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Distribution channels used by fruit and vegetables producer organizations in Poland

Kanały dystrybucji wykorzystywane przez organizacje producentów owoców i warzyw w Polsce

Abstract. Fruit and vegetable production is an important branch of Polish agriculture. In recent years, the fruit and vegetable market has undergone significant changes concerning in particular the structure of the distribution channels. Growers establish producer organizations (PO's) to increase their bargaining position vis a vis large retail chains and processing companies. Knowledge on the way producer organizations operate on the market is limited. Firstly, the aim of the study is to fill this gap, first of all, by indicating the distribution channels used by PO's in Poland. Secondly, an attempt was made to answer the question whether producer organizations supplying retail chains differ from other entities. The study showed that PO's used various distribution channels. The most important ones were wholesale markets, retail chains (super and hypermarkets, discount chains) and processing companies. It turned out that PO's selling to retail chains were relatively larger in terms of the value of produce delivered by producers-members and more prone to source fruit and vegetables from farmers who are not their members. The study was conducted using unpublished governmental data on the population of PO's active in the fruit and vegetable sector in Poland in 2017.

Key words: distribution channels, fruit and vegetables, producer organizations

Synopsis. Produkcja owoców i warzyw jest ważną gałęzią polskiego rolnictwa. W ostatnich latach, rynek owoców i warzyw przeszedł znaczące zmiany, w szczególności dotyczące struktury kanałów dystrybucji. Plantatorzy ustanawiają organizacje producentów (OP), aby zwiększyć swoją pozycję przetargową wobec dużych sieci detalicznych i firm przetwórczych.

Wiedza na temat funkcjonowania OP na rynku jest ograniczona. Po pierwsze, celem badania jest wypełnienie tej luki, przede wszystkim poprzez wskazanie kanałów dystrybucji wykorzystywanych przez OP w Polsce. Po drugie, podjęto próbę odpowiedzi na pytanie, czy OP zaopatrujące sieci detaliczne różnią się od innych podmiotów. Badanie wykazało, że OP korzystały z różnych kanałów dystrybucji. Najważniejsze z nich to rynki hurtowe, sieci detaliczne (supermarkety i hipermarkety, sieci dyskontowe) oraz firmy przetwórcze. Okazało się, że organizacje producentów sprzedające do sieci detalicznych były stosunkowo większe pod względem

wartości produktów dostarczanych przez producentów-członków i bardziej skłonne do pozyskiwania owoców i warzyw od rolników, którzy nie są ich członkami. Badanie zostało przeprowadzone przy użyciu niepublikowanych danych rządowych dotyczących populacji organizacji producentów działających w sektorze owoców i warzyw w Polsce w 2017 roku

Słowa kluczowe: kanały dystrybucji, owoce i warzywa, organizacje producentów

Introduction

Poland is a significant European fruit and vegetables producer, occupying the third or the fourth position in terms of production volume and area. Fruit and vegetables sector plays also an important role in the domestic agriculture with the share of 12% for fruit and 8% for vegetables in the value of plant production [GUS 2019]. The picture of the sector in Poland reflects changes in the agro-food system. Foreign direct investments and international competition, new consumption patterns, advances in information and transportation technology, have redesigned both the macroeconomic environment and incentive structure for market players. It is assumed that major shifts in the fruit and vegetable sector globally are driven by the emergence of modern retail channels and growing concentration of companies processing fruits and vegetables [Bijman and Hendrikse 2003].

These changes required farmers to look for ways to improve their bargaining position in the face of the growing processing and retail sectors. Individual producers with small production volumes, often lacking the necessary logistics infrastructure, encountered difficulties in entering redesigned distribution channels [Beamer 1999]. In response to the new challenges, the state provided aid to horticultural growers by providing them with financial support to set up producer organizations (PO's). According to data from the Polish Ministry of Agriculture and Rural Development, fruit and vegetable producer organizations received approximately EUR 1 billion of public aid in the years 2004–2013 [Chlebicka 2017]. As a result of this support, the scope of horizontal integration among fruit and vegetable producers in Poland has been constantly growing. While in 2004, i. e. in the year of Poland's accession to the EU, there were almost no officially recognised producer organizations, at the beginning of 2019 there were 271 such organizations [Rejestr...]. Comparing to other European Union Countries the number of PO's is relatively big but at the same time, they associate relatively small number of farmers. The question is though whether these entities are big enough to supply modern retail distribution chains.

