The Methodology for the Formation of the Regional Food-producing Clusters

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ABSTRACT

The cluster conception represents a relatively new approach to the regional organization of the economic system focusing on the relationships among companies and the existence of clusters in the interrelated industries (Karepova et al., 2015). The efficiency of cluster formation in different economic sectors is achieved through the combination of geographical location of interrelated companies and joint efforts of business, government and science (Ryazantsev et al., 2015). It has been proved in practice that the cluster organization of regional economies leads to the increase in labour and production efficiency as well as reduces transactional expenses and encourages innovations (Pismennaya et al., 2015). During the period of the economic reforms implementation, the agricultural companies of the country were left with no state support, they had to face high prices for resources as well as the mass purchase of agricultural products by unscrupulous sub-purchasers and the absence of any appropriate market infrastructure.

Keywords: Regional System, Market Mechanism, Agro-industrial Sector, Fruit Market, Clustering, Development Model
JEL Classifications: L66, R15, M49

1. INTRODUCTION

Many agricultural enterprises were deprived of the possibility to carry out the extended reprocessing and thus lost their attractiveness for the investors. Nowadays the agro-industrial cluster has been one of the promising alternatives of such integration in our country for several years. Despite all the efforts to encourage the shift from industrial fruit-growing to the intensive development of production, the economic efficiency of the industry remains low due to the poor state of the supply and sales chain (Karabulatova and Isakova, 2008). Thus, the search of the innovative (extraordinary) ways for the food-producing industries based on the natural combination of all reprocessing stages from the capital goods production to the delivery of high-quality final product to final and intermediate consumers is of particular importance.

2. METHODOLOGY

The following quantitative and qualitative methods (Georgiou, 2007; Iskandar et al., 2014) can be applied to the preliminary analysis of the conditions for the cluster development in the region:
- The analysis of the social and economic indicators in the region;
- The identification of the regional policies;
- The statistical analysis of the innovative activities in the region.

The indicators which can be used as the basis for the cluster development in the region include:
- The share of the goods and services produced by the cluster in the total output in the region;
- Positive dynamics of the development and economic

efficiency of the cluster and its members activities (the amount of output, profit and investment);

• Potential competitiveness of the goods produced within the cluster which can be defined as the higher share of the product produced by the industry in the international market than the total share of the country's product in the total international trade; larger share of export than import within the industry.

The identification criteria for the possible clusters are:
• The existence of the competitive enterprises;
• The competitive advantages within the region/area for the cluster development;
• Geographic concentration and neighborhood;
• A great variety of the participants and "the critical amount."

The analysis of the current state and the development of fruit-producing territories carried out at the regional level allowed determining a number of problems which were grouped according to the reprocessing stages (Figure 1).

In our opinion, the increase in the regional management efficiency must be based on the innovative cluster approach which provides the possibility to analyze the fruit production structure within the traditional agricultural management as well as to consider the development of related industries with regard to the major sector.

Therefore, we developed the model of the cluster organization of fruit-producing subsector (Figure 2). The model represents the interaction mechanisms of the economic entities with the customers (final and intermediate), as well as with public authorities in the sphere of the indirect industry regulation and it also illustrates its aims.

The key factor for the implementation of the model is the establishment of a cluster network. We suggest the following scheme for its formation (Figure 3).

The methodology validation is based on the research of Stavropol region.

3. MAIN PART

The economy of Stavropol region has traditionally been agriculture-specific. The industry takes the first place both in the number of people employed in the regional economy and in the gross regional product. Almost every fifth citizen of the working age is employed in agriculture taking into account the fact that more than 40% of the population live in the rural areas.

Economy and social sphere of many municipal units as well as the rural population's welfare depend on the state and the development dynamics of agriculture.

The agricultural industry share in the gross regional product is about 13%, and as a result, the industry has been holding the 3rd position in the rating of the main industries in the regional economy for the last 3 years.

Land is considered to be the main factor of production in agriculture. The agricultural areas in the region cover 5.7 million ha, and the available soil is known to be highly fertile.

