“The optimization of the structure of production and distribution of agricultural goods by suburban enterprises of Odessa”

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The optimization of the structure of production and distribution of agricultural goods by suburban enterprises of Odessa

Abstract

The article proposes the ways of the optimization of the structure of production and distribution of agricultural goods by suburban enterprises of Odessa. Urgency of research in the ways to develop these areas is caused by a significant concentration of efforts to satisfy the ever growing needs of the urban area, paying a particular attention to commodity issues that primarily cover the agricultural domain. Also a significant challenge is to enhance the competitive capacity of products in the suburban agricultural sector and its producers in domestic and foreign markets.

The aim of the article is to develop the optimal structure of production and distribution of goods in agricultural sector, which will increase the overall efficiency and competitive capacity of suburban agricultural enterprises. The subject of the research is a set of theoretical, methodological and applied aspects of management on production and sales of agricultural goods in suburban agricultural farms.

The optimization of the assortment of commodities as part of the marketing complex is based on identifying the general trends in the development of this field of knowledge, determining its optimal parameters based on economic and mathematical modeling. The project on distributive policies of suburban farms for 2014 is developed from the economic mathematical model of the optimization of the structure of production and distribution of agricultural farming goods. It is based on the use of its own marketing network as the main channel of commodity sales. It was economically founded the expediency of detected results by identifying the profitability of functioning of suburban agricultural enterprises in 2014.

Keywords: optimization, economic-mathematical model, marketing distributive politics, suburban area, economic efficiency.
JEL Classification: Q13.

Introduction

The importance of the scientific study on the problems of development of agricultural production in suburban areas is resulting from the real social and economic processes taking place in the agricultural sector of the economy. Urgency in studying the ways of developing these areas caused by a significant concentration of efforts to satisfy the ever growing needs of the urban area, paying a particular attention to commodity issues that primarily covers the agricultural domain. Moreover the significant issue is to enhance the competitive capacity of products in suburban agricultural sector and its producers in domestic and foreign markets. Due to such circumstances, the importance of factor of the development is in the use of modern concepts and business philosophy which are based on marketing.

The aim of the article is to develop the optimal structure of production and distribution of commodities in agricultural sector which will increase the overall efficiency and competitiveness of suburban agricultural enterprises.

The subject of the research is a set of theoretical, methodological and applied aspects of production and sales of agricultural goods in suburban agricultural farms.

1. Literature review

The optimization of the product range as a part of the marketing complex shall be grounded on identifying general trends in this field, determining its optimal parameters based on economic and mathematical modeling.

Glushkov claims that the mathematical model is a number of symbolic mathematical objects and a correlation between them (Glushkov, 1983).

Kurytskyy sees the economic mathematical model as a concentrated expression of the most significant relationships and regularities of the economic system functioning process in mathematical form (Kurytskyy, 1997).

We should not equate an economic mathematical modeling and a research using modeling techniques. The modeling by itself can be considered as the process of creating and constructing of the economic mathematical model that is adequate to the object of the study. Modeling is not presuming for making calculations, it may be purely theoretical. At the same time the research by methods of modeling involves not only the construction of the model, but its use for the "model" calculations. This process is quite complex and requires consistent implementation of a number of interrelated activities which can be grouped into certain stages (Zhaldun, 2008).

Through the use of economic-mathematical methods and models includes features as formally described relationships between economic variables reflecting specific production processes to solve the optimization problem of planning and management, identifying dependencies between parameters and adequate adjustment plans and management decisions, timely response to changes goals and learning resource constraints (Piskun, 2012).

The central part in the system of models of optimal planning of agriculture at the enterprise level belongs to the optimization model of production structure. It makes it possible to determine the basic parameters of production for the current and future planning. It can be used to analyze the existing production structure, which allows identifying more appropriate ways of using the resources and opportunities to increase production volumes, based on actual data from previous years.

Economic-mathematical methods are ensuring the formation of a balanced plan specialization and combination of branches, which is the best for a given production environment: modeling agro-economic processes related to accommodation, specialization, concentration and cooperation of agricultural production, the development of specific economic and mathematical models, the rationale for them an input information. The main unknown in these models are taken different area sown crops and livestock animals with varying degrees of detail (Kurnosov, 1977).

Braslavets suggests two possible formulation of economic and mathematical optimization problem of specialization in agriculture (Braslavets, 1972).

In the first statement the problem is composed and solved on the actual data. The aim of solving the problem is an economic analysis of the actual location and specialization of the object. Results solution is allowed to assess the actual development, location and specialization of agriculture in terms of the best use of available climatic and economic conditions to ensure the highest possible level of production.