So far, the literature has been dominated by research on the process of establishing producers' organizations, the effects of cooperation in PO's from the perspective of associated farmers, the conditions for effective cooperation in PO's [Krzyżanowska and Trajer 2014, Bouamra-Mechemache and Zago 2015, Francesconi and Wouterse 2015]. Only scattered studies address the issue of POs activities on the market, including key marketing decisions such as the product offer or distribution channels [Camanzi et al. 2011].

Firstly, the aim of the study is to indicate the distribution channels used by PO's. Secondly, an attempt to answer the question whether producer organizations supplying products to retail chains differ from other entities is made. In particular, the scale of pro-

duction of producer organizations is verified as a key factor in adjusting to the needs of concentrated buyers related to the volume, quality and logistics. The study is conducted using a unique database of the entire population of PO's active in the fruit and vegetable sector in Poland in 2017.

Data and methods

The empirical study analysis is based on unpublished data on producer organizations from the fruit and vegetables sector in Poland collected by the Agency for Restructuring and Modernization of Agriculture (ARMA). The agency implements measures dedicated to producer organizations in Poland under the 1st pillar of the EU Common Agricultural Policy. Data covered production and marketing activities of all fruit and vegetable PO's in 2017, however due to the fact that for some PO's data were incomplete, the sample used is 260 PO's instead of 271. Descriptive analysis was used to indicate and discuss distribution channels used by PO's. In the second part of the analysis, the logistic regression model was used to distinguish the characteristics of PO's affecting their participation in the large retailers' supply chain.

Distribution channels for fruit and vegetables in Poland

Distribution is the process of moving products or services from the producer to the consumer through distribution channels. In turn, distribution channels are defined as the group of successive links (persons or institutions) through which one or more marketing streams flow [Norwood and Lusk 2018]. Given the two main uses of fruit and vegetables (direct consumption and processing), the distribution system for these products should be considered in two cases: the distribution system for fruit and vegetables intended for further processing and the distribution system for fresh fruit and vegetables intended for direct consumption [Karasiewicz 2001]. The purchase of fruit and vegetables for further processing is carried out primarily by direct purchases of processing companies from producers, intermediaries and wholesale markets used mainly by small processing companies. On the other hand, wholesale trade in fresh fruit and vegetables in Poland is mainly conducted through [Gołębiewski and Sobczak 2017]:

- wholesale markets and commodity exchanges (including online), where retail stores, intermediaries (including exporters), HoReCa sector representatives usually source their supplies;
- retail chains which purchase from producers (directly and/or via distribution centres or intermediaries);
- intermediaries.

Retail trade in fruit and vegetables involves retail chains (super and hypermarkets, discount stores), individual grocery stores, markets, catering outlets and producers selling on their farms.

As far as fruit and vegetables processing is concerned, there were about 2300 enterprises in Poland in 2015, of which 420 produced juices [unpublished data of Central Statistical Office]. The vast majority of them were small companies employing up to

nine persons. There were 350 enterprises with more than nine employees, including 216 small enterprises (with 10–49 workers), 110 medium-sized enterprises (50–249 workers) and 22 large enterprises (more than 250 persons employed). The value of sold production of fruit and vegetable processing enterprises and juice producers (employing more than nine people) in 2015 amounted to approximately EUR 3,206 million [unpublished data of Central Statistical Office]. The market share of large enterprises accounted for 40%, which was driven by the 60% market share of large juice producing companies. The market share of the 14 largest enterprises producing processed fruit and vegetable products was smaller and amounted to 30%. The share of medium-sized companies in the market of processed fruit and vegetable products was 50%, and in the case of juices 34%. It should be noted here that in the case of Poland, processing is very important for the allocation of domestic production. It is estimated that about 50% of fruit harvests and 30% of vegetable harvests go to processing [unpublished estimates of Institute of Agricultural and Food Economics for 2017].

The distribution of fresh fruit and vegetables has changed dramatically due to the emergence of super and hyper markets in Poland 30 years ago. Currently, modern distribution channels account for 56% of the value of food retail sales, with discount chains having the largest share (over one third of the modern food market). In terms of retail sales of fresh fruit and vegetables, discount stores had the largest share in retail sales of these products in 2016 – 38%. Jeronimo Martins Polska (Biedronka stores) remained the leader with over 25% share in retail sales of fresh fruit and vegetables. Other formats of modern retail trade had a smaller share in retail sales of fresh fruit and vegetables, equal to 17% for supermarkets and 14% for hypermarkets. Discount chains and supermarkets are the channels where fruit and vegetable sales are constantly growing. The development of these channels takes place at the expense of individual grocery stores and hypermarkets. However, when compared to Western European countries, grocery retail market in Poland is still highly fragmented, with c.a. 135,000 outlets in 2016 (about 3500 grocery retailers per million residents) [GfK Polonia 2017].

In the distribution of fruit and vegetables in highly developed countries there is a clear trend to move away from a transactional approach to cooperation and integrated forms of marketing across the distribution channel [Stokke 2009]. Distribution channels are shortened due to the willingness of large retailers to establish direct contacts with manufacturers, excluding the wholesale level. This phenomenon is in line with the general trend of decreasing importance of the institutional wholesale trade, accompanied by capital and organizational and technical concentration at the retail level. Wholesale markets work well in a situation where both the sellers and the final buyers are confronted with a high degree of fragmentation of entities. The subject of individual transactions are then relatively small quantities of products, which are additionally characterized by seasonality and short duration (there is a need for frequent deliveries and quality control). With the increasing share of retail chains in fruit and vegetables retail, the share of direct sales from producers (suppliers) to supermarkets is increasing. Direct cooperation of large retail chains with producers guarantees certain benefits – their supplier is not anonymous (as on the stock exchange or auction), a number of requirements are imposed on producers, it is possible to interfere in the production processes in order to ensure the desired quality [Hendrikse and Bijman 2001]. Large customers seeking to reduce their own transaction

costs focus on working with a small number of suppliers who are able to provide large supplies of homogeneous quality products, delivery of a wide range of fruit and vegetables, all year round deliveries and high quality of products [Reardon et al. 2009].

Products and marketing channels used by fruit and vegetable PO's in Poland

Fruit and vegetable producer organizations are economic operators set up by individual growers to strengthen their bargaining power of the market. Cooperation in producer organizations enables, among others, concentration of supply, joint planning of production, concentration of demand for production means, negotiation of sales/purchase conditions, gaining new markets, activities aimed at improving the quality of manufactured products, creation and promotion of own product brands. Membership of producer groups may bring a number of benefits to producer members. The most frequently mentioned in the literature include improvement of the income situation of producers, improvement of the quality of manufactured products and access to new markets [Chlebicka et al. 2009].

According to the data of the Agency for Restructuring and Modernization of Agriculture, currently there are 271 fruit and vegetable producer organizations in Poland. At the beginning of 2019, they associated 6.3 thousand producers. The average number of members per one entity was 23 producers, however, half of them associated nine members and less. The largest number of members per one PO was 203 producers, the lowest accounted for five growers.

Producer organizations on the fruit and vegetable market are dominated by those that sell both fruit and vegetables (42%), only vegetables (26. 2%), only fruit (24. 3%), nineteen entities produced mushrooms and one herbs. In 2017, the area devoted to fruit production in growers-members farms amounted to 32. 2 thousand hectares, and 21.1 thousand hectares for vegetables. This represented respectively 10% and 11.5% of the total area of fruit and vegetable production in Poland [GUS 2019].

Producer organizations are created primarily for the purpose of marketing products produced by associated producer members. Under the law, a producer may be a member of only one producer organization for a particular product category. Growers are also obliged to market practically entire production via PO. At the same time, a producer organization may source products from other producers who are not members, up to the limit of 50% of the PO sales revenue.

In 2017, fruit and vegetable producer organizations generated sales worth PLN 2720 million; fruit sales amounted to PLN 1223 million, while vegetable sales amounted to PLN 1497 million. The average value of sales per one PO was PLN 12 million, while the median was PLN 5 million. The highest recorded value of annual sales by PO amounted to PLN 141 million. In 2017, around 36% of PO sales were generated by products purchased from producers who were not members of PO's.

As far as the product offer is concerned, it should be noted that the level of product specialization is high – the most important product category constituted almost 80% of the sales value. The offer of PO's was dominated by apples, which accounted for 56% of sales in the case of fruit organizations. Apples were included in the offer of 94 companies,

and what is more, in the case of as many as 82 entities they constituted the most important product category sold. As far as vegetables are concerned, the most important product category were greenhouse tomatoes (20% of vegetable sales).

Depending on the adopted marketing strategy, PO's used different distribution channels to sell their products. As depicted in Table 1, the most important marketing channel for Polish PO's in 2017 was wholesale markets which accounted for 45% of the POs' total sales. Retail chains (super and hypermarkets, discount chains) ranked the second and accounted for approximately 22% (18% for fruit and 25% for vegetables). The share of processing companies in turn was considerably lower and amounted to 17%.

Other channels were less important – mall retail shops accounted for 2% of the total value, 3% was self-processed whereas the remaining 11% was accounted for by other outlets. Interestingly, the share of particular types of distribution channels in the case of fruit and vegetables was in general very similar. A slight difference was found in the case of processing that turned out to be more important for marketing vegetables.

The majority of the PO's used more than one distribution channel (80% of all POs). Around 30% of companies used a single distribution channel, which usually related to those specialized in supplying vegetables for processing, followed by PO's involved in the production of greenhouse tomatoes and mushrooms. Producer organizations specialized in fruit production used more diversified distribution strategies when compared to those selling vegetables.

Selling to large retail chains was used by approximately one third of PO's under study. This share was comparable to the share of PO's transacting with small retail shops and other outlets. However, it was considerably lower than the share of PO's supplying either the wholesale channel or the processing industry channel. The two latter channels were both used by approximately 70% of PO's.

Table 1. Fruit and vegetables sales of Polish POs by marketing channels in 2017 (sales in m. PLN)
Tabela 1. Sprzedaż owoców i warzyw przez polskie organizacje producenckie w 2017 r. (sprzedaż w mln PLN)

Marketing channel	All OP's		Fruit OP's		Vegetables OP's	
	Sales	Share in total OP(%)	Sales	Share in total fruit (%)	Sales	Share in total vegetable (%)
Retail chains (directly)	491.34	22	207.07	18	284.27	25
Wholesale markets	1013.77	45	495.76	44	518.01	45
Small retailers	35.51	2	27.07	2	8.44	1
Others	243.84	11	171.10	15	72.74	6
Processing companies	396.45	17	162.19	14	234.26	20
Own processing	67.38	3	38.04	3	29.34	3
Products withdrawn from the market	26.04	1	24.90	2	1.14	0
Total	2274.33	100	1126.13	100	1 148.20	100

Source: own calculations based on unpublished data collected by ARMA.

The characteristics of producer organizations supplying retail chains

Given the changes in the distribution of fresh fruit and vegetables related to the increasing role of retail chains (discussed in section 2), it is worth taking a closer look at whether PO's selling to the retail chains stood out from the others. As shown in Table 2, it appears that PO's supplying retail chains were performing better than others. The average value of sales was more than half as high as in the case of other entities. At the same time, on average, PO's selling to retail chains noted a much higher share of sales generated by production sourced from growers non-members. Moreover, these PO's used relatively more distribution channels – four compared to two. At the same time the share of the main marketing channel in sales of PO's selling to retail chains was relatively smaller – 63% compared to 82%.

Table 2. Average sales of POs* in 2017 (PLN m.)

Tabela 2. Przeciętna sprzedaż realizowana przez OP* w 2017 r. (mln PLN)

Scale of production of POs	POs selling to retail chains (1)	POs not selling to retail chains (2)	Difference between (1) and (2)
Total	18.4	8	56%
Production of growers-members	13	6.4	51%
Production of growers-members per one member	0.46	0.24	48%
Production procured from non-members	5.4	1.6	70.3%

* without OP's specializing in the production of products for processing

Source: own calculations based on unpublished data collected by ARMA.

Based on specific requirements of modern retail chains discussed in the section 2, it can be expected that POs delivering to this marketing channel are relatively larger and more productive. To assess the determinants of the participation of PO's in the modern retailers supply chain a number of variables were considered. Variables were grouped into three sets: productivity, organizational and product specific factors. Factors related to productivity included land size of farmers-members (*Mem_land*), sales generated by production from growers-members (*Mem_s*) and sales generated by production from growers non-members (*Nmem_s*). Organizational factors embraced the number of years of operation on the market (*Years*), legal form of the PO (*Legal*). The last set comprised the category of products delivered (fruit – *Fruit*, vegetables – *Veg*) and the level of specialization (80% of sales and more generated by one product category meant high specialization; *Spec*).

In the logit regression analysis, the dependent variable corresponded to the decision to deliver to retail chains, and assumed a categorical value of 1 and 0 otherwise. The model equation was formulated as follows:

$$Y_i = \log(P_i / 1 - P_i) = \alpha + \beta X_i + e_i$$

where:

Y_i – dummy variable that takes the values of 1 for farmers selling vegetables to supermarkets and 0 otherwise;

$\log(P_i / 1 - P_i)$ – logit for market channel choice;

P_i – probability of participation in supermarket supply chain;

$(1 - P_i)$ – probability that farmers have not organized to supply vegetables to supermarkets;

X_i – vector of independent variables (three groups);

β_i – parameters to be estimated;

e – error term absorbing all omitted factors.

Table 3 presents the results of the logit estimates of the factors influencing POs participation in the modern retail chains.

Table 3. Factors affecting PO's participation in the modern retail chains

Tabela 3. Czynniki wpływające na udział OP w nowoczesnych sieciach handlowych

Variable	Marginal effects	Std. Err.	z-Statistic	p-Values	Odds ratio
Mem_land	0.1072*	0.0574	1.85	0.024	3.4658
Mem_s	0.3530***	0.0566	4.13	0.000	24.1011
Nmem_s	0.4138***	0.1107	2.83	0.005	76.7976
Years	0.0661	0.0739	0.89	0.371	1.4703
Legal	0.0112	0.0568	0.20	0.843	0.1660
Veg	-0.0451	0.2079	-0.22	0.828	0.5395
Fruit	-0.0712	0.0567	-1.25	0.210	0.3778
Spec	0.0085	-0.0085	-0.0085	-0.0085	-0.0085
	0.0750	0.0750	0.0750	0.0750	0.0750
	-0.11	-0.11	-0.11	-0.11	-0.11
	0.910	0.910	0.910	0.910	0.910
	0.8902	0.8902	0.8902	0.8902	0.8902

$N=257$ (260-POs delivering only to processing companies), log Likelihood = -29.56685, LR $\chi^2 = 108.44$, Prob > $\chi^2 = 0.0000$, Pseudo $R^2 = 0.5567$.

*, ** and *** denote statistical significance at 10, 5 and 1% confidence levels respectively.

Source: own calculation based on ARMA data.

The results showed that the model is highly significant (the log likelihood statistic was -29.56685; Pseudo R^2 value 0.5567; χ^2 of 108.44 is significant at 0.1% level with a p -value of 0.000). Among the individual explanatory variables, all the factors connected with the PO productivity were statistically significant. However, factors related to the period of market operation, legal form and type of the product and product specialization turned out to be statistically insignificant.

Land area of growers members had a positive sign for large retail supply chain participation, which is consistent with the a priori expectations. The marginal probability value (0.1072) has significance p -value of 0.054. These findings imply that an increase in the area under production of PO's members results in supermarket participation. The odds ratio value of 3.4658 associated with members' land area indicates that the probability of participating in large retailers supply chain increases with increased area that a PO has at its disposal.

The marginal probability of sales generated by growers-members production (0.3530) is significant at 0.1% level (p -value=0.000). The positive sign on its coefficient indicates that an increase of production by growers-members results in increased large retailers supply chain participation choice by PO's. The value of odds ratio (24.1011) shows that POs are most likely to increase participation in this marketing channel with increased production delivered by growers-members.

The value of sales generated by the production procured from growers non-members has a marginal probability of 0.4138 which is significant (p -value = 0.005) at 1% level. The positive sign explains that an openness of a PO to buy produce from non-members results in shifting from traditional markets to modern retail chains participation. The relatively large odds ratio (76.7976) indicates that PO's are most likely to choose large retail chains with increased levels of outside procurement practices.

Summary and conclusions

The process of concentration of the processing industry and food retail trade, which has been observed for many years in the world and recently in Poland, has had serious consequences for the strategy and organization of suppliers. An interesting and rarely discussed topic in Polish studies are the effects of the growing role of retail chains in the organization of the food supply chain. Fruit and vegetables are one of the few categories of agricultural products that are placed on shop shelves in an unprocessed form. It is therefore to be expected that adaptations to the supply model implemented by large retailers will be the most visible in the fruit and vegetable sector. These changes will mainly affect the organization of production and logistics, with particular emphasis on the quality aspect (at the stage of production, storage and transport) and changes in distribution channels used by fruit and vegetable growers.

Producer organizations are playing an increasingly important role in the marketing fruit and vegetables products in Poland. They concentrate supply through cooperation between individual producer who members of PO's, as well as through the purchase of products from outside the PO, acting as an intermediary in this case. The study showed that PO's used a vast variety of distribution channels. The most important channels, representing 84% of POs sales, were the following: wholesale markets, retail chains (super and hypermarkets, discount chains) and processing companies. In line with expectations formulated based on the literature review, it turned out that PO's selling to retail chains were relatively larger in terms of the value of produce delivered by producers-members.

Moreover, these entities were also more likely to source fruit and vegetables from farmers who are not their members. This observation may indicate that the bargaining power of significant number of PO's in Poland is still insufficient and that it needs to be strengthened. However, the fact that large PO's need to buy additional quantities of produce from non-members may indicate the unwillingness of non-associated producers to join active POs. On the other hand, it may result from the PO's willingness to reduce risk resulting from unstable environmental conditions, lack of long-term sales contracts or, generally speaking, reluctance for commitments related to the accession of new members to the PO.

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