novi Sad. It was founded in 1921 and headquartered in Novi Sad. Currently, it trades in six groups of products: cereals, animal feed components, seeds, mineral fertilizers, industrial plants and consumer goods. However, only spot trade is performed in the commodity exchange in Novi Sad. Since 2002, Produktna berza

organizes continuous spot trade among the members of the commodity exchange through electronic pairing of account limits. A major shift in the previous development of commodity market in Serbia was brought about by the establishment of the Indemnity Fund in 2009, whose role in the system of public warehouses is to guarantee the quality and quantity of stored goods. In addition to this, as a result of the adoption of the Law on Commodity Exchange, it may well be expected that a more intensive development of the spot market in the observed area will take place in the future, as will the establishment of the futures market.

Analysis of raspberries as a potential commodity exchange material

In 1996, the Chilean Food Association came up with the idea of bringing together all of the world's largest raspberry producers. This led to a conference being organized in Chile in 1998, where it was decided to establish the International Raspberry Organization [37]. So far, 11 conferences in total were held: in Chile (1998 and 2010), USA (2000), Hungary (2002), Australia (2004), Serbia (2006 and 2016), Poland (2008), Canada (2012), China (2014) and Bulgaria (2018). The next conference will take place in Poland in 2020.

Bearing in mind that the Russian Federation is not a member of the IRO and that it has a significant share in the global production of this fruit, the total global raspberry production will continue to be analyzed on the basis of the data published by the Food and Agriculture Organization – FAO (Table 1).

It can be concluded that there has been an increase in raspberry planting by around 20% on a global scale in the last ten years. In this respect, there was an increase in the production of this fruit in the observed period (Table 2).

Table 1: World area harvested raspberries

year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
ha	98,024	96,930	106,362	106,816	102,201	92,598	93,087	100,879	115,852	118,219

Source: FAOSTAT.

Table 2: World production raspberries

year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
tonnes	523,198	553,638	522,062	599,483	569,351	588,114	628,163	676,447	841,899	812,735

Source: FAOSTAT.

It is noticeable that in the observed ten-year period, raspberries production increased by about 65%. Observed by regions, Europe is convincingly the largest raspberry producer (Table 3).

Table 3: Production share of raspberries by region, 2008-2017

Region	Share (%)
Europe	71.40%
Americas	26.20%
Asia	2.30%
Africa	0.10%
Oceania	0.10%

Source: FAOSTAT.

71.4% of total raspberry production on a global level in the 2008-2017 period was generated in Europe. The largest raspberry producer in the world is the Russian Federation, which produced an average of 141,077.9 tonnes of raspberries annually, while Serbia ranked fourth, with an average annual production of 86,530.4 tonnes during the observed decade (Table 4).

Table 4: The largest raspberry producers in the world, 2008-2017

Country	Quantity in tonnes
Russian Federation	141,077.9
Poland	106,158.3
USA	92,170.5
Serbia	86,530.4

Source: FAOSTAT.

Raspberry production in Serbia in the 2008-2017 period is presented in Table 5.

Table 5: Raspberry production in Serbia in the 2008-2017 period

Year	Quantity in tonnes
2008	84,299
2009	89,961
2010	83,870
2011	89,602
2012	70,320
2013	68,458
2014	61,715
2015	97,165
2016	113,172
2017	109,742

Source: SORS.

Raspberry production in Serbia is becoming increasingly popular, which is confirmed by a significant increase in its production in the last three years during the observed period. The raspberry cultivar Willamette makes up for more than 90% of this production.

According to data relating only to 2017, Serbia ranks third, with a total production of 109,742 tonnes of raspberries (Table 6).

Table 6: The largest raspberry producers in the world in 2017

Country	Quantity in tonnes
Russian Federation	146,377
Mexico	120,184
Serbia	109,742
USA	106,100
Poland	104,482

Source: FAOSTAT.

The bulk of raspberry production is intended for export, and only a small portion is retained in the domestic market. Export of raspberries from Serbia is presented in Table 7.

Table 7: Export of raspberries from Serbia in the 2010-2017 period

Year	Export in thousands of tonnes
2010	63
2011	78.7
2012	64.8
2013	59.7
2014	78
2015	101
2016	75
2017	99

Source: Nikolić, 2018.

