FEATURES OF THE APPLICATION OF GAME THEORY IN THE PROBLEMS OF THE ORGANIZATIONAL AND ECONOMIC MECHANISM OF THE GREENHOUSE INDUSTRY IN THE REPUBLIC OF UZBEKISTAN

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Abstract

The article analyzes the current organizational and economic mechanism for the functioning of greenhouses in the Republic of Uzbekistan. With the help of game theory methods , the problem of optimal cultivation of vegetables and fruits in a greenhouse has been solved. The subject of the study is the organizational and economic mechanism for the functioning of greenhouses in the Republic of Uzbekistan. The purpose of the work is to identify the problems of development of the organizational and economic mechanism for the functioning of greenhouses in the Republic of Uzbekistan with the help of game theory. According to the decree of the President of Uzbekistan dated November 20, 2018 "On measures to create additional conditions for the development of greenhouse complexes", another 105 modern greenhouses worth $343.3 million will be created in the coming years. New complexes, according to the document, will occupy another 800 hectares of land. A significant part of them (47 per 405 hectares) with a total value of more than 230 million dollars will be created in the Tashkent and Samarkand regions. Methods: game theory methods, payoff matrices, analysis, comparison. Results (Findings) : with the help of game theory, the problem of optimal cultivation of fruits and vegetables in a greenhouse has been solved. Conclusions: The use of game theory can be of great help in building production and financial plans in the greenhouse industry.

Keywords: *greenhouse farming; agricultural commodity producers; game theory; organizational and economic mechanism; vegetables and fruits.*

Introduction. Due to the tense economic and international situation, food supplies today occupy a special place in the priorities of public policy. In solving the problem of increasing the self-sufficiency of the population with food, the main role belongs to areas in which the effective economic and economic activity of agricultural producers is of great importance for the economy. Today, business entities need to create conditions that ensure a consistent process of continuous reproduction of agricultural products. That is why it is necessary to have appropriate organizational and financial mechanisms for the sustainable development of the industry in the region (5, p. 1378).

The term "organizational and economic mechanism" of agricultural development should be understood as the interaction of problems of production relations based on economic and administrative-legal levers and effective forms of organization of social production processes that ensure the sustainable development of agricultural sectors (3, p. 45). The main functions of the organization and financial management are: creating favorable economic conditions, increasing the efficiency of production activities, ensuring the competitiveness of products, increasing the interest of employees and teams in the high economic performance of the enterprise, ensuring the high quality of the company's transformation, material and technical base.

In this paper, a study is made of the possibility of using game theory in the problems of the organizational and economic mechanism of the greenhouse industry.

Materials and methods

The following situation was chosen to solve the research problem. A transition to new agricultural machinery is envisaged. The experts found that if successful , there is a chance that (70%) will receive 1.5 of the profits that can be made with old equipment. Otherwise (30%), the company will lose 0.3% of profits if the equipment does not meet expectations (often failing, producing defective products). At the same time, you can use additional equipment maintenance services with a one-time profit of 0.5, the success rate in this case will be 90%. It is also possible to partially install new equipment. In this case, the probability of success will be 60%, the profit will be 1.1, and the loss will be 0.05. The cost of additional services in this case will be 0.3 of the standard profit, and the chances will remain the same. The best option needs to be determined .

Literary review

The agro-industrial complex is an integral part of the productive forces of the Republic of Uzbekistan, is subject to the general laws of the economic development of the region and is specific, with its own characteristics. Today, the economic situation of the greenhouse economy in the region is characterized by instability, economic growth problems continue to exist, and the organizational and economic mechanism should create conditions for an effective economic system in the industry. The level of profitability of agricultural organizations, including subsidies, in 2019 reached 5.9% of rural households (21.8%). Without state support, production efficiency was -32% in agricultural enterprises and -29.6% in agricultural holdings. This shows that the mechanism of financial management in the region does not fully meet the tasks assigned to it and is characterized by the destruction of agricultural potential, the problem of adapting agricultural products to market conditions, and inefficient fiscal and credit policies (17, p. 104).

In today's economic conditions, only those business entities that introduce innovations and major scientific and technological achievements based on the use of new generation technologies and efficient production methods that allow rational use of resources and reduce costs can meet the requirements of competition. Therefore, the modernization of the technological sphere of production, associated with the transfer of agricultural enterprises to new generations of equipment and technologies, plays an important role in the sustainable development of the greenhouse industry.

It is recommended to include the technical and

technological modernization of production, the development of information systems and marketing activities in the region's agriculture in the group of innovative industries to improve the organizational and financial mechanism. The development of agriculture largely depends on the state of the material and technical base of farms and, above all, on the safety and availability of a fleet of engines and tractors. In 2019, in agricultural organizations, compared to 2018, only 4 tractor fleets increased by 4 units, in agricultural (agricultural) enterprises - by 12 (10, p. 490). In such conditions, the formulation of problems with the help of game theory helps a lot.

Results and analysis

According to the task, calculations are carried out (from left to right, the standard profit is taken as 100):

1) 127.5-12-50=65.5
2) 120-16-50=54
3) 93.5-0.75-30=62.75
4) 66-2=64

According to the information provided, the best option for the company would be to switch to new equipment using additional services. However, the final prices for other options do not differ much from the optimal ones, so they can also be taken into account. You don't always have to rely on data from a single analysis. It would be advisable to conduct a comparative analysis of old and new equipment. Approximate indicators for comparing equipment can be (13, p.63):

1) the value received as a result of the operation of the equipment;
2) reliability
3) maintenance
4) the cost of consumables and replacement parts and their availability on the market;
5) ease of use
6) useful life of the equipment.

It is also worth considering the use of additional services that allow you to quickly resolve problems with equipment, orienting employees on the correct use and maintenance of equipment with the possibility of improving it. However, it is possible that the services will be provided not in accordance with the contract, but "through the sleeves", and it may be necessary to strengthen the quality control of work, which may increase the cost.

The choice of partially used equipment from a purely logical point of view will be the most correct, since before a complete transition to something new, it is necessary to test the equipment, determine the nuances of work, compare indicators based on the results of old and new equipment, prepare curators for equipment that will train staff on working with new equipment. If deficiencies are found, there is no need to completely recall or modify all equipment, which will cost the company high cost or downtime. Partial application is widely used when changing the management of a company and is very effective because it pushes the company to grow and improve, while guaranteeing stability in the company's work (4, p. 127).

There is also an option to reject the application. In this case, the company has nothing to lose, but never gains. This option is used in a conservative policy, it makes sense when the company receives a stable income and does not seek to increase profits. Deciding to be inactive about something can have a positive effect. For example, some companies look to other companies to innovate and track

the success of their applications. Thus, such companies with a conservative strategy minimize the risk associated with innovations by applying them after their effectiveness has been proven, and have received several fixes to work consistently.

Summing up all the options, I can't recommend any particular one, since each case has its own specifics that should be taken into account. When making decisions, it is sometimes dangerous to approach all issues with a universal template solution based on analysis; it is worth considering all the nuances of the problem if it is directly related to production, that is, to the main activity of the company, as in this case.

Strengths:	Weak sides:
• a stable number of orders from regular customers • product simplicity, wide application • A small company allows you to manage it more efficiently	• narrowly focused production as a result of the inability to maneuver in case of low demand • limited number of suppliers and consumers • consumer addiction
Capabilities:	Threats:
• Expansion of production when new orders appear. • Expansion of the product range • new consumer contracts	• emergence of new competitors for vegetable growing • appearance of product substitutes • decrease in demand for vegetables • Delays in deliveries of raw materials from suppliers • invisible circumstances

Figure 1. Matrix "Business Screen"

The effectiveness of this method lies in finding the best option in the face of complete uncertainty. This method is used when there are many alternatives and several possible scenarios that, as a rule, cannot be influenced. The effectiveness of the method directly depends on the accuracy of predicting the alternative in a particular scenario. For example, with a specific demand, it will be possible to achieve a certain volume of production (18, p. 236).

The choice of the optimal strategy is adapted to many criteria, based on which you can determine the best option. You can also use weighted criteria scores if the topic prefers some criteria over others.

For greenhouses, the criteria for choosing the optimal strategy are applied in cases of product selection when the demand for them is unknown, when expanding production and expanding the range of products. An important factor in the effectiveness of this method is the accuracy of predicting the results of choosing an alternative under certain conditions. The statistics of recent years, observations and conclusions of expert groups contribute to the greatest accuracy. However, the expansion of trends may not always give accurate forecasts, especially in our time. Therefore, it is also worth considering current trends, experience in the development of the industry.

Discussion. The greenhouse sells its products through stores. Sales are subject to weather conditions. The cost of growing vegetables is α_0, and fruit - β_0 rubles, the selling price corresponds to α_1 rubles and β_1 rubles, respectively. Determine the best business strategy.

a = 1000, b = 2300, c = 1400, e = 700,
$\alpha_0 = 20$, $\beta_0 = 5$, $\alpha_1 = 40$, $\beta_1 = 12$.

We compose a mathematical model of the problem. With regard to possible demand conditions, the company has two strategies.

1. F1 = (1000, 2300) - produce 1000 vegetables and 2300 fruits,
2. F2 = (1400, 700) - produces 1400 vegetables and 700

fruits.

Nature (the market) also has two strategies:

1. D1 = hot weather,

2. D2 = cool weather.

If the company adopts the F1 strategy and the demand is indeed in the first state, i.e. the weather is hot (D1), then the products will be fully sold and the revenue will be w11 = $1000 \cdot (40-20) + 2300 \cdot (12-5) = 36100$.

If the company adopts the F1 strategy and demand is in state D2 (weather is cool), then the fruit will be sold only partially, and the income will be: w12 = $1000 \cdot (40-20) + 700 \cdot (12-5) - (2300-700) \cdot 5 = 16900$.

Similarly, if the company chooses the F2 strategy and nature chooses the D1 strategy (the weather is hot), then the income will be (vegetables will be lower):

w21 = $1000 \cdot (40-20) + 700 \cdot (12-5) - (1400-1000) \cdot 20 = 16900$, and if nature chooses strategy D2, then

w22 = $1400 \cdot (40-20) + 700 \cdot (12-5) = 32900$.

Since the maximin strategy in the game is a = max (16900, 16900) = 16900, and the minimum strategy is b = min (36100, 3290) = 32900, then the value of the game is in the range

16900 den units $<v<$32900 den . units

We solve this game analytically. The average performance of the first player, if he uses the optimal mixed strategy x′ = (x1′, x2′) and the second player, the pure strategy corresponding to the first column of the paytable, is equal to the value of the game v:

$36100 \cdot x1′ + 16900 \cdot x2′ = v$.

The first player gets the same average odds if the second player uses the strategy corresponding to the second column of the payroll, i.e.

16900 x1 + 32900 x2 = v.

Thus, the company optimally grows 1218 kg of vegetables and 1427 kg of fruit.

Conclusion.

Summarizing the results of the study, we can formulate the following conclusions. The agricultural sector is the most promising in the economy of the Republic of Uzbekistan. Game theory is widely used in the innovation economy. In recent years, its importance has increased significantly in many areas of economics and social sciences. In the field of finance, this applies not only to solving general financial problems, but also to analyzing the strategic problems of companies, which contributes to the choice of the main production sector and the adoption of optimal management decisions. The application of game theory contributes to the successful development of the greenhouse industry.

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