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MODEL SOLUTIONS OF DISTRIBUTION LOGISTICS WITH REGARD TO ORGANIC PRODUCTS [1]

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ABSTRACT

The objective of the paper was to present model solutions of distribution logistics with regard to organic products in organic farms. Moreover, size and production structure, as well as participation and structure of commodity production divided into departments was defined. The scope of the paper covered the research in 50 organic farms located in the south of Poland. The study was carried out within the development subsidy No NR 12-0165-10 "Innovative impact of technology and IT support of management on production efficiency in organic farms". Total commodity production in the investigated farms was 6009.73 PLN·ha^{-1} which constituted at the average 69.3% of global production. In the structure of plant commodity production, vegetables, grain seeds and fruit constitute a considerable part and in the animal production it was milk and eggs. It was found out that decisions within the scope of model solutions of distribution of organic products mainly concern the selection of proper distribution channels, organization of physical distribution (marketing logistic) and localization of sale points. Four models of organic products distribution were suggested.

Introduction

Organic farming becomes an interesting subject, both among possible consumers as well as producers - farmers. Reasons for such state of affairs should be searched for not only in more frequent negative assessments of intense methods of agricultural production, but also even higher awareness of consumers and rising level of their requirements towards a product and a producer (Kondratowicz-Pozorska, 2006).

Dynamic development of organic farming in Poland, after EU accession in 2004 gave rise to the need of carrying out research and analysis concerning this branch of agriculture. Getting information on production and economic situation of organic farms and their competitiveness has become crucial, especially because the number of agricultural producers interested in the production with organic methods raises systematically (Kowalska 2010).

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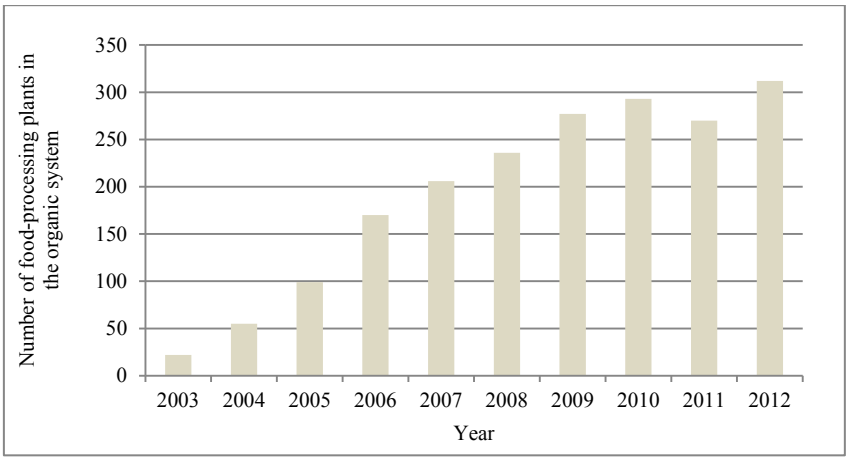
It is estimated that presently organic farming is being developed in approximately 140 countries, whereas the area of organic crops is over 32 mln ha, out of which 1/4 in the European Union countries (Willer and Kichler, 2009). In these countries organic production has been legally based and is subject to support as a part of Common Agricultural Policy of the European Union for many years. The organic food market is characterized there with respectively high demand, wide assortment of the offered products and effective distribution channels. Nevertheless, on the markets of the member states from the Central and East Europe barriers in development occur, especially in the consumption and trade sphere. Thus, there is a need to undertake actions aiming at improvement of distribution and the increase in demand for organic products in these countries (Smoluk-Sikorska, 2010).

Development of organic farming is related to the development of markets of these products. On the part of supply there is a rich assortment of organic products in distributive networks whereas on the part of demand an increasing number of consumers who have high organic awareness can be observed (Komorowska, 2006).

It should be emphasised that in Poland there is no system of suitable organic products distribution and farms which produce this type of food products function more due to subsidies. There are not many enterprises who distribute organic food and the existing ones function only on local, very narrow markets. An outlet of this type of food develops very slowly in Poland, thus entrepreneurs very carefully try on to run businesses within this branch. Development of enterprises which process organic food may be an example. In 2012 number of food processing plants of organic farming products increased three times in comparison to 2004 i.e. from 100 to 312 food processing plants. The highest number of organic food processing plants in 2012 was reported in Mazowieckie Voivodeship (59), Wielkopolskie Voivodeship (42) and Lubelskie Voivodeship (36). Opolskie Voivodeship reported the lowest number of organic food processing plants, that is only 2 plants, in Podlaskie Voivodeship – 5 and Lubuskie Voivodeship – 6.