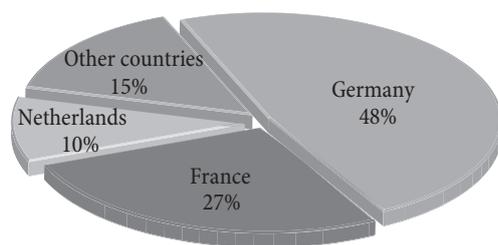
It is important to note that between 90% and 95% of the total raspberry production is exported. Raspberry is mainly exported as frozen fruit, where Serbia is the world leader. In 2017, exports of frozen raspberries from Serbia amounted to approximately 94,000 tonnes, which accounted for 29.9% of the total world export of frozen raspberries [35].

The most important buyers of Serbian raspberry are presented in Figure 1.

According to data from 2017, almost one half of the raspberries produced in Serbia is exported to Germany, while approximately a quarter of the production is exported to France. It is noticeable that raspberries are very attractive fruits for foreign buyers.

On the other hand, Serbia has recorded an increase in import of raspberries from other countries. It is estimated that in the 2010-2015 period, between 1,000 and 3,000 tonnes of raspberries were imported in Serbia, and in 2016

Figure 1: The most important buyers of Serbian raspberry



Source: Nikolić, 2018.

approximately 5,000 tonnes. In 2017, raspberry import to Serbia amounted to about 11,000 tonnes, which is an increase of more than 100% compared to 2016 [17].

Ten years ago, raspberries were grown in Serbia on an area of 14,000 to 15,000 hectares [25, pp. 171-178]. However, by the end of 2017, raspberries in Serbia were occupying an area of 21,861 hectares, which is approximately 12.5% of the total area covered by cultivated plants in the observed country [40]. In the regions of Šumadija and Western Serbia, raspberries are grown on an area of 18,175 ha, which is more than 80% of the total area covered by raspberries in Serbia. They are mostly produced in the territory of the municipalities of Ivanjica and Arilje, where approximately a quarter of the total raspberry plantations in Serbia are grown [16].

The empirical research conducted in the territory of Arilje indicates that raspberry production in Serbia is very profitable. In order to plant and cultivate raspberries on an area of one hectare, with proper irrigation systems put in place, an investment of roughly EUR 12,140 is required. Earnings in the first year alone amount to EUR 9,300. It is observed that the accumulation rate is approximately 77%, which means that the earnings on the capital invested are generated already in the second year [8, pp. 57-68].

Raspberry yield per hectare in Serbia is presented in Table 8.

Table 8: Raspberry yield per hectare in Serbia

Productive area, ha	21,861
Production, t	109,742
Yield, t/ha	5.02

Source: SORS.

In Serbia, one hectare yields roughly 5 tonnes of raspberries on average. Although the Russian Federation

is the largest producer, it does not generate high raspberry yields per hectare. This is probably because it does not apply the latest technology in raspberry processing and cultivation. The Netherlands, Italy, Switzerland and the United States have the highest raspberry yield per hectare [25, pp. 171-178].

In addition to yield, another important element in achieving total raspberry income is the price. The purchase price of raspberries is changing every year, which causes uncertainty among raspberry producers and often dissatisfaction, as well. In order to achieve the best possible export price through joint appearance in the foreign market, the cases of associations of individual producers and raspberry purchasers are increasingly frequent in Serbia. An independent appearance of individual producers in the foreign market could damage the reputation of the Serbian raspberry, and the financial effects could be significantly below the real level. Mutual competition between individual producers and raspberry purchasers in the foreign market may be one of the reasons for offsetting the price of raspberry below the market level [25, pp. 171-178]. Empirical research conducted in Šumadija and Western Serbia indicates that the sector of raspberry production in Serbia shows great potential for successful and sustainable cluster development. However, for this development to take place, the following important prerequisites need to be fulfilled: better organization of marketing channels through horizontal and vertical integration of all the stakeholders in this sector, strengthening cooperatives specialized in the production of raspberries and application of innovations and scientific knowledge in the production, processing and distribution of raspberries [21, pp. 1417-1431]. Also, the development of cluster initiatives requires joint work of agricultural producers, processors, refrigerators, traders, the Government, regional development agency, science and research institutions, as well as other institutions and organizations [21, pp. 1417-1431].

