

# Factors of increasing the competitiveness of agricultural machinery enterprises in post-crisis conditions

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**Abstract.** The article systematises the factors of increasing the competitiveness of agricultural machinery enterprises in the post-crisis conditions of their functioning. Special attention is paid to the study of the phenomenon of competitiveness and its content at the present time. Factors such as improving personnel training, improving the selection of suppliers, components for agricultural machinery and risk management arising in the process of its production are considered in detail. As a criterion for choosing suppliers for agricultural machinery enterprises, commodity price organisational and business factors are accepted. Taking into account these factors, the stages of choosing suppliers of components for machine-building enterprises have been formed. At the same time, expert values of significant criteria were used and suppliers were ranked and the most suitable for the company was selected. Risks were identified with their subsequent assessment, a risk map of the company was compiled, risk management measures were developed and monitoring of their implementation was provided. Special attention is paid to the industry risks associated with the appearance of new agricultural machinery manufacturers on the domestic and foreign markets.

## 1 Introduction

The current situation in the domestic agricultural machinery sector is quite complicated: the enterprises included in it have a low level of profitability, the demand for agricultural machinery of domestic production is low, supplies to the Russian market of imported machinery are growing, and many components are supplied from abroad.

In some segments of the Russian agricultural machinery complex, the trend towards monopolisation has clearly begun to emerge. For example, in one of the two key groups of agricultural machinery products – combine harvesters – the production concentration coefficient for one of the largest enterprises increased from about 50% in 2015 to 80% by the end of 2021. We are talking here about the Rostselmash plant, whose position in the industry has significantly strengthened. The government, while simultaneously solving the problems of developing competition and increasing the list of agricultural machinery produced in Russia, is trying to ensure the development of the industry by localising foreign

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manufacturers in Russia, including concluding special investment contracts with them, providing for various state preferences, in response to a foreign company investing in the organisation of production [1].

The state's attention to the industry of agricultural machinery continues to be actively subsidised and receive new preferences from the government. For example, in 2021, 15.7 billion rubles were allocated from the federal budget under the program of subsidising agricultural machinery manufacturers. Currently, the government has decided to change the mechanism of support provided to the industry.

Thus, if at present the main mechanism for supporting the industry actually consists in direct subsidising of producers, then starting from 2022, the government intends to switch to subsidising the preferential leasing mechanism. As a justification for such a step, experts name a number of reasons, among which are the presence of controversial issues in the mechanism of allocation of funds, the threat of monopolisation of the agricultural machinery industry and insufficient rates of mechanisation of agriculture.

In the current situation, when competition among agricultural machinery manufacturers is sharply increasing and the conditions of state support for its production are changing, the importance of measures to increase the competitiveness of domestic producers is rapidly increasing.

## **2 Materials and methods**

At the present stage of the economic development of the world economy, the problem of competitiveness occupies a central place in the economic policy of any state. The creation of competitive advantages over the rival becomes a strategic direction of the government's activities in the field of ensuring the competitiveness of the national economy.

To ensure their competitiveness, organisations strive to develop new forms of business, new types of services, they fight for every consumer. To understand exactly how to do this, an organisation needs to study the market, collect the necessary information about it, which is analysed, and then, based on the results of the analysis, market development strategies are developed.

The relevance of the problem of competitiveness at all levels of management is obvious. Most countries are trying to create all the necessary conditions for the sale of their goods not only on the domestic market, but also on the external market. The high competitiveness of products and services allows you to sell goods and services to other countries at more favorable prices, thus stimulating investment in these industries and enterprises, contributing to the introduction of STP as the shortest way to reduce costs and increase efficiency, thereby accumulating resources to increase production and improve quality. As a result, the value of a product or service increases, the value of enterprises, businesses, corporations and the competitiveness of the industry increases. Gross domestic income and per capita income are growing in the country.

The problems of competitiveness in relation to various levels of management are quite widely represented in economic research. It is considered in relation to the product, enterprise, industry, region, national economy. Despite this, currently there is no exact definition of the concept of competitiveness, including in relation to an individual enterprise.