The second statement involves the decision of predictive or planned economic-mathematical problem based on relevant background information. The task of development, location and specialization of agriculture is solved taking into account two aspects: temporal and spatial.

Model structure of an agricultural production based on commercial relationships is proposed by Kolesnev. This model is aimed to study specialization in order to optimize the combination of agricultural industries (Kolesnev, 2006). When setting the model must take into account peculiarities of the farm that are important for assembly economic-mathematical problem (Kolesnev, 2004).

Model of program of agricultural enterprises that cooperate is proposed by Lenkov. Indigenous task of improving industrial relations in agriculture is to increase the efficiency of production, creating preconditions for the functioning of all enterprises in the self-sufficiency and self-financing. The mechanism of market economy put all businesses in front of needing to skillfully use the achievements of other formations; will push them to promote mutually beneficial cooperative relations. Co-production involves the establishment and development of relations of production of all types of enterprises and cooperative formations, establishment of industrial and economic systems, which provide activities to achieve the highest efficiency of each partner (Lenkov, 1997).

2. Research methodology

A key issue in the formulation of optimal resource allocation plan and structure the production and sale of agricultural products is the substantiation using areas of resource potential of households, forming the maximum financial performance sufficient for repayment of debt and creating an enabling environment for economic growth.

Based on the state of the level of economic development of agricultural production in suburban farms, defined priorities and economic conditions, we can formulate the following statement of the problem: based on the achieved level of economic development, to find a plan for the use of productive resources, which provided an optimal size of concentration conditions of industries, including development of manufacturing processes that would be consistent with the requirements of crop rotation in agriculture and would provide the best financial and economic results (Ivashchuk, 2008).

A special moment in the formulation of the optimization problem is to determine the production and economic ties with businesses logistics and sales. An important component is the consideration for terms of lease and credit commitments.

Economic-mathematical problem of agricultural branch should include the following conditions:

- intensive use of land in the development of production of cereals, vegetables, fruits, grapes, fodder production;
- scientific compliance with crop rotation in agriculture;

- productive livestock management, including evidence-based feeding system, balance feeds based on nutritional and cost of different types of feed;
- directions of agricultural products use;
- alternative production technologies;
- creation of performance indicators of production and financial activities (Bratslavets, 1971).

It is important to determine the optimality criteria. Economic-mathematical problem involves obtaining optimal solutions for the criterion of the maximum of profit that are most consistent with the objectives of economic development in market conditions. Equity income is defined as the difference between the cost of sales and its total cost. In developing the optimal settlement the loss ratio of a single industry or occupation is not expected, so in this case, a balance sheet profit is net profit. Determination of the volume of sales was carried by achieved level for the best years into accounting the dynamics.

Structural economic-mathematical model of the problem is based on the general linear programming problem. The peculiarity of its construction is to use the size of the sums of multiplication of the size of industries and activities, technical and technological factors cost-output and installation of certain ratios of volumes of resources and products among themselves.

3. Discussion

Before starting the economic process modeling, it is studied in detail using a variety of sources. It is getting ascertained the external and internal connections of the economic process; conditions of functioning of economic systems are getting clarified; then it should be found the place in the hierarchy of the process that is learning, and a period of time when it should be modeled.

The key data of the selected research are presented in Table 1 below.

It's been determined that the proportion of other distribution channels in monetary terms is high indicating about the profit of this channel. Thus for crops 68.4% of which sold to intermediaries, the share in income channel is 74.2%. At the same time with the realization 17.1% on the markets and their own networks farms receiving 15.6% of revenues.

Table 1. The outgoing data of the cost and structure on sales of agricultural production on average in 2007-2011 in Odessa suburban area

Types of products	Sold in total		Including:									
			Processing		Population as wage		Shareholders on the account of rent for land and property shares		The market, own stores, stalls, tents		Other channels	
	Thaus. UAH	%	Thaus. UAH	%	Thaus. UAH	%	Thaus. UAH	%	Thaus. UAH	%	Thaus. UAH	%
Grain	195524	100	4026	2,1	1843	0,9	14223	7,3	30432	15,6	145001	74,2
Oilseeds	61414	100	2677	4,4	284	0,5	775	1,3	8366	13,6	49313	80,3
Potatoes	13361	100	-	-	7	0,1	14	0,1	1331	10,0	12008	89,9
Vegetables	57931	100	6830	11,8	72	0,1	102	0,2	7904	13,6	43024	74,3
Fruits	3608	100	318	8,8	3	0,09	-	-	1188	32,9	2098	58,2
Grapes	20028	100	11684	58,3	-	-	-	-	560	2,8	7784	38,9
Melons	362	100	1	0,2	21	5,8	1,7	0,5	97	26,8	242	66,8
Meat	22371	100	5062	22,6	1593	7,1	37	0,2	8733	39,0	6946	31,0
Milk	15450	100	6163	39,9	219	1,4	2	0,01	7361	47,6	1706	11,0
Eggs	37206	100	156	0,4	94	0,3	3	0,01	15768	42,4	21184	56,9
Wool	13	100	10	72,3	-	-	-	-	-	-	4	27,7

Note: Calculated by the author based on data of the Main Department of Statistics in the Odessa region.