In order to find a long-term solution to the problems that often arise in the production and distribution of raspberries, at the beginning of 2017, the ministry in charge of the agricultural sector development in Serbia agreed with the producers and purchasers of this fruit to form a working group. The group was formed in May 2018.

The main task of the working group is the preparation of a strategic document that will fully address and define the situation in the field of raspberry production and purchase, highlight the critical points in the retail chain of the raspberry production with the aim of adopting appropriate measures for strategically solving the existing problems. Moreover, its other high-priority goals are to consider the adverse effects of climatic and pedologic factors on the production and yield of raspberries, as well as improving the quality and health situation of raspberry planting material; improving the conditions for storing and transporting raspberries; regulation of the raspberry purchase rules and definition of minimum requirements for purchase points, fruit classification, etc.; rational organization of the purchase, placement and sale of raspberries in the world market; planned increase in production areas while preserving the quality of the fruit; other issues in the field of raspberry production.

The aforementioned facts may indicate the economic justification for establishing a commodity exchange for raspberries, whose existence would enable the definition of the market price of this fruit in Serbia. In addition, it is necessary to observe the readiness of raspberry producers to switch to an alternative way of selling this fruit (selling through the commodity exchange), which was the objective of the conducted empirical research.

Service quality and perceived value

The objective of the conducted empirical research is to analyze the influence of refrigeration service quality, as well as the influence of perceived value of sales through a commodity exchange on the satisfaction and loyalty of the raspberry producers to the owners of refrigeration facilities. Customer orientation implies concern for the quality of service and customer satisfaction, and as a reward it generates loyalty of customers, which results in increased profitability and revenue. Quality is the key to achieving customer satisfaction. The quality of services has to be constantly improved in order to achieve satisfaction of the customers with the provided services, i.e., products. Parasuraman, Zeithaml & Berry [20] define services as multidimensional. Dimensions of services

are immeasurability, heterogeneity and inseparability of production and consumption. Crosby [4] explains that due to the non-material nature of services, they cannot be measured by durability or number of defects. Because of the heterogeneity of the services, quality measurement is always a great challenge. Parasuraman et al. [20] have defined ten dimensions of service quality that were later reduced and grouped into five dimensions of service quality [34, pp. 31-46]: tangibility, reliability, responsiveness, assurance and empathy as five standard service quality research tools. In this paper, the statements based on the abovementioned five dimensions were used to investigate the quality of cold storage services.

The most often used definition of value in marketing literature observes value as a difference in benefits and sacrifices, which occur during the purchase and use of products and services [6]. Therefore, the value implies a set of different benefits that consumers receive in exchange for investing their money, time and energy when purchasing and consuming products and/or services. In addition to the physical attributes of the products, customers also expect different advantages during the procurement process (kindness and helpfulness of the staff, provision of additional services). Costs as the second element of value include financial expenditures, time spent and physical and psychological efforts that consumers invest into the process of procurement and purchase of products [14]. Some studies indicate that financial expenditure is the only element of costs [30, pp. 278-290]. Nevertheless, besides financial expenditures, other investments are also needed in order to procure, to own and to use a product/service. While evaluating alternatives during purchase of products or services, customers decide for the ones whose perceived benefits (quality, kindness, delivery speed, reputation, etc.) exceed the perceived expenditures (money, time, effort) [27, pp. 73-79].

Value is often considered not to be an objective dimension defined by the enterprise, but rather something that consumers estimate based on their own personal experience when using a product or service and/or collecting information from their environment [7, pp. 111-112]. For the purpose of this paper, the respondents evaluated the perceived value of a commodity exchange based on the

information available in their environment, given the fact that they do not have any personal experience in using commodity exchange services.

Different authors use different dimensions for measuring perceived values. Petrick [22] developed a model for measuring the key elements of perceived value in hotel management. The model contains 18 statements grouped into five basic units (factors): quality, reputation, emotional response, monetary price and behavioral price. Relying on the original Petrick's scale, Nasution & Mavondo [15] ranked the following three dimensions of perceived value of services in terms of significance: reputation, value for money and prestige. The statements for measuring these three dimensions were used for measuring perceived value in this study.

