

Functioning field of farm enterprises in Russia: uncertainty and risks

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Abstract—The article presents the results of research of the market and institutional field of farming development in Russia, including formed risks and uncertainties in it. The main hypotheses can be summarized by saying that the fact that the work of farmers (except for environmental characteristics) are significantly affected by such distinctive features of the farms themselves as their internal organizational structure, behavioral patterns, and applied strategies. Moreover, to perceive the state of the environment and adapt to it for farmers are important both purely economic motivation and other value orientations, in particular social and environmental ones. Verification of the proposed hypotheses about the differentiation of assessments by farmers of the environment surrounding their work is carried out based on the most significant surveys of economic science and analytical data obtained in the course of a large-scale survey of farm heads in the Kurgan Region. As a result, the results of empirical researches show that in each group of farms (united in their size and age of their heads), firstly, the estimates of uncertainty and risks, and secondly, the ways of adaptation to them. The results of the interpretation and analysis of subjective assessments of farm heads regarding the state of the institutional and market field (including uncertainty and risks) can be used both to determine farming development strategies in the region and to develop directions and instruments for modern agricultural policy.

Keywords—farms, market environment, institutional conditions, uncertainty, risks.

I. INTRODUCTION

The facts that testified the preservation and development of farms in the agrarian sector of the economies of many countries of the world contradict some of the negative forecasts of economists regarding the development of farming in different historical periods. For example, Karl Marks predicted the gradual disappearance of family (peasant, farmer) agriculture against the background of the rapid concentration of production and the growth of the size of agricultural organizations [1]. In turn, many modern scientists agree with the classics that family farms will gradually be absorbed by larger agricultural organizations that use, firstly, modern technologies, and secondly, the work of hired workers [2, 3, 4]. However, in practice, family farms in many countries (including industrialized ones) not only survived, but also thrive, constantly expanding their activities [4]. It should be noted that the reaction of farmers to certain changes in the institutional and market field (affecting their activities), of course, is ambiguous.

Usually different points of view are explained by the size of the farms, the age of their heads, the specialization of the activity, the results of the operation (other circumstances). Great importance for the formation of the attitude of farmers to such characteristics of the environment as uncertainty and risks has a goal setting of the activities of farms, in which in recent years has been observed significant multifunctionality. An important fact. Classical economic theory reduces the basic meaning of the activities of farms to maximize profits as the basic prerequisite that determines the behavior of the economy [5]. However, due to the unique nature of the farm (combining within three different institutions: family, production unit and household), the range of goals pursued by farmers is greatly expanded (supplemented by social, environmental, and others).

Theoretical and empirical studies conducted in different countries have shown that the family foundations of the farm (family membership, its age structure, the educational level of its members, attitude to rural work and rural life, views on traditions in everyday life and in production) effect on decision-making algorithms and operating strategies no less than the desire to extract the highest profit [6]. Moreover, a change in values is reflected in the adoption by farmers of decisions that in agricultural production have a prolonged effect, and on which the state of the farm depends in the future. It should be noted that if the vector of changes in values is similar to that in industrial production, then the economy tends to increase capitalization, industrialization, innovation, consolidation. However, on the other hand, the dominance of family traditions in the organization of farming activity causes significant restrictions in the growth of the farms' size and, consequently, the need to find new sources of sustainability and competitiveness.

Based on theoretical materials on the various essential characteristics of farms and the multifunctionality of their activities, as well as practical experience, it can be stated that the study of the state of the environment surrounding the farmer's activities (above all, various risks arising in it) is important, firstly, to understand the tendencies of changes in intra-company behavior occurring due to changes in external content, secondly, to study the transformations in the algorithms of farmer (short-term and long-term) decisions - making and emerging (under these conditions) strategies.

In connection with the above trends in the development of farming, the main hypotheses of this study are that, firstly,

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different groups of farms react differently to the state of the current environment (they differ in behavior patterns), firstly, different groups of farms react differently to the state of the current environment (they differ in behavior patterns), secondly, depending on the behavioral patterns, some farmers are more focused on maximizing profits, while others also focus on solving social and (or) environmental issues, thirdly, each specific farm (integrating certain internal attributes in the course of the activity and focusing on one or other goals) uniquely assesses the surrounding uncertainty and risks, specifically adapting to them.