Source: Raport o stanie rolnictwa ekologicznego, on-line, 2014

Figure 1. Number of food-processing plants within the system of organic farming in Poland in 2003-2012

Markets of majority of EU countries are more developed in comparison to the Polish market. Therefore, majority of production of Polish farms from the branch is exported. Increase of the presence on the Polish market requires development of demand through appropriate shaping of consumers' as well as salesmen's awareness. In the Central and Eastern Europe countries direct sales is the most significant. There, selected fresh products are offered (Poland, Romania, Bulgaria) and sales networks (Czech Republic, Hungary), where processed products are available (mainly grain and fruit-vegetables products). However, often lack of meat and meat processed products is reported. Generally, on the Central and Eastern Europe countries markets, organic food is characterized with low availability and its assortment is rather limited (Łuczka-Bakuła and Smoluk, 2006; Kovacs and Richter, 2005).

An agricultural producer, in order to successfully participate on the European market, must participate in pro-development activities, i.e. inter alia: active marketing, trainings, education, participation in fairs or implementation of innovative processes. Finally, agricultural producers in Poland, in order to obtain high competitive position on the European market must have, first of all, a wide range of activities which enable constant distribution of their own products, out of which the most important are: the use of active promoting campaigns, increase of the quality of products, development of institutions supporting the sale of products and shaping of specialization of their own farms. Moreover, a farmer must be aware that the consumers' requirements increase incessantly and they are reflected in the increased demand for products with special features and unique recipes (Wojcik, 2012).

Organic food cannot be easily found in usual shops and distribution centres. Indeed, specialist shops with organic food and their networks are established but it takes place only in big cities. However, these activities still are on a scale, which is too small to raise the sales in Poland. Surely, high price of organic products in comparison to traditional food is an obstacle in obtaining wider consumers' interest.

Objective, scope and methodology of work

The objective of the paper was to present model solutions of distribution logistics with regard to organic products in organic farms. The scope of the paper covered the research in 50 organic farms located in the south of Poland. The study was carried out within the development subsidy No NR 12-0165-10 "Innovative impact of technology and IT support of management on efficiency of production in organic farms". The collected information was obtained on the basis of a guided survey carried out with a farm owner and detailed two-year studies. Information concerned 2010/12 and the collected data allowed determination of the size and structure of global and commodity production, sales structure of organic products and characteristic of the distribution process.

Research results

Average area of agricultural land in the researched objects was 12.48 ha and was within 3.32 ha and 31.80 ha. Arable land – 53.6% and permanent grasslands – 36.7% prevailed in the general structure of use. Orchards and perennial plantations occupied the remaining part. Grains dominated in the disposition of crops – over 45.8% and then fodder plants – 34.0%, vegetables and root crops. A marginal participation was in case of herbs because it

was only 1.8% of the area. Average overall livestock is 0.65 LSU per 1 ha of agricultural land. It is safe livestock for natural environment and even its tripling would not cause negative effects for the environment.

Organic farms of Małopolska region are characterized with high dispersion according to the agrarian structure. Thus, the production scale per one object is small, and therefore, the size of commodity production is also small and it only can decide on the amount of farm revenues. This aspect of assessment of economic activity of the researched objects is significant at creating models of goods distribution as well as production organization models. Simultaneously, it should constitute a source material for persons who undertake modernization and restructuring of production towards organic.

Table 1 and 2 presents a general and unitary size and value of global production divided into farm groups and branches (plant and animal) as well as the value of commodity production.

