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# Environmental-social barriers of the agri-food market as indicators of anthropogenic load on the agro-industrial system

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**Abstract.** This article deals with the interaction problems between man, nature and social institutions in the context of changing politics and strategy of the state in this field. Features of anthropogenic load on the agro-industrial complex were studied. The concept of barriers to entry the agri-food market, classification and types of barriers were defined. Ecological-social barriers have been investigated. The article is intended for specialists of the Ministry of agriculture and food of the Omsk oblast and local self-government bodies of regional municipalities, heads of agricultural organizations and processing enterprises, farmers, market specialists, researchers, teachers and students of agricultural universities.

## 1. Introduction

The study of anthropogenic load on the agro-industrial complex is one of the most popular areas of modern global economic and technical sciences. At the federal and regional levels, the AIC ecosystem has recently been under close attention. In the new institutional economy, barriers to entry the sectoral agrarian market are one of the main directions of ensuring competition, long term food security, a factor guaranteeing the development of the industry and economic agents, an essential component of social and economic policy by guaranteeing high food standards. At the same time, questions of the barriers' existence and overcoming simultaneously focus the attention of researchers on the functioning of the free market, the economic availability of food, artificial restriction of purchasing power for each individual citizen. In this regard, it is necessary to study the economic, technological and ecological-social aspects of market agents' functioning, as well as existing mechanisms that may hinder or even deter enter to the market without allowing to increase the efficiency and dynamics of the agri-food market.

The relevance of the study is confirmed by the fact that there is a positive relationship between the emergence of new economic entities and economic growth. However, it is necessary to study the types and nature of barriers to enter the industrial agrarian market in order to develop a set of measures to affect them, as well as market subject's action algorithms when a barrier occurs. Balance and sustainability of the market's economic development becomes possible only by ensuring equal rights of various economic agents. At the same time, creating conditions for restoration and development of the region's agri-food market taking into account the peculiarities and specifics of its subjects' relations development is the most important strategic task of the state policy, which results in the expansion of sales markets, the creation of cooperation conditions, integration and development of market infrastructure.



The aim of the study is to find specific mechanisms aimed at typification of the barriers to entry into the industrial agrarian market, definition of ecological-social barriers traits, as well as their characterization as indicators of anthropogenic load on the agricultural ecosystem both at the federal and regional levels in the formation of agri-food politics.

## **2. Research methods**

For knowledge systematization, a set of principles, techniques and methods leading to objective knowledge was used; the height and depth influence nature of the industry barriers of entry on the economic growth provision in the agrarian market was studied.

During the study, three main types of science information activity methods were applied. Out of the universal cognition methods, we operated the method of analysis and generalization to characterize individual elements of the process of ensuring the market infrastructure development, induction and deduction at institutions regulating mechanism development, relations of economic agents whose behavior burdens the activity of market subjects, preventing the emergence of new economic agents. This mechanism may be recommended to be used in other sectors of the economy.

Empirical methods were used to obtain practical knowledge while studying the agri-food market economic entities' activity process based on targeted observation and experiments inside institutions.

All used methods correspond to the fundamental principles: the principle of objectivity (alienation of the researchers' personality from the object of cognition); the principle of systematics (the study was performed in 2011-2020); the principle of reproducibility (all stages and phases of the research process can be repeated and verified by other researchers).

To determine the conceptual framework of the study, the main paradigms of studying agri-food market entry barriers were studied. The market barriers entry research was studied by V.Yu. Voloshina, S.A. Lukyanov, R. Malikov, A.P. Taburchak, R.G. Ter-Grigoryants et al. However, it should be noted that in the agro-industrial complex and the agri-food market there are peculiarities of the emergence of barriers and transaction costs, therefore, we consider the research meaningful and relevant.

Over all paradigms of scientific knowledge, the opinions of the positive-dialectical knowledge doctrine appear more adequate and applicable in our study since it examines a system consisting of interconnected components and links inverse in properties. This system must be logically and alternately described as it is quite justified.