II. RESEARCH METHODOLOGY.

Both the neoclassical theory based on the premises of rationality and profit maximization, as well as modern organization theories (in particular, the theory of intrafirm behavior), serve as the methodological basis for the verification of hypotheses. Because of the results of similar studies obtained in other countries, it is not always possible to adapt to domestic conditions for various reasons (for example, due to significant differences in the business environment, the current structure of farms, established cultural traditions), Farming development trends in Russia and its regions should take into account all the observed features. Moreover, empirical studies of ongoing (and potentially possible) changes in goals, values, attitudes to risk, perception of uncertainty and other behavioral limitations are highly significant both for analyzing the development of farming and for building predictive models of its functioning in the prevailing environmental conditions.

We should start with a rigorous specification of such phenomena as uncertainty and risks faced by the farm business. Although at first sight, various kinds of uncertainties and certain risks are similar in content, related to the degree of awareness and predictability in the course of decision-making, these concepts still require a clear differentiation. Decision Theory distinguishes between procedures for solving problems and problems under certainty, risk conditions, and uncertainty conditions [7]. Thus, decisions under certainty conditions are made when possible results are accurately known; in particular, the probability of the occurrence of certain events is indisputable. With regard to risk and uncertainty, in such circumstances, the probability of achieving a result is not always predictable, and if the risk is subject to empirical assessment (quantifiable), then uncertainty can be characterized only qualitatively [8]. Nevertheless, not all representatives of the Decision Theory making insist on a clear distinction between risk and uncertainty, arguing that the results of all decisions made have only subjective probability, and risk ultimately is a combination of uncertainty and the values formed on this problem [9]. Moreover, the risk increases if uncertainty increases or the importance of the intended outcome increases, and, conversely, decreases as the uncertainty or value of the solved problems decreases [9].

In addition, in many types of activities (including in agriculture) there are often arise extreme (not previously occurring) situations. Under such conditions, the theoretical concept of risk and uncertainty is useful in a meaningful way (it forces one to take into account the differences between them), but is not realizable in practical procedures for risk assessment and their analysis [10]. Therefore, in applied research, risk and uncertainty quite often are considered as broader concepts, particularly: uncertainty is reduced to a

situation in which the consequences of decision-making are not precisely known, and risk - to the possibility of adverse outcomes of decisions in conditions of uncertainty [10]. It is this (broader) understanding of risk and uncertainty is advisable to take as the basis of a methodological approach to the study of the prospects for the development of peasant (farmer) farms in a mobile institutional and socio-economic field.

Further. In agricultural production (depending on sources), risks are classified as production, market, financial, technological, institutional, behavioral, accidental (associated with catastrophes and natural disasters) [11].

For example, production risks arise due to the fact that agriculture is biological in nature and is characterized, above all, by high uncertainty due to adverse weather conditions, infectious diseases of animals and plants, the presence of many pests. Certainly, such factors as the quality of weather services and the level of veterinary services, the development of the newest means of combating diseases and pests of plants, certainly affect the reduction of production risks. Nevertheless, the high mobility and openness of rural areas nevertheless leads to high risks of certain epidemics among animals, periodic damage to plants by rare pests and diseases.

Market risks are mainly associated with unpredictability and fluctuations in prices for agricultural products and resources, although there are other market uncertainties. It should be noted that a significant basis for the occurrence of market risks in agricultural production is the duration of the production cycle and, as a result, a significant time lag between the moments of decision-making and obtaining a result.

Together with the production risks in agricultural markets, the volume of supply of agricultural products, prices and profitability of activities become unpredictable. Many measures of state support offered to small agricultural producers are aimed at compensating this particular type of risk in countries with market economies.

Financial risks are defined in Theory of Decision as risks associated with the size and structure of debts and liabilities, the availability of financial resources, the time for generating income and making expenses. The pattern is such that there is a close correlation between the size of such risks and certain characteristics of farms. For example, the younger the head of the farm is, the greater the debt and financial risks are. In addition, the availability of state assistance in this regard does not always play a positive role. This means that support provided at a certain time, on the one hand, increases the importance of planning, but on the other hand, it increases financial risks. Due to the fact that financial risks directly depend on liquidity, solvency and profitability of production, the low financial performance of farms further aggravates the existing financial risks.

Technological risks arise (unlike previous ones) during the introduction of new technologies and, firstly, are associated with the unpredictability of the results of their application, secondly, they depend on the reliability and effectiveness of their use compared to traditional ones. The emergence of such risks, on the one hand, is associated with significant costs for technical and technological innovations (cost side), and on the other hand, due to the development and introduction of unknown biotechnology effects on health (or other newer methods or systems).