Table 1
Overall and unit size of global production with division into farm groups and branches (plant and animal)

Farms group	Parameter	Production					
		Plant		Animal		Total	
		GU·farm^{-1}	GU·ha^{-1}	GU·farm^{-1}	GU·ha^{-1}	GU·farm^{-1}	GU·ha^{-1}
Total	Average	353.46	27.21	336.05	25.87	689.51	53.08
	Standard deviation	291.05	16.13	405.57	17.86	625.68	23.21
up to 5 ha	Average	136.74	40.31	76.81	22.65	213.55	62.96
	Standard deviation	106.57	0.93	59.37	14.15	130.04	25.42
5.01-10.00 ha	Average	207.16	30.12	203.26	29.55	410.41	59.67
	Standard deviation	86.14	11.59	141.88	19.25	187.07	25.20
10.01-10.00 ha	Average	426.56	28.18	269.26	17.79	695.82	45.98
	Standard deviation	189.51	14.07	294.46	18.45	290.12	18.40
area 20.00 ha	Average	747.28	24.07	909.35	29.29	1656.63	53.36
	Standard deviation	318.89	12.83	484.86	15.10	652.35	19.65

Source: Kowalski et al. 2014

As the data presented in this table show, a farm produces at the average 689.51 GU which gives a unit production in the amount of 53.08 GU. The biggest farms produce almost 1656.63 GU whereas the smallest farms 8 times less – 213.55 GU. Farms from the second and third group achieve a subjective index respectively on the level of: 410.41 and 695.82 GU·farm^{-1}. However, one should remember that the presented values concern global production, where an internal turnover between production departments exists. And this affects the final production. When comparing both branches of production one may observe that in the scale of whole researched population, plant and animal production give its similar amount – 353.46 and animal production 336.05 GU·farm^{-1}. However, plant production

prevails between particular groups – in the first and third group objects. Whereas, animal production – in the fourth group with balance within the second group.

Table 2
Overall and unit size of global and commodity production with division into farm groups and departments (plant and animal) – PLN·ha^{-1}

Farms group	Parameter	Production					
		Plant		Animal		Total	
		Global	Commodity	Global	Commodity	Global	Commodity
Total	Average	5008.35	3922.47	2626.94	2087.28	7635.26	6009.73
	Standard deviation	6962.16	7144.55	3027.17	2837.83	6908.55	7039.20
up to 5 ha	Average	7526.57	6431.35	2110.42	1538.72	9636.75	7969.95
	Standard deviation	8486.46	8776.62	2067.40	1854.05	8811.23	9017.54
5.01-10.00 ha	Average	3856.65	2492.26	3108.25	2522.96	6964.96	5015.25
	Standard deviation	3498.51	3291.82	4176.75	4059.55	4959.47	4615.75
10.01-10.00 ha	Average	7497.32	6871.44	1503.18	1194.88	9000.50	8066.32
	Standard deviation	10043.05	10274.33	2108.35	1766.65	9231.47	9577.97
area 20.00 ha	Average	1425.01	296.73	3640.62	2952.85	5065.63	3249.58
	Standard deviation	1060.08	1126.86	1919.75	1733.67	1932.44	1599.23

Total commodity production in the investigated farms was 6009.73 PLN·ha^{-1}, which constituted at the average 69.3% of global production. Commodity production in the group of objects up to 5 ha and from 10-20 ha – 7969.95 and 8066.32 PLN·ha^{-1}, which constituted respectively 67.0 and 60.5% of global production. In comparison to these objects, in the group of farms from 5-10 ha commodity production was lower by 38% in the biggest farms (area of 20 ha) – by 60%.

When analysing participation of commodity production in particular area groups, it was determined that the highest participation was in farms of area from 10 to 20 ha – 77.97% and the lowest in farms above 20 ha – 60.5%. Whereas, taking into consideration production departments, it was reported that animal commodity production (55.9%) slightly prevailed over plant commodity production (44.1%). The highest participation of animal commodity production occurred in the group of farms with area of 20 ha – 75.9% and the lowest up to 5 ha – 47.3%

Figure 1 and 2 present structure of commodity production expressed in percentages and it was determined based on the value of sold goods.

In the plant production department three main products were reported. They constituted 77% of the whole commodity production value. Vegetables had the highest participation – 27%. Herbs, hay and fodder plants had the lowest participation in the commodity production. In total they constituted 14% of the commodity production value from animal production branch.