As for the territorial specialization of labor (Arutynova, 2010; Kornai, 1998; Song et al., 2016), Stavropol region remains the important producer and supplier of agricultural goods and supplies. For instance, in 2013 the region ranks No. 2 in crop page comparing with other RF regions. In Russian rating Stavropol region is the leader in winter rape milling, a record holder in the maize yield, the second of the southern regions in poultry and sheep stock, meat production, the third in egg production. The region is among top five Russian leaders in the livestock; it is the first in sugar beet yields.
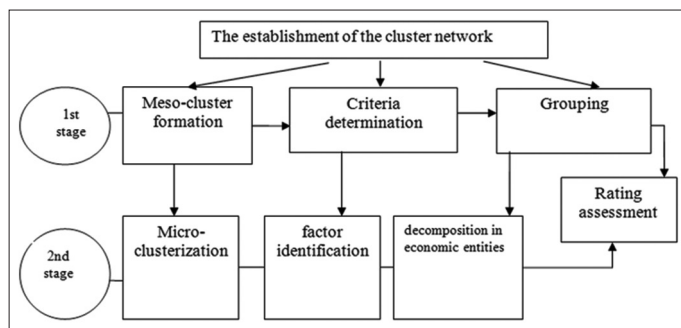
Figure 1: The problems of fruit and berry subsector development at the regional level at different stages of cash flow cycle
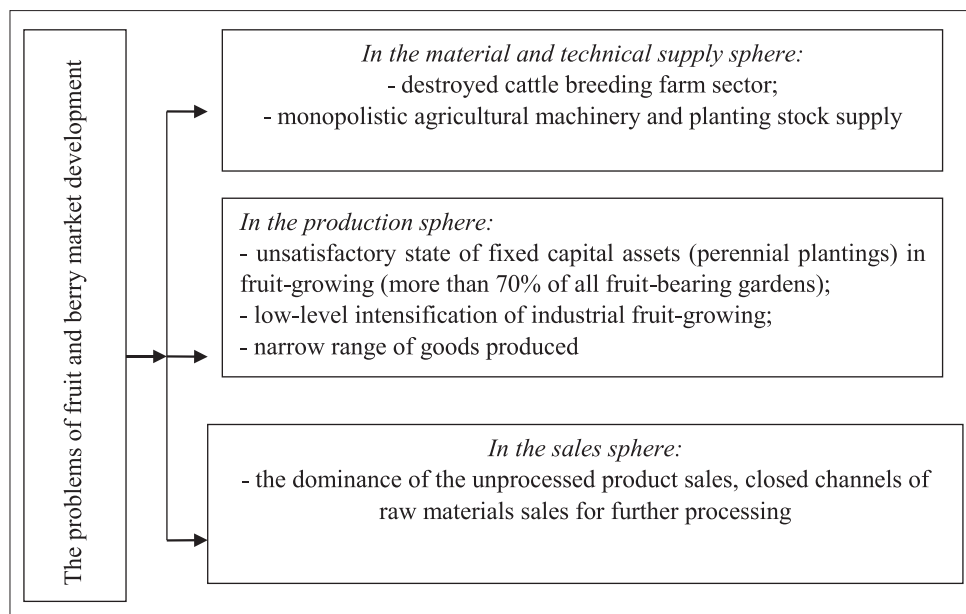
Figure 2: The conceptual model of the establishment and development of fruit cluster at the regional level
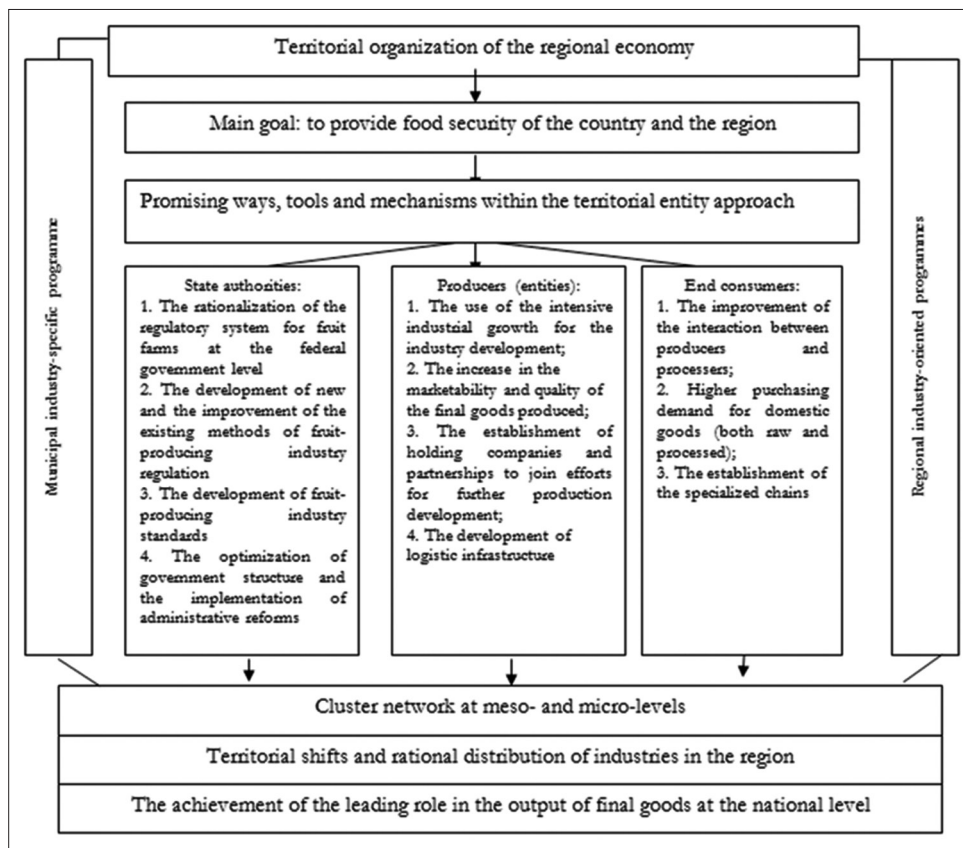
Figure 3: Meso- and micro-cluster network establishment at the regional level