Perceived value is also an important means of customer satisfaction. Petrick [23] emphasizes that perceived value is an important factor that relates to customer satisfaction and intention to repurchase. Zeithaml [33] defines perceived value as the consumer's overall assessment of the product's usefulness based on the perception of what is obtained and what is given. Cronin, Brady & Hult [3] show in their study that perceived value is the most important factor of the intention to repurchase.

Satisfaction and loyalty

Customer satisfaction is one of the most important tasks of every service organization, since the future business success of the enterprise depends on the level of customer satisfaction. Satisfaction, i.e., customer satisfaction, depends first of all on the benefits gained when delivering value, but also on customers' expectations based on previous experience, their friends' opinion and accuracy of marketing information obtained from the service company.

Current studies suggest that a fully satisfied customer will much more likely repurchase the services of the same company. Customer satisfaction is a sense of pleasant fulfillment. An increase in the level of satisfaction is accompanied by the intensification of customers' intentions that result in their loyalty.

Satisfaction and loyalty are, hence, two very much related concepts. If customers are satisfied with a service, they will use the service again, which is a token of loyalty. A

loyal customer transfers his positive impressions to others and thus secures new customers. A loyal customer is open to cooperation, usually not sensitive to price changes and is interested in new services [2, pp. 484-490].

The concept of loyalty consists of the behavioral component (intention to reuse, including the amount of money and frequency) [10, pp. 15-31] and the attitude component (preferences, trust in products or services, as well as in word-of-mouth) [34, pp. 31-46].

According to this, customers are loyal to a particular company if they have the habit of repeating the purchase of its products and/or services, as well as of spreading positive word-of-mouth and attracting new customers to the company. This implies that the measurement of customer loyalty involves examining the level of intention to repurchase, but also the level of customers' willingness to recommend the company to their friends and acquaintances.

The statements for the abovementioned components were used for examining loyalty in the empirical research conducted for the purpose of this paper.

Relationship between quality, perceived value, satisfaction and loyalty

In literature, perceived value is often confused with or used as a synonym for customer satisfaction. However, some authors differentiate these two variables. Woodruff [32] explains that perceived value can occur at any stage of the purchase, including repurchase. Oliver [19] says that satisfaction should be viewed as an evaluation after the purchase.

Numerous studies indicate the relationship between perceived value, satisfaction and loyalty. Some authors such as Liljander & Strandvik [11], Spreng & Patterson [26] or Ravalid & Gronroos [24] support in their research the attitude of positive and direct influence of perceived value on customer satisfaction. McDougall & Levesque [13] confirm in their research that perceived value has an indirect impact on the repurchase intention, being one of the loyalty components achieved through customer satisfaction. Those customers who have received superior value from products/services of a particular company

often favor the respective company and recommend it to others [7, pp. 111-112]. Whether customers will repeat their purchase from the same producer and be willing to share positive impressions with others depends on the perceived value they have gained on the basis of their previous experiences [1, pp. 95-108]. It also depends on the expected future business relationships in which the quality of interaction is viewed as a substitute for future expected benefits. Incorporating perceived value into models for measuring satisfaction and loyalty enables a more detailed view of customer satisfaction assessment and their commitment to a particular company and its products and/or services. Gallarza & Saura [5] prove in their study that there is a connection between quality, perceived value, satisfaction and loyalty in customer behavior. In order to increase customer loyalty, it is necessary to improve service quality. Without a satisfied user, there is no loyal user, and satisfaction itself is related to quality [31, pp. 99-123]. If employees in a service organization show interest for clients and meet their demands at any given moment, the customers will build up trust and be satisfied, which leads to establishing long-term relationships and creating loyal customers.

Considering the previously conducted studies, as well as the objective of this research, the following research hypotheses were formulated:

H1: There is a positive influence of the quality of refrigeration services on the satisfaction of the users of refrigeration services;

H2: There is a negative influence of the perceived value of sales through a commodity exchange on the satisfaction of the users of refrigeration services;

H3: There is a positive influence of the satisfaction of the users of refrigeration services on their loyalty;

H4: There is a statically significant difference in the influence of satisfaction on loyalty among the respondents whose basic or additional sources of income are raspberries.

