Clusters and cooperatives as a tool of sustainable food security: a comparative analysis

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Abstract. The present model of development of the Russian agriculture, characterized by domination of large agri-food companies, creates threats for sustainable development of small agricultural business (local and family farms). Potential disappearance of these small businesses from the market would undermine the sustainability of the Russian agriculture and the food security of Russian Federation. In order to survive in this unfavorable environment, small business should combine their resources, participate in agri-food value chains and get access to Russian and global food market. The goal of the present paper is to identify potential strategies of development of small agricultural business within different models of cooperation. The paper contains a detailed analysis of key features of clusters and cooperatives. It is demonstrated that clusters as flexible structures have a higher potential of resource accumulation thanks to absence of limitations for potential members. Clusters also ensure trans-border cooperation. All these features are absent in agricultural cooperatives. Due to these facts clusters should be preferred to cooperatives as a tool of strategic development of small agricultural business. However cooperatives can be used as an additional tool. Cooperatives can participate in clusters. These conclusions constitute the contribution of the present paper for practice. In addition to this recommendation for selection of strategies of small business development, the comparative analysis of clusters and cooperatives helped to identify the key distinctive features of clusters as institutional structures. Knowledge of these features may be useful for analysis of cluster development. This result is the theoretical contribution of the present paper.

1. Introduction

Russian agriculture, unlike agriculture in Europe and USA, is dominated by large companies that tend to control the whole agri-food value chain. On the one hand, this concentration of production within big companies is beneficial for the Russian agriculture as it helps to mobilize resources for innovation-oriented development and to ensure increase in agricultural production [1, 2]. The former is especially important within the context of digital transformation in agriculture [3], while the latter plays an important role in the substitution of imported food (which is considered a strategic task due to the food embargo introduced in 2014 and the policy of food security [4] and in development of Russian food export.
However, this domination of big companies creates problems for the sustainability of the Russian agri-food sector:

- one of the key goals of development of the Russian agriculture is food security which is understood as independence from foreign food supplies. Big companies managed to ensure a high level of food security thanks to their ability to concentrate resources. But now food security of Russia depends on a relatively small number of large companies. If one of these companies faces economic problems or goes bankrupt, it can undermine the stability of food supplies on the Russian market. This risk can be partially eliminated by a more balanced structure of the Russian agri-food sector (which should include large, medium-size and small companies) [5, 6];
- as the global experience of organization of agri-food sector demonstrates, concentration of production within big companies that control the whole value chain reduces the economic efficiency. Large agricultural companies should co-exist and cooperate with small ones. Large companies should outsource some stages of production and some functions to external providers in order to ensure a high level of efficiency. Small agricultural enterprises (and even family farms) can effectively act as contractors. It means that large companies should not necessarily eliminate medium-size and small enterprises from the market – they can include them in their value chains [7]. This model of division of labor is typical for cattle breeding where different stages of productions are divided between agricultural companies of different size. As professionals indicate, absence of this division of functions in Russian agriculture hinders the development of the local cattle breeding sector. Survival of small agricultural companies and family farms is crucial for long-term sustainability of the Russian agricultural sector;
- disappearance of small agricultural companies from the market caused by Russian agri-food giants large creates negative social effects for local employment and for local social stability in general;
- large companies are interested in mass production. However, customers are now switching to more personalized products [8, 9]. These products are often produced by small companies that satisfy needs of local customers.

All these factors mean that all stakeholders of Russian agricultural sector are interested (like the state, customers of local products, local communities) or may potentially be interested (like large agricultural companies) in survival of small agri-food businesses. Unfortunately, small companies do not have sufficient resources to resist to this pressure from large companies. The position of small companies becomes even less sustainable due to the instable economic situation in Russia. Finally, lack of logistic infrastructure hinders the access of small agricultural companies to national and global markets and makes them dependent on market intermediaries.

In order for small companies to ensure their economic efficiency and to survive in the present unfavorable environment these companies should 1) combine their resources, 2) cooperate with large companies (in order to get guaranteed cash flows) [7] 3) get access to national and foreign markets (due to the limited demand in Russia, access to foreign markets is now more important). All these ways of evolution can co-exist: if small companies manage to combine their resources, it would be easier for them to cooperate with large companies (and to negotiate favorable terms of cooperation) and to organize nationwide sales and exports of local food.