The theoretical and methodological basis of the research was made up of scientific works and concepts of domestic and foreign scientists, which consider the issues of market entry barriers specificity as special institutions including informal and formal rules that are part of the agri-food market entities' economic environment.

## **3. Agri-food market barriers**

One of the most important directions of assessing the agri-food market development is the methodological analysis of the industry entry barriers emergence nature and the relationship of market expansion with increased adverse impact on the environment, the severity of anthropogenic load on rural areas and the allocation of agri-food market institutional hubs. The system of evaluating indicators of market agents influence and their actions on the AIC ecosystem can become an alternative characteristic for justifying the importance of the industry barriers existence to contain market boundaries and reduce the negative impact on the natural environment.

According to J. Bain [1, p. 34], the entry barrier is that allows entrenched companies to extract excess profits while bypassing the risks of new firms. Another description of industry barriers based on judging the cost asymmetry of entrenched companies and start-ups is suggested by J. Stigler [1, P. 35]. As the key notion, the representatives of well-known Chicago school record that entrance barriers are the cost of creation, which is borne by an enterprise wishing to enter the economy sector but are not borne by entrenched ones. Von Weizsäcker suggested J. Stigler's normative theoretical study, defining entry barriers as production costs, which imprinted a difference in use economic resources

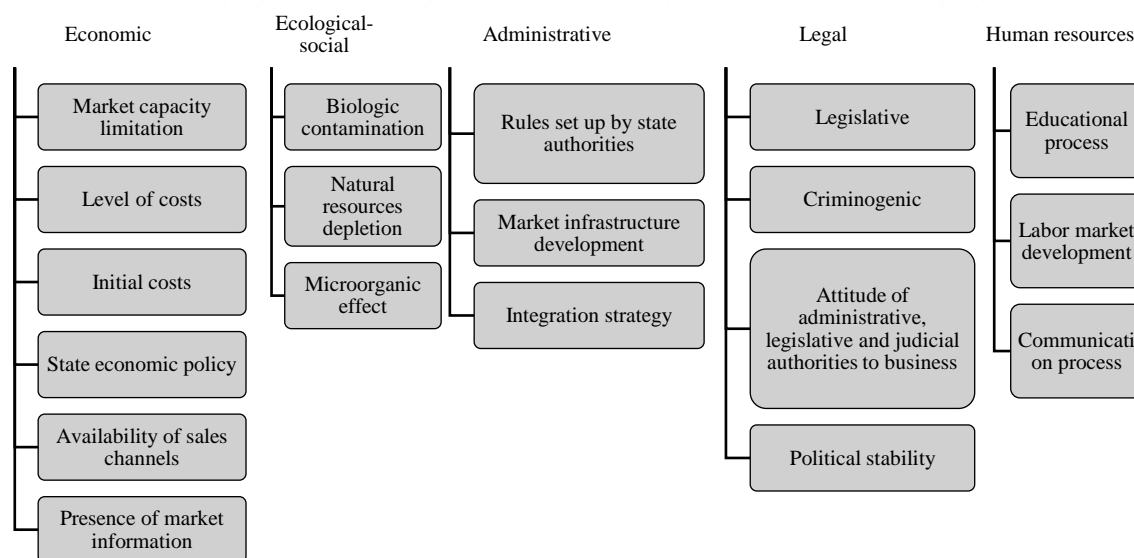
from the society's point of view [1, P. 36]. B.A. Raizberg, E.B. Starodubtseva, L.Sh. Lozovsky consider entrance barriers as market mechanisms that prevent new players from entering the market and the ones functioning earlier - leaving it. Y.Ya. Olsevich analyzes the development of the economy, emphasizing the diverse conditioned ones by social types of people [2] forming cultural barriers in the communicative process.

A significant part of agricultural products is characterized by a significant amount of transportation and storage costs. Since the periods of harvesting and products' use do not coincide, it is necessary to build or rent storage facilities that are not used all year round. These circumstances lead to barriers appearance and a strong increase in transaction costs.