Methods and materials

Having in mind the dominant role of the municipalities of Ivanjica and Arilje in raspberry production in Serbia, the empirical research was carried out in the territory of these two municipalities. The research was conducted in November 2017, whereby 80 valid surveys were collected. The structure of the sample in terms of socio-demographic characteristics is presented in Table 9. It should be noted that the majority of the respondents in the sample are raspberry producers whose main source of income is not raspberry production (72.5%). Moreover, the largest percentage of the respondents are raspberry producers with more than 10 years of experience in growing raspberries (77.6%). The data were obtained by distributing the questionnaires in person, whereby the respondents assessed to what extent they agree with the statements on the five-point Likert scale (1 – Strongly disagree; 5 – Strongly agree). Statistical processing and data analysis were performed by using the

Table 9: Descriptive statistics for the characteristics of the respondents

	% of the respondents	
Income – Raspberry production	The main source of income	27.5
	Not the main source of income	72.5
Years of raspberry production	Up to 10 years	22.5
	10 to 20 years	38.8
	Over 20 years	38.8
Area covered by raspberries	Up to 25 ares	46.3
	25-50 ares	30.0
	More than 50 ares	23.8
Number of workers	Up to 3	61.3
	3-6	33.8
	Over 6	5.0
Number of seasonal workers	Up to 3	53.8
	3-6	36.3
	More than 6	10.0

Source: Authors' calculation.

software packages Microsoft Excel and SPSS (Statistical Package for Social Sciences, 21.0).

Results and discussion

When speaking about statistical analyses, descriptive statistics was applied first, and then also exploratory factor analysis, which served for grouping the statements into factors whose relations are observed. As a measure of internal consistency within the factors, we used the Cronbach's alpha coefficient. The assumed relationship between the observed factors was analyzed by applying the multiple and simple linear regression.

For the purpose of grouping the statements from the questionnaire into factors, an exploratory factor analysis was performed. This analysis resulted in two factors that refer to the quality of refrigeration services and the perceived value of sales through a commodity exchange. The value of the Cronbach's alpha coefficient is, for both factors, higher than the recommended value of 0.7 [18], which shows that the factors have good internal consistency. Individual factor loadings and the values of the Cronbach's alpha coefficient for each factor are presented in Table 10.

Indicators that must be considered when assessing the justification for applying the exploratory factor analysis are the Bartlett's test of sphericity and the Kaiser-Meyer-Olkin

(KMO) indicator for sampling adequacy. The value of the KMO indicator in this study is 0.730, while the Bartlett's test of sphericity has a statistically significant value (Sig. = 0.000), indicating that the application of factor analysis is justified. The total percentage of variance explained by these two factors is 56.44%.

The results of descriptive statistics for the statements used in the research are given in Table 11. Based on these results, it can be concluded that the factor Quality of refrigeration services ($M = 3.030$, $SD = 0.752$) has a lower average rating than the factor Perceived value of sales through a commodity exchange ($M = 3.962$, $SD = 0.736$). Within the factor Quality of refrigeration services, the highest average rating is recorded for the statement – Owners of refrigeration facilities have the appropriate equipment and facilities ($M = 3.900$, $SD = 0.894$), while the statement – Owners of refrigeration facilities understand the needs of each client – has the lowest average rating ($M = 2.562$, $SD = 1.112$).

When it comes to the factor Perceived value of sales through a commodity exchange, the respondents awarded the highest average grade to the statement – Sales through a commodity exchange would be more profitable than sales through refrigeration facilities ($M = 4.350$, $SD = 0.828$). On the other hand, the lowest average rating within this factor is observed for the statement – Effort invested in sales through a commodity exchange would be less than

Table 10: Results of the exploratory factor analysis

Statements	Factor loading	A
Quality of refrigeration services		0.760
Owners of refrigeration facilities keep their promises in a reliable and precise way	0.773	
Owners of refrigeration facilities are ready and willing to help and provide a quick service	0.690	
Owners of refrigeration facilities have the necessary knowledge and skills	0.758	
Owners of refrigeration facilities understand the needs of each client	0.650	
Owners of refrigeration facilities have the appropriate equipment and facilities	0.644	
Perceived value of sales through a commodity exchange		0.825
Sales through a commodity exchange would be more profitable than sales through refrigeration facilities	0.693	
Effort invested in sales through a commodity exchange would be less than the effort to sell through refrigeration facilities	0.810	
Time spent on selling through a commodity exchange would be less than time spent on selling through refrigeration facilities	0.839	
Communication with commodity exchange workers would be better and more efficient than communication with workers in refrigeration facilities	0.780	
Selling through a commodity exchange is more prestigious than selling through refrigeration facilities	0.679	
Bartlett's test of sphericity		Sig. = 0.000
KMO		0.730

Source: Authors' calculation.

the effort to sell through refrigeration facilities ($M = 3.650$, $SD = 1.032$).

