STUDYING THE FACTORS THAT INFLUENCE THE INNOVATION AND INVESTMENT DEVELOPMENT OF AGRICULTURAL ENTERPRISES BY THE EXPERT SURVEY METHOD

Introduction. It is known that the factors influencing the organization of innovation and investment activities of agricultural enterprises may be related to the macroeconomic processes in the country and the microeconomic environment of the enterprise as well as may have an internal nature. The study of a complex of factors allows us to identify the most significant of them and to neutralize their adverse effect in a timely manner.

Problem Statement. The action of these factors ultimately causes an increase in uncertainty and risk in the process of innovation, so the study of their nature and the search for ways to counteract their adverse effect on innovation and investment is extremely relevant.

Purpose. The purpose of this research is to study, to analyze, to verify, and to evaluate the R&D level of the studied objects and to prepare sound conclusions for making decisions on such objects.

Materials and Methods. The formalized rational forecasting methods (trend extrapolation, modeling, etc.) are based on a sufficiently developed retrospective information base. In order to maintain the objectivity of the study of the effect of the macroeconomic factors on the organization of innovation and investment activities, we have chosen the expert survey method.

Results. One of the most influential factors, according to the experts, is the corruption in the government and the judiciary, the second one is the armed conflict in Eastern Ukraine. The most influential marketing factors that negatively affect the investment and innovation are unpredictability of the future prices for agricultural products and the monopolization of markets and the control of power by oligarchs.

Various factors of the economic environment have a significant impact on the innovation and investment development of agricultural enterprises. Moreover, this impact may have both favorable and unfavorable aspects. The factors influencing the organization of innovation and investment activities of agricultural enterprises may be related to the macroeconomic processes in the country and the microeconomic environment of the enterprise and may be generated within an innovating enterprise, i.e. have an intrafirm nature. The influence of an enterprise on the macroeconomic factors is almost impossible, the factors of the microenvironment may be adjusted to a certain extent, while the intrafirm factors are leveled in the process of managing enterprise’s innovation and investment development. The action of these factors ultimately leads to increasing uncertainty and risks in the process of innovation, so the study of their nature and finding ways to counteract their adverse impact on innovation and investment is extremely important.

According to the analysis of recent studies on the methods for assessing the macroeconomic factors influencing the innovation and investment activities, their choice is crucial and a difficult task. Since the macroeconomic factors are the least predictable in the domestic economy, it is difficult to assess them using formalized research methods. In particular, Grabovetsky has noted that the formalized rational methods of forecasting (extrapolation of trends, modeling, etc.) are based on a sufficiently comprehensive retrospective information base. The extraordinary level of novelty associated with the innovation processes limits the ability to obtain sufficient retrospective information required for the use of the formalized forecasting methods, on the one hand, and creates an urgent need to analyze and to predict the qualitative changes, on the other hand. All these factors make these methods completely unsuitable [1].

The complexity of the analysis of innovation processes has been emphasized by Shpyliovyi who notes that the quantitative evaluation of innovation projects is very difficult, and the current method for assessing the efficiency of innovation projects and technology parks recommends evaluating the efficiency of each innovation project and activity based on the total number of points scored according to relevant efficiency criteria [2].

In addition, the multi-vector nature of innovation affects the duration of the innovation life cycle, which necessitates the assessment of efficiency at each stage of the cycle [3].

Especially many problems arise when it is necessary to give long-term assessments of qualitatively new processes and phenomena that have not previously occurred in public life and about which, of course, there has been no information. It should be added to the above that the quantitative methods do not allow predicting possible random changes in the behavior of phenomena (processes, objects) that occur more often in the current conditions than in the past [4].

In connection with the above, we have chosen the expert method in order to maintain the objectivity of studying the effect of macroeconomic factors on the organization of innovation and investment activities.

The purpose of assessing the effect of certain factors on the innovation and investment activities of agricultural enterprises is to study, to analyze, to verify, and to evaluate the R&D level of the studied objects and to prepare sound conclusions for making decisions on such objects.
The main objectives of the expert survey are as follows:

- To objectively, comprehensively study the factors influencing the innovation and investment activities of agricultural enterprises;
- To assess the compliance of innovation activities of enterprises with the current level of R&D progress in the agricultural sector;
- To study the regional innovation environment and the main obstacles to the introduction of innovation in the production process, as per directors and managerial staff of agricultural enterprises;
- To assess the level of using innovation products at specific enterprises, as well as the degree of spreading the innovation-driven development of domestic agricultural enterprises;
- To identify the stimulating/restraining influence of government bodies and local authorities on the development of innovations by agricultural enterprises of Kharkiv Oblast.