In 2015, Stavropol region could reach the key indicators of the agricultural sector development programme. For example, this year the record-breaking crop yield of 9 million tons has been received. It has become possible due to the more efficient agricultural technologies applied by the agrarians, elite seed planting and the amount of the fertilizers increased by 20%.

Another strategic indicator of the programme – vegetable production – has also been reached. Today it totals 452 tons. Moreover, the greenhouse vegetable production has grown by 30%. By the end of 2015, the total amount of greenhouse vegetables might reach 35.5 tons.

Stavropol region was among the first to adopt the programme on the development of greenhouse vegetable production. Regional government and municipal authorities pay much attention to the support of the regional agriculture including vegetable production. In its turn, departmental special-purpose programme on "The development of greenhouse vegetable production in Stavropol region for 2013-2015" developed by the Ministry for Agriculture of Stavropol region is aimed to increase the competitiveness of the regional agricultural industry and to supply the population with the affordable food of high-quality. Greenhouse vegetable production plays an important role in it.

The investigation of the 1st stage resulted in the meso-cluster classification of fruit-producing territories in Stavropol region based on the dominant factors of fruit production distribution and the directions of the final product sales (Table 1).

The analysis shows the historically and traditionally crucial role of natural and biological factors (Golyshev, 2009; Simboli et al., 2015) in the establishment of fruit-producing industry in the region under examination. At the same time, 50% of non-standard product were processed as raw materials, so this way of output marketing was profitable.

The municipal meso-clusters (Georgievsk and Mineralnye Vody) where 90% of the total regional industrial fruit production is concentrated produce 41% and 27% of non-standard products, which amounts more than 5000 tons and is sold as raw materials for further processing. This type of marketing has negative profitability level and is 12%.

At the 2nd stage, fruit-producing agglomerations based on qualitative and quantitative criteria were formed at the micro-level (economic unit level), the natural and economic characteristic of which is shown in Table 2.

The estimation shows that the integrator (specialized unit) can be the enterprise the intensification of which reaches 90% and the resulting indicators of its product marketability, peak profit, profitability, labor efficiency are 1.3-1.5 times higher than the average in the region.

The parameters of fruit-producing areas are determined by a number of identification criteria which characterize the degree of agricultural production intensification (productivity, production technology, production concentration and cooperation), as well as by logistic (marketability level), financial and economic indicators.

However, the analysis has shown that the percentage of the intensive-type orchards is only 12% of the total area of fruit trees, which reveals the extensive possibilities to introduce fruit tree planting of a new type.

The quality of fruit is improving; the percentage of standard products has increased up to 45% by now. The price of fruit has grown by 54% in the last 5 years, which shows the rising fruit quality and the higher purchasing power of the population. The profitability of fruit production now reaches 32%.

At the same time, the volume of fruit processing is very low and amounts 4-9% of the total production in the region (Tatarkin, 2014; Kobersy, 2016). The situation has negative effects on producers' profit who have to sell up to 60% of fruit (and sometimes even more) to the tinned food plants for further processing at a very low price (2500-4000 rubles per ton).