The results of descriptive statistics also point to the fact that average ratings of Satisfaction ($M = 2.379$, $SD = 0.987$) and Loyalty to sales through refrigeration facilities ($M = 2.104$, $SD = 0.905$) are very low and significantly lower than the average ratings of the Perceived value of sales through a commodity exchange. In fact, the lowest average value is observed for the statement referring to the readiness of raspberry producers to sell through refrigeration facilities even if their commission was higher than commissions of a commodity exchange ($M = 1.700$, $SD = 1.095$).

The results of correlation analyses are presented in Table 12. Namely, we observe that there is a high degree of correlation between the variables Quality of refrigeration services, Satisfaction and Loyalty of raspberry producers. Therefore, with an increase in quality of refrigeration services, there is also an increase in satisfaction and loyalty of raspberry producers who use their services. On the other hand, a negative correlation occurs between Perceived value of sales through a commodity exchange and the

Quality of refrigeration services, Satisfaction and Loyalty of raspberry producers. With regard to such results, it can be concluded that, with an increase in the perceived value of selling products through a commodity exchange, there is a decrease in perception of the quality of refrigeration services, as well as a decrease in satisfaction and loyalty of raspberry producers to selling through refrigeration facilities. Finally, a positive correlation occurs between Satisfaction and Loyalty of raspberry producers, indicating that, with an increase in satisfaction of raspberry producers, their loyalty to the owners of refrigeration facilities whose services they use also increases.

With an aim of examining the hypotheses, multiple and simple linear regression were used. Namely, the multiple regression analysis was first applied to examine the influence of the factors Quality of refrigeration services and Perceived value of sales through a commodity exchange on Satisfaction with sales through refrigeration facilities. The results of this analysis are given in Table 13. The results of multiple linear regression indicate that Quality of refrigeration services ($\beta = 0.686$, $\text{Sig.} = 0.000$) has a positive and statistically significant influence on

Table 11: Results of descriptive statistics analysis

Statements	M	SD
Quality of refrigeration services	3.030	0.752
Owners of refrigeration facilities keep their promises in a reliable and precise way	2.765	1.093
Owners of refrigeration facilities are ready and willing to help and provide a quick service	2.900	1.038
Owners of refrigeration facilities have the necessary knowledge and skills	3.025	1.113
Owners of refrigeration facilities understand the needs of each client	2.562	1.112
Owners of refrigeration facilities have the appropriate equipment and facilities	3.900	0.894
Perceived value of sales through a commodity exchange	3.962	0.736
Sales through a commodity exchange would be more profitable than sales through refrigeration facilities	4.350	0.828
Effort invested in sales through a commodity exchange would be less than the effort to sell through refrigeration facilities	3.650	1.032
Time spent on selling through a commodity exchange would be less than time spent on selling through refrigeration facilities	3.787	1.039
Communication with commodity exchange workers would be better and more efficient than communication with workers in refrigeration facilities	3.762	0.996
Selling through a commodity exchange is more prestigious than selling through refrigeration facilities	4.262	0.882
Satisfaction with sales through refrigeration facilities	2.379	0.987
Sales through refrigeration facilities is a smart decision	2.550	1.054
I am satisfied with sales through refrigeration facilities	2.262	1.087
I am very satisfied with my experience and cooperation with the owners of refrigeration facilities	2.325	1.052
Loyalty to sales through refrigeration facilities	2.104	0.905
I would recommend to others to sell through refrigeration facilities	2.487	1.006
I will continue to sell through refrigeration facilities even if a commodity exchange is established	2.125	1.194
I will continue to sell through refrigeration facilities even if their commission is higher than commissions of a commodity exchange	1.700	1.095

Source: Authors' calculation.

Table 12: Correlation matrix

	Quality of refrigeration services	Perceived value	Satisfaction	Loyalty
Quality of refrigeration services	1			
Perceived value	-0.210*	1		
Satisfaction	0.714***	-0.276*	1	
Loyalty	0.615***	-0.476***	0.721***	1

Source: Authors' calculation.