Accidental risks mean the likelihood of production reduction due to unforeseen circumstances, based on either natural disasters (fires, destruction from hurricanes, hail, floods), or inadequate behavior of production participants (theft of property, lack of qualifications of workers), or problems with technical equipment (for example, significant technical breakdowns). The trajectories of such risks in the future are ambiguous, since they are also influenced by the essential characteristics of functioning farms (farmers' age, production specialization, territorial distribution of farms), their investment strategies (willingness to invest in technological and organizational innovations, the ability to introduce new technologies).

Institutional risks are determined by the quality of formal and informal institutions that show the field for the functioning of peasant (farmer) farms. Laws, rules and other regulations, within which agrarian activities are organized, play an important role. In general, the regularity is such that the better the activities of farms are institutionalized, the less institutional risks, and vice versa, any institutional uncertainty (including weak specification and protection of property rights) not only enhances institutional risks, but also significantly reduces the motivation of farming development in whole. Of course, not only stability, but also favorable external conditions for agricultural (including farm) production are essential: adequate support and control instruments, acceptable taxes, and environmental requirements that correspond to the capabilities of agricultural producers and public preferences.

It is also necessary to single out the such kind of risk that any (including agrarian) producers face as behavioral (human) risk due to the unpredictability of human behavior during production. Individual differences in skills, experience, education, attitudes towards risk, needs, values, thinking styles, health status, etc. they do not allow to predict the behavior of production participants during the implementation of technological processes with a high degree of probability. Since agricultural production is geographically dispersed, the result of each technological operation is characterized by a high subjective dependence. Even in family farms, where the possibility of opportunistic behavior of their members is significantly limited by many circumstances (common goals, close values, etc.), and the possibility of conflicts of interest is extremely low, the influence of individual characteristics of the participants in production is essential. With the increase in the farms' sizes and the expansion of the scale of their activities, even technological innovations cannot neutralize the dependence of production on the behavioral characteristics of its participants, and, consequently, behavioral risks only increase.

As shown by foreign studies, farmers assess the significance of certain risks are ambiguous. For example, J.

Patrick and his colleagues [12], when studying the risk attitudes of farmers that specialized in different types of agricultural production, note that crop farm owners rank the circumstances of risk in order of importance in the following order: 1) weather; 2) prices for products; 3) inflation; 3) the cost of resources; 4) natural disasters; 5) plant diseases and pests; 6) political environment. Moreover, relying on empirical research, scientists note that for the heads of livestock farms, the importance of risk factors is structured somewhat differently, although the same conditions are noted as essential: 1) product prices; 2) the cost of resources; 3) animal diseases; 4) inflation. Moreover, the perception of risks is influenced by many essential characteristics of farms: education and age of farmers, their health, participation in off-farm activities and the amount of income from it, the well-being of the farm and the availability of its own resources [12].

III. THE RESULTS OF EMPIRICAL RESEARCHES

In order to test the hypotheses put forward during this study, we used materials from a survey of heads of farms of the Kurgan region, made in 2015-2016, the data of which demonstrated the high importance of all types of risks (technological, market, financial, random, behavioral) for the development of farming. The following risks were proposed as estimates: 1) price changes for products (market); 2) changes in prices for agricultural resources (market); 3) the change in products' demand (market); 4) changes in legislation and other regulations (institutional); 5) change in the terms of the loan (financial); 6) opportunistic behavior, lack of qualifications, asymmetry of information, illness and others (behavioral); 7) adverse weather conditions (technological); 8) natural and man-made disasters (random).

The question for assessments was formulated as follows: "How much damage do the occurring situations cause to the results of the activities of your farm?". It was proposed to evaluate the risks in points from 1 to 5 (1 - estimated damage of less than 20%; 2 - 20-40%; 3 - 40-60%; 4 - 60-80%; 5 - 80-100%).

For further analysis, the surveyed farms were grouped according to their size and the age of the farms' heads. The survey results showed that (on average) adverse weather conditions cause the greatest damage to the activities of peasant farms (most farms specialize in grain production). Other risks are ranked in the following order: 1) random risks; 2) mobility (not in favor of farmers) of prices for agricultural resources; 3) price fluctuations for products and behavioral risks (have the same score on the score); 4) fluctuations in demand for products from consumers; 5) changing the conditions for obtaining a loan; 6) institutional risks (changes in legislation, norms, rules) (Table 1).