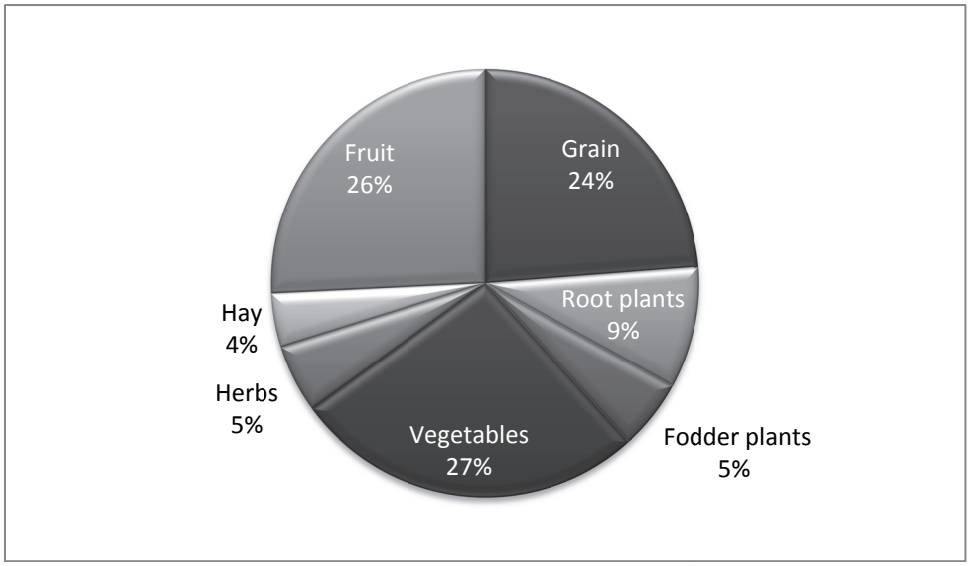


Figure 1. Structure of commodity production – plant production department

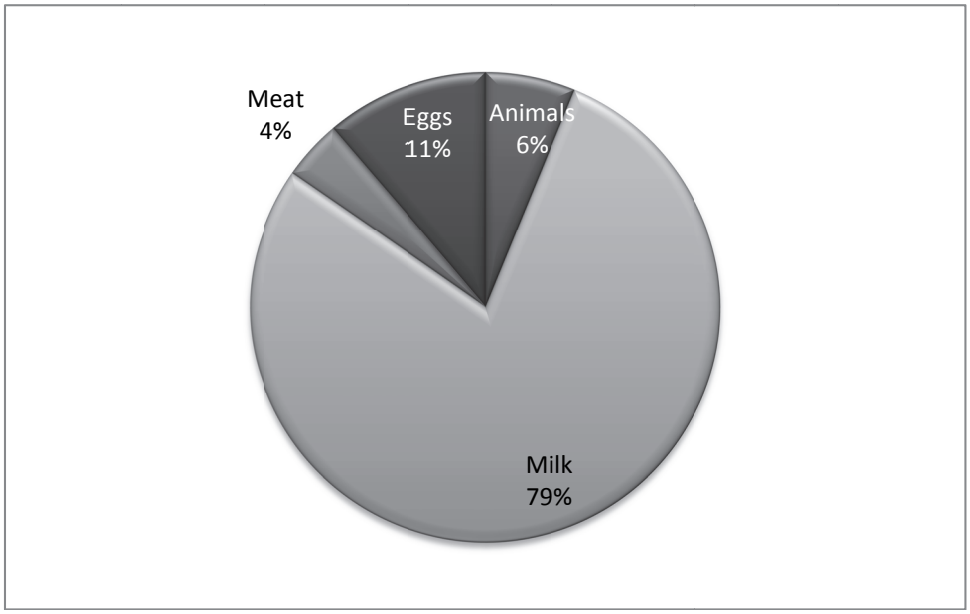


Figure 2. Structure of commodity production – animal production department

In the animal production branch, milk constituted the biggest part of the sold production – 79%. It mainly results from the selection of farm for the research and the production trend, where 12 out of 50 farms selected for detailed research, produced only milk. Pork constituted the lowest participation in the sales of commodity production – 4% and live animals – 6% (cattle, foals, horses).

Distribution next to production is one of the most important elements in the logistics chain, because its task is to make products available in the place and time responding to the clients' needs and expectations.