In order to conduct an effective study, first, it is necessary to formulate common methodological principles for the review of innovation and investment activities, which meet the trends of global R&D development and promote the implementation of priority areas of innovation in Ukraine and in the agriculture sector. In particular, it is necessary to clearly define the basic requirements to be met by such a methodology (Fig. 1).

These requirements allow the obtaining of reliable, timely, adequate to modern realities, information on the studied problem and its further use to make management decisions in the process of innovation and investment development of enterprise.

The expert survey methods are questionnaires and surveys. We have chosen the method of questionnaires and formed a questionnaire to collect data on innovation activities of agricultural enterprises and the factors that affect it. The questionnaire contains the list of questions on urgent problems that hinder the comprehensive development of innovation, as well as the list of questions related to the development of innovation in a particular agricultural enterprise.

Forty-eight experts have been involved in the survey: 41.7% of them employed in the higher education system, 2.1% of them are leading specialists of R&D institutions, and 56.3% are top

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>Reliability</td>
<td>Ensuring reliability of the results of expert interview</td>
</tr>
<tr>
<td>Simplicity</td>
<td>Both the interview technique and the method for the result evaluation should be easy to use</td>
</tr>
<tr>
<td>Unambiguous interpretation</td>
<td>Presenting the material of the expert survey in such a way as to ensure unambiguous interpretation and clarity for experts</td>
</tr>
<tr>
<td>Economy of resources and efforts</td>
<td>Ensuring low time inputs and resources in terms of both interviewing the experts and processing the results</td>
</tr>
<tr>
<td>Computerization</td>
<td>Using computerized processing of expert interview results with the least labor costs</td>
</tr>
<tr>
<td>Quickness</td>
<td>Quickly preparing and interviewing to ensure reliability</td>
</tr>
<tr>
<td>Presentation in media</td>
<td>Disseminating information to stakeholders through the media (press, Internet, etc.)</td>
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Fig. 1. Requirements for the expert evaluation of the innovation and investment development of agricultural enterprises
Source: prepared by the authors.
managers and chief accountants of agricultural enterprises of Kharkiv Oblast. The data on the education of experts are shown in Fig. 2.

Thus, most of the interviewed experts have higher education. Among them, the largest share (55.7%) belongs to the experts who get a master’s degree (specialist) (this category includes the majority of top managers and chief accountants of agricultural enterprises covered by the survey). A significant share is occupied by the experts who are PhD (CSc) (23.6%) and by those who have a bachelor’s degree (11.2%). The share of DSc accounts for 9.3% of the respondents. The survey covers top managers and chief accountants of 18 agricultural enterprises. Among the enterprises, there are large-, medium-, and small-sized ones, with the area of agricultural land up to 100 ha. The employees of R&D institutions, higher educational establishments, and government bodies also are involved in the interview. The results of interviewing the respondents on the implementation of innovation activities by the enterprises managed by them are given in Fig. 3.

According to the respondents, 10 enterprises were engaged in innovation activities, in 2018, 9 ones were innovating, in 2019, and in 2020,
their number decreased to 8. Most of them spent money on machinery, equipment, and software. In 2020, 3 companies spent on in-house R&D. In 2018, there were 4 such enterprises; in 2019, as few as 2 did so. Only one enterprise spent money on external R&D each year for the reporting period, and one enterprise invested in acquisition of external knowledge, for the entire period.

The results are rather pessimistic and show the fact that the vast majority of surveyed companies do not have enough funds to carry out innovation activities and to purchase the state-of-the-art equipment.

Further questions to the experts related to their attitude to the factors influencing innovation and investment. As a result of applying the expert method of assessing the factors influencing the innovation and investment development of agricultural enterprises, the experts’ opinions on the political and legal factors are distributed as follows (Fig. 4).

According to the experts, the most influential factor is the corruption of the government and the judiciary (an average score of 9.7), the second important one is the military conflict in the Eastern Ukraine (an average score of 9.2). The third factor, with a certain lag behind the second one, is the general unstable situation in the country, which deters investors from investing in innovation (7.1 points). The experts also have noted an imbalanced regulation of the legal framework for foreign investment (7.0 points) and the complicated legislation in the field of innovation (6.6 points). The lack of a clear and understandable government policy in the field of innovation scores 6.2 points, which is also quite high. The government shall promote capital inflows instead of hindering investment, especially, the investment in innovation.

Let us consider the opinions of experts on how the marketing and economic factors influence innovation and investment development of the agricultural sector (Fig. 5).

The experts have stated that the most influential marketing factors that adversely affect investment and innovation are the unpredictability of the future prices for agricultural products (9.3 points), as well as the monopolization of markets and the oligarchy (9.2%). The next important factor is large-scale labor migration of qualified personnel (8.8 points), which is a really big problem in Ukraine. Unfortunately, many smart and gifted young people leave villages, or even go abroad, having failed to find an adequate pay or proper working conditions. This is a complex problem that may be solved only at the national level, with support
1. Unpredictability of the future prices for agricultural products 9.3
3. Monopolization of markets and control of power by oligarchs 9.2
10. Large-scale labor migration of qualified personnel 8.8
8. Insufficient use of marketing research 8.7
7. The impact of COVID-19 on the activities of agricultural enterprises 8.1
11. Insufficient use of the scheme of guarantee contracts for the supply of agricultural products 7.1
6. Lack of clear sales policy at enterprises 7.1
9. The complexity of organizing enterprise’s own outlets 6.9
2. Underdeveloped organizational and economic mechanism of innovation and investment activity 5.5
4. Raiding and redistribution of property by means of forced privatization 3.5
5. Insignificant investment in innovation as compared with annual amortization deductions 3.4
12. Other 2.1

**Fig. 5.** Experts’ answers to the question, “Which marketing and economic factors have an adverse effect on the innovation and investment development of agricultural enterprises?”

Source: prepared by the authors.

of regional authorities. Thirdly, the experts have mentioned the COVID-19 pandemic, a factor that unfavorably influences the world economy as well (8.1 points).

The financial factors play an important role in ensuring innovation and investment development. Unless there is proper funding none innovation R&D product may be completed. None organizational innovation may bring good results without proper financial incentive of researchers, and innovation products may not be sold to end users. At the same time, we should keep in mind the influence of the international environment on the innovation and investment development of domestic agricultural enterprises, because the agricultural sector is export-oriented and exports are growing steadily.

Figure 6 shows how the opinions of experts on the effect of financial and international factors are distributed.

According to the experts, the first and most critical factor is the lack of enterprise’s own financial resources for innovation and investment (9.9 points out of 10). Almost every expert has emphasized that innovation would be faster and more efficient if there is money for it. Since ordinary activities do not always cover the costs with profits, the enterprises do not possess enough funds for some other innovation activities. Second, the experts have mentioned insufficiently secured investors’ rights and the difficulties associated with pre-trial and judicial protection of investments (9.4 points out of a maximum of 10). In Ukraine, this factor is a significant barrier to the inflow of foreign investment. The same is true for domestic investors who also have complained about the corrupt judiciary as one of the main obstacles to a favorable investment climate in the country. The third important factor is a high cost of borrowings (9.2 points). Innovating enterprises that have a lack of own funds may not afford expensive loans, and therefore do not invest in innovation.

Let us consider how the experts have assessed the effect of the social and environmental factors (Fig. 7).
First, the experts have mentioned the two factors that with the highest score, 10 points out of 10 possible. They are low competences of research and educational institutions in innovation and global trends and the lack of experience in implementing innovation in medium- and small-sized agricultural enterprises. Second, the experts have noted the lack of qualified professionals in the field of innovation, who agree to work in rural areas (9.8 points) and the need for improving management skills in managers and/or the need to involve third-party leading professionals in innovation management. The third important factor that, according to experts, has a very significant impact, is the social infrastructure of villages, which is often either completely degraded or insufficiently maintained (9.7 points).

The experts also have noted that the links between the agricultural producers and the R&D institutions are currently insufficient and require expanding cooperation that should be facilitated by means of material incentives, by both the R&D institutions and educational establishments, and the innovating companies and investors (9.6 points).

To identify the priority of the effect of certain groups of factors on innovation and investment development, we have asked the experts, “Which factors most strongly influence the refusal of agricultural enterprises to innovate?” (Fig. 8).

In the experts’ opinion, the largest share belongs to financial and investment factors (29.2%) followed by the marketing and economic ones (21.7%) and by the political and legal reasons (20.0%). Therefore, the problem of financial support and the organization of an effective sales system by enterprise are of the greatest importance for the development of innovation. On the part of the government, ensuring stability and transparent pri-
Citing in agricultural markets, reducing the influence of oligarchs and corruption on the economic policy will favorably affect innovation and investment development in the agricultural sector and in the country as a whole.

