“Prospects for the introduction of innovations by agricultural enterprises in Ukraine”

AUTHORS	Lubov Lipych Svitlana Bortnik Oleksandr Tovsteniuk Oksana Kchilycha Myroslava Kushnir

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Lubov Lipych, Doctor of Economics, Professor of Lesya Ukrainka Eastern European National University, Ukraine.

Svitlana Bortnik, Candidate of Economic Sciences, Associate Professor, Lesya Ukrainka Eastern European National University, Ukraine.

Oleksandr Tovsteniuk, Candidate of Economic Sciences, Associate Professor, Lesya Ukrainka Eastern European National University, Ukraine.

Oksana Kchilycha, Candidate of Economic Sciences, Associate Professor, Lesya Ukrainka Eastern European National University, Ukraine.

Myroslava Kushnir, Candidate of Economic Sciences, Senior Lecturer, Lesya Ukrainka Eastern European National University, Ukraine.

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Lubov Lipych (Ukraine), **Svitlana Bortnik** (Ukraine), **Oleksandr Tovsteniuk** (Ukraine), **Oksana Kchilycha** (Ukraine), **Myroslava Kushnir** (Ukraine)

PROSPECTS FOR THE INTRODUCTION OF INNOVATIONS BY AGRICULTURAL ENTERPRISES IN UKRAINE

Abstract

Innovative processes in the agriculture of Ukraine have specific characteristics. Most enterprises require substantial investments to finance innovative development. The article highlights the factors that influence the development of innovative investment activity of agricultural companies and analyzes their innovative and investment potential. It systematizes a set of risks and threats inherent in innovative and investment activity of agricultural enterprises using SWOT-analysis, which helps determine its possibilities. It offers a matrix for selecting strategic alternatives of innovative development of agricultural enterprises, which makes it possible to link three vectors of the innovative and investment activity: the level of innovative activity of enterprises, the scope of their activities, the most appropriate strategies for further development.

Keywords innovative activity, management of innovative and investment activities, agro-industrial companies

JEL Classification O13, O31, Q16

INTRODUCTION

Among the world's countries Ukraine has favorable climatic conditions, a significant resource potential and established traditions of agricultural production. However its agro-industrial complex (AIC) is characterized by insufficient levels of efficiency compared with developed countries, low innovation potential and investment attractiveness, resource-based orientation, reduced competitiveness and safety of agricultural products, irrational use of natural resources. Under the conditions of the global integration processes the development of measures to improve the functioning of the agro-industrial complex is becoming increasingly relevant. This is impossible without significant investments into high-tech production facilities and the latest technologies in the crop and livestock production. Today, most companies require major investments to upgrade their main means of production and expand its volumes, introduction of innovative technologies, procurement of new plant varieties and breeds of livestock, other innovative capital-intensive investment projects. Experts in public administration and managers of agricultural enterprises need to find new forms and methods of innovative and investment activity and its strategic sectors.

The goal of research. The goal of this research is to identify the characteristics and trends of innovative and investment activity of agricultural enterprises in Ukraine and to determine the factors that influence it. On this basis we attempt to define strategic directions of innovative and investment activities of enterprises.

1. LITERATURE REVIEW

There are many studies devoted to innovations, including innovation in various branches of the economy. Different interpretations of the concept of innovation can be used.

As regards Ukraine, there exist many scientific papers devoted to the specified issue. There are also scientific articles that examine individual aspects of the problem, such as the use of mathematical tools to predict innovative and technological development of the Ukrainian economy (Yurynets, Z., 2016).

Ukraine has a separate law regulating this activity. The Law of Ukraine "On Innovative Activity" (2007) defines innovations as newly formed (applied) and (or) improved competitive technologies, products or services as well as organizational and technical solutions of industrial, administrative or commercial character, which significantly improve the structure and quality production and (or) social sphere.