Similarly while 86.3% of the volume of potatoes realization for other channels received 89.9% of revenues, with its own network realized 13.5% of potatoes, and received 10% of revenues.

Vegetable production along with other channels is being actively released to the processing enterprises (22.1% volume) and gets 11.8% of revenues. Among others a private network which sells 9.6% of vegetable crops gets 13.6% of their income. Distribution with the help of intermediaries provides 68% of the volume that is 74.3% of revenues. Consequently the prices on realization of products to the processing enterprises are significantly less than the market prices.

Similar to vegetable crops is being determined the distribution of income in fruits. Thus the realization of 30.6% of these crops to the processing enterprises gives only 8.8% of revenues, while by the other

channels with the realization of 36.3% of the volume is being received 58.2% of revenues. As to a private network for fruit crops its unit weight in natural proportion and value indicates is nearly the same (33% and 32.9%).

Matching patterns are inherent to distribution of sunflowers and grapes. And for melons common trends are similar to cereals and potatoes.

Among animal products, distribution of 42.1% of the meat by its own network provides a 39% income. However, other channels, where sold 28.2% of the volume, gives 31% of revenues. Although trends in the distribution of crop production goods to processing companies, sales of meat for this channel correspond to earned income, indicating that it is price stability channel.

Sale of milk is observed by trends similar to those of vegetable and fruit crops in crop production. When implementing to processing enterprises 43.8% of milk is obtained 39.9% of revenues, while the implementation of 9.8% for the other channels gives 11% of revenues and 44.6% in the implementation of its own network – 47.6 % of revenues. The structure of farm income in suburban area is shown in Figure 1.

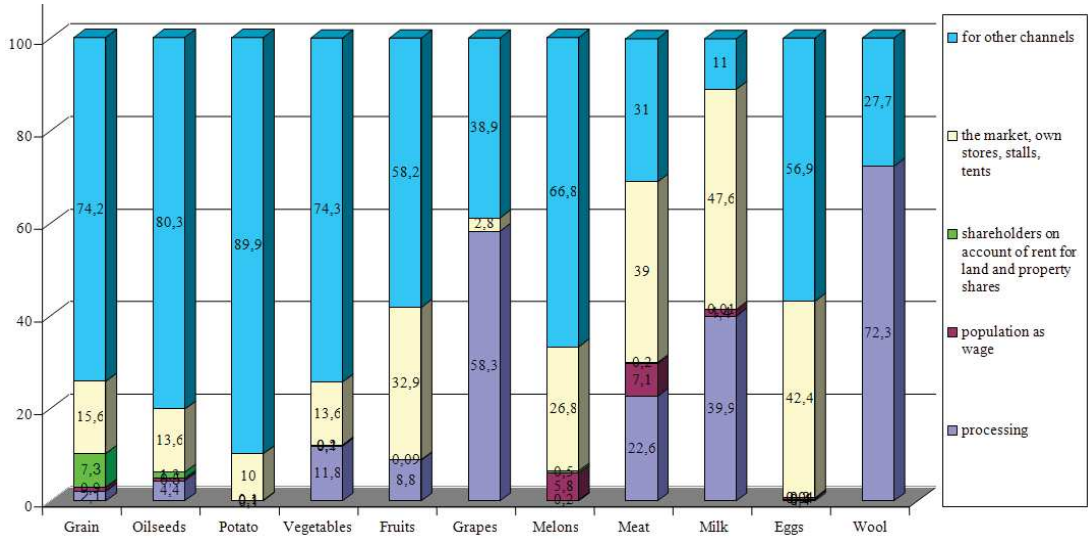

Fig. 1. Structure of sales channels for agricultural products in suburban area of Odessa (average for 2007 to 2011)

Under these circumstances, the distribution of goods, that have principal areas of specialization, largely depends on the activity of intermediary organizations because they provide the final condition of receipt of goods for industry and consumer goods. From the perspective of traditional supply-side concept that is positive. At the same time, due to this there is a significant increase in prices of final consumption, from the standpoint of marketing negatively affects to the level of demand, and hence to the level of customer satisfaction. These results demonstrate the feasibility of planning a new structure of production and marketing of products based on the concept of marketing.

