

The Agricultural Supply Chain Systems in Cooperation and Integration of Agro-Industrial Complexes of Russia

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Abstract- This article is devoted to cooperation and integration development as agricultural supply chain systems in the Agro-Industrial Complexes (AICs) of Russia and Kazakhstan. This article reveals the correlation between investments and the number of coops (0.8), between the state backing and the number of coops in Russia (0.87), Kazakhstan (0.9), and the USA (0.76). Article content demonstrates that the Pearson coefficient of correlation between the number of coops and the specific weight of produced wheat is below the average standard in Kazakhstan (0.4), as the integration & cooperation policy is only starts to take a shape.

Key words: Agro-Industrial Complex (AIC), cooperation, integration, Agricultural Supply Chain Systems, investment, coop.

1. Introduction

The Agro-Industrial Complex (AIC) is a network of economic and social factors of the agricultural business. Cooperatives, in particular, agricultural cooperatives, have changed over the past decades [1]. They took simpler shape getting father from their basic social goals. Thus, agricultural cooperatives (coops) deviated from intermediary replacement [2] to stay in charge of local power plants [3].

In addition, vertical and horizontal agro-industrial integration is now taking roots [4]. Horizontal integration in agriculture is a good news for cooperation between agricultural enterprises and farms [5]. Vertical integration will open new

opportunities for value chains in food and agricultural business [6]. It is predicated on agreements (formal or informal), including cultivation contracts that can also lead to unique organizational frameworks, such as industrial clusters, unions or joint ventures [7].

The world's cooperation and integration engines of AIC revved into gear. In many Western European countries, food complex development reached great heights on the back of well-organized agricultural coops, food processing, transportation and marketing businesses [8]. In Spain, there are three pillars regarded as possible groundbreaking aspects: product changes, market changes, and technology mutations [9]. In Italy, vertical integration is a specific case as the supply chain is integrated with pasta. Besides, the chain is built upon agreements signed by the leading stakeholders running their operations within the chain (farmers, seed and chemical producers, dealers and the food industry) under the public support [10]. Studies of horizontal integration in organic farming have pointed to a reduction in manufacturing costs. In Europe, agricultural coops together cover about 60% of the agricultural production and marketing segment, and nearly half of the materials delivery segment. In the US, these figures are in the range of 28% and 26%, respectively [11]. Credit cooperatives make a good figure when it comes to coops in general. In Europe, 4,200 credit cooperative banks are in touch with 63,000 representative bodies [12]. In the USA, the number of big capitalist farms is 11.6 times higher than in Russia (55.5 thousand); 59% of the revenue accrue to them, while their share in the farming network is only 3.7%. In recent years, the number of US farm cooperatives has been steadily declining as they seek to consolidate and remain

competitive amid the merger of a big family and chemical companies.

The Russian and Kazakh government acted as a regulatory authority at all stages of agricultural supply chain systems in cooperation and integration. In Russia and Kazakhstan, business models are evident to extend towards agricultural holdings. At this, they turn into key items of the network [13]. According to available official data released in 2016, agricultural production index was 114.3% (crop production – 116.7%; animal production – 104.7%) in Russian farm business (National Report of Russia, 2016). In the Republic of Kazakhstan (RK), the main share of meat (82.5%), vegetables (86%) and milk (94.8%) are produced by farms (Statistics Committee of RK, 2016). Designing new innovative methods, mechanisms and financial tools is an essential practice in agriculture, so as the modernization of already existing ones and the assessment of their potential for application in agro-clusters and finance systems of the entire AIC.

Low agility and efficiency of management decisions, driven by poor innovations [14], weak investment [15] and little government support [16],

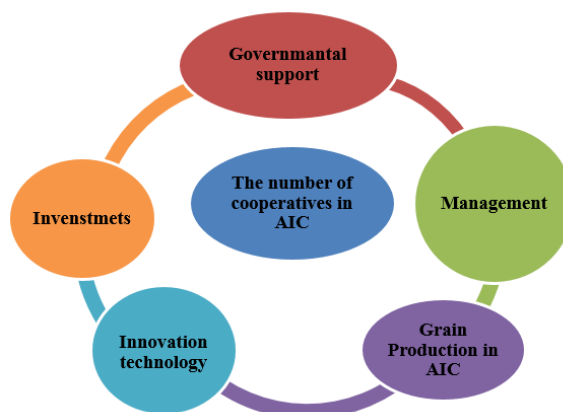
are one of the most pressing AIC problems of Russia and Kazakhstan. As the international practice (the USA case) shows, integration and cooperation of agricultural supply chain systems boost the AIC [17], so one has to deal with the factors that could speed up this process. Therefore, a necessary has arisen for determining which factors have the greatest effect.

We studied how the investment boost, government support strengthening and a step up on innovations affect the integration and cooperation of agricultural supply chain system development in agriculture. We went for comparing the Kazakh grain industry with the Russian and the US equivalents. Correlation analysis was conducted to determine the effect of the above factors on the integration of cooperation strategies and on the AIC performance improvement.

2. Materials and methods

This research considers factors (Figure 1) that should be taken into account when making managerial decisions associated with the AIC organization in the Republic of Kazakhstan.