From the macroeconomics point of view, distribution means the process and structure of shifting goods from producers to target consumers. Thus, it constitutes a selected group of market channels and connections between them. Distribution systems of a particular organization structure and equipped with material-technical factors, which exist in economy, create conditions, which constitute the basis for selection of the manner of relocating products from the production zone to the consumption zone. Features of these systems cause that in a short period, they become an external factor for shaping ways of distribution. In the microeconomics, distribution is often identified with the sales process and the process of supplying products of a particular enterprise to final purchasers. Decisions related to selection of the sale manner are included in each enterprise to strategic decisions, because they finally influence effectiveness of market activities and achieved economic effects (Sikora, 1993; Rutkowski, 2002; Beier and Rutkowski, 2004).

Table 3 presents basic amounts characteristic for the distribution process: multiplicity of sales, average distance on which products were sold and the participation of the service transport in the process of sale.

Table 3
Characteristic of the distribution process of organic products

Specification	Plant production - products						
	Grains	Root plants	Fodder plants	Vegetables	Herbs	Hay	Fruit
Multiplicity of sale (-)	6	15	12	42	2	5	19
Average distance of sale (km)	3	2	4	12	10	8	22
Participation of service transport in the sales process (%)	4	3	3	11	–	1	–
Specification	Animal production - products						
	Animals		Milk		Meat		Eggs
Multiplicity of sale (-)	3		183		3		278
Average distance of sale (km)	18		21		7.5		35
Participation of service transport in the sales process (%)	–		–		–		–

Average multiplicity of plant products sale was 15 and the average distance of sale was 9 km. Vegetables were sold the most often and the herbs and hay less frequently. Distance from outlets was from 2 to 22 km. As one may notice, due to proper equipment of farms in transport means, participation of service transport in the process of products distribution was marginal.

Significantly higher multiplicity of sale was in case of animal products – particularly due to such products as milk and eggs. Average multiplicity was 116 and average distance from outlets was two times higher than in case of plant products. All products were transported with own transport or at the client's cost.

Producers of organic food products should pay attention more often to the changes of consumers' likings and preferred manners of satisfying food needs, e.g. demand for the so-called convenient food products, partially or totally ready for consumption and also to the need of forming new products. This, on the other hand requires the use of new technologies, adjusted to the existing legal regulations with regard to organic farming (Żakowska-Biemans, 2006).

Requiring outlet of agricultural products forces organic food producers to numerous activities, the task of which is to obtain new and maintaining fixed clients. In present times, it is very difficult, because, a present market suggests more and more rich offer of products of foreign origin. Only thorough research of client's needs will create demand for specific products and will allow loyalty to a known product. It should be also emphasised that consumers' awareness rising every year is reflected in the demand for goods which differ with original recipe, which results from the search of extraordinary composition.

According to Wójcik (2012) a modern consumer, taking up a decision on the purchase of food, becomes more requiring, thus an appropriate price and the standard quality is not enough. The basic issue, which becomes more and more significant for a possible client

is a selection of products of suitable parameters, and the most significant are:

– taste and health values,
– known brand name
– production traditions,
– regional origin,
– strict control of the production process.

In case of Poland it is difficult to talk about an organized sale of organic food products. A main obstacle in construction of the distribution network which ensures the flow of goods from a producer to trade is territorial dispersion of farms. Insufficient development of the direct system between a producer and retail is a weak element of the distribution system in Poland.

In Poland direct sale of organic food prevails and sale through specialist channels, which is characteristic for the initial phase of the market development. Contrary to the Western Europe countries, characteristic feature of specialist shops is their small number (approximately 250) and a low variety of assortment. Insufficiently developed indirect cell is an additional weakness (number of specialist warehouses is about 30). While, the number of producers of organic food products increases (farms and food-processing plants) and thus supply of eco-products. At the same time considerable changes occur in the size of demand for organic food products, especially among citizens of big cities (Łuczka-Bakuła and Smoluk-Sikorska, 2009; 2010).

Decisions within the scope of model solutions of distribution of organic products mainly concern the selection of proper distribution channels, organization of physical distribution (marketing logistic) and localization of sale points. It is difficult to clearly determine one, two models of distribution of organic goods on account of specificity of the Polish organic farming. Polish farms are very spread within an area, they have a small number of raw material, a poor assortment, and the existing organization of purchase and sale of organic products does not function like in western countries.

Organic farming may be sold both in traditional channels of distribution as well as in special channels, typical of a given type of products. From among the most popular retail agents there are:

– shops with healthy food,
– specialist shops (e.g. meat processing plants, bakery shops, dairies),
– traditional super and hyper markets.

Depending on the number of agents which occur in the channel and the form of channel organization one may list three types of channels:

– direct and indirect,
– short or long,
– traditional and vertically integrated.

Selection of a proper channel of distribution depends on many factors. The most important are:

– size and nature of the market,
– product type and features,
– clients' behaviour and preferences,
– competition,
– farm size and position.

Model 1

In direct channels of distribution, products are transferred without the participation of agents from an organic farm to consumers. A farmer must reach final recipients with his products at his own cost and risk. As a part of direct sale, plant products are sold to a final consumer i.e. to individual persons and directly to retail shops and catering plants.

Direct sale may take place in various forms. The most frequent methods of agricultural products distribution are:

– direct sale in farms ("at the door") - consumers buy products in a farm any time,
– sale on an agricultural fair – a farmer leases a spot on a fair, sells products on particular weekdays and hours or every day,
– sale by the road – concerns mainly seasonal products, particularly fruit and vegetables, a form which does not require much capital, however, sanitary conditions and sale safety conditions are not favourable,
– sale directly to the consumer's house (“to the door") – products are supplied very often to fixed consumers, who place orders for a particular amount of a product for a specific day of delivery. Such form of sale requires having a proper transport,
– sale through the Internet – carried out in various forms, including individual delivery or shipment to a consumer,

– Sale in a "collect yourself" form – a purchaser has a possibility of harvesting himself from the farmer's field; it is applied in case of soft fruit particularly strawberry, stone fruit, apples, pears, plums. Orchards must be equipped with proper ladders and containers which facilitate harvesting.
– neighbour sale ("from a farmer to a farmer") – may concern both plant products, e.g. grains, hay as well as products for the household needs, which are not produced by a farmer himself but purchased from a neighbour.

Direct sale serves establishing closer and more permanent contacts with purchasers, which allows a faster flow of information between consumers and a producer and also accepting a profit margin of a distributor by a farmer. Direct sale from a farm allows our clients to see where and how products, which they buy, are cultivated. Moreover, a supplier and his products become less anonymous. Also price is then favourable for a client. However, access to farms located far from big city centres may be a problem (Pilarczyk and Nestorowicz, 2010).

Direct channels of sale of organic food products should be used by small farms with dispersed production. They usually have limited possibilities within the scope of other form of sale of their products. Direct sale does not require high investment inputs, endows a producer with a fixed inflow of cash, enables also a close contact with purchasers and obtaining information from them on their needs and preferences. Disadvantage of this form of sale is its local nature. It may be used in farms located near big communication tracks.

Model 2

Sale of organic products in this model is designated for bigger area farms, which have suitable potential and assortment of products, which are production oriented. In indirect channels (the so-called long), there are agents, at least one on each level of the distribution channel. These may be wholesale agents (purchase of agricultural products directly at a producer, wholesale purchase), retail agents and agents who process food (food-processing plants which offer only a ready organic food products).

Sale of organic food products to final consumers in a direct channel may take place in shops with healthy food products in shops which offer traditional food with traditional service, in self-service shops, on-line shops, in specialist shops (e.g. bakeries), in supermarkets and eating establishments.

On one hand this solution gives a farmer:
– a possibility of wider market penetration and potential sale of a product,
– facilitates expansion of a producer-seller to new markets, which have not been available for him so far,
– possibility of reduction of the number of transactions, which may lead to lowering of distribution costs,
– additional advantages related to specialization and carrying on uniform activities on a great scale,
– releasing a producer from construing his own sales network,
– possibility of employing sellers,
– possibility of maintaining stocks on each level of a channel.

However, on the other hand it causes:
– partial or full loss of control over the selection of final clients, prices, product promotion,

– elongation of the payment period for a product, which means slowing down the flow of capital at a producer and sometimes also crediting agents,
– possibility of conflicts of interests in a channel,
– increase of threat which results from improper execution of undertaken obligations, ignoring producer's requirements, or bad work carried by agents.

Model 3

The next distribution model is based on the so-called short channels, where there are not many levels. Both small and bigger agricultural producers of a specialistic or multi-trend commodity production may participate therein. It is a model of commodity distribution where between an agricultural farm and consumers, there is an agricultural organization (agricultural cooperative, producers' group) which group farmers who produce specific food products. Extending and initiating cooperation with other producers - farmers will allow extension of offer and introduction to sale of the so-called complementary goods, that is fuller satisfaction of the client's needs. Having a wide assortment and appropriate number of organic products, one may in a simpler way contact bigger trade networks and thus conclude long-term contracts for the supply of specific products. Short channels have similar advantages as well as disadvantages as indirect channels.

Model 4

The system of distribution of organic products in this model is based on entities (farms, warehouses, food-processing plants) loosely related to each other. Each of them has its own objectives and aims at maximization of its profits. In the moment, when between entities a fixed cooperation will start, then interested entities may be identified with a given channel of distribution, including impact of own decisions and decisions of other links on the effectiveness of functioning of the whole channel of distribution. A belief that reaching aims of all interested entities is related to the need or even necessity of starting special coordination mechanisms in the whole channel may induce to such activity. Shaping of such mechanisms caused development of various forms of cooperation of entities, which function in the market zone and creating adequate organization solutions. This mutual cooperation allows the increase of bidding force, achieving advantages of scale and maximization of the inflow to the market. The existing relations between entities within the so-called vertical integration have the most frequently contract nature (relation of independent entities through conclusion of contract). Producers of organic food products sign contracts for supply of determined amount of their goods to distributors and those undertake to receive these products and supporting them not only within the trade but also counselling related to organic production.

Conslusion

According to Pilarczyk and Nestorowicz (2010) as well as based on authors' own research, it should be determined that the system of distribution of organic products in Poland will develop dynamically if diversification of sale channels will take place. Cooperation of organic producers with big trade networks cannot be avoided. Only increase of sales partic-

ipation in a conventional channel will allow decrease of distribution costs and profit margins and this will decrease prices for final purchasers, which will facilitate reaching a bigger group of clients. It is difficult to assign a specific distribution model for the investigated organic farms because majority of them carries out a varied production both with regard to the size as well as assortment. Thus, in many cases the investigated farms will have to base on two or three distribution models, the profit from the obtained sale will be a selection criterion.

For Polish farmers who run organic farms, export of products abroad is still the most profitable, thus high dispersion of organic agriculture in Poland may be a problem – foreign clients need big amounts of goods and properly selected assortment. Association of organic farmers or producers' groups may solve this problem.

In the process distribution development, it it is worth to follow certain solutions which can be found on markets of other European states, but at the same time, one should not forget about preconditions typical for Poland, such as the society's wealth level, awareness level and client's education or certain shopping habits, and also farmer's attitudes towards forming cooperatives or producers' groups by them, which result from earlier experiences.

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MODELOWE ROZWIĄZANIA LOGISTYKI DYSTRYBUCJI PRODUKTÓW EKOLOGICZNYCH

Streszczenie. Celem pracy było zaproponowanie modelowych rozwiązań logistyki dystrybucji produktów ekologicznych w gospodarstwach ekologicznych. Określono również wielkość i strukturę produkcji, a także udział i strukturę produkcji towarowej z podziałem na działy. Zakresem pracy objęto badania przeprowadzone w 50 gospodarstwach ekologicznych z rejonu Polski południowej. Pracę wykonano w ramach grantu rozwojowego nr NR 12-0165-10 „Innowacyjne oddziaływanie techniki i technologii oraz informatycznego wspomagania zarządzania na efektywność produkcji w gospodarstwach ekologicznych". Ogółem w badanych gospodarstwach produkcja towarowa wynosiła 6009,73 PLN·ha^{-1}, co stanowiło średnio 69,3% produkcji globalnej. W strukturze roślinnej produkcji towarowej znaczący udział stanowiły warzywa, ziarno zbóż oraz owoce a w produkcji zwierzęcej mleko i jaja. Stwierdzono, że decyzje w zakresie modelowych rozwiązań dystrybucji produktów ekologicznych w głównej mierze dotyczą wyboru odpowiednich kanałów dystrybucji, organizacji fizycznej dystrybucji oraz lokalizacji punktów sprzedaży. Zaproponowano 4 podstawowe modele dystrybucji produktów ekologicznych.

Słowa kluczowe: gospodarstwa ekologiczne, sprzedaż, rynek, model, produkt, dystrybucja