The problem of probable competition and the circumstances of entering the industry is considered one of the main ones in the study of the specific industry markets economics. This has led to the rise of multiple approaches, both periodical and antagonistic, to the definition of industry entry barriers. At present, in various industries including the AIC there are barriers to the enterprise/economic entity entry into the market, for example exclusive rights, restrictions, benefits, legal acts, social and economic development programs, etc. [3, P. 189]. In accordance with the barriers allocated, economic entities already operating on the market may not be concerned about competition from “new” economic entities [4, P. 295].

We believe that *barriers to entry the industrial agrarian market* are a systemic variety of different height and depth of market penetration and influence of economic, ecological-social, administrative, legal, human resources institutions, whose behavior burdens the activity of market subjects, preventing the emergence of new economic agents. This definition is the author's definition.

There is a variety of classifications of barriers to entry industry markets. As a result of this research, as well as the analysis of scientific literary sources, we offer the author's classification of barriers for companies operating in the agri-food market when allocating transaction costs, including administrative, economic, ecological-social, legal and human resources (Figure 1).



**Figure 1.** Typing of barriers and forms of their manifestation in the market environment (Compiled by authors)

Market barriers negatively affect the size of transaction costs arising from entering and exiting the agrarian market. However, it cannot be said unequivocally that measures to remove barriers should be

carried out on a market-wide basis. Depending on the barrier type, it is necessary to implement an individual approach to the development of measures to overcome them, to substantiate the hypothesis of the influence of the barrier's depth and height on the growth of environmental problems on the territory of the agri-food market hub allocation, or the logistic route of AIC products promotion.

Hence, for the efficiency of the economic entity, creation of conditions for cooperation, integration, development of market infrastructure and free movement on the sectoral agrarian market should provide such conditions that contribute to the AIC development as a whole, but also account for the consequences of environmental impact on the territory.

#### **4. Anthropogenic load on the AIC ecosystem**

Natural ecosystems of the territory of the Russian Federation from the Vistula Spit (Kaliningrad oblast) to Ratmanov Island (Chukotka Autonomous Okrug), stretching from west to east for almost 10 thousand km, are continuously exposed to anthropogenic factors. Expressing an opinion on the degree of anthropogenic load, experts are usually limited to traits describing the “focal” type of influence - urbanization (concentration of urban population), and also the level of man-made pollution (saturation and frequency of harmful emissions into the atmosphere) and the “background” type formulated by tilled territory trait. However, this approach is limited. It is necessary to consider the influence of factors that disturb the natural functioning of nature and living organisms.

The agrarian sector of the country's economy has a defining influence on the environmental situation. In turn, rural population has an impact on the environment because of their role in activities. The impact of agriculture surpasses even environmentally important industries such as power engineering, ferrous metallurgy and mining. Their environmental impact has limited local nature. At the same time, the dependence of agricultural production on the characteristics of the environment and weather conditions is immeasurably higher than the sensitivity of industrial production, where the main factor is the availability of natural and energy resources.

Water plays a critical role because it participates in many different mechanisms and processes; but when contaminated by unsustainable agricultural practices, it carries serious risks to human health and ecosystems of the planet, being often underestimated by authorities and agents in the agricultural production and agri-food market. According to FAO, the main sources of water contamination in many countries are not cities or industry, but agriculture.

The priority of any state's policy is to preserve and increase the natural resource potential, improve the environmental situation, as well as the human right to a balanced diet, health preservation and diseases prevention of the population. In view of the continuous population growth on the planet and the needs for fruitful life, the process of food production must constantly increase. However, there is conflict and rivalry for resources (the conflict between the need to increase the percentage of growing plants, animals, food production) and, as a result, alarming situation in the natural resource base of agriculture due to the increase in the carbon dioxide concentration, the growth of which is driven by global warming.