Figure 1. Factors affecting the development of integration & cooperation of agricultural supply chain systems of the AIC



Comparative analysis allowed us determining the effect on the integration and cooperation systems accurately. At this point, we examined how effective these factors were when integrated into the US sector of agriculture (the USA is one of those countries that has successfully integrated the agricultural supply chain system of cooperation and integration into its AIC a long time ago), as well as into the Russian sector that, as Kazakhstan, is at the stage of development [23].

Data for case analysis are collected from the Russian Grain Market Review (RF Ministry in

Agriculture), Rural Development Service Report 78, Grain (U.S. Department of Agriculture), Statistics Committee reports and national reports of the Ministry of Agriculture of the Republic of Kazakhstan. Data on information technology are taken from the Orbit and the United States Patent and Trademark Office. Correlation analysis was conducted using the Pearson coefficient.

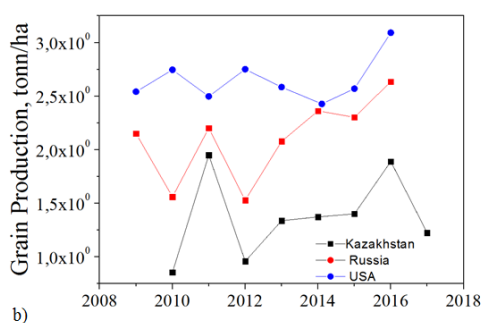
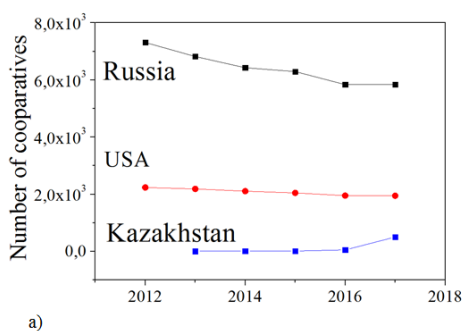
3. Results and discussion

3.1. Number of Cooperatives and Their Production Potential

Figure 2 shows coop formation dynamics in the RK, Russia and the USA (Cooperative Statistics, Rural Development Service Report). In Russia and the United States, the number of cooperatives tends

to drop. The Republic of Kazakhstan lags far behind Russia and the USA (Figure 2a). According to the AIC Development Program of the Republic of Kazakhstan, the Government is intent on increasing the number of cooperatives. The US, unlike Kazakhstan and Russia, decided on an effective management strategy for the cooperation-and-integration development [18].

Figure 2. a) The Number of Running Coops in Russia (RF Ministry in Agriculture; Federal State Statistics Service), the USA (Rural Development Service Report) and the RK (reports of the Ministry of Agriculture), b) Specific Wheat Production Capacity in Russia, the USA and the RK



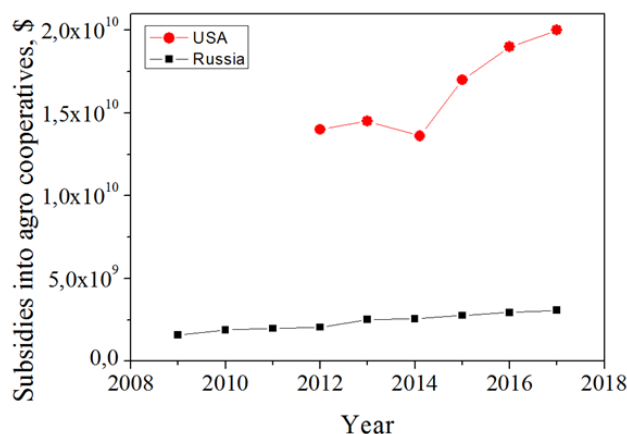
The USA took an advantage in development and production on the back of its AIC management policy implying an innovation boost, well-targeted state support and the attraction of investment in agribusiness and foreign agro-industrial sector. For example, specific wheat production (weight-to-area ratio) is higher in the USA than in Russia and Kazakhstan (Figure 2b). In 2017, Russia and the US stepped up on their specific wheat production, but the RK dropped it due to a diversification policy, under which wheat areas should be reduced by 20% within the next five years – from 12.4 million hectares to 10.1 million hectares (2017 Report of the Ministry of Agriculture). Let us consider how the above factors affect the cooperation-and-integration system of the USA AIC and Russian AIC.

3.2. State Policy of Coop Support in Kazakhstan, the USA and Russia

Decision-making on management and development strategies for cooperation and integration of agricultural supply chain systems is affected by the state support issue [19]. According to the AIC Development Program of the Republic of Kazakhstan for 2017-2021, the Government intends to increase AIC subsidies. At the same time, Russia launched an information resource to support farms

and agricultural cooperatives. In 2014, Russia also opened a Federal Center for Agricultural Counseling and Agricultural Staff Retraining (Ministry of Agrarian Policy Ministry). Despite the support, however, this indicator remains at the low level in comparison with indicators recorded in Europe and the USA (Russia – 30%, Europe – 42-59%, the USA – 60%). In 2017, Russian agricultural cooperatives were planned to be funded through grants with 846 million rubles as part of the United Subsidy Program. Besides, no less than 1,200 new cooperatives were in the plan for creation by that time. According to the 2017 Public Declaration of Priorities of the RF Ministry of Agriculture, the same number of coops is in the plan of the Republic of Kazakhstan in 2021 (State RK AIC Development Program). Russia and Kazakhstan commonly establish agricultural vertical coops that entail the creation of peasant households and family farms. Figure 3 shows that cooperatives and farms are better supported by the government in the USA than in Russia and Kazakhstan.

Figure 3. State Grants (in USD) for Coop and Farm Development in Russia and the USA



At the same time, the US Government spends more than 20 billion USD a year on grants for farms and coops; about 39% of 2.1 million farms receive subsidies, while the lion's share of materials accrue to the biggest producers of corn, soybeans, wheat, cotton and rice (US Department of Agriculture, "2012 Census Highlights: Farm Economics"). In 2017, Russian Federation allocated 3 billion USD for agricultural cooperatives, Kazakhstan – 76 million USD, and the United States – 20 billion USD. However, grants are not a prerequisite for success. The lead is taken by a proper management strategy aimed at coop development (increase in the investment attractiveness, information database development, reasonable number of cooperatives and organizations, and integration process management).

3.3. Innovation Technology in AIC Development in the USA and Russia

The USA has a great advantage in managing coops and farms – they effectively use education and research, support farmers, and represent the interests of their members in public authorities.

An important factor in the management and development strategies for cooperation and integration of agricultural supply chain systems of AIC is the introduction of innovations boosting production, processing, etc. According to the United States Patent database, the number of cereal technology and selection patents that were registered between 1996 and 2017 in the US is 250, in Russia – 73 (Questel ORBIT database), in Kazakhstan – 239 (Kazakhstan Patent Database).

The USA and Kazakhstan follow an active innovation policy. Unfortunately, patent data show that Russia is lagging behind in this area [21], [22].

3.4. Investments in Agribusiness

As reported by Prequin, investments in the agricultural sector of the US amounted to 3.9 bn USD (Prequin) in 2015. They, basically, go to innovation technology development. In Russia, total investment in fixed assets of agricultural organizations was 15 billion USD over the past 3 years [20]. Investments in Russian Agriculture are mainly a kind of state backing. In this regard, it is of fundamental importance to provide constant feedback to the investor through a long-term planning horizon and investment project management. The Republic of Kazakhstan follows a policy to attract investment in agriculture. In 2017, investment volume in fixed capital amounted to about 1 billion USD. An important tool for supporting investment in AIC can be a unified information system on investment potential of the agricultural regions.

3.5. Correlation analysis

Table 1 provides coefficients of correlation between the factors affecting the numbers of coops in Kazakhstan, Russia and the United States. Correlation coefficients are calculated in Origin 9 program.

Table 1. Coefficients of Correlation between the Number of Coops and Factors Affecting AIC in the USA, Russia and Kazakhstan

The Number of Cooperatives			
	USA	Russian Federation	Republic of Kazakhstan
Factors	Pearson coefficient	Pearson coefficient	Pearson coefficient
Investment in Agriculture	0.8	0.85	0.8
State Policy (Gants)	0.76	0.87	0.9
Specific Wheat Production	0.62	0.58	0.4

Table 1 shows a positive correlation between investments and the number of coops in the USA (0.74), Russia (0.85), and Kazakhstan (0.8). There is also a positive correlation between the state subsidies and the number of coops – Pearson coefficient is greater for Russia and Kazakhstan than for the USA. A very low coefficient of correlation is between the number of cooperatives and the specific wheat production in Kazakhstan (0.4), Russia (0.53), in the USA (0.62). The low coefficient indicates that Kazakhstan has not settled on the final management strategy yet, but is at the initial stages of its implementation. The correlation coefficient between the production potential and the number of coops in the USA indicates a correct organization of their operations. The correlation analysis reveals that cooperation and integration of agricultural supply chain systems of Russia and Kazakhstan need more investment and government support to develop than the US farms do. Therefore, decisions on cooperation require these two factors to be considered when improving the integration and cooperation systems. It should be noted that more investments will have a positive effect on the AIC development, but the excessive state support and regulation may reduce investment activity [20].

4. Conclusion

The comparative analysis of cooperation-and-integration development in AIC of Russia and Kazakhstan shows that there has been an upward movement, but at the same time, their management and development strategies are far from those adopted in the USA. Correlation analysis showed that integration and cooperation in AIC depend on the level of state support and investments. This article is shown through the example of the United States that the effectiveness of cooperation-and-integration development depends on the right

management strategy, namely – on the innovation boost, state grants and intervention. At the present stage, integration and cooperative systems of Russian and Kazakh AIC are at the stage of development, as evidenced by the low Pearson coefficient of correlation between the number of coops and specific production potential (0.5 and 0.46, respectively), as well as by weak innovation background if compared to the USA. Russia and Kazakhstan are following a positive AIC development and support policy, as evidenced by a shaped policy for attracting investments and allocating subsidies to the AIC.

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