Therefore, innovation can be defined as a result of work obtained through the use of new scientific knowledge transforming the process of functioning and development of industrial and economic systems of agribusiness towards improving its efficiency and sustainability.

In agriculture, unlike other types of economic activity, the process of development and implementation of innovations happens slowly. A. Polehenka (2017) notes that in Ukraine because of long stages of development and testing of innovations, the results of fundamental research in the selection of agricultural crops give the biggest impact in 15-20 years after the beginning of funding and in the selection of livestock species – in 20-30 years or more. Research requires deep knowledge, time and appropriate material as well as material and technical basis. That is why it is carried out mainly in research institutions. The most common innovations are new varieties and hybrids of plants, breeds of animal, strains of microorganisms, models and modifications of agricultural equipment, technologies, chemicals and biological agents, economic developments, etc.

According to the Law of Ukraine "On investment activity" (1991) the components of innovative activity as a form of investment activity are: production of new types of equipment and technologies; implementation of long-term research programs; funding of fundamental research; development and introduction of new resource-saving technologies designed to improve social and environmental situation.

Therefore, understanding by the Ukrainian society of the exceptional importance of innovative development for the economy of Ukraine in general and its agricultural sector in particular is reflected in the development and adoption of a number of laws, programs, strategic frameworks, organizational and economic mechanisms of innovative activity, areas of innovation. Among the strategic priorities for 2011–2021 the Law of Ukraine "On priorities of innovative activity" (2011) defines technological renovation and development of agricultural complex; introduction of energy-efficient, resource-saving technologies, development of alternative energy sources; widespread use of technologies of clean production and environmental protection.

Among individual researchers A. Zorhach (2013) defines innovative and investment activity of companies as a form of activity, which helps introduce a set of technological, organizational and other innovations into the production process involving capital investments and actions that accompany investments' realization.

In the opinion of I. Kipioro (2014), for agricultural enterprises in the short term the crucial condition for development and stability will be the effectiveness of their innovative activity. In determining the nature of innovative development of agricultural enterprises V. Onegina (2015) interprets it in terms of quantitative and qualitative changes in the productive forces, economic relations and results of economic activity through innovation.

Innovation of agricultural enterprises, implementation by them of research and development are characterized by significant capital intensity. At the same time, the volumes of financial support of agricultural enterprises contribute to the quality of innovations and the speed of their implementation, which requires the use of their financial resources – both of their own and if they are insufficient – of the attracted ones including foreign investments.

Considering the problems of financial provision of innovations in the agro-industrial complex of Ukraine O. Datsiy (2011) believes that the main cause of stagnation in the agro-industrial complex of Ukraine is investment deficit caused by the curtailment of state financial support to agricultural enterprises and low investment attractiveness of individual segments of the agricultural sector. Therefore, the main priority in financial provision of innovative development of agricultural companies is the distribution of investments into advanced technologies and entrepreneurial activity on the market of high-tech products of agricultural production.

Innovation management of agricultural enterprises is an activity linked to the development of technological processes and upgrading of equipment, organization of production and its resource provision, conditions on financial markets and the markets of the means of labor for agricultural production, the state and dynamics of the system of financial and economic security. This activity occurs in the dynamic economic conditions of the external environment that determines the relevance of analysis of trends, patterns and characteristics of innovative and investment processes. Innovative and investment development of enterprises can be interpreted as a process of production and economic activity based on a continuous search and use of new methods and areas of realization of enterprises' potential in the changing environment related to the modification of the existing and creation of new products, technologies and markets.

Innovative processes in agriculture are characterized by some peculiar features that, in turn, affect the determination of the strategic principles of its development and management. They are described in the works of M. Polehenka (2017) and I. Kipioro I. (2014). They include:

- orientation of enterprises' strategies on sustainable development on the basis of a number of economic, social and environmental criteria for the effectiveness of their implementation;
- significant level of risks and uncertainty of the results of innovative projects;
- necessity to take into account specific regional characteristics in the development and implementation of innovations;
- the lack of effective market of innovations and underdevelopment of its infrastructure;
- state monopoly in the development, implementation and marketing of innovative products;
- high requirements to innovative products of agricultural enterprises regarding their quality and safety for people.