TABLE I. EVALUATION BY HEADS OF PEASANT (FARMER) FARMS OF THE INFLUENCE DEGREE OF VARIOUS RISKS ON THE RESULTS OF THEIR ACTIVITIES (GROUPED BY THE SIZE OF THE LAND AREA, HA)

Size of land, ha	The number of farms in the group	Changes in product prices	Changes in prices for agricultural resources	Changes in products' demand	Institutional changes	Changing loan terms	Behavioral risks	Bad weather	Random risks
1–200	63	3,4	3,4	3,0	2,3	2,4	3,6	3,7	3,3
201–400	33	3,8	3,7	3,1	2,1	2,8	3,8	4,5	4,2
401–600	20	3,9	3,7	4,0	2,8	2,8	3,1	4,0	3,9
601–800	11	3,5	3,8	3,4	2,2	3,1	4,0	4,0	3,7
801–1000	4	2,5	2,5	2,0	2,0	1,8	2,8	3,0	3,0
1001–2000	19	3,4	3,7	3,1	2,3	2,8	3,3	4,4	3,8
2001 and more	8	3,5	3,4	2,4	2,4	2,8	2,8	4,4	4,0
In average	Bcero 158	3,5	3,6	3,1	2,3	2,7	3,5	4,0	3,7

Source: compiled by the authors according to the results of a survey of farms' heads of the Kurgan region.

The situation is such that if for the majority of large-scale farms the weather conditions (or other natural risks) are most

significant, in the middle-sized of them the significant damage is primarily caused by fluctuations in products' demand, price changes for it, unfavorable prices for resources.

TABLE II. RANKING BY HEADS OF PEASANT (FARMER) FARMS THE DEGREE OF INFLUENCE OF VARIOUS RISKS ON THE RESULTS OF THEIR ACTIVITIES (GROUPING BY FARM SIZE, HECTARES)

Assessed aspects	1–200	201–400	401–600	601–800	801–1000	1001–2000	2001 and more	In average
Changes in product prices	3	3	2	4	3	4	3	4
Changes in prices for agricultural resources	3	4	3	2	3	3	4	3
Changes in products demand	5	5	1	5	4	6	6	5
Institutional changes	7	7	5	7	4	8	6	7
Changing loan terms	6	6	5	6	5	7	5	6
Behavioral risks	2	3	4	1	2	5	5	4
Bad weather	1	1	1	1	1	1	1	1
Random risks	4	2	2	3	1	2	2	2

Source: compiled by the authors according to the results of a survey of farms heads of the Kurgan region.

With regard to smallholders, it can be stated that behavioral risks pose more significant threats to them, and those that are, firstly, related to the health of family members, secondly, the reluctance of the population (especially the younger generation) to engage in agricultural activities. In addition, the importance of behavioral risks is also emphasized in the responses of heads of large farms, but the nature of such risks varies considerably. Farmers, for example, identify both the opportunistic behavior of the participants in

production (especially employees) and the lack of qualification to perform specific technological operations as risky factors. As for institutional risks, they do not pose a special danger to them. Perhaps this is due to the relatively stable institutional field created for farming in the early 1990s, and certain state actions aimed at supporting this form of organization of agricultural production.

Analyzing the opinion of the heads of peasant (farm) farms, differentiated by age, we can note only some differences in their assessments regarding the significance of risks for farming. Most often, their views coincide (Table 3).

TABLE III. EVALUATION BY HEADS OF PEASANT (FARMER) FARMS OF THE INFLUENCE DEGREE OF VARIOUS RISKS ON THE RESULTS OF THEIR ACTIVITIES (GROUPED BY AGE OF FARMERS, YEARS)

Age of farmers, years	The number of farms in the group	Changes in product prices	Changes in prices for agricultural resources	Changes in products' demand	Institutional changes	Changing loan terms	Behavioral risks	Bad weather	Random risks
25-45	57	3,3	3,5	3,1	2,3	2,8	3,7	4,1	3,9
46-65	94	3,6	3,5	3,1	2,3	2,6	3,4	4,0	3,6
66 и более	7	3,7	4,0	3,2	2,2	2,4	4,0	3,9	3,1

Source: compiled by the authors according to the results of a survey of farms' heads of the Kurgan region.

Thus, representatives of all age groups assessed the institutional risks as insignificant (the explanation for which is given above) and the risks of changing the terms of the loan (Table 4). The last is because most heads of farms rarely apply to credit institutions, and if they use such services, they are on pre-defined (stable) conditions and, as a rule, with government support.

TABLE IV. RANKING BY HEADS OF PEASANT (FARMER) FARMS THE DEGREE OF INFLUENCE OF VARIOUS RISKS ON THE RESULTS OF THEIR ACTIVITIES (GROUPED BY AGE OF FARMERS, YEARS)

Assessed aspects	25-45	46-65	66 and older
Changes in product prices	5	2	3
Changes in prices for agricultural resources	4	3	1
Changes in products' demand	6	5	4
Institutional changes	8	7	7
Changing loan terms	7	6	6
Behavioral risks	3	4	1
Bad weather	1	1	2
Random risks	2	2	5

Source: compiled by the authors according to the results of a survey of heads of farms of the Kurgan region.

For farmers aged 66 years and older, behavioral risks are most significant, which are mainly related to concerns about health (including family members) and weak intentions of the young generation to continue farming. For representatives of the middle-aged generation of farmers (45-65 years old), technological and incidental risks associated with weather conditions and natural disasters, as well as market risks of a different nature, are of the greatest concern. Moreover, the change in demand is not identified as a significant source of risks, which is understandable, since the formation of market prices for farm products is most influenced not by demand, but by supply.

IV. CONCLUSION

The results of an analytical study of the socio-economic environment of the functioning of family farms directly on the territory of the Kurgan region clearly demonstrate the presence of many risks in the course of farming. The most significant of them are related to the natural characteristics of the branch, among which the seasonality of production is particularly noteworthy, which, firstly, significantly reduces the benefits of specialization, secondly, causes the problem of uneven use of resources throughout the year. Since farms of the Kurgan region specialize mainly in crop production (livestock requires more substantial investment in technology, has a longer payback period), the dynamics of their production is most closely associated with natural risks and fluctuates largely than corporate firms. When the production cycle is relatively short, and seasonality is somewhat neutralized due

to the use of modern technologies, the production process becomes more controlled and, as a result, less dependent on weather conditions (for example, in the production of pork and poultry meat, greenhouse production). Of course, among agricultural producers, from the point of view of this aspect, corporate farms (investment-oriented firms) gain significant competitive advantages compared to family farms. They neutralize such technological risks by diversifying production, technological innovations made available to them thanks to broader financial opportunities.

We especially note that if during the survey of farms' heads in 2015-2016 the problem of product sales (demand fluctuations, in particular) was not highlighted by them as significant, the studies conducted in subsequent years (2017-2018), when a good wheat harvest was obtained in the Kurgan Region, showed that demand fluctuations and (to a greater extent a) proposals entail many additional risks. In contrast to large corporate farms, which cover the technological stages of bringing products to the final consumer with their activities, the sale of products during fluctuations in supply or demand becomes a significant problem for farms. In this situation, the market risks associated with inadequate prices for agricultural resources and products produced by farmers (price disparity), high transaction costs are complemented by the risk of establishing extremely low prices for farmers' products.

Another modern trend in the development of agricultural production, globalization, makes a certain contribution to the formation of unfavorable factors for farmers. The need to compete not only on the national, but also on the international markets (both agricultural products and raw materials, as well as resources) combined with high price mobility, determine, firstly, the instability of farm incomes, secondly, the uncertainty regarding the existence of this unique form of organization agrarian activity in general. Political circumstances (introduction of sanctions, first of all) also significantly affect the functioning of farms, both in a positive aspect (weakening competition, for example) and in a negative aspect (rising prices for equipment, seeds, fertilizers, etc.).

Thus, the most significant threats to the development of farming can be of a different nature (economic (market, financial), institutional, natural) [13]. In determining the prospects for the development of farming in the coming decades, it is necessary first to turn to the alternatives that institutional theory suggests for the current situation. Regarding its conceptual approach, it is important to refer to the following conditions for the preservation of farming: 1) introducing new institutional mechanisms into the organizational structure of the farm (up to its transformation into some completely new hybrid organization, which, firstly, overcomes the weaknesses of family farms, secondly, expands their capabilities, thirdly, helps confront potential threats); 2) the formation of an institutional environment that is more acceptable for the functioning of the farm (the one in which

the classical farm is able to realize the advantages existing in its internal structure). Of course, there is a third option. If modern agricultural production is not interested in preserving family farming (as an important production unit dominating agriculture in many countries of the world for a long period), farming will lose its family base and gradually (and perhaps rapidly) be modified into a corporate firm.

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