To record the structural economic and mathematical optimization problem the variables that reflect the area of agricultural land, the production of livestock and crop production, cost of sales, expenses and retained earnings are defined. Restrictions tasks that can be divided into several parts: restrictions on land resources, in volume production, for animal feed balance, to gross output in value terms, to implement different output channels, on the costs of production and sales, profits from the sale of agricultural products are formed.

Built upon the identified limitations of economic-mathematical model describes the optimal sizes of indicators for 2016 based on evidence-based system of crop rotation and specific zones.

Analyze the project of distributive policies in suburban farms based on cost parameters, i.e. the income from the sale of agricultural products (Table 2).

Table 2. Cost and structure of agricultural production in the suburban area (project 2016)

Types of products	Sold in total		Including:									
			Processing		Population as wage		Shareholders on the account of rent for land and property shares		The market, own stores, stalls, tents		Other channels	
	Thaus. UAH	%	Thaus. UAH	%	Thaus. UAH	%	Thaus. UAH	%	Thaus. UAH	%	Thaus. UAH	%
Grain	207067	100	3106	1,5	1857	0,9	14080	6,8	159236	76,9	28789	13,9

Table 2 (cont.). Cost and structure of agricultural production in the suburban area (project 2016)

Types of products	Sold in total		Including:									
			Processing		Population as wage		Shareholders on the account of rent for land and property shares		The market, own stores, stalls, tents		Other channels	
	Thaus. UAH	%	Thaus. UAH	%	Thaus. UAH	%	Thaus. UAH	%	Thaus. UAH	%	Thaus. UAH	%
Oilseeds	88609	100	3720	4,2	531	0,6	1241	1,4	68760	77,6	14356	16,2
Potatoes	6439	100	-	-	6	0,1	6	0,1	4926	76,5	1500	23,3
Vegetables	187410	100	19493	10,4	372	0,2	193	0,1	144112	76,9	23240	12,4
Fruits	2879	100	127	4,4	1	0,02	-	-	1756	61,0	996	34,6
Grapes	12057	100	7403	61,4	-	-	-	-	4292	35,6	362	3,0
Melons	386	100	1	0,3	7	1,9	0	0,1	264	68,3	114	29,4
Meat	16822	100	2809	16,7	1127	6,7	17	0,1	5316	31,6	7553	44,9
Milk	16275	100	6087	37,4	163	1,0	-	-	1432	8,8	8593	52,8
Eggs	53803	100	53	0,1	108	0,2	-	-	30829	57,3	22812	42,4
Wool	23140	100	-	-	-	-	-	-	22677	98,0	463	2,0

Analysis of digital data in Table 2 shows that in the project for 2016 will be implemented crops on 207067 thousand, herewith 76.9% implemented by its own network, 13.9% – in other channels, 6,8% – shareholders, 1,5% – processors, and 0.9% – population as wages.

In addition it is planned that the priority of the channel will be own network, i.e. selling products in retail stores, stalls, tents and markets under the logo and brand name of each manufacturer. In plans the channel will be the basis for the implementation of almost all production facilities, reducing the sale of goods to intermediaries.

Thus, plans for its own network to sell 77.6% of oilseeds, the other channels – 16.2%, processing enterprises – 4.2%, in addition, 1.4% – population and 0.6% – shareholders. Total cost of sales will be 88609 thousand.

Potatoes is planed to sell 76.5% of its own network, 23.3% – in other channels, 0.1% of the population and shareholders. It is planned to implement the potato for 6439 thousand.

From the sale of vegetables will get 187410 thousand of income, with plans to implement 76.9% by its own network, 12.4% by other channels, 10,4% – to processors, 0.02% to shareholders and 0.1% to public.

Fruits and berries will be implemented on 61% of its own network, 34.6% of production by other channels, 4.4% to processors and 0.02% to population. Overall, it is planed to gain from the sale of fruit and berries in 2879 thousand income.

Implementation of melons should provide income up to 386 thousand. On its own network will be realized 68.2% of these products, in addition 29.4% – by other channels, 1.9% – for population, 0.3% – to processors, and 0.1% to shareholders.

Implementation of eggs in value will be 53803 thousand. On its own network will be implemented 57.3% of the eggs, besides 42.4% – by other channels, 0.2% – to population and 0.1% – to shareholders.