**Table 13: Results of multiple linear regression
(dependent variable – Satisfaction with sales through refrigeration facilities)**

Hypothesis	Independent variable	β	T	Sig.
H1	Quality of refrigeration services	0.686	8.544	0.000
H2	Perceived value of sales through a commodity exchange	-0.132	-1.647	0.104

Source: Authors' calculation

Satisfaction with sales through refrigeration facilities. On the other hand, Perceived value of sales through a commodity exchange ($\beta = -0.132$, Sig. = 0.104) has a negative and statistically significant influence on Satisfaction with sales through refrigeration facilities. Based on the results of the regression analysis, it is to conclude that hypothesis H1 can be accepted, while hypothesis H2 of the present research cannot be accepted.

When it comes to the impact of Satisfaction with sales through refrigeration facilities on Loyalty to sales through refrigeration facilities, this impact was examined by using the simple linear regression analysis. The results of this analysis are presented in Table 14. The results obtained indicate that Satisfaction has a pronounced, positive and statistically significant influence on Loyalty to sales through refrigeration facilities ($\beta = 0.721$, Sig. = 0.000). Based on this, it is to conclude that hypothesis H3 can be accepted.

Examination of statistically significant differences between the attitudes of certain groups of raspberry

producers, according to whether raspberry production is their basic source of income or not, was performed by applying the t-test for independent samples. The results of analyzing the statistically significant differences between the attitudes of the respondents of the respective groups are presented in Table 15. Namely, based on the results, we can conclude that there are no statistically significant differences between the attitudes of the respondents according to the income criterion, in terms of the respondents' satisfaction attitudes ($t = -0.589$, Sig. = 0.560) and their loyalty to sales through refrigeration facilities ($t = 0.509$, Sig. = 0.614). Therefore, this is to say that hypothesis H4 cannot be accepted.

Conclusion

An adequate regulatory framework is a very important requirement for commodity exchanges to be established and to function efficiently. In mid-2019, the Law on Commodity Exchange was adopted in Serbia (to be applicable as of

**Table 14: Results of simple linear regression
(dependent variable – Loyalty of the users of refrigeration facilities)**

Hypothesis	Independent variable	F	β	t	Sig.
H3	Satisfaction	84.478	0.721	9.191	0.000

Source: ' calculation.

Table 15: Results of the t-test for two independent samples

	Income 1		Income 2		t-value	Sig.
	M	SD	M	SD		
Satisfaction	2.257	1.216	2.425	0.893	-0.589	0.560
Loyalty	2.197	1.057	2.069	0.848	0.509	0.614

Source: Authors' calculation.

May 2020) and it should support commodity exchange development in the future period.

However, in addition to the defined rules, the functioning of a commodity exchange also requires a sufficient quantity of goods. Nearly one quarter of the world's total raspberry production is generated in Serbia, with almost all of the production being exported. In addition to this, standardization of commodity exchange materials plays an important role in the process of commodity exchange trading. It ensures that goods have a declared quality, which may often come across as a problem with alternative ways of trading.

The observed dissatisfaction of raspberry producers in Serbia with the quality of refrigeration services imposes the need for establishing a more efficient mechanism for trading in this fruit. The results of the empirical research show that the respondents awarded a lower rating to the quality of refrigeration services in comparison to the perceived value of a commodity exchange, but also that the perceived value of sales through a commodity exchange negatively influences the satisfaction with refrigeration services and, consequently, the loyalty to the owners of refrigeration facilities. Raspberry producers gave lower ratings for the statements referring to their willingness to continue selling through refrigeration facilities even if commodity exchange was established or in the event that commissions charged by refrigeration facilities were higher than commissions of the commodity exchange, which can indirectly lead to the conclusion that they would be ready to trade through a commodity exchange. Having the previous conclusions in mind, as well as the positive experiences of the functioning of commodity exchanges in the world and adequacy of raspberries as a commodity exchange material, the idea of establishing a raspberry commodity exchange in Serbia is put forward as a possible solution.

It must be emphasized that this conclusion was derived from the analysis of producers which are not entirely dedicated to the raspberry production (raspberry production is an additional source of income for them) because of the predominant peasant economy structure in the local communities which were observed. This may diminish the relevance of the conclusion regarding this issue.

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