The key element of the strategy of sustainable development of small farms is the model of combination of their resources, that is, the model of their cooperation. Among many models of cooperation two are the principal ones: clusters and cooperatives. Both models have substantial advantages and are used for regional and industrial development in Russia [10, 11]. They are also popular at the international level. Cooperatives and clusters are used as tools of food sufficiency [12] as well as an instrument of inclusion of local producers into global agri-food value chains [13-15]. However, as far as we know, there are no publications dedicated to comparative analysis of clusters and cooperatives. There is an extensive literature that compares cooperatives to other models of business organizations in agriculture [15]. The same is true for clusters. But these comparative studies have been done separately for clusters and cooperatives. In this paper we will combine these directions
of research. The goal of the present paper is to compare clusters and cooperatives as tools of combination of resources of small farms in order to simplify choice of one of these institutional alternatives.

2. Materials and Methods

The following key points are principal for our research:

- the concept of hybrids as a compromise between markets and hierarchies. This concept was proposed by Oliver Williamson in 1991 [16] and further developed by Claude Ménard in 2004 [17]. Ménard identified the three characteristics of hybrids: resource pooling, coexistence of cooperation and competition (coopetition) and presence of contractual agreements among hybrid members. Ménard indicates that clusters and cooperatives are hybrids (this opinion is now shared by almost all scholars who work in the field of institutional economics as well as theory of cooperatives).

- the taxonomy of hybrids developed by Ivan Kotliarow [18]. This taxonomy is based on two criteria: initiator of hybrid (internal or external) and nature of cooperation between hybrid members (implicit or explicit). This taxonomy shows the difference between cooperative and clusters. Cooperatives are usually set up by their members (initiators are internal) and cooperation between these members is explicit. In case of clusters they are also set up by their members, but the cooperation is implicit. Cooperatives are organized structures, while clusters are more “natural”. Implicit cooperation consists in the fact that different economic agents do not explicitly coordinate their efforts, but their actions create value for all of them [18].

It means that cooperatives and clusters have many features in common: they are hybrids initiated by their members. Both structures are used for resource pooling. The key difference consists in the nature of cooperation: it is explicit in case of cooperatives and implicit in case of clusters. This basic difference creates important divergencies between cooperative and cluster models of functioning.

3. Results and discussion

Scholars have different opinions on the nature of cooperatives. One stream of research states that real cooperatives must comply with the cooperative principles. Another stream of research states that new types of cooperatives constantly emerge and not all these types meet the requirements presented in the cooperative principles [13]. Scholars who belong to this stream of research believe that organizations should be considered as cooperatives even if they comply with cooperative principles only partially. For the goal of the present research only the cooperatives that adhere to the cooperative principles will be analyzed. Agricultural companies need clear and transparent management tools and too general understanding of cooperatives will make these tools too vague.

Historical approach towards clusters states that they are geographic concentrations of organizations [19]. These concentrations are not organizations themselves. However, a new approach towards clusters emerged that defines them as organizations of organizations or meta-organizations [20]. This approach is applicable to organized clusters only, while classic clusters are indeed geographic concentrations of organizations. Only classic clusters will be analyzed in the present research.

Comparative analysis of cooperatives and clusters are presented in the table 1.

| Criteria                  | Cooperatives | Clusters                        |
|---------------------------|--------------|---------------------------------|
| Centralized governance    | Present      | Absent (may exist)              |
| Types of members          | Individual producers | Individual producers, companies, non-commercial organizations, governmental institutions etc |
| Cooperation between members | Explicit    | Implicit (partially explicit)    |
Many distinctive features of clusters are pre-determined by the fact that clusters are not organizations (cooperation between members is implicit). For this reason clusters normally do not have a central governing body. Cluster members may set up such a body but it will perform only coordinating functions and its decisions will not be mandatory for all members. In addition, some cluster members may not wish to participate in the organization of this body.

Membership in a cluster is not based on formal procedures. In order to be a member, companies must 1) be located in the region where the cluster operate 2) have organizational and production ties with some cluster members. It means that cluster members do not form vertical or horizontal chains – they set up partnerships and a superposition of these partnerships ensures the unity of the cluster. Each member normally participates in more than one partnership, but no partnership includes all members (all partnerships are “partial”). It makes cooperation between cluster members non-linear and network based. It also means that there is no single model of governance within a cluster: each member and each partnership has its own model of governance. Taking into account these considerations, we can say that membership is probably not the best word to describe the participation of economic agents in a cluster.