Implementation of wool will make by its own network for 98% and for 2% by other channels.

The main way to implement the meat and milk are other channels. As for meat, its implementation in terms of value is 16821732. In this case, 44.9% – by other channels, 31.6% – on its own network, 16.7% – to processors, 6.7% – to population and 0.1% – to the public.

For milk, the proceeds of its implementation constitute 16274938. In this case these products will realized for 52.8% by other channels, 37.4% – to processors, 8.8% – on its own network, and 1% – to population.

The primary distribution channels of grapes, as in previous years will be the implementation of products to processing enterprises. Thus is planned to implement 61.4% grape. By own network is planed to sell 35.6% and by other channels – 3%. Total realization of grapes consist of 12057.

Intuitively, dominance of own channels in agricultural suburban zones are presented in Figure 2.

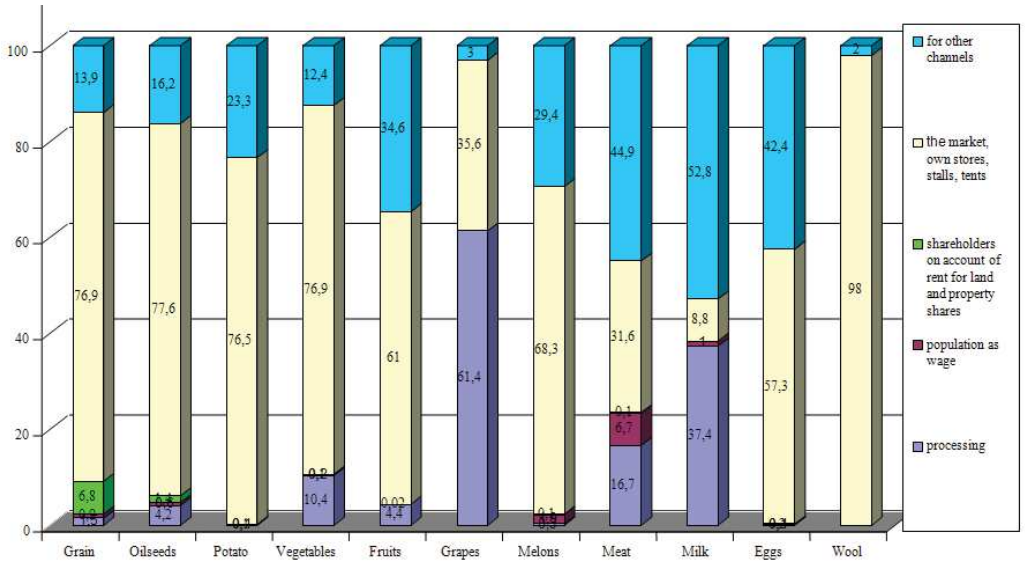

Fig. 2. Project structure of agricultural products channels in suburban area of Odessa for 2016

Table 3 shows the values of economic efficiency, making it possible to determine how appropriate implementation in the suburban area of the results obtained in the calculation of economic-mathematical model for 2016.

Table 3. Economic efficiency of Odessa suburban agricultural enterprises

	Average for 5 years	Project 2016	Project to medium	
			Million UAH	%
Gross output in comparable prices of 2010, million UAH	650	966	316	148,62
Revenue from product sales, million UAH	369	592	223	160,51
The full cost of production, million UAH	334	486	152	145,55
Profit from product sales, million UAH	35	129	94	370,09
Profitability,%	10,41	26,47	16,06	x

Analysis of the numerical data shows that the suburbs will receive gross output in comparable prices of 2010 in the amount of 966 million, which is on 316 million or 48.62% more than the average for previous 5 years. Revenue from product sales of agricultural production is forecast at 592 million, that is at 223 million or 60.51% more than in previous years. This income is fully cover the full cost of production, which will be 48 million. That is at 152 million more than in previous years. In such circumstances, agriculture of suburban area can make a profit of 129 million. This will be at 94 million more than in previous years. Profitability will be 26.47%, which is more than the average data of the previous three years at 16.06 percentage points.

Conclusion

Sales of agricultural products in the suburban area of Odessa are both direct and non-direct method. The use of intermediaries is a priority for almost all products. This will cause a significant increase in prices of final consumption. From the standpoint of marketing it have a negative affects to the level of demand, besides hurting positioning their products in the market to individual manufacturers. The results of economic-mathematical model of optimization of the structure of production and marketing of agriculture in the suburban area suggests that using own distribution system makes it possible to significantly increase the efficiency of the suburban agricultural sector that to increase the overall profitability of the Odessa's enterprises and increase their compe-titiveness.

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