One should also mention such peculiar feature of agricultural production, which significantly affects the organization of innovative and investment activities in this field, as a large number of producers: from individual owners of land plots to big organizational structures (agricultural holdings along with households, farms, collective, private and lease holding agricultural enterprises, limited liability companies, joint stock companies, agricultural production cooperatives). This requires coordination of interests of agricultural production and complicates the process of management of its development. This is especially evident during the realization of strategic objectives. That is why the strategic directions of innovative development of agricultural enterprises must be specified taking into account the peculiarities of the innovation process in agricultural production, its complexities, diversity of the types of innovation and the requirements not only to economic efficiency but also to the safety of innovative agricultural products for people and the environment.

2. PRESENTATION OF THE MAIN MATERIAL OF THE RESEARCH

According to the data of the State Statistics Service of Ukraine (2016), the number of organizations that carry out scientific and technical activities decreases every year. If in 2010 scientific and technical works were carried out by 1303 organizations, then in 2015 – by only 978, 44.3% of which were related to the public sector, 40.3% – to the business sector, 15.4% – to higher education.

Insufficient funding, reduction in the number of scientific organizations and their employees has led to the reduction in the number of scientific and technical works in 2010–2015. Thus, the number of works performed in 2010 amounted to 62,5 thousand, in 2015 – to 41,1 thousand, of which more than two third were implemented in the production or used in other ways. Therefore, the decline was 34.2%.

In 2015 the share of performers of scientific research (researchers, technicians and support staff) in the total number of the employed population amounted to 0.50%, including researchers – 0.33%, which is one of the lowest figures in Europe. According to the data of Eurostat (2016), in 2014 this share was the highest in Finland (3.21% and 2.31%), Denmark (3.17% and 2.15%), Iceland (2.94% and 2.0%), Sweden (2.85% and 2.16%), Austria (2.85% and 1.74%) and Norway (2.62% and 1.84%); and the lowest – in Romania (0.51% and 0.32%), Bulgaria (0.76% and 0.55%), Turkey (0.77% and 0.65%) and Cyprus (0.82% and 0.61%).

The analysis of innovation potential of the Ukrainian economy in general according to such indicators as the share of expenditures on research and development in the state budget, the number of research organizations that perform scientific work, the number of the completed and implemented scientific works and inventions, demonstrates its decline. Innovative activities of enterprises remain low too.

A survey of innovate activity in the economy of Ukraine (the calculations were made according to the method of calculation of the total index of innovations (2015) showed that if the total index of innovations in 2010–2012 amounted to 31.6%, in 2013–2015 it decreased to 29.3%.

In 2015 the Patent Office of Ukraine received 7358 applications from scientific organizations on issuing intellectual property rights, including 26.0% – on inventions and 4.5% – on varieties of plants (State Statistics Service of Ukraine, 2015). However, it should be noted that the economic situation has deteriorated due to the consequences of the global financial crisis as well as political and military conflicts. The situation remains complicated regarding the implementation of the latest achievements of scientific and technological progress, recovery of high-tech agricultural production, introduction of new resource-saving technologies in production activities of enterprises. This reduces the competitiveness of Ukrainian agricultural products on the domestic and foreign markets because of the constant increase in costs in comparison with similar products in the developed countries.

However, in the recent years there have been some positive changes in agricultural production, which suggests that there has been a significant restructuring of conditions, factors and sources that determine it's innovative and investment potential and economic development. The agricultural sector of Ukraine is the only area of the national economy, which shows good financial results. The profitability of agricultural production is higher than average for the economy, but much lower than in the European countries. In the recent years profits earned in agricultural production of Ukraine have a positive dynamics.