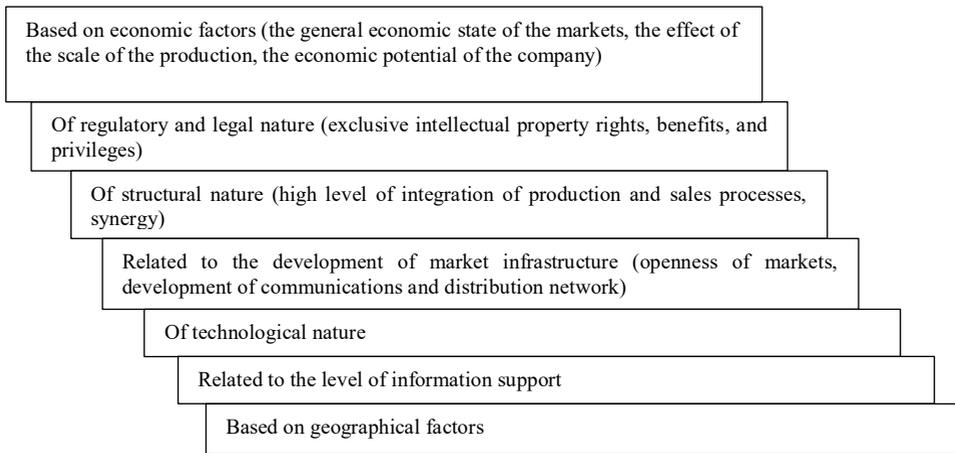
Currently, there are two main approaches to defining the competitiveness of an enterprise. According to the first approach, the competitiveness of a firm can be defined as its ability to produce a competitive product [2-4]. The second approach connects the concept of competitiveness of an enterprise with the quantitative and qualitative characteristics of its activities, which most often include market share, the level of innovation, the technical level of production, the qualifications of personnel, etc. [5].

Both approaches considered are based on the recognition that the competitiveness of an enterprise is based on the realisation of its specific competitive advantages.

Competitive advantages can be defined as the high competence of an enterprise in a certain area, which makes it possible to overcome the influence of competition, attract consumers, form, and maintain their loyalty [5, 6]. Competitive advantages can relate to the characteristics of a product, a trademark, the method of production used, sales of goods.

Summarising the points of view of various authors, the competitiveness of an enterprise can be considered as an economic category that characterises its ability to produce and sell competitive products with the best use of its economic potential compared to competitors. In other words, it is the ability of an enterprise to meet the needs of customers in a better way than competitors.

The composition of the competitive advantages of agricultural machinery enterprises is shown in Figure 1.



**Fig. 1.** Competitive advantages of agricultural machinery enterprises. Made by the author using the source [6].

Increasing the competitiveness of machine-building enterprises is possible only on the basis of taking into account all the factors that influence it.

### 3 Results

In our opinion, the most promising areas of increasing the competitiveness of domestic agricultural machinery enterprises at present are:

- improving the use of personnel;
- improvement of methods of selection of component suppliers for agricultural machinery;
- implementation of a system for management of risks arising in the process of agricultural machinery production.

We will consider the issues of improving financial incentives in relation to the management apparatus, specialists and employees, because it is they, being intellectual labor workers, who determine the innovative variant of the enterprise development.

To improve the material motivation of these categories of personnel, it is proposed to introduce two new wage systems: wage by grades and wage by *KPIs* – key performance indicators.

The development of market relations, the opening of branches and representative offices of foreign companies on the territory of the Russian Federation, labour migration have led to the evolution of human resource management. In order to meet the current economic situation, under conditions of increasing competition for qualified human resources, new tools for staff motivation are emerging.

One of these tools is the system of occupational levels (grades), which became widespread in Russia at the beginning of the 20th century. For full characterisation of this system, it is necessary to consider the content of such categories as “grade” and “grading”.

A grade is a set interval of “weights” or ranks, within which positions are considered equivalent for the company and have the same payment range, i.e. tariff.

The most promising for industrial enterprises at present is remuneration according to *KPI – a key performance indicator* [6, 18].

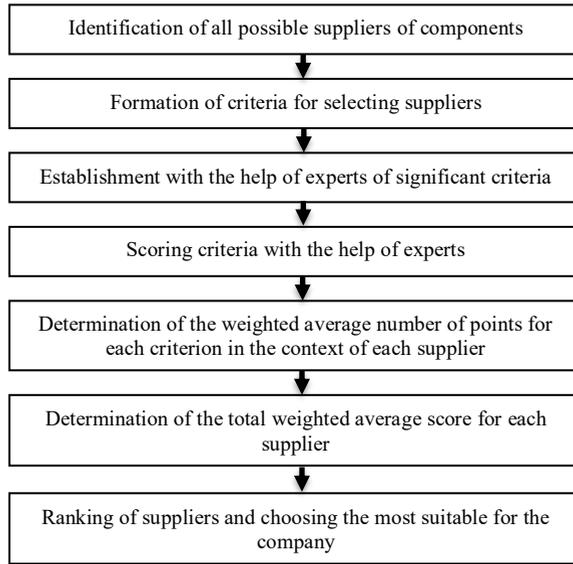
The *KPI* of each employee characterises the effectiveness of his specific work and is reflected in the amount of his salary.

The use of the *KPI* for calculating the wages of each employee is associated with the establishment of the composition of indicators, taking into account the specifics of his work.

Agricultural machinery enterprises are characterised by a diverse and heterogeneous nomenclature of purchased components, heterogeneous relationships in the supplier – consumer system (the situation of a monopolist supplier; one supplier produces several types of components and there are several alternative suppliers for one type of components); significant impact of risks associated with suppliers on the production of final products.

Currently, the following main methods of evaluating suppliers of components for agricultural machinery enterprises are used.

Each of the considered methods, to a certain extent, has a limited character, and does not allow taking into account the whole complex of factors characterising suppliers of components for agricultural machinery enterprises. To eliminate this drawback, it is proposed to use the method of creating ratings to select suppliers of components for JOHN DEER RUS LLC. This method is implemented by performing a number of interrelated steps (Figure 2).



**Fig. 2.** Stages of selection of suppliers of components for JOHN DEERE RUS LLC.

The total rating of each supplier is determined by the formula:

$$P_i = P_{ij} \times a_j, \quad (1)$$

where  $P_i$  is rating of the  $i$  supplier;

$i$  – supplier's index;

$j$  – criterion index;

$P_{ij}$  – evaluation of  $j$  criterion by  $i$  supplier, in grades;

$a_j$  – weight of the  $j$  criterion.

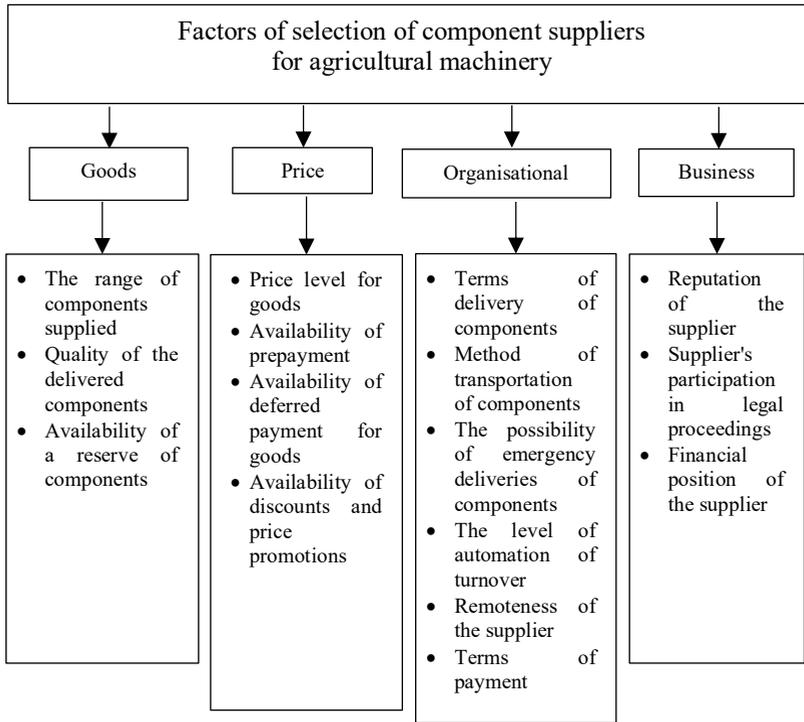
The sum of the weighting factors must be equal to one.

Based on comparing the rating values for different suppliers, the best one is determined. If there are identical ratings of two or more suppliers, the procedure is repeated again, but using new criterion.

Consider in more detail the criterion for selecting suppliers for agricultural machinery enterprises. First of all, they will be systematised by identifying the following groups of factors [7]:

- commodity;
- pricing;
- organisational;
- business.

The composition of each group of factors is shown in Figure 3.



**Fig. 3.** Factors of choosing suppliers for agricultural machinery enterprises.

An example of the proposed rating selection of suppliers for JOHN DEERE RUS LLC is presented in Table 1.

**Table 1.** An example of the selection of suppliers of components for agricultural machinery enterprises of goods based on their rating assessment.