The next step we have asked the experts to assess the current level of innovation support by individual components, in agricultural enterprises (Table 1).

Most experts have expressed dissatisfaction with the financial support of innovation at their own enterprises (the top managers of the enterprises), and at agricultural enterprises in the region (the professionals of educational establishments and research institutions). “Fully dissatisfied” option has been chosen by 72.2% of the respondents.

We have obtained similar results with regard to the satisfaction of experts with the level of motivation of employees to innovate as “Fully dissatisfied” option has been chosen by 77.8% of the respondents. Most experts (38.9%) have been “not fully satisfied” with progressive pay systems.

Regarding corporate learning, 66.7% of the respondents are fully dissatisfied with the level of corporate trainings at agricultural enterprises;
33.3% of the experts are “partially satisfied” with introducing such organizational innovation as improving the organization of management and information communication between departments, while 27.8% of the respondents are “fully dissatisfied.” The use of drones in agriculture is now a quite advanced technology in the world. The experts have assessed the level of its introduction in the agricultural enterprises as unsatisfactory (44.4% of the respondents).

Regarding the use of modern machines, tractors, and combines, the opinions of the respondents have been distributed almost equally: 22.2% of the experts are satisfied with this component of innovation development in the agricultural sector, while the rest of the experts’ answers are divided among “partially satisfied”, “not fully satisfied”, “fully dissatisfied,” each having a share of 16.7%.

Hence, one can see that there are different points of view on this component, depending on the competence and qualifications of a particular expert. In general, the experts are satisfied with the development of innovation in dairy farming, as 38.9% of the respondents have expressed their satisfaction with modern feed producing

### Table 1. Grouping the Expert Responses Concerning Their Satisfaction/Dissatisfaction with the Innovation Component of the Development of Agricultural Enterprises

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Number of expert responses</th>
<th>Structure, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fully satisfied</td>
<td>Satisfied</td>
</tr>
<tr>
<td>Financial support of innovation</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Motivation of employees for generating innovation ideas and proposals</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Progressive pay systems</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Corporate learning</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Improvement of the organization component of management and information communication between departments</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Use of drones in agriculture</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Use of modern machinery, tractors, combines, etc.</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Use of modern feed producing and dispensing systems</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Introduction of modern systems in dairy farming, in particular advanced milking parlors</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Averaged by all experts</td>
<td>1.9</td>
<td>3.3</td>
</tr>
</tbody>
</table>

*Source:* prepared by the authors.
and dispensing systems and 44.4% of the experts have the same judgement with respect to the level of the introduction of advanced technologies in dairy farming.

To adequately interpret the verbal judgements, the Harrington verbal-numerical scale has been used to assess the degree of satisfaction with innovation indicators in the enterprises (Table 2).

Thus, the experts have shown a high dissatisfaction with financial support of innovation, motivation of employees to innovate, and the quality of corporate learning.

At the same time, they have demonstrated a moderate satisfaction with the use of advanced feed producing and dispensing systems and the introduction of advanced technologies in dairy farming.

The experts have expressed a low satisfaction with the use of modern machines, tractors, and combines (0.22) and a low partial satisfaction with innovation in improving the organization of management (0.33). Regarding progressive pay systems, the experts are not fully satisfied, but the intensity of this quality is moderate (0.39).

The study has shown the areas of innovation activity to be addressed by agricultural enterprises in the first place: funding the innovation, motivating the employees to innovate, and organizing corporate learning.

At the last stage of the survey, the respondents are asked to rank (by scoring points from 1 to 10) the possible actions of the Ukrainian authorities, which may have the most favorable effect on investment in the agricultural sector. It is proposed to determine the importance of each action by scoring points from 0 to 10 inclusive, where 10 corresponds to the most important, according to the expert, and 0 corresponds to the least important. The threats that are equivalent, in the expert opinion, may be assigned with the same score (from 0 to 10 points). The list of questions is taken from a recent opinion poll conducted by Dragon Capital, EBA, and the Center for Economic Strategy, the results of which were published in January 2021 (Fig. 9).

The results of the survey have shown that all experts consider rebooting the judiciary the top priority area of innovation and investment deve-
development (10 points). Effective measures to separate the political sphere and the business interests of the oligarchs for limiting their influence on political decisions (9.9 points).

The second important task in terms of improving innovation and investment development is effective measures to combat corruption (9.1 points). The third place is shared by the simplification of the licensing system and transparency of licensing procedures (8.6 points) and the necessity to appoint experienced reformers with a good business reputation to the key offices (8.5%). The results are more than predictable, given the depth and duration of the problems with the judiciary, the domination of the oligarchs, and the corruption in the country.

This question has revealed “painful points” that hinder the development of innovation and investment activities in the agricultural sector. Investors do not give money unless they are confident that their interests are protected by the judicial system and the risk of losing capital is minimal.

Conclusions

Studying the factors influencing the innovation and investment development of agricultural enterprises has shown that the most influential ones are the financial factors, as the search for resources to fund innovation is often complicated by nationwide problems, and innovation often does not transform into a marketable product or into improvements in the organizational and managerial operation of agricultural enterprises.

According to the survey results, the marketing and economic factors play an equally important role, as the full development of innovation and investment activities is impossible unless there is an adequate predictable market of agricultural products and the enterprise has a well-designed sales strategy. The third place belongs to the political and legal factors that the enterprises cannot influence in any way. The task of the government is to remove barriers to innovation investment in the agricultural sector whose share in the country’s GDP accounts for almost a quarter.

The expert survey has shown that improving the investment climate and developing innovation are intensified if the government takes the following steps: rebooting the judiciary, separating the political sphere and the business interests of oligarchs, and effectively combatting corruption.

Table 2. Gradation of Experts’ Responses by the Level of Satisfaction / Dissatisfaction with Support of Innovation Development of Agricultural Enterprises, According to the Harrington Scale

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Coefficient</th>
<th>Interpretation of the result</th>
<th>Gradation of quality intensity by the Harrington scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial support of innovation</td>
<td>0.72</td>
<td>Fully dissatisfied</td>
<td>High</td>
</tr>
<tr>
<td>Motivation of employees for generating innovation ideas and proposals</td>
<td>0.78</td>
<td>Fully dissatisfied</td>
<td>High</td>
</tr>
<tr>
<td>Progressive pay systems</td>
<td>0.39</td>
<td>Not fully satisfied</td>
<td>Moderate</td>
</tr>
<tr>
<td>Corporate learning</td>
<td>0.67</td>
<td>Fully dissatisfied</td>
<td>High</td>
</tr>
<tr>
<td>Improvement of the organization component of management and information communication between departments</td>
<td>0.33</td>
<td>Partially satisfied</td>
<td>Low</td>
</tr>
<tr>
<td>Use of drones in agriculture</td>
<td>0.44</td>
<td>Fully dissatisfied</td>
<td>Moderate</td>
</tr>
<tr>
<td>Use of modern machinery, tractors, combines, etc.</td>
<td>0.22</td>
<td>Satisfied</td>
<td>Low</td>
</tr>
<tr>
<td>Use of modern feed producing and dispensing systems</td>
<td>0.39</td>
<td>Satisfied</td>
<td>Moderate</td>
</tr>
<tr>
<td>Introduction of modern systems in dairy farming, in particular advanced milking parlors</td>
<td>0.44</td>
<td>Satisfied</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

Source: prepared by the authors.
The novelty of the obtained results is the methodological substantiation and practical application of the expert method for studying the factors influencing the macro- and micro-environment on the innovation and investment development of agricultural enterprises.

The further study will aim at identifying possible managerial measures to neutralize the factors that have a significant adverse impact on improving the efficiency of innovation and investment activities of agricultural enterprises.

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Результати. Одним з найбільш впливових чинників експерти зазначили корумпованість влади та судової системи, друге місце посідає військовий конфлікт на Сході України. Найбільш впливовими маркетинговими чинниками, що негативно впливають на інвестиції та інновації, було визнано непрогнозованість майбутнього рівня цін на сільськогосподарську продукцію та монополізація ринків і захоплення влади олігархами.

Висновки. В результаті експертного дослідження методом анкетування виявлено, що поліпшення інвестиційного клімату й розвиток інновацій активізується у тому випадку, якщо держава здійснить наступні дії: перезавантаження судової системи, розмежування політики та бізнес-інтересів олігархів.

Ключові слова: інноваційно-інвестиційний розвиток, аграрні підприємства, інноваційне середовище, чинники впливу на інноваційно-інвестиційний розвиток, експертний метод, рівень інноваційного забезпечення аграрних підприємств.