The size of foreign direct investments into the Ukrainian economy in general and into its agriculture has a clear upward trend. However, according to the data of the State Statistics Committee of Ukraine, growth rates during the studied period are different (Table 1).

Table 1. Foreign direct investments into the agriculture of Ukraine in 2010–20015

Indicator	2010	2011	2012	2013	2014	2015
Capital investments into agriculture, forestry and fish industry, mln UAH	11568	17039	19411	19059	18796	30155
Foreign direct investments into Ukraine's economy, mln UAH	44806,0	50333,9	55296,8	57056,4	45744,8	43371,4
Rates of growth (decline) in foreign direct investments, %	105.10	112.33	109.86	103.18	80.17	94.81
Foreign direct investments into agriculture, mln UAH	730,7	736,3	728,8	776,9	617,0	500,6
Rates of growth (decline) in foreign direct investments into agriculture, forestry and fish industry, %	102.30	100.77	99.98	106.60	79.42	81.13
Foreign direct investments into agriculture, forestry and fish industry, % of the grand total	1.6	1.5	1.3	1.4	1.3	1.2

Agricultural enterprises should not only have sufficient innovative and investment potential, but also be able to use it effectively. The result of effective use of investment funds is the improvement in indicators of economic activity and financial condition of agricultural enterprises and the branch in general. The analysis shows that in 2015 the rate of foreign direct investments into Ukraine's economy decreased significantly – by 23% and amounted to 43371,4 million UAH. We also see a decline in investments into agriculture, forestry and fish industry in the general structure of foreign investments from 1.6% in 2010 to 1.2% in 2015.

According to the State Statistics Committee of Ukraine, instability in the indicators of production's profitability (Table 2) and its low value resulted in low investment attractiveness of the industry in the studied period, which could be explained by the lack of growth in production volumes and crop yields of agrarian enterprises.

Compared to the developed countries, lower productivity of the key agricultural crops and their profitability is explained not so much by the high dependence on climatic and weather conditions, but by the low technical and technological level of the agro-industrial complex. According to the estimates of M. Mohylova (2013), in the recent years the industry's average level of fund provision of 1 hectare of agricultural land in Ukraine has become 3-7 times lower compared to the developed countries. And this gap continues to deepen.

Exploring the economic influence of climate change on agricultural crops in Canada, Ochuodho T. and Lantz V. (2015) concluded that future climate changes will be affecting several sectors simultaneously, which will cause significant interaction effects between the economy's sectors. Over time the effects of interaction will significantly change the structure and rates of economic growth.

The macroeconomic analysis conducted by A. Kasatova and D. Zahmatov (2014) of the conditions of interaction of the financial and agricultural sector showed that the development of agricultural enterprises depends not only on weather conditions, but also on the funding and support of the industry by the government and the financial sector after joining the WTO. Today, it is not profitable for the financial sector to provide loans to agricultural enterprises due to the increased risks and losses that it has because of the preferential crediting of agricultural enterprises. Therefore, an important form of mutually beneficial financial cooperation and attraction of investments into innovative activity of agricultural enterprises is securitization of agricultural loans for agrarian enterprises.

According to the Ministry of Agrarian Policy and Food of Ukraine (2016), 75% of agribusiness companies have a limited access to financial resources as the main component of investment resources. Internal self-financing in the form of revenue savings (60%) and personal savings (13%) are the

Table 2. Profitability of agricultural production in agrarian enterprises of Ukraine, %