Non-linear interactions mean that a cluster cannot be concentrated around one big agricultural company. A cluster must normally include several large companies that create demand for local suppliers and compete for them.

Absence of a formal contract governing relations between cluster members may seem to contradict the hybrid criteria [17] (one of these criteria is a formal contract) and to lead to the conclusions that clusters actually are not hybrids. However, this conclusion would be incorrect. While there is no uniform contract linking all participants of the clusters, each “partial” partnership is based on a contract. Combination of these contracts can be considered as a substitution for a single contract.

All types of business organizations can participate in a cluster. Non-commercial and government organization may also become members. It is obviously due to the fact that clusters do not have formal requirements for their members.

While a cluster is located in a region, this localization is geographical, not administrative or political. It means that clusters can easily cross administrative or political borders provided that these borders are transparent for economic exchanges. In other words, a cluster must be located in a limited geographic region, but this region may include parts of different states [21]. It increases the potential of customers as tools of transnational cooperation and integration. This factor is especially important for Russia.

All these factors ensure flexibility of clusters. They easily accept new participants and include them into existing partnerships. New partnerships are also easily formed. Each partnership is free to choose its own model of governance (and each partnership may include different organizational structures). This fact is probably the key advantage of clusters as all other hybrids allow only one model of governance. This limitation (absent in case of clusters) creates restrictions for potential members of

| Model of organization | Bottom-up or top-down | Bottom-up |
|-----------------------|-----------------------|-----------|
| Formal contract       | Present               | Absent (combination of contracts) |
| Membership            | Open (pre-selection apply), formal | Open, informal |
| Geographic localization| Not necessary | Mandatory |
| Common assets         | Present               | Absent    |
| Participation of external investors | Impossible | Possible |
| Co-existence of different organizational models | Impossible | Possible |
| Ties between members  | Linear                | Networks (non-linear) |
| Specialization        | Specialized           | Specialized |
other forms of hybrids. While clusters are not organizations (or even meta-organizations), they create favorable business environment that greatly simplifies the cooperation between cluster members and reduces transaction cost of their interaction. This analysis allows to identify three different approaches towards clusters (table 2).

All this potential is missing in case of cooperatives. Being formal structures, they are more rigid in comparison with clusters which limits their development. An important barrier for cooperatives consists in impossibility to attract external investors. This problem is absent in case of clusters as different cluster members can attract investments.

Table 2. Comparative analysis of different approaches towards nature of clusters

| Basis of analysis       | Nature of clusters                      | Sources                     | Limitations                                                                 |
|-------------------------|-----------------------------------------|-----------------------------|-----------------------------------------------------------------------------|
| Geography               | Geographic concentration of businesses  | M. Porter, 1990             | This approach does not take into account organizational ties between cluster members |
| Organizational          | Clusters as meta-organizations          | E. Lupova-Henry et al., 2021| Only clusters with a high degree of integration correspond to this definition |
| Business environment    | Cluster as a geographically localized environment for business cooperation | Y. Mindlin et al., 2019     | Highlights geographic localization of clusters and presence of organizational ties between cluster members, and recognizes the softness of these ties |

One more important advantage of clusters in case of Russia consists in the absence of clusters in the Soviet Union. Cooperatives are often associated with the history of the forced collectivization in the USSR and farmers distrust them [22]. Clusters as more flexible and informal structures are more attractive for potential members.

Unfortunately, there is no official statistics about the cluster development in Russia. It is partially due to the novelty of this form of business cooperation as well as to the absence of precise legal definition of clusters. Statistics about cooperatives are presented in the table 3 (based on the data provided by the Association of farmers and agricultural cooperatives in Russia, https://www.akkor.ru/sites/default/files/prezentaciya_razvitie_spok.pdf).

Table 3. Trends of development of agricultural cooperatives in Russia

| Year | 2012 | 2013 | 2014 | 2015 | 2016 |
|------|------|------|------|------|------|
| Number of agricultural cooperatives | 7314 | 6820 | 6429 | 6293 | 5839 |
| Number of working cooperatives | 4616 | 4027 | 3795 | 3491 | 3750 |
| Share of working cooperatives, % | 63 | 59 | 59 | 55 | 64 |

The table 3 demonstrates that the number of agricultural cooperatives in Russia is decreasing and the share of working cooperatives is relatively low. While the share of working cooperatives increased in 2016 (we do not have access to more recent data), it is not high. This trend demonstrates that cooperatives are not an efficient way of development of the Russian agriculture.

