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Contents

Abbreviations

APG	Agricultural producer groups
CAP	Common Agricultural Policy
EU	European Union
MS	Member State(s)
PLN	Polish Zloty
PG	Producer groups
PO	Producer organisation
RDP	Rural Development Programme
UAA	Utilised agricultural area

Fruit and vegetables producer organisations – some insights on their functioning based on data from Poland[1]

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1. Introduction

In quest for ways to improve the competitiveness of the European farming businesses, farmers have long been encouraged to organise as associations or cooperatives. The continuous support provided within the Common Agricultural Policy for establishing and functioning of agricultural producers' groups and organisations (see, for example, the European Union regulation 1308/2013) can serve here as an example.[2] While the justification for promoting producer organisations can be manifold, it is often based on the presumption that acting together should contribute to strengthening farmers' relatively weak position in the food supply chain (see e.g. Bijman et al., 2012).

Given the political emphasis put on encouraging farmers' cooperation, an extensive literature has emerged which investigates factors that facilitate or discourage the establishment of agricultural producer organisations (for recent literature reviews see Van Herck, 2014; Fałkowski and Ciaian, 2016). Other studies analyse the impact that the membership in producer organisations may have on farmers' incomes and small-scale farmers' market participation (see e.g. Francesconi and Wouterse, 2015). These works significantly improve our understanding of why farmers may want to get involved in a formal cooperation and what effects this may bring about. Other important contributions highlight the challenges which producer organisations face when designing their internal

[1] This report has been prepared while Jan Fałkowski was visiting researcher at the Joint Research Centre, European Commission. The authors are solely responsible for the content of the paper. The views expressed are purely those of the authors and may not in any circumstances be regarded as stating an official position of the European Commission.

[2] For a brief historical review of available measures see e.g. Bijman et al. (2012) or Bouamra-Mechemache and Zago (2015).

structure (see e.g. Szabo, 2010; Pascucci et al., 2012; Fischer and Qaim, 2014; Fałkowski et al., 2017).

While these studies are definitely very informative and useful from the policy perspective, the evidence they provide becomes at some point seriously incomplete. This is because this literature tends to show only one side of the functioning of producer organisations. More specifically, the focus in these studies is almost exclusively on the upstream part of the supply chain: farmers' predispositions to act together, their relationships with the organisation, and the benefits/costs they may expect from joining a collective action. Indeed, a vast majority of empirical works which investigate various aspects of the functioning of producer organisations use a farm household as a unit of analysis.

Although this approach offers many advantages, it comes with a considerable cost. Most importantly, it ignores the fact that the performance of a producer organisation is not only a function of its relations towards farmers, but depends also on its relationships with sectors downstream from it. In fact, the net benefits that producer organisation may bring about for its (potential) members are largely driven by the extent to which it is able to meet demands from processors, retailers or final consumers (see e.g. Hellin et al., 2009). This in turn is strongly determined by the range of products a given producer organisation offers and the types of purchasers it contracts with. In fact the key economic decision of a producer organisation is about marketing channels in which it participates and the range of products it produces. For obvious reasons, the literature focusing on farmers can say only very little, if at all, about these issues.

In this paper we try to address this shortcoming. To achieve that, we take a detailed look at producer organisations' market behaviour. Our focus is on both: the type of contractors producer organisations deal with as well as the product assortment they offer. By doing so we aim at complementing the existing studies which provide some insights on marketing and performance of farmers' cooperatives (Arcas et al., 2003; Bijman et al., 2000; Guzmán et al., 2009; Pennerstorfer et al., 2013; Ton and Szabo 2012). To best of our knowledge however, none of these studies focused explicitly on the differences across producer organisations in terms of marketing channels they use or product mix they offer. What should be also noted, the existing literature is almost exclusively focused on agricultural cooperatives. While producer organisations can have the legal form of a cooperative, they may also take other legal forms (Bijman et al., 2012). In our study therefore we look not only at agricultural cooperatives but also at producer organisations having a different legal form.

Our empirical example comes from the fruit and vegetables sector in Poland. The choice to focus on this setting could be motivated as follows. First, Poland is among the biggest

fruit and vegetables producers in the European Union (EU). Second, Poland is among those EU Member States that have most actively supported the development and strengthening farmers' horizontal integration within the Common Agricultural Policy. Third, in Poland, as well as in other European countries, the scope of horizontal integration in fruit and vegetables sector is larger than that observed in other sectors. This is because the financial support has been mainly directed towards this particular sector.[3] It should be also recognised, that policy instruments aimed at encouraging cooperation between fruit and vegetables producers started earlier than in other sectors.[4] Overall then, one can assume that regularities observed in this sector might be more telling than those observed in other sectors, in which agricultural producer groups/organisations started to grow only recently.

Based on the available data, we show that there exists a huge heterogeneity across producer organisations not only in terms of their size, which is widely recognised, but also, and perhaps more importantly, in terms of their product mix and marketing channels they use. This in turn calls for improving our understanding of potential factors that might account for this variation. It seems equally important to advance our knowledge about the channels through which these factors can exert their impact. In this context both empirical and theoretical works are needed. In some places, the present paper tries to indicate potential areas for further research.

The remainder of the paper is organised as follows. Sections 2 and 3 briefly describe the fruit and vegetable sector in Poland and the development of producer organisations in this sector, respectively. Section 4 briefly describes the data that we use in our analysis and Section 5 explores the heterogeneity across fruit and vegetables producer organisations in terms of their market behaviour. Finally, Section 6 concludes.

2. Fruit and vegetables sector in Poland – main characteristics

Poland is one of the biggest producers of fruit and vegetables in the European Union. To illustrate that, recall that Poland accounts for 11% of the EU fruit production and for 9% of the EU vegetables production. In terms of agricultural area devoted to fruit and

[3] To see this one may recall that over the period 2004-2013 groups and organizations of fruit and vegetables growers received about 1 billion euro (under common organisation of the market in fruit and vegetables). In turn, the support for the process of horizontal integration of farmers in other sectors amounted to approximately 193 million euro (mainly under Rural Development Plan 2007-2013). These data come from the Polish Ministry of Agriculture and Rural Development.

[4] While in fruit and vegetables sector producer organisations in Poland have been encouraged since 2004, in other sectors this support has been introduced only in 2011 (milk sector) or 2013 (all others) (for a brief overview of the history of policy instruments aimed at encouraging the establishment of agricultural producer groups in different sectors in the EU, see, for example, Bijman et al., 2012; or Bouamra-Mechemache and Zago, 2015).

vegetables production Poland ranks third in the EU, only after Spain and Italy. Growing area in Poland stands for 10% of EU fruit area and for 11% of EU vegetables area (Figures 1 and 2). Polish production ranks first as regards soft fruit, apples, mushrooms, onions, cabbage and carrots. Poland is also a leader regarding the production of many processed fruit and vegetables (mainly apple juice, frozen soft fruit and frozen vegetables) and one of the leaders as far as exports of fresh and processed fruit and vegetables are concerned.

Figure 1. Fruits area by EU Member States, 2015

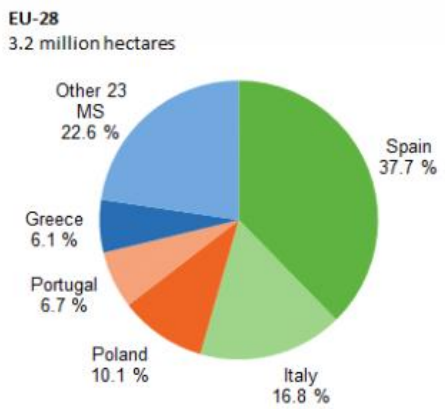
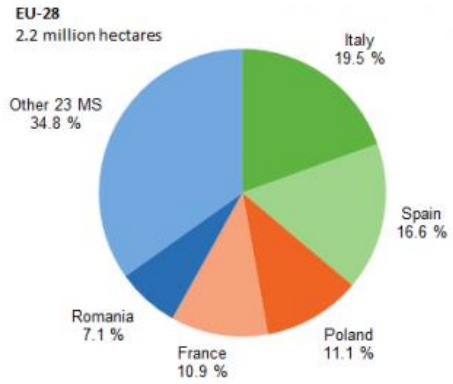


Figure 2. Vegetables area by EU Member States, 2015



Source: Eurostat

The area of orchards and fruit bushes in Poland in the last five years was about 414 thousand ha (average for 2010-2015).[5] The share of fruit crops in the utilized agricultural area (UAA) amounted to roughly 3%. However, the share of commodity production of fruits in agricultural commodity production was twice as high and amounted to 6%. The value of commodity production of fruits per ha was PLN 10.2 thousand, five times higher than the value of crop commodity production. As far as the cultivation area of vegetables is concerned, an average for the period 2010-2015 amounted to 172 thousand ha, which corresponded to approximately 1.2% of UAA. The share of vegetables in agricultural commodity production however was much higher and amounted to 8.3%. As in case of fruits, this was the effect of substantially higher value

[5] These and the following data regarding the growing area come from the Central Statistical Office of Poland, GUS (var. vol.).

of commodity production of vegetables per 1 ha, which in this case amounted to PLN 38 thousand/ha.

As elsewhere also in fruit and vegetables production, the process of incremental farm concentration has been observed. It manifested itself in a gradual decrease in the number of holdings involved in this type of production, as evidenced by the figures in Table 1. In the relatively short period of time from 2010 to 2013, the number of fruit-growing holdings decreased by 22%, mainly due to the sharp 86% drop in the number of the smallest holdings (up to 1 ha).

Table 1. Number of the fruit and vegetable growing holdings in Poland in 2010 and 2013

Specification	Fruit-growing				Vegetable-growing			
	2010		2013		2010		2013	
	Number in thousand	%	Number in thousand	%	Number in thousand	%	Number in thousand	%
Total	81,739	100	63,868	100	45,845	100	26,584	100
Up to 1 ha	27,317	33.4	3,938	6.2	14,321	31.2	3,746	14.1
>1 ha	54,422	66.6	59,930	93.8	31,524	68.8	22,802	85.9
including >5 ha	20,198	24.7	24,162	37.8	11,393	24.8	9,810	36.9
Average farm area	5.01	x	6.23	x	3.46	x	5,30	x

Source: Charakterystyka gospodarstw rolniczych. PSR 2010, GUS, 2012, Charakterystyka gospodarstw rolniczych w 2013 r. GUS, 2015.

On the other hand, the number of holdings with more than 5 ha increased by 20%. In the effect, the average area of the fruit-growing holding increased by 24%, from 5 ha to 6.2 ha. The process of concentration was even stronger among vegetable growing holdings. Over the same period the number of holdings involved in this type of production decreased by 42%, from 45.8 thousand in 2010 to 26.6 thousand in 2013. The number of the smallest holdings (up to 1 ha) decreased radically by 74%. In the effect, the average area of the vegetable growing holding increased by 53%, from 3.5 ha in 2010 to 5.3 ha in 2013. What should be noted though, notwithstanding these developments, the average holding involved in either fruit or vegetables production still remains relatively small.

The fruit production has significantly increased during the last decade (Table 2). This concerns especially the biggest export hit, namely apples and soft fruit. It is worth recalling in this context that Poland is the leading world exporter of apple juice concentrate. Considerable increase has been also observed in indoor cultivations of tomatoes and mushrooms (in contrast to outdoor cultivations for which the total production decreased between 2003 and 2015, see Table 2).

Table 2. Production of fruit and vegetables in Poland in 2003-2015 (thousand tons)

Sector	2003	2005	2007	2009	2011	2013	2015	2015/2003
Total fruit	*3 304*	*2 922*	*1 694*	*3 646*	*3 415*	*4 128*	*4 099*	*1.24*
Fruit from trees	2 877	2 425	1 267	3 103	2 887	3 526	3 581	1.24
Apples	2 428	2 075	1 040	2 626	2 493	3 085	3 168	1.30
Soft fruit	431	497	427	543	528	603	518	1.20
Total vegetables	*5 091*	*5 458*	*5 709*	*5 601*	*5 575*	*4 986*	*4 795*	*0.94*
Ground vegetables	4 420	4 785	4 987	4 810	4 803	4 004	3 792	0.85
Cabbage	1 237	1 320	1 325	1 276	1 231	975	874	0.70
Carrot	835	929	938	913	887	743	677	0.81
Onion	678	714	753	708	677	551	548	0.81
Glass-house vegetables	671	673	722	791	772	982	1002	1.49
Mushrooms	165	190	205	220	260	295	315	1.90

Source: Central Statistical Office of Poland

The recent decade has been also marked by a continuous and significant increase in fruit and vegetables export. In terms of value the export increased by more than 60% since 2004. This positive trend has been observed both for fruits as well as vegetables. In 2003, Polish exports of fresh fruit reached approximately 600 thousand tons, while ten years later it was approximately 1 450 thousand tons. As regards the international sales of Polish vegetables – in comparison to 2003, the volume of exports grew almost by 100% to the current 700 thousand tons; exports of processed vegetables in turn grew by approximately 70% and reached the current level of about 850 thousand tons. Large part of these exports was directed towards other EU Member States. In this context, it might be noted that the Polish trade balance in fruit and vegetables with other EU countries in the whole period of last 12 years (following the accession to the EU) has remained positive.[6]

[6] This holds also for the trade balance in agro-food products in general.

When one takes a more detailed look at sales channels used by fruit and vegetables growers, the following general picture emerges. As regards distribution channels used by fruit producers, half of the fruit production in Poland is sold to processing companies. The other half is accounted for by fresh produce sold on the domestic market (34%) and export (14%). As far as distribution channels for ground vegetables are concerned, 70% of the total production is sold in a fresh form – 61% delivered on the domestic market and 9% exported. About 30% of total vegetable production is processed. The majority of vegetables grown under cover is delivered fresh – about 88% on the Polish market, the rest (mainly tomatoes) is exported.[7] Taking into account sales channels of fresh produce on the domestic market in 2015, modern distribution channels had the largest market share (60,2%). Within those discount shops were the most important (30.3%), followed by supermarkets (16.4%) and hypermarkets (13.5%). However, groceries and street vendors still play an important role, with the share in the distribution of this product category of about 40%.[8]

3. Producers organisations of fruit and vegetables growers in Poland

As commonly argued, an important element behind the abovementioned developments in the Polish fruit and vegetable sector was the EU accession and embracing Poland with the EU Common Agricultural Policy. While many measures contributed to this state of affairs, support for producer organisations is widely believed to play a key role. During the recent 15 years Polish horticultural farmers (especially apple producers) managed to establish formal cooperation framework. At the end of 2015, 305 entities grouping fruit and vegetables growers were registered in Poland. Among those there were 195 producer organisations (64% of all the entities) and 110 (36% of all the entities) producer groups. Producer groups (PGs) are legal bodies formed by farmers who wish to acquire the status of recognised producer organisations (POs).[9] The number of producer organisations (groups) has been constantly growing over the last decade and this was visible especially between 2009 and 2012 when 60% of the currently registered entities were formed. Over time some organisations (groups) stopped their activity. In total, in the period 2004-2015, this happened to 35 groups and organisations from fruit and vegetables sector.

[7] These data come from the report *Strategia krajowa dla zrównoważonych programów operacyjnych organizacji producentów owoców i warzyw w Polsce na lata 2010-2016* (National strategy for the sustainable operational programmes of producers organizations), Ministry of Agriculture and Rural Development, Warsaw 2013.

[8] GfK Households Panel, 2016.

[9] PGs have maximum 5 years to meet the conditions for being recognised as a producer organisation.

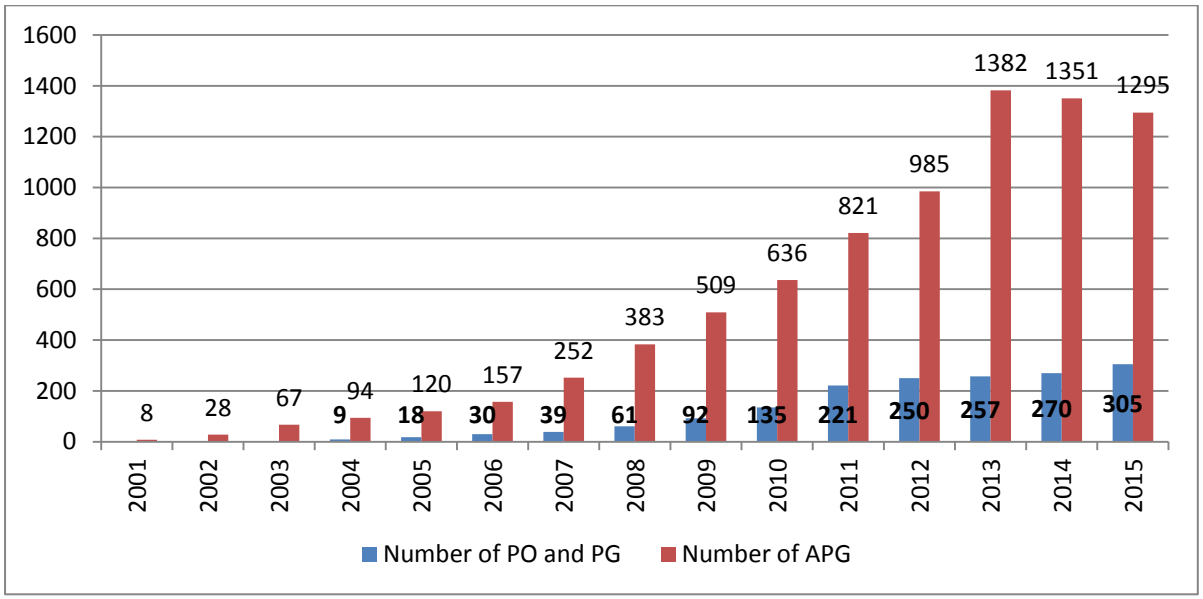
Among the fruit and vegetable producer groups and organisations, the largest category comprise entities that registered their activities in the area of production and marketing of both fruit and vegetables. At the end of 2015 there were 131 of such entities. The other 73 PGs and POs focused only on fruit production and marketing. Further, growers specialised in vegetables production were associated in 84 PGs and POs and mashroom growers operated under the umbrella of 17 PGs and POs.

Fruit and vegetables PGs and POs associated 6,6 thousand growers - 5,4 thousand growers (82%) were associated in producer organisations and 1,2 thousand growers (18%) were associated in producers groups. If we compare the number of the organisations' and groups' members and the total number of fruit and vegetable growers (296 thousand), it transpires that in 2015 as little as 2,2% of fruit and vegetable producers were associated. However, unpublished data of the Agriculture Market Agency on trade of POs in 2014 indicate that the value of products sold by them was PLN 1,6 billion, which made up approximately 14% of domestic fruit and vegetable production. While analogous data for PGs are not available, if we assume that PGs operate on a similar scale as PO's do, it turns out that the share of producer groups and organisations in marketing fruit and vegetables in Poland amounts to roughly 30% of the total production, which is close to the EU average.[10]

As already stated earlier, in Poland as well as in the EU in general, in the fruit and vegetable sector farmers' horizontal integration is more developed than in other sectors. This is clearly visible when one compares the number of horticultural groups/organisations with the number of similar organisations grouping farmers specialised in other type of production (Figure 3). As depicted on Figure 3, which illustrates the development of agricultural producer groups (APG) established in Poland since 2001 in all sectors, in 2015 there were 1,295 of such entities. This means that according to the most recent data horticultural groups/organisations account for almost a quarter of the APG population. With this overall picture in hand we now move to a more detailed analysis of fruit and vegetables producer organisations' market behaviour.

[10] More data on fruit and vegetables POs in EU member states can be found at https://ec.europa.eu/agriculture/fruit-and-vegetables/country-files_en

Figure 3. Number of agricultural producer groups (APG), producer organisations and producer groups in fruit and vegetable sector (PO and PG) in Poland (2001-2015)



Source: Based on registers of agricultural producer groups (APG), producer organisations and producer groups in fruit and vegetable sector (PO and PG)

4. Data

The data which we use in our study come from the Agricultural Market Agency. During the process of data collection this agency was responsible for implementing measures dedicated to producer organisations in Poland under the 1st pillar of the Common Agricultural Policy.[11] These data provide detailed information on fruit and vegetables producer organisations including the two aspects of their functioning which are the focus of the analysis presented below. This concerns in particular the marketing channels that these organisations use and the product mix that they offer.

While these data are unique in allowing to highlight these issues, two features of the dataset should be mentioned and kept in mind throughout the analysis. First, the data presented below refer only to 2014. Unfortunately analogous data for other years were not available to us. This feature of our data obviously implies that we are not able to analyse changes in market behaviour over time. This is a serious shortcoming. That said, we still believe that the data at hand, even if covering only one year, allow us to uncover new aspects of the functioning of producer organisations and shed some light on issues which until now have been largely unexplored. As such, they may still provide some important insights both for policy makers as well as for the future research.

[11] This has changed in 2017. Now the support for fruit and vegatbles producer organisations is administered by the Agency for Restructuring and Modernisation of Agriculture (ARMA).

The second point that should be recognised is that in the analysis below we use the data on all Polish producer organisations (POs) in fruit and vegetables sector registered in 2014. This implies that our investigation does not include producer groups (PGs), that is those entities that were not given the status of a producer organisation (recall the earlier discussion at the beginning of Section 3).[12] The reason for this is that for producer groups no comparable data are available. In principle our dataset includes all 143 such organisations. That being said, as for 6 producer organisations a lot of data were missing, part of the analysis is based on 137 observations.

5. Empirical analysis

Below we present the results of the descriptive analysis, the aim of which is to explore some of the heterogeneity across producer organisations from the Polish fruit and vegetables sector. We start with some information regarding geographical distribution of the existing organisations and legal forms that they have. In the next step we describe their market behaviour in terms of marketing channels they use and product mix they offer.

5.1. Geographical distribution and legal form

In 2014 there were 143 organisations of fruit and vegetables producers operating in Poland. The spatial distribution of POs corresponded to the concentration of domestic fruit and vegetables production. The highest number of POs was registered for Mazowieckie region which is the biggest fruit and vegetables producer region in the country. Overall, 80% of POs were located in five (out of 16) regions: Mazowieckie, Wielkopolskie, Kujawsko-Pomorskie, Lubelskie and Łódzkie.[13] An uneven distribution of the organisations across the country is also evident when one recalls that Mazowieckie and Lubelskie regions accounted for the half of all farmers producing fruit and vegetables within the entities under study.

In line with the evidence existing for other countries, the analysed producer organisations displayed significant heterogeneity in terms of the number of associated producers. On average each organisation had 31 members and the median size was equal to 16. The largest one associated 276 growers, whereas the smallest one grouped 5 growers. The size of organisation in terms of the number of members varied across regions. On average the largest producer organisations were in Lubelskie region (64 members per PO) and Małopolskie region (61 members per PO).

[12] In addition to 143 recognised producer organisations, in 2014 in Poland, there were also 127 producer groups growing fruits and vegetables.

[13] According to the Eurostat classification, all these regions correspond to NUTS 2 level regions. In total, in Poland there are 16 such regions.

In the process of registration producer organisations need to declare what product categories they are going to produce and sell. They can choose between the following categories: fruit, fruit and vegetables, vegetables and mushrooms. Within our dataset, 40% of the organisations were producing and selling both fruits and vegetables. Another 32% specialised in fruit production, whereas 21% specialised in vegetables production. The remaining 7% specialised in mushroom production.

Among organisations under study, tree fruit growers' organisations had the largest number of members (44% of associated growers), followed by organisations of fruit and vegetables producers, organisations of vegetables producers and organisations of mushrooms producers. This has been also reflected in the distribution of land utilised by different types of organisations. The total area of fruit and vegetable production in POs under study amounted to 31.4 thousand ha. The largest area was planted with fruit trees (53% of total PO area) and ground vegetables (40% of PO area) (Table 3). In turn, berries plantations and vegetables under cover accounted for 6% and 1.6% of land respectively.

Table 3. Growing area of PO's members in ha in 2014 (for mashrooms in tonnes)

Sector		Area (for mashrooms in tonnes)
Total fruit and vegetable area (in ha, without mashrooms)		31 414,07
Mashrooms (t)		70 256,63
Fruits (ha)	Total area	18 488,08
	including tree fruits	16 665,68
	including berries	1 817,40
	glass house production	5,00
Vegetables (ha)	Total area	12 925,99
	including ground vegetables	12 435,90
	including vegetables under cover	490,09

Source: Based on unpublished data of Agency for Agricultural Market

The analysed producer organisations displayed also significant heterogeneity as far as their legal form is concerned. Most of them operated as limited liability companies. This

form was chosen by 69% of POs and this was the most popular legal form regardless of the type of production a given organisation was pursuing. In addition, 19% of POs operated as associations and the remaining 12% were organised in the form of co-operatives.

Table 4 presents some further information on producer organisations by disentangling between their different legal forms. The largest number of growers cooperated in limited liability companies (over 60% of all members of the POs). On average, these type of entities operated also the largest growing area (237 ha as compared to 219 ha operated by associations and 200 ha operated by cooperatives). That said, the average number of members per one PO in case of limited liability companies (21 growers) was much smaller than the one observed for associations (63 growers) or cooperatives (39 growers). Farm holdings of growers organised in the form of limited liability company though were on average larger than farm holdings of growers organised in other legal forms.

Table 4. Number of growers and the size of the their holdings depending on the legal form of POs in 2014

Legal form of PO	Number of POs	Total number of POs' members	Average number of members in PO	Average growing area of PO	Average size of a member's holding in PO
Limited liability company	99	2046	21	237	11
Association	27	1708	63	219	3
Co-operative	17	669	39	200	5

Source: Based on unpublished data of Agency for Agricultural Market

5.2. Heterogeneity in marketing channels

While the size or legal form heterogeneity is important and definitely should be recognised, the analysed producer organisations display also substantial heterogeneity in terms of their market behaviour. This is clearly visible when one looks at the types of contractors they deal with and product mix they offer. Below we report basic information

on both these issues. We start with the marketing channels that fruit and vegetables producer organisations participate in.

Our data allow us to distinguish between six marketing channels that producer organisations can use: 1) large retail chains (super- and hyper-markets), 2) wholesalers, 3) small retail shops, 4) other outlets, 5) processing industry, and 6) self-processing. Basic differences between these marketing channels are presented in Table 5. In terms of the value of sales, the wholesale marketing channel is the largest and accounts for 51.4% of the total sales (see column 1). Super- and hyper-markets rank the second with the share of roughly 21%. Further, 14.3% is sold to processing companies, 2.3% goes to small independent retail shops, 1.2% is self-processed whereas the remaining 9.5% is sold to other outlets.

Sales to the processing industry are least concentrated as the top 10% of producer organisations supplying this channel account for around 37% of the total value of products sold to this type of purchaser (see column 2). For other outlets and wholesalers this share is 43% and 45% respectively. In case of large retail chains top 10% of organisations account for roughly 51% of total sales. The highest concentration (61%) is observed for small retail shops. As noted above however, this marketing channel accounts for a marginal share of total sales.

Table 5. Main characteristics of marketing channels used by fruit and vegetables producer organisations in Poland in 2014

Marketing channel	*% total sales*	*% of sales by top 10%*	*% of organisations using it*
	(1)	(2)	(3)
Large retail chains	21.0	51	32
Wholesalers	51.4	45	63
Small retail shops	2.3	61	33
Other outlets	9.5	43	31
Processing industry	14.3	37	69
Self-processing	1.2	-	7

Source: Own calculations based on 137 producer organisations; for 6 organisations the relevant data were not available.

The most frequently used option is to sell to processing industry which is utilised by 69% of producer organisations. The second most popular marketing channel is selling to wholesalers (roughly 63% of the organisations use this option). Small retail shops, other outlets and large retail chains are all used by roughly the same share of organisations which oscillated in the range of 31-33%. The least common option was to self-process (done by 10 organisations which is roughly 7% of the population).

An interesting question which arises in this context is what factors can account for this variation in the choice of marketing channels. One potential answer would suggest that these different choices of marketing channels reflect the differences in productivity among the organisations under study. An alternative explanation would incline towards studying the relationships within the agro-food supply chain and investigating the issue of contracting practices used by different types of buyers of agricultural output. Yet another line of research that could be pursued is to explore the fact that, as our data indicate, among organisations supplying large retail chains there are relatively few associations.[14]

Interestingly, many producer organisations use more than one marketing channel. In fact, as presented in Table 6 (column 1), roughly 70% of them use two or more marketing channels and around 35% of them sell to 4 or more marketing channels. Further, as reported in column (2), producer organisations that deliver their products to only one marketing channel are relatively small. Even though they account for roughly 30% of all organisations their share in total sales value is only 12%. In contrast, those producer organisations that deliver to 3, 4 or 5 marketing channels are relatively large as their share in total sales exceeds their share in the population (compare columns 1 and 2). While this suggests that larger organisations participate in more marketing channels, it also poses a question for the future research about how to account for this observation. One potential answer is that this is a strategic decision to diversify the risk of relying on only one type of buyers. If this is the case however then another immediate question is why smaller organisations do not pursue this strategy. An obvious explanation would be that this is precluded by the small scale of their operations. Other way of looking at it would point to a lack of managerial capital. Alternatively, one could use it to support the argument that only larger organisations are able to cover relatively high fixed costs of entering certain marketing channels. Obviously, these and other potential explanations need to be carefully examined.

The analysed producer organisations also vary to a large extent in terms of the degree to which they rely on a given marketing channel. For those organisations that use more

[14] While large retail chains are used by 41% of cooperatives and 39% of limited liability companies, this marketing channel is used by 11% of associations.

than one marketing channel the share in total sales accounted for by the main channel varies from 37% to 99% with the median share equal to 79%. This in turn suggests that in organisations which contract with more than one type of purchasers, the sales are not evenly split between different channels and it is often the case that there is one marketing channel which dominates the others. The average share in total sales accounted for by the main channel across organisations using different number of marketing channels is reported in Table 6, column (3). As before, improving our knowledge about factors determining the importance of a given marketing channel in total sales of producer organisations could be a fruitful line for future research. In this particular context, studying the relationships within the agro-food supply chain might be one way to go forward.

Table 6. Number of marketing channels used by fruit and vegetables producer organisations in Poland in 2014

Number of marketing channels used	*% of the population*	*% of total sales*	*Average share of the main channel in total sales (%)*
	(1)	(2)	(3)
1	30.6	12.4	100
2	30.6	28.0	83
3	13.1	24.1	77
4	14.6	20.2	64
5	9.5	14.8	57
6	1.5	0.5	69

Source: Own calculations based on 137 producer organisations; for 6 organisations the relevant data were not available.

5.3. Heterogeneity in product mix

Except for varying in terms of the number of marketing channels used, the investigated producer organisations display also a vast heterogeneity in terms of product mix they offer. This is clearly visible when one looks at the number of different products that

producer organisations offer on the market.[15] As reported in Table 7 (column 1), a relatively small share of organisations offer only one product category (14%) and a great majority of them (86%) sell two product categories or more. In this context, it is also interesting to observe that almost 70% of the organisations under study offer 4 product categories or more.

Table 7. Product mix offered by fruit and vegetables producer organisations in Poland in 2014

Number of products offered	*% of the population*	*Average share of the main product category in total sales (%)*	*% of total sales by organisations with respective product mix*
	(1)	(2)	(3)
1	13.9	100	30.0
2	9.5	87	7.8
3	8.7	84	5.7
4	19.0	79	18.9
5 and more	48.9	64	37.5

Source: Own calculations based on 137 producer organisations; for 6 organisations the relevant data were not available.

Again, the existing studies (and theories that they use) hardly allow to understand what drives these differences and further research is needed in this respect. Descriptive analysis suggests, for example, that organisations of the form of limited liability companies seem to offer more products than associations or cooperatives (compared to the latter two, limited liability companies less often sell 3 products or less and more often sell 5 products or more).[16] Further, organisations specialised in selling fruits seem to offer more products than organisations specialised in selling vegetables. That being said, to what extent these patterns are robust across different settings and through what

[15] All products covered by the fruit and vegetables sector are listed in EU Regulation 1308/2013 in Annex I, Part IX.

[16] While 27% of limited liability companies sell 3 products or less, 54% of them sell 5 products or more. For associations the respective shares are 42% and 38%, whereas for cooperatives these shares are 41% and 35% respectively.

channels these effects may be potentially transmitted is largely unknown. Equally important is to improve our knowledge about the extent to which organisations which differ in terms of the number of products offered differ also in their performance (for example, in terms of output levels or labour/land productivity). For example, one potential research question that comes to mind in this context is the following: Is it the case that multi-product organisations are stronger performers than single-product organisations, which is often found for manufacturing firms?

In this context it also interesting to see whether multi-product organisations evenly distribute output across product categories they offer or whether they predominantly rely on one product category. In the data we find that, on average, fruit and vegetables producer organisations in Poland do possess a core product. For the whole population the main product category accounts for 84% of total sales. Again however, there is a huge heterogeneity among organisations in this respect and the share of output of the main product ranges from 25% to 100%. In fact, for a quarter of organisations the main product category accounts for less than 55% of total sales, whereas for another quarter it accounts for more than 97%. The average share of total sales accounted for by the main product category across organisations with different product mix is reported in Table 7 (column 2). As the reported figures indicate, the share of the main product in total output decreases with the number of product categories offered. While this is perhaps not surprising, we have only limited knowledge about factors which drive the decision about the product mix and the extent to which we should expect an even distribution of output across different products or not. Descriptive analysis suggests, for example, that this might be very strongly related to the competitive pressure a given organisation faces. In the data we find that the importance of a core product tends to increase when market competition intensifies. That said, this observation needs further examination.

Further, and interestingly, as presented in Table 7 (column 3), the two extreme categories of producer organisations (that is those selling 5 product categories or more and those offering only 1 product category) account for the largest shares of total sales (37.5% and 30% respectively). Finally, comparing the figures presented in columns (1) and (3) allows to assume that producer organisations with the highest specialisation (i.e. strongest reliance on their core product) are the largest. While they account for almost 14% of the population, their share in total sales is much higher and equals to 30%. In contrast, for producer organisations with more than one product offered, the share in total sales is always smaller than the respective share in the population (compare columns 1 and 3).

6. Conclusions

Horizontal integration between farmers has been consistently supported by the European Union. Yet our understanding of how exactly agricultural producer organisations operate is still very limited. While we have a fairly good knowledge about factors encouraging the establishment of formal cooperation between farmers, we know relatively little about how producer organisations function on the market and what drives their market behaviour. For example, the differences between producer organisations in terms of their marketing channel choice or product mix they offer remain largely unexplored. In this paper we aimed at making the first step to fill this gap. Using the example of producer organisations from the fruit and vegetables sector in Poland, we documented a huge heterogeneity characterising the producer organisations in question as regards their product mix and marketing channels they use. This was done with the help of a simple descriptive analysis. While this approach has its shortcomings, it nonetheless allows one to observe some regularities in the data and provides support for formulation of some hypotheses that can be subjected to a more systematic investigation.

The next step should involve some attempts to test whether the patterns uncovered by the analysis presented in this paper are robust. Another area for future research is to provide theories and evidence that would explain how the findings reported above could be accounted for. What should be emphasised, both theoretical developments and empirical work is needed here. The outcomes of these efforts should be helpful and of interest not only to researchers, but also to policy makers who seek to better understand the functioning of the fruit and vegetables sector, on which producer organisations play an important role.

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