Indicator	2010	2011	2012	2013	2014	2015
The level of profitability of the activity of agricultural enterprises in Ukraine, %	17.5	19.3	16.3	8.3	9.3	30.5
Crop production						
Grain crops and legumenous cultures	13.9	26.1	15.8	2.4	25.7	42.6
Sunflower seeds	64.7	57.0	44.9	28.2	36.7	78.4
Sugar beet	16.7	36.5	15.7	3.1	17.8	27.7
Vegetables	–0.1	7.5	–0.6	7.5	14.5	32.0
Fruits and berries	14.9	17.9	9.6	127.5	65.8	58.3
Livestock production						
Milk	1.5	1.6	1.8	13.1	11.1	12.7
Cattle	–40.5	–33.2	–28.3	–41.3	–34.5	–16.9
Pork	2.1	1.7	1.8	0.2	5.6	12.6
Poultry meat	–3.3	–4.0	–2.4	–5.9	–12.6	–5.4
Eggs	42.1	46.5	52.6	47.6	58.8	60.9

most common source of financing for agribusiness companies. External financing through bank loans (28%) and trade credits from suppliers (11%) are rarely considered as an opportunity for agribusiness. Approximately one half of producers immediately sell 80-100% of their yields to replenish their working capital, which is extremely inefficient.

As of October 1, 2016 the Ukrainian agro-industrial complex realized 349 investment projects with investment volumes of 500 million UAH (98% of the total number of projects). Considering the number of investment projects in Ukraine's regions, we can see an increase in the number of projects in 2016 compared to 2015 in 5 regions – in the Vinnitsa region (45 projects), Kherson region (38 projects or 5% more), Poltava region (37 projects (an increase by 10 projects) or 38.5% more than in 2015), Cherkasy region (35 projects (an increase by 8 projects) or 30% more than in 2015) and Lviv region – 30 projects (or 20.0% more).

However, in general, in the recent years the number of the new technological processes implemented in the agro-industrial complex of Ukraine was only 25.7% compared to 2000. In 2012–2016 less than 8% of agricultural enterprises in Ukraine were engaged in the development of innovations, while in the developed countries this indicator is 30-70%, with the average figure for the European Union standing at 47% (Rocznik statystyczny rolnictwa, 2015).

The analysis shows that in the structure of expenditures of agricultural enterprises on technological innovations preference is given to the acquisition of machinery and equipment, which accounts for 100% of the total volume of expenditures on technological innovations. Statistical data also show that the main source of inflows into innovation activities of agricultural enterprises remains their own funds.

It should be noted that in the agricultural production the scope and rate of innovations is insufficient. Nowadays most companies solve the problems not of development, but of survive. Therefore, they are not capable of introducing innovations due to the lack of their own funds. In the current crisis and unstable economic situation interest rates on loans have increased while state financial assistance to the companies on innovations is insignificant.

Therefore, innovative and investment activities of agricultural enterprises are characterized by certain risks and threats arising from the general macroeconomic trends in the economy and the peculiarities of the process of agricultural production that have a significant impact on the processes of its development and management, and, therefore, require an in-depth analysis and evaluation.

Considering the available information we use the tools of SWOT-analysis (Table 3).

Therefore, it is necessary to focus the systems of management of agricultural enterprises on prevention and localization of these risks and threats. The SWOT-analysis identified some opportunities to enhance the innovative investment activity of agricultural enterprises. Therefore, in order to increase the efficiency and improve the management of innovative and investment development of agricultural companies it is necessary to develop a concept and strategy of innovative and investment activity. In developing the concept of strategic development it is necessary to remember that strategic planning of innovative and investment activity of agricultural enterprises is not a means to satisfy the current one-time needs, but should become a systematic process that is initiated and supported primarily by the state and enterprises.

Regarding the process of development of investment strategy to increase the efficiency of innovative and investment activities of agricultural enterprises, it should include the following stages:

- strategic analysis that determines the possible key factors of success;
- substantiation of innovative investment strategies and development of mechanisms for implementing the chosen strategies;
- development of programs and projects to be implemented within the chosen investment strategy; determination of a list of basic steps to ensure the fulfillment of goals and objectives;

Table 3. SWOT-analysis of innovative and investment activity of agricultural enterprises

Strengths	Weaknesses
• favorