Formalized model of agricultural insurance development strategy as an element of industry management digitalization

K Zhichkin¹, V Nosov², L Zhichkina³, A Tarakanov⁴, V Zhenzhebir², F Sterlikov²

¹ Department of Economic Theory and Economics of AIC, Samara State Agrarian University, 2 Uchebnaja Street, 446552, Kinel, Russia
² Department of Economics and Management, K.G. Razumovsky Moscow State University of technologies and management, 73 Zemlyanoy val, 109004, Moscow, Russia
³ Department of Land Management, Soil Science and Agrochemistry, Samara State Agrarian University, 2 Uchebnaja Street, 446552, Kinel, Russia
⁴ Department of State Law Disciplines, Institute of Public Administration, 80 Leninsky Prospekt, 119261, Moscow, Russia

E-mail: zskirill@mail.ru

Abstract. The article discusses the possibilities of agricultural production management digitalization with formalized models, using the example of state support for agricultural insurance. The aim of the study is to adapt the BCG model for use as a tool for designing a development strategy for agricultural insurance with state support. Tasks: - determine the possibilities of using the BCG model to design an agricultural insurance development strategy; - offer a model parameters system; - define a set of strategies in the framework of the goal. Putting the model into practice will make the existing state support system more transparent and predictable, depending mainly on the objectives of state policy and the actual indicators achieved by the industry. At the costs high level offered by these measures, the system involves the creation of a sustainable market for insurance services, regulated by both economic and administrative mechanisms. The presence of such decisions totality will automate the decision-making process at the industry management level; ensure the agricultural policy continuity in the long term.

1. Introduction

Digitalization of agricultural production is the most important task for the agro industry development. However, it should include not only automation of production processes themselves (parallel driving systems, processing of crops with plant protection products and automatic fertilizing, etc.), but also managerial decision-making automation, both at the level of individual enterprises and industry as a whole [1-8]. The introduction of MRP II / EPR, APS standards and their further development make it possible to use methods for optimizing the enterprises production activities [9, 10]. However, all these approaches are mainly used at the operational and tactical planning level and do not affect the strategies development level [11]. This is due to difficulties in obtaining quantitative information currently used in management software products.
2. Methods and Materials

Formalized strategic analysis models, such as BCG, GE / McKinsey models can be used as the basis of a strategic planning system for an industry, production that allows formalizing the strategy development, adapting them to the characteristics of a particular industry or a specific task. An example of this approach is the state support systems for agricultural insurance.

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Tasks: - determine the possibilities of using the BCG model to design an agricultural insurance development strategy; - offer a model parameters system; - define a set of strategies in the framework of the goal.

The object of the study is the economic aspects associated with determining the development strategy of the industry in crop insurance with state support. The research methodology consists in analyzing the economic mechanism for the development of agricultural insurance with state support. During the study, the abstract logical method, situational and system analysis, economic and statistical methods were used.

3. Results and Discussion

According to the World Bank, most of the agricultural insurance market in the world falls on crop insurance. More than 90% of the collected premium is generated through insurance in the crop industry [12]. In the Russian Federation, the crop sector accounts for more than 95% of the damage from emergencies in agricultural sectors [13-16]. All this testifies to the importance of agricultural insurance for the agro-industrial complex of Russia. Moreover, in the Samara region conditions crop insurance with state support remains minimally widespread. Since 2014, the number of concluded agreements on crop insurance with state support has been reduced (from 114 in 2014 to 0 in 2017) [17]. The region is located in the risky farming zone. The environmental and climate factors have a major impact on crop production in agricultural organizations. At the same time, the loss of agricultural insurance varied from 8.2% in 2014 to 33.0% in 2013. That is, for the period under review by 1 ruble insurance premiums agricultural producers received 0.287 rubles compensation (table 1).

Table 1. Data on agricultural insurance in the Samara region

| Index | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|-------|------|------|------|------|------|------|------|
|       | Insurance premium | | | | | | |
| Agricultural insurance total (million rubles) | 185.3 | 227.9 | 367.0 | 305.3 | 444.9 | (19.6) | 104.0 |
| Crop insurance with state support (million rubles) | 144.7 | 198.6 | 355.3 | 298.9 | 441.7 | (27.1) | 87.1 |
| including subsidies received (million rubles) | 56.9 | 90.0 | 143.8 | 121.5 | 96.6 | 0.0 | 46.3 |
| Number of Contracts | 1378 | 1104 | 858 | 592 | 384 | 251 | 241 |
| Crop insurance with state support (pcs) | 77 | 50 | 114 | 76 | 30 | 0.0 | 24 |
| Insurance payments | | | | | | | |
| Insurance payments under agricultural insurance contracts, total (million rubles) | 102.4 | 104.1 | 93.5 | 158.0 | 77.3 | 109.6 | 0.11 |
| Insurance payments (crop insurance with state support) (million rubles) | 34.8 | 65.6 | 29.2 | 88.9 | 76.9 | 109.4 | 0.0 |
| Sum insured under crop insurance contracts (million rubles). | 1998.4 | 2742.4 | 4905.4 | 4127.3 | 6098.5 | 0.0 | 1724.6 |
| Loss of agricultural insurance (%) | 55.3 | 45.7 | 25.5 | 51.7 | 17.4 | - | 0.1 |

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Loss of crop insurance with state support (%)  24.0  33.0  8.2  29.7  17.4  -  0.0

The model serves to formulate the state strategy directions in the field of supporting the agricultural insurance system at the regional level (for countries with a significant variety of climatic conditions and, accordingly, with the agricultural production risk level) or the country as a whole (for small countries) [18-19].

As a basis, it is proposed to divide the regions into 4 groups in accordance with two indicators: the agricultural insurance spread, the risk degree (the possibility of losing the yield part). The first indicator characterizes the agricultural producers’ protection degree in relation to external influences (first of all, to the climatic conditions that are forming in this territory). The widespread insurance use allows enterprises, even with significant losses, to continue normal economic activity, making it unnecessary to develop emergency assistance programs in adverse circumstances (for example, as a result of the 2010 drought, the state was forced to help in several areas - eliminating the drought effects, purchasing feed grain, compensation for the purchasing seeds cost, etc.) As a rule, these measures are more dependent on the needs of the region or country leadership in supporting a specific population group than on the real need.

![Figure 1. A formalized model of the state support strategy for agricultural insurance.](image)

The second indicator - the risk degree - is proposed to be assessed in terms of the products share that are annually lost as a result of natural or man-made emergencies. The value of this indicator (in accordance with the existing methodology) is calculated as the arithmetic mean of the total loss over the past five years. To reduce the impact of inflationary processes and the existing pricing system, it is necessary to calculate this indicator in physical terms for each culture separately, taking into account the occupied space. We propose a boundary value of 20%.

In view of the foregoing, the model should have the form (Figure 1).

Strategy “Increasing the share of insured space”. With a losses low level and a small share of insured sown area. It is enough for the government to compensate for a part of the insurance premium and
organize a monitoring service for the activities of insurance companies that would detect violations by insurers and policyholders. The compensation amount should be determined by the predicted (preferred) rate of the insurance market development. The result of this strategy should be a shift to the “Cost optimization” position.

Strategy “Optimization of insurance support costs”. Having reached the desired state of the market (the share of insured areas should be at least 70%), the region (country) administration can proceed to fix the situation achieved, optimizing costs. The condition for this should be the achievement of the market equilibrium state, in which a possible reduction is compensated by the new participants appearance. With a possible reduction in the insurance premium, the state should offer new insurance products that would be attractive to agricultural producers without state support (for example, crop insurance as collateral for lending).

Strategy “Formation of attractiveness for market participants”. Unlike the two previous strategies, the proposed situation is much more complicated. Significant amounts of annual damage make the situation unattractive for insurance companies. Therefore, the priority for the state is to create the basis for the effective and mutually beneficial activities of insurers and policyholders. To reduce potential damage, it is proposed to introduce a basic state insurance program similar to the US CAT program [20-23]. A commodity producer pays only administrative expenses in the amount of 1.000 rubles / culture and can claim a minimum compensation for damage. In addition, the program is the basis for participation in other types of state support. Such an insurance product will reduce the amount of possible damage by 30%, which makes insurance activities more attractive [24-26].

Strategy "Maintaining insurance at an achieved level". The state, having created an insurance system corresponding to this level, ensures the stable operation of the agro-industrial complex in the event of any emergency. In addition to the measures proposed in the previous strategy, it is necessary to solve additional problems - ensuring payments in the event of large-scale climatic disasters, ensuring the interest of insurance companies in providing insurance services with significant compensation for damage, etc. [27-29] Therefore, this position proposes the implementation of the following measures: control over the insurance fund formation; the compensation of administrative costs and part of the damage exceeding the capabilities of the insurance fund and the reinsurer, who took part in the risks under the contract; the principle implementation to “insurance self-compensation”, linking the possibility of providing highly profitable insurance services (for life insurance, medical insurance, property insurance and civil liability) with more risky (and less profitable) types (agricultural insurance).

4. Conclusion
Putting the model into practice will make the existing system of state support more transparent and predictable, depending mainly on the objectives of state policy and the actual indicators achieved by the industry. At the costs high level offered by these measures, the system involves the creation of a sustainable market for insurance services, regulated by both economic and administrative mechanisms. The presence of such decisions totality will automate the decision-making process at the industry management level; ensure the agricultural policy continuity in the long term.

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