The structure of cooperatives in Russia is presented in the table 4 (based on the data provided by the Association of farmers and agricultural cooperatives in Russia, https://www.akkor.ru/sites/default/files/prezentaciya_razvitie_spok.pdf).

The table 4 demonstrates the needs of farmers and small agricultural businesses. The first need consists in access to financial resources. Traditional financial resources (bank credits etc) do not meet...
farmers’ requirements. Farmers are also interested in organizing their own marketing channels. Retail sector in Russia is dominated by large retail networks and their business models are very different from models of business organization used by farmers. It means that potential clusters in Russia should be oriented not only towards processing and production, but also towards access to credit resources and marketing channels.

### Table 4. Structure of agricultural cooperatives in Russia

| Type of cooperatives | Number of cooperatives | Credit | Processing | Sales (marketing) | Service | Purchase | Other | All |
|----------------------|------------------------|--------|------------|-------------------|---------|----------|-------|-----|
|                       |                        | 1381   | 1032       | 985               | 813     | 425      | 1203  | 5839|
| Share, %              |                        | 24     | 18         | 17                | 13      | 7        | 21    | 100 |

The biggest problem of clusters is impossibility to commonly invest in assets (as clusters are not formal organizations and have no common formal contracts). However, this problem is solved in two ways:

- Cluster do create a common pool of assets. This pool is not in a common ownership – each asset is owned by a specific cluster member. But all other cluster members have access to this asset. This possibility of access is the basis of existence of this common pool of assets;
- While cluster does not (and cannot) invest in common assets, “partial” partnerships that compose the cluster can invest into assets for these partnerships. These assets are especially intended for the use within the cluster. These investments extend the common pool of assets.

It means that resource pooling in case of clusters is also non-linear. There is no formal pool of assets, cluster members rather form a set of separate assets and provide other cluster members with access to them (table 5).

### Table 5. Different models of formation of assets.

| Firms | Cooperatives | Clusters |
|------|--------------|----------|
| Firm’s investments into firm’s assets | - All cooperative members invest into cooperative’ common assets; - Each cooperative member may invest into his/her own assets | - No investments into common assets (and no common assets); - Each member of the cluster invests into its own assets; - Each cluster member may have access to assets of other cluster members |

We can define the following distinctive features of clusters (in addition to the general characteristics of hybrids): 1) geographic localization; 2) full organizational decentralization (absence of central governing body); 3) non-linear interactions; 4) non-linear combination of resources; 5) superposition of partnerships; 6) multiple models of governance; 7) participation instead of membership.

Key problems of cooperatives in comparison with clusters:

- Cooperatives normally include a limited number of stages of the value chain, while clusters cover the whole value chain. As Russia is now trying to substitute imports in order to ensure its food security (or even food sovereignty), clusters should be preferred as they will help to develop local producers at all stages of the value chain;
- Cooperatives depend on self-regulation of their members. Organization of this self-regulation may require a lot of efforts. Governance of clusters requires less resources thanks to their decentralization;
- Farmers do not trust cooperatives in Russia due to negative experience of the Soviet forced cooperatives.
We can conclude that clusters can be preferred as a tool of development of small agricultural
business over cooperatives. However, implementation of clusters does not exclude the use of
cooperatives. For example, cooperatives can be used to provide farmers with access to credit
resources.

4. Conclusion
Our analysis demonstrates that clusters are more efficient tools of development of small agricultural
businesses than cooperatives. Clusters will solve key problems of local farms: 1) access to industrial
value chains (thanks to cooperation with large companies participating in clusters), 2) access to
national and global markets (thanks to the logistic infrastructure created within clusters), 3) access to
top level agricultural services (from service companies participating in clusters). The state must create
stimuli for implementation of agricultural clusters in Russia.

From the theoretical point of view, the key result of the present paper consists in identification of
main distinctive feature of clusters (in addition to the general characteristics of hybrids proposed by
Claude Ménard). These distinctive features can be used for analysis of clusters and evaluation of
cluster policy in Russia.

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