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THE INFRASTRUCTURE AND ORGANIZATION OF THE TRADE OF FRUITS AND VEGETABLES BASED ON THE AGRI-FOOD MARKET IN KRAKÓW-RYBITWY

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Abstract

The aim of this study is to present the organization of the wholesale fruit and vegetable market while taking into consideration the agri-food market in Cracow-Rybitwy. Selected aspects which are presented are necessary for trading and analysing the process of delivery as well as sales of fruits and vegetables by the manufacturers: 30 suppliers of fruits and 30 suppliers of vegetables were selected for detailed analysis. The following aspects were presented: costs resulting from the possibility of using the market, a distance needed to transport products, an amount of harvest sold on the market covered by research studies, the cost of sales and their structure. A general analysis of transport used for the transportation of fruits and vegetables was conducted. The frequency of arrivals and time spent at the market during individual months was also calculated. The analysis was made separately for the sale of fruits and vegetables. It was found that the organization of the garden crops market leaves much to be desired. The proof of this is the frequency of arrivals, the length of time spent at the market by manufacturers, the efficiency and cost of sale.

Keywords: market, fruits, vegetables, means of transport, costs of sale

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INTRODUCTION

To agricultural services and the network for technical maintenance of agriculture, such aspects are related as retail and wholesale networks for supplying farms with industrial and energetic means of agricultural production. Alongside networks for purchasing and selling of agricultural products, their storage and preservation as well as for their processing and delivery to the food markets, this is one of the most advanced networks in agricultural infrastructure. Supplying farms is based on the modernized networks of former commercial enterprises and cooperatives. Also new networks of private enterprises, which sale and supply with products in agriculture and agri-food sector, are developing. Some of these entrepreneurs become local middlemen between farmers and enterprises processing and exporting food products. Also the developing chain of supermarkets plays a positive role in agricultural commodity trading (Wójcicki 2009).

The market economy's competitiveness causes an important problem for the manufacturers of fruits and vegetables. The complication is associated with excessive production of a particular product at an affordable price. The specificity of certain horticultural products is based on low quality which in a situation with a very limited storage infrastructure in households enforces growers to sell their produce promptly before it loses its usability. Unfortunately due to the problem stated above, gardeners become merchants that spend countless hours at markets instead of focusing on their production. The necessity to repeatedly commute to locations situated many kilometers away with the produced goods increases costs of production. It should be noted that the production costs in horticultural farms surpass the same costs on farms with multidirectional production, which is underlined by Kowalczyk (2006) and Kowalski et al. (2012) in their research. The most crucial challenges which the gardeners have to face are: rapidly changing surroundings including trading products based on the creation of supermarkets and the growing demand of consumers (Krzyżanowska and Trajer, 2011). The type and specificity of entities participating in the horticultural market depend on the level of the distribution line, which determines the level of wholesale and retail. Gardeners, processing companies, and associations involved in the mediation of these products are involved in the wholesale trades (Pizło, 2001). According to Filipiak's research (2014), the largest amount of vegetable sales was made by merchants (38.8%). The next highest sales were made by personal sellers (25.1%). Drelichowski et al. (2007) believe that the wholesale markets are a very important element of agribusiness. The success in their activities is determined by the efficiency of information set by the manufacturers and agricultural producers.

Agricultural marketing infrastructure must include efficient wholesale trade fairs, agricultural markets, fruit and vegetable markets, flower markets,

as well as grain and feed storehouses, mills, or even storage facilities for strategic food reserves (Wójcicki 2009). Unfortunately in Poland the organization behind trading wholesale horticultural products leaves much to be desired. There is a lack of necessary agricultural markets, and those that exist, are not sufficient enough. This applies to the infrastructure which includes the surface of storage, cabinets, sorting lines, lines for packaging products, etc. As a result of the research conducted by Parlińska and Bezat (2008) it appears that the development of the wholesale market is diverse. The aim of the development program was that every emerging market would be entitled to receive the same conditions for their development. Better organization of the agricultural market, and adapting such production to the requirements of the consumer in terms of quality, quantity and assortment should allow the manufacturers improving their management efficiency and provide the consumers with cheap and good quality product (Kozak and Gumkowski, 2006). An example of the organization of the horticultural market is the inclusion of manufacturers in the development of its organizational structures. The producers of fruits and vegetables are involved in the form of shares or creation and the principles of the market participants in the field of wholesale markets mainly located in metropolitan areas such as: Warszawa, Lublin, Krakow, Gdansk and other big cities (Filipiak and Maciejczak, 2008). Undoubtedly to improve their market positioning the producers must associate with the producer groups, which turn out to be very uncommon. The efficiency of operating in groups in the supply chain is based on the following elements: the size of the group, the homogeneity of the group, the number of functions, range of collecting and processing information, quality of management, as well as the surroundings of the institution (Bijman and Wollni, 2008). Problems associated with the organization of the trade of fruits and vegetables in Krakow-Rybitwy were the subject of research.