Table 1: Meso-cluster classification of spatial-economic distribution of fruit-producing areas in Stavropol region

Cluster characteristics of the territories	Municipal clusters at meso-level			
	Georgievsk	Mineralnye vody	Budennovsk	Novoaleksandrovsk
Spatial distribution of the fruit-producing companies in the region, ha				
More than 500	1			
From 100 to 500	3	3	1	1
<100 ha		2	2	
Gross output of fruit, ton				
More than 2000 tons	2			
From 1000 to 2000 tons		1		
<1000 tons	2	4	3	1
Product marketability coefficient				
Average on the territories	0.58	0.73	0.6	0.55
Dominant factors of fruit production on the territories				
Natural	X	X	#	#
Material	&	X	X	X
Labor	#	#	X	X
Infrastructure	#	X	X	X
Investment potential rating**	h	m	l	l

**X: Available, #: Limited availability, &: Unlimited availability, h: High, m: Medium, l: Limited

Table 2: The characteristics of fruit-producing clusters and classification results of their distribution on the Stavropol region territories

Meso-regional clusters and micro-territories	Development factors				Rating, scores		Attractiveness rating*
	Natural	Material	Labor	Infrastructure	Based on yields	Based on product quality	
Georgievsk	X	X	#	&	43	58	High
Interinvest LLC	&	X	#	&	100	73	High
SPK Novozavedenskoye	X	#	X	X	30	45	Medium
Nezlobnensky agro-industrial company	X	#	X	#	27	41	Medium
Rassvet LLC	X	X	#	X	46	100	High
Mineralnye Vody	X	X	#	X	16	93	Medium
"Kavkaz" CJSC	X	#	#	X	100	71	Medium
Agrocapital LLC	#	X	X	X	4	88	Low
Beshtautempelg of LLC	X	#	#	#	10	30	Medium
"Sady Stavropolia" LLC	&	X	X	&	30	100	High
"Ovoshchevod" LLC	X	#	#	X	6	10	Low
Budennovsk	X	#	#	X	63	60	Medium
"Ovoshchevod" agro-industrial company	X	#	#	X	43	60	Low
Vinogradnoe CJSC	#	X	X	#	64	60	High
Novoaleksandrovsk	X	X	#	X	10	20	Low
Company Novoaleksandrovsky CJSC	X	X	#	X	10	20	Low

X: Available, #: Limited availability, &: Unlimited availability, *: Based on the development factors

Table 3: The key indicators of the targeted development programme and the balanced distribution of fruit-producing clusters in the region by 2020

Indicators	The level achieved, (average annual) 2006-2014	Outlook 2020 г.	Key indicators of the prospective project			
			Meso-clusters at the regional level			
			Georgievsk	Mineralnye Vody	Budennovsk	Novoaleksandrovsk
Fruit production, ton	9167.4	40,000	28,000	8000	3000	1000
Yield, c/ha	44.1	150	200	150	100	100
Fruit sold, ton	8475.2	25,000	13,000	8000	3000	1000
Cost price of products sold, thousand rubles	71,534	300,000	152,000	96,000	39,000	13,000
Earnings from sale, thousand rubles	89,405	500,000	324,000	120,000	42,000	14,000
Profit from fruit sales, thousand rubles	18,318	200,000	172,000	24,000	3000	1000
Price for 1 ton of fruit sold, rubles	10,549	20,000	24,920	15,000	14,000	14,000
Fruit profitability, %	25	66	113	25	7	7
Fruit processing in the region, ton	561	15,000	15,000	-	-	-
Fruit processing, %	16.3	37.5	100	-	-	-

Taking into consideration key indicators we worked out the amendments to the strategy for the development of regional fruit-producing sector within the cluster approach (Table 3).

4. CONCLUSION

Based on our research the following conclusion can be made. Provided intensive growth technologies are applied to seed orchards, the total amount of fruit production will increase by more than 4 times and will reach 40,000 tons by 2020 due to the rise in yields. Georgievsk meso-cluster which has the highest natural, investment and economic potential for the development of fruit-growing will remain the key vector (integrator). The positive effect on the rise in the level of fruit-growing profitability will be achieved through the establishment of the processing sector on the basis of the micro-cluster "Interinvest" LLC integrated into Russian holding company "Roskontsentrattrade" LLC. It will allow achieving the highest economic effect in the fruit-producing cluster owing to the organization of the intensive industrial development of the sector with closed-loop production and receiving the highest profitability of 113%. Due to the balanced proportion of the output and the industrial fruit processing specialized fruit companies will be able to achieve the sustainable economic growth; a constant rise in product sales profitability will be reached by the higher quality and lower cost prices as a result of the economies of scale.

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