Criterion of choice of the supplier	Weight of the criterion	Points criteria by supplier			Weighted average number of points		
		No.1	No.2	No.3	No.1	No.2	No.3
1	2	3	4	5	6	7	8
Goods criteria							
1. The range of components supplied	0.15	9	7	8	1.35	1.05	1.2
2. Quality of the delivered components	0.1	8	7	7	0.8	0.7	0.7
3. Availability of a reserve of components	0.06	5	4	6	0.3	0.24	0.36
Price criteria							
4. Price level of components	0.08	7	8	6	0.56	0.64	0.48
5. Availability of prepayment	0.07	5	4	6	0.35	0.28	0.42
6. Availability of deferred payment for component	0.09	7	8	9	0.63	0.72	0.81
7. Availability of discounts and prices and price promotions	0.06	5	7	6	0.3	0.42	0.36
Organisational criteria							
8. Terms of delivery of components	0.06	4	3	5	0.24	0.18	0.3
9. Method of transporting of components	0.01	4	3	3	0.08	0.06	0.06
10. The possibility of emergency deliveries of components	0.04	6	5	7	0.24	0.30	0.28
11. Remoteness of suppliers	0.02	2	3	3	0.04	0.06	0.06
12. Terms of payment	0.09	6	7	8	0.54	0.63	0.72
Business criteria							
13. Reputation of the supplier	0.05	4	5	4	0.2	0.25	0.2
14. Supplier's participation in legal proceedings	0.03	3	4	2	0.09	0.12	0.06
15. Financial position of the supplier	0.08	6	7	6	0.48	0.56	0.48
TOTAL	1.0	-	-	-	6.2	6.23	6.49

Thus, the calculations showed that the most preferred supplier is No. 3, since it has a maximum rating number of 6.49.

Thus, it can be concluded that the introduction of a rating method for selecting suppliers of components for JOHN DEERE RUS LLC will increase the competitiveness of its products by saving on costs, and, consequently, the competitiveness of the entire enterprise.

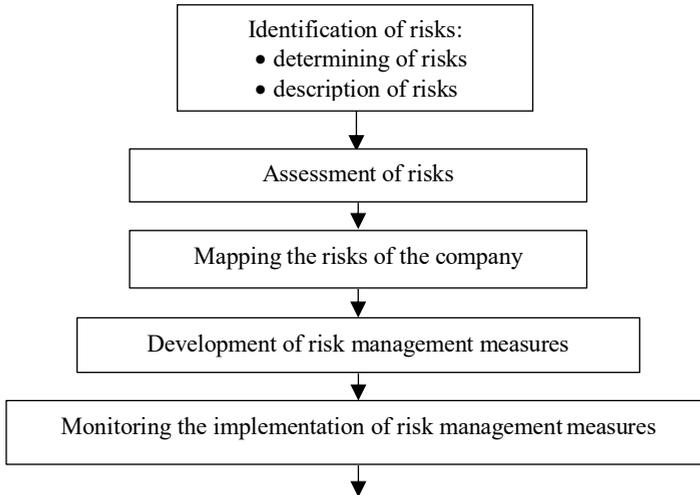
In the modern economic literature, there are many definitions of the concept of "risk", which can be reduced to the following three:

- 1) risk is a deviation from the planned results (losses or additional profit);
- 2) risk is an uncertainty that can be qualitatively and/or quantitatively assessed;
- 3) risk is an action at random in a situation of uncertainty in order to get a positive result.

In relation to industrial production, risk can be defined as the possibility of loss of part of resources and/or loss of income in comparison with the levels and values calculated based on the conditions of the most rational use of resources and the adopted development of market conditions.

In general, the risk management system of an agricultural machinery enterprise can be represented as follows.

The study of various approaches to risk management of an industrial enterprise allows us to propose the following option for JOHN DEERE RUS LLC (Figure 4).



**Fig. 4.** Elements of the risk management system for JOHN DEERE RUS LLC.

An analysis of the activities of JOHN DEERE RUS LLC showed that the following types of risks may arise in its activities (Table 2).

**Table 2.** Types of risks in the activities of JOHN DEERE RUS LLC that may reduce its competitiveness.

Name of the risk	Characteristics of the risk
1	2
Industry risk	The risk of new agricultural machinery manufacturers appearing on the domestic and foreign markets
Price risk	Increase in prices by suppliers for material resources used in the production of agricultural machinery
Country and regional risks	Risks associated with changes in the political situation in the host country and its regions
Inflation risk	Growth of the inflation index in the host country
Financial risk	Reduction of sources of formation of financial resources of companies and their amount
Reducing the solvency of buyers of agricultural machinery	Reduction of financial opportunities of potential buyers of agricultural machinery
Risk of errors in research and development projects	The probability of making mistakes when developing new types of agricultural machinery or improving those already mastered
Currency risk	Sharp increase in exchange rates with which the company calculates
Credit risk	The probability of late repayment of loans received from banks or their repayment in incomplete volume
Liquidity risks	Insufficient level of liquidity of the company's assets
Legal risk	The probability of changes in legislation in the business sphere
Tax risks	The probability of new taxes, higher tax rates and the abolition of tax benefits
Reputational risks	The probability of a company violating the terms of contracts, which leads to a decrease in its image in the business world

A variety of methods are used to assess risks, the most common of which are the following.

1. The method of expert assessments. The risk assessment is carried out by an expert who uses logical and mathematical-statistical methods for this.

2. Development of a risk profile. Risks are assessed according to a number of parameters, which are reflected on the appropriate scale. The risk profile obtained in this way is compared with the reference one.

3. Adjustment of the discount rate. It assumes an increase in the discount rate in accordance with the totality of risks affecting the project.

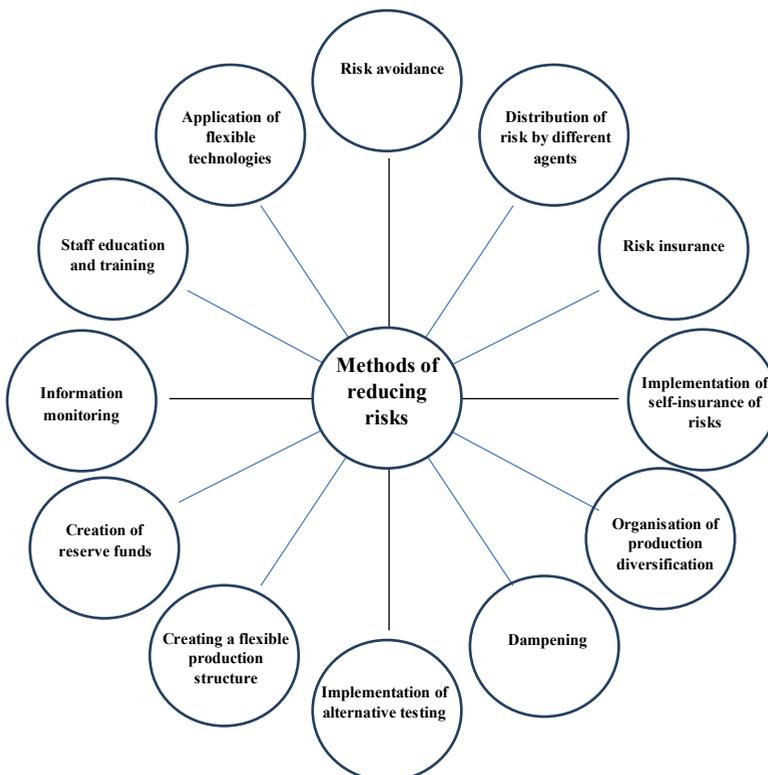
4. The method of reliable equivalents. It assumes expert adjustment of cash flows depending on the subjective assessment of the level of risk associated with the receipt of these flows.

5. Sensitivity analysis. By making successive single changes to the technical and economic parameters of the project, the risks that most affect the project are identified.

6. Method of scenarios. By simultaneously making changes to a number of technical and economic parameters, alternative scenarios for the development of the project are formed.

7. Simulation modeling. It involves the construction of a financial model and multiple calculation of project scenarios calculated taking into account the correlation between its parameters.

For reducing the impact of risks on the competitiveness of JOHN DEERE RUS LLC, various methods can be used (Figure 5).



**Fig. 5.** Methods of reducing risks in activities of JOHN DEERE RUS LLC.

## 4 Discussion

Practice demonstrates the recognition of sustainable development as the main strategic priority in the agro-industrial complex at the level of enterprise management and regional development in the long term. During the development of a sustainable development strategy, the company's management should adhere to flexible management of innovative projects aimed at making managerial decisions through the analysis of business processes and the creation of innovative business models. This approach provides for the improvement of the final version of the project through a certain range of step-by-step actions to correct it. In the same way, changes are made to the program that performs the function of coordinating the activities of project teams.

## 5 Conclusions

Promising directions of further research will be the stages of formation of the management system of sustainable development of the agro-industrial complex. In conditions of high risks and uncertainty of the Russian economy, management decisions are required within the framework of the concept of sustainable business development, aimed at anticipating actions from competitors and consolidating the company's market positions. However, the transition of the company's management to a sustainable development management system is a long-term evolutionary process that requires slow qualitative transformations of the internal environment of the enterprise.

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