AIM OF RESEARCH

The aim of this study is to assess the organization of the fruit and vegetable wholesale market while taking into consideration the agri-food market in Krakow-Rybitwy. The work involved both: the producers and participants, as well as the area where the market is located including its infrastructure.

A comparative analysis and characterization have been made of both sales and the producer groups which included fruits and vegetables. The analysis includes the characterization of the transport services used by the producers, the frequency of arrivals and time spent at the market, as well as the expenses of sales.

MATERIAL AND METHODS

The research took place at the agri-food market in Krakow-Rybitwy in 2015. The study includes some aspects of the economic infrastructure for trade on the agri-food market in Kraków-Rybitwy. The information was collected by conducting direct interviews which helped in filling out the questionnaire. The study included 60 randomly picked sellers (and at the same time producers). Half of them dealt with the sales of vegetables and the other half with fruits. The sellers chosen for the survey were asked for permission to provide information. Among the sellers of vegetables and fruits who agreed to answer the questions, there have been chosen the first thirty people in both groups. The number of interviewees in each group was suggested by the minimum group size accepted in statistics.

The information in the questionnaire contained:

- a general characterization of the farms, in which the product is created,
- the distance between the farms and the market,
- the structure of the sales made with the manufactured goods at the market,
- a general characterization of the transport services used to transport the goods to the market,
- the frequency of arrivals and time spent at the market.

Based on the gathered information, the monthly time spent at the market by the producers and a number of arrivals in certain parts of the country were calculated. The cost of sales which include: the cost of fuel which was used to transport the goods, the cost of staying at the market, and the costs associated with work were also calculated. The cost of fuel was calculated while taking these factors into consideration: the average amount of fuel used which has been stated by the seller, the distance between the market and the farms and the amount of arrivals, as well as the average price of diesel or gasoline in a given period of time. The fees associated with staying at the market were calculated based on applicable fees (table 1) and the declared number of arrivals. The costs affiliated with labour included the amount of time used to sell the goods and get to the market as well as the hourly rate (10 $PLN \cdot h^{-1}$) received by the hired workers (sellers).

RESULTS

The agri-food market Rybitwy occupies an area of 7.3 ha. The area is fenced, lighted and monitored 24/7. The market Rybitwy provides the rent of the retail and warehouse space. It is possible to sell goods both on the stalls and directly from the vehicles. The access to the market is very convenient thanks to the three-pronged highway, which connects the place with the centre of Kraków

and further the motorway A4 to Katowice and Rzeszów. The new bridge over Wisła river enables exits towards Sandomierz. The agri-food market is situated directly at the junction of Christo Botewa and Półłanki streets. In Christo Botewa Street there are two gates – one gate both for exits and entrances, and another one only for exits. In Półłanki Street there is one entrance, two two-way gates and one emergency gate. The area of the market is divided into five sections: section I – soft seasonal fruit, section II – citrus fruit, section III – groceries, section IV – tomatoes and cucumbers, section V – crops. There is also a wholesale of plant protection products, which is located in the building next to the offices. The agri-food market Rybitwy consists of many other commercial buildings and three WC with toilets and washbasins. Along Półłanki and Botewa streets there are car-parks for customers.