The Omsk oblast is a region with high man-made pressure, but the industry has much lower anthropogenic load. The situation with the environment in the Omsk oblast is aggravated every year. One reason is the unreasonable agrarian nature management that contributes to land degradation, especially in the south of the region. In the region's territory, there are 4481,7 thousand hectares of soils prone to erosion and deflation. Of these, 1762,5 thousand hectares are now subject to degradation: 12.1% destroyed by erosion, 73.5% - deflated and 14.4% - destroyed by water and wind. The decay of the territory in many districts of the Omsk oblast reaches 80-90%. When cultivating crops, the natural process of returning nutrients consumed by plants to the soil is disrupted. It is necessary to recover these annual losses by introducing organic and mineral fertilizers. But this leads to soil contamination, accumulation of harmful substances - nitrates - in plants. Elements of transport infrastructure: roads and highways of federal importance, especially sections Omsk — Tatarsk, Omsk — Petropavlovsk, Tyumen—Omsk, are long pollution lanes and reach up to 100-300 m each side of the road [5]. Synthetic soil radioactivity is mainly determined by cesium-137 and strontium-90.

However, the federal or regional nature of the study is currently unrepresentative. In the world frame, borders are erased not only in terms of tourism, but also in trade and production. In order to create an environment conducive to sustainable agriculture and rural development, significant corrections need to be made both in national and international environmental policies.

In fact, there is a steady trend of overconsumption and overproduction of food. According to estimates by the Food and Agriculture Organization of the United Nations [6], globally about one third of food products goes bad or gets thrown away. In fact, anthropogenic load in the production of agricultural products is not justified by the economic effect and needs of the population. Uncertainty of future natural resources availability, including forests, food, water, energy pose unprecedented socio-economic and environmental challenges. The possibilities for achieving sustainable development require deep knowledge of multi-level and multi-factor management, legal frameworks, regulatory and institutional structures, as well as social practices.

Many states are engaged in the creation of a sustainable green economy. This becomes achievable only if the ecological and economic balance of the territories' development is observed. This requires a systematic reorientation of all sectors of the economy; it is necessary to ensure that the economy's needs for resources is interconnected with the possibilities of preserving sustainable ecosystems functioning, which doesn't lead to their significant destruction and limited economic development. Sustainable development should be based on controlling the reduction of anthropogenic load and improving the quality of life of the population through resource and energy-saving innovative technologies, conservation and increase of the ecosystems' productivity, as well as assessment of the need and validity of measures to manage the penetration height and depth of the agri-food market ecological and social barriers in the relationship of economic agents.

## 5. Ecological and social barriers of the agri-food market

Looking at the classifications of the agri-food market entry barriers, we have identified a tendency of that researchers do not consider the anthropogenic load impact on the AIC ecosystem participants. In this regard, we consider it necessary to supplement the generally accepted classifications of industry market barriers with a separate type - environmental-social, manifestation forms of which in the market environment are: biological pollution; depletion of natural resources, microorganic effects. At its core, the ***ecological and social barriers of entry into the sectoral agrarian market*** are a systemic variety of various institutions and individuals activities manifestations, influencing nature, leading to quantitative and qualitative changes in the ecology, burdening the functioning of market agents, including limiting the emergence of new economic agents.

***Biological pollution.*** In this case, the pollutant is organisms whose introduction and reproduction are undesirable for both humans and ecosystems as a whole. Penetration is a consequence of human activity in agricultural production. The AIC ecosystem undergoes changes that contribute to the spread of protozoal and helminthic infestations. Of the recorded 89 species of parasitic worms, 26 are in farm animals [7]. Domestic and farm animals are sources of environmental objects' seeding by pathogens. Parasitic environmental pollution is expressed in an increase in the infections' parameters of people and farm animals, which affects the increase in the cost of their keeping and reduces the quality of products, while increasing transaction costs.

***Depletion of natural resources.*** Presence of the environmental aspects of economic activities related to depletion of natural resources and a significant level of influence on natural systems are accompanied by increased transaction costs, following the economic agents' relationship. Difficulties arising from the increasing intensity of environmental management force to find ways of adapting to transforming conditions, preventing irreversible negative consequences by comparing all sorts of alternatives to institutional solutions — finding alternatives to the replacement of non-renewable resources in agricultural production and food sales, methodologies for determining the economic value of natural resources, including considering the cost of overcoming barriers, recovery of environmental costs or compensation for damage caused to the society and the environment.

**Microorganic effects.** Researchers believe that it is anthropogenic intervention in nature that causes the spread of diseases such as Ebola, avian influenza, SARS, etc. [8]. We were able to assess the combination of the microorganisms' vital activity effects on other living systems in 2020 due to the COVID-19 pandemic - risks of agribusiness continuity disruption, sudden quantitative changes, reduction of labor productivity indicators, threats to safety.

Moreover, microorganisms are both the cause and the victims of contamination. For example, the water diversion from reservoirs to agricultural needs leads to changes in temperature, reservoir shallowing and changes in the chemical composition of water (as in the Aral Sea), which affects the inhabitants of the reservoir.

Because ecosystems of fields, gardens, pastures, vegetable gardens and other agrocenoses are simplified systems that are unstable and incapable of self-regulation, they cannot exist without human support. Enterprises have weak opportunities to overcome ecological and social barriers to entry into new markets, hence they need state support [9].

## 6. Results

To ensure the food independence of the Russian Federation, which guarantees physical and economic accessibility of food products for every citizen of the country with correspondence to mandatory requirements and not less than the volumes of rational consumption standards, it requires active and responsible involvement of all market institutions and their representatives in the AIC ecosystem. Thus, currently food market agents act as special institutions that include informal and formal rules being a part of the business environment of agri-food market's entities. As a result, the author's definition of barriers to entry the industrial agrarian market was formulated, the classification of industry barriers was proposed considering the specifics of the economy sector. The nature of a separate category of costs was revealed; these costs are transaction, arising as a result of ecological and social barriers impact on activity of the sectoral agrarian market's subjects.

In order to overcome market industry barriers and reduce transaction costs, agri-food market entities need a system of certain institutions. External barriers are mainly labor-intensive and costly, since their decline mostly depends on the external environment. It should be noted that in the system of multi-layered national economy of the state, the food industry and agriculture are rightly considered a special strategic, socially important industry, and with that assistance, national and economic independence and, of course, the statehood of the country. The key role in the algorithm of overcoming market industry barriers is accordingly assigned to public authorities, since this functionality falls within their responsibilities. Only a competent tasks allocation will allow to reduce the cost of time and finance, transaction costs and bureaucratic procedures.

## 7. Conclusion

This article solved the problem of goal-setting in the agri-food policy formation, which is to expand instruments and mechanisms of sales markets expansion, creation of conditions for cooperation, integration and development of market infrastructure taking into account the change in the magnitude of anthropogenic load indicators on the AIC ecosystem.

There are grounds to argue that in order to achieve food security in the formation of agri-food policy, it is necessary to develop a single integrated system consisting of different types of limiters that are interconnected with each other. We considered this mechanism as a system of interconnected instruments that provide the necessary conditions for the effective functioning of the agri-food market, diversified development of subjects' relations within the framework of the infrastructure and institutional arrangement of the agri-food market taking into account the peculiarities, development specifics, magnitude of the industry barrier which an economic agent will face. The mechanism formation is aimed at achieving the main goal, which is to optimize not only production and sales costs, but also transaction costs.

In our opinion, the nature definition of the resulting transaction costs under the influence of various (including environmental-social) agri-food market barriers on economic subjects activity of the

industrial agrarian market and identification of factors influencing their size will allow to justify and implement an effective system of the AIC ecosystem management. However, modern trends of clustering, functional connections, expansion of the world market require a scientifically balanced combination of state regulation measures with the mechanism of the set-up market relations between market subjects. We believe that there is a need to re-focus on the formation of a holistic system of assistance and protectionism for producers and consumers of agricultural products. For sure, this measure will contribute to the strategy implementation of world food security.

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