Table 1. Obligatory fees at the market in Kraków-Rybitwy

The subject associated with fees	Market fees (UMK) (PLN)	Operational Market fees „Efekt" S.A. (PLN)	Total fees (PLN)
For every square meter used for the sale of fruits, vegetables, tables, etc.	1.00	13.50	14.50
For selling out of a car:			
passenger car	6.00	35.00	41.00
carrying capacity ≤ 1,5 t	6.00	46.00	52.00
carrying capacity > 1,5 t ≤ 3,5 t	8.00	68.00	76.00
carrying capacity > 3,5 t ≤ 6 t	11.00	81.00	92.00
carrying capacity > 6,0 t ≤ 10,0 t	13.00	95.00	108.00
carrying capacity >10 t	20.00	139.00	159.00
Occupying space in front of the vehicles listed above	1.00	-	1.00
For picking up the goods:			
Passenger cars.	-	-	11.00
Passenger cars with a trailer.	-	-	10.00
Vans with a carrying capacity. ≤ 1,5 t	-	-	12.00
Trailers with a carrying capacity. ≤ 1,5 t	-	-	11.00
Trucks with a carrying capacity. >1,5 t ≤6 t	-	-	30.00
Trailers with a carrying capacity. >1,5 t ≤ 6 t	-	-	22.00
Trucks with a carrying capacity .> 6 t	-	-	50.00
Trailers with a carrying capacity > 6 t	-	-	38.00

Source: http://khrybitwy.pl/cennik-oplat.html

Table 1 shows the structure and amount of fees associated with the use of the agri-food market. As can be seen the fees vary depending on the purpose of using the market (buyer, seller), as well as the size of the occupied area and the

capacity of the vehicle. While comparing the charges and the price of a unit of most fruits and vegetables, there is a noticeable disadvantage for producers.

Table 2 summarizes the information regarding the area used for horticultural crops in farms in which the produced vegetables and fruits end up at the market, as well as the distance between the farms and the market. As can be seen the vegetables in contrary to the fruits are delivered from vegetable farms where there is a larger scale of horticultural farming. When it comes to vegetables farms the average area of horticultural crops is 5.87 ha which is quite a good result for the farms in Małopolska. On the other hand the cultivation area of fruits which are sold at the market in Kraków-Rybitwy is more than one hectare smaller that the area used for vegetables, averaging at about 4.71 ha. The farms that supply vegetables are mainly located in the municipality of Igołomia-Wawrzeńczyce and Miechów, hence a relatively smaller average distance from the farm to the market. Fruits are mainly supplied from Raciechowice, Limanowa and the Nowosądeckie county, which are further away from the market and the average distance from the farm to the market is 64 km. Analysing the table 2 it is seen that the market in Kraków-Rybitwy is the place where most of the harvested horticultural crops are sold, so on average: 87% of the produced vegetables and 76% of the produced fruits.

Table 2. The area used for horticultural crops at farms, distance from the market, number of crops sold at the market

Specification	Vegetables	Fruits
	min. – max. (average)	min. – max. (average)
Area used for horticultural crops(ha)	1.14-32.19 (5.87)	1.27-10.59 (4.71)
Distance from the market (km)	11-68 (31)	22-235 (64)
Amount of crops sold at the market in Kraków-Rybitwy (%)	20-100 (87)	10-100 (76)

Source: Own study

Due to the necessity of delivering the produced fruits and vegetables to the markets different means of transport, which include vans and trucks, play a very important role at horticultural farms. A partial characterization of the transportation is presented in table 3. As shown the cars are advanced in age, and their average age is 17 at vegetable farms, and 15 at the fruit farms. Among the cars which the products are delivered by the respondents, the most popular are vans, which include: Lublin (various versions) – 12 pcs, Mercedes Sprinter – 8 pcs, Iveco Turbo Daily – 8 pcs, Volkswagen Transporter – 6 pcs. The average load capacity of the cars in both of the studied groups is comparable and amounts to

about 1.6-1.8 tons. The average fuel consumption of the cars, is more or less the same in both of the groups which is about 11.8-12.1 l·100 km^{-1}.

Table 3. Characteristics of the means of transport

Specification	Vegetables	Fruits
	min. – max. (average)	min. – max. (average)
Age (years)	7-31 (17)	5-26 (15)
Carrying capacity (ton)	0.3-6.5 (1.8)	0.7-6.0 (1.6)
Fuel consumption (l·100 km^{-1})	8.5-25.0 (11.8)	8.5-23.0 (12.1)

Source: Own study

Unfortunately the difficulties associated with selling the farming produce, force the gardeners to spend a lot of time selling and transporting their goods, which is proved by the data in table 4 which present the amount of arrivals to the market (l.arriv.) and the time spent at the market (time sp. [h]) in a certain month. The producers of vegetables go to the market on average 4-13 times a month, however in extreme cases they have to arrive daily. They spend at the market an average time of 36-172 hours per month. The fruit producers arrive less often to the market, on average of 4-11 arrivals per month; they also spend about 29-154 hours at the market per month. The common time spent at the market during a single visit including the journey is about 10-11 hours, but in some cases the time exceeded 24 hours. It is also worth mentioning that the producer doesn't always sell his merchandise at the market and it is very common that he has to take the majority of his products back to the farm.

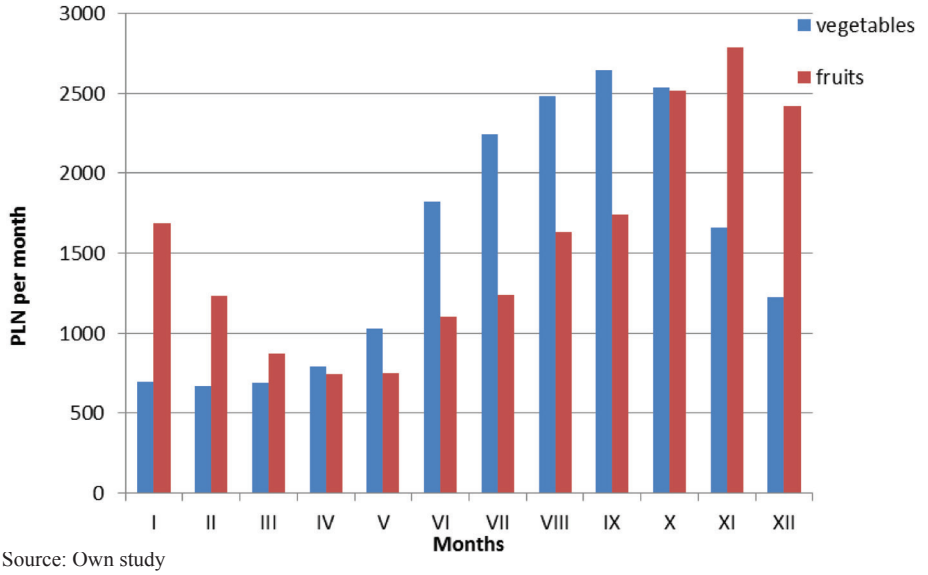
Figure 1 shows the cost of vegetable and fruit sales in certain months. There are differences in the levels of costs due to the seasonality of production and sales. The average monthly cost of vegetable sales ranged from 667-2642 PLN, and 743-2787 PLN for fruit sales. It is worth noting that the costs mentioned above are independent and don't have anything to do with the effectiveness of sales. Comparing the presented costs and the individual value of the fruits and vegetables, there is an unfavourable balance for the producers. Analysing the information gathered in figure 1, we can notice that there is no clear relationship between the costs associated with selling fruits and vegetables. The situations vary depending on the frequency of arrivals and time spent at the market; in some months the costs of selling vegetables are larger than the costs associated with selling fruits and vice-versa.

Table 4. Amount of arrivals and time spent at the market in certain months

Month	Specification	Vegetables	Fruits
		min. – max. (average)	min. – max. (average)
I	l. arriv.	0-15 (4)	0-19 (6)
	Time sp. [h]	0-152 (39)	0-276 (57)
II	l. arriv.	0-15 (4)	0-21 (6)
	Time sp. [h]	0-129 (36)	0-206 (55)
III	l. arriv.	0-18 (4)	0-20 (4)
	Time sp.. [h]	0-191 (38)	0-150 (42)
IV	l. arriv.	0-25 (5)	0-11 (4)
	Time sp. [h]	0-296 (41)	0-107 (29)
V	l. arriv.	0-25 (7)	0-12 (4)
	Time sp.. [h]	0-340 (49)	0-136 (30)
VI	l. arriv.	0-30 (11)	0-20 (6)
	Time sp. [h]	0-431 (98)	0-210 (42)
VII	l. arriv.	0-31 (12)	0-21 (6)
	Time sp. [h]	0-428 (132)	0-226 (56)
VIII	l. arriv.	0-31 (13)	0-25 (6)
	Time sp. [h]	0-402 (148)	0-276 (95)
IX	l. arriv.	4-30 (12)	0-20 (6)
	Time sp. [h]	20-392 (172)	0-322 (106)
X	l. arriv.	4-31 (12)	0-26 (10)
	Time sp. [h]	16-409 (161)	0-376 (138)
XI	l. arriv.	0-30 (9)	0-22 (11)
	Time sp. [h]	0-272 (97)	0-388 (154)
XII	l. arriv.	0-20 (7)	0-20 (9)
	Time sp. [h]	0-281 (69)	0-376 (140)

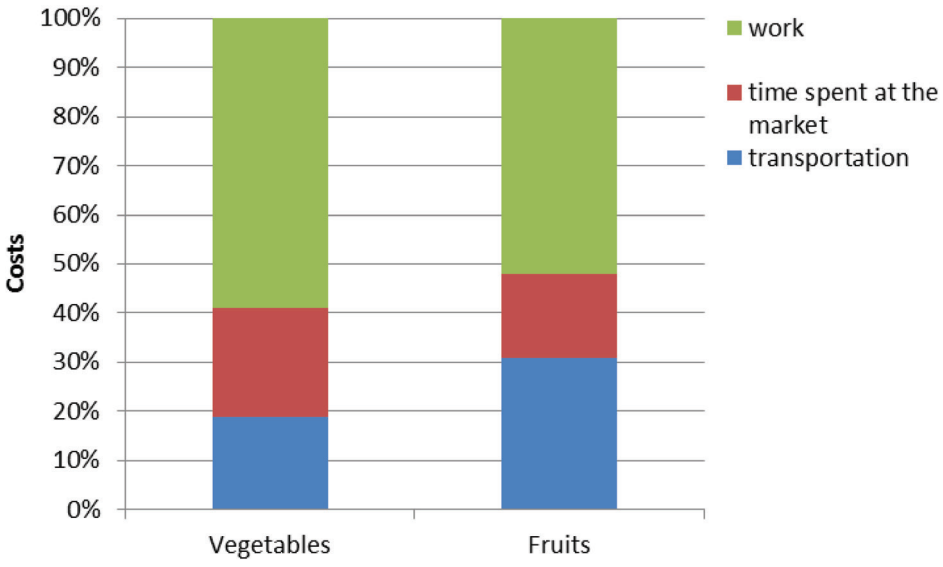
Source: Own study

The structure of the costs associated with the sales of fruits and vegetables is illustrated in figure 2. As can be seen when it comes to fruits and vegetables the cost of labour dominates, which is about 59% and 52% of the total costs of sales. The costs of transport are at 19% (vegetables) and 31% (fruits), the cost of staying at the market stands at 22% and 17% respectively. The higher costs of transporting fruits are due to the greater distance between farms and the market (table 2).



Source: Own study

Figure 1. Average cost of selling fruits and vegetables per month



Source: Own study

Figure 2. The structure of the cost of sales

CONCLUSION

Based on the conducted research it has been stated that:

1. The fruits and vegetables that end up at the market in Krakow – Rybitwy originate from a majority of households in which the area exceeds the average in Małopolska (3.98) which has been proven by the average area used for horticultural crops ranging from 4.71 ha for fruits and 5.87 ha for vegetables.
2. The producers of horticultural crops mainly use vans more often than trucks, even though their age is very advanced for this type of technical measure and averages at about 15-17 years. This situation is unfavourable due to the use of worn out cars as the main type of transport which also serves as a sales point and a place where the producer can stay while he's at the market.
3. The organization of the horticultural crop market leaves much to be desired, which is proven by the frequency of arrivals and time spent at the market by the producers as well as the effectiveness of sales. After all the wholesale market is the main place to sell fruits and vegetables produced at farms of which 87% and 76% are sold at the market in Krakow-Rybitwy.
4. The positive aspect of the organization associated with the sales is the fact that the market is located relatively close to the farms where the horticultural crops are produced, which is especially noticeable when it comes to the vegetable farms which are located on average of 31km from the market.
5. Considering the size of harvest and price sales, which are respectively: for onion – 29 t $\cdot ha^{-1}$ and 0,9 PLN $\cdot kg^{-1}$, white cabbage – 75 t $\cdot ha^{-1}$ and 0,35 PLN $\cdot kg^{-1}$, carrot – 33 t $\cdot ha^{-1}$ and 0,8 PLN $\cdot kg^{-1}$ and apples – 30 t $\cdot ha^{-1}$ and 1,3 PLN $\cdot kg^{-1}$, the producers have to sell 10% of their crops per hectare of white cabbage, onions, and carrots as well as approx. 7% of their apple crops per hectare to cover the relatively high costs of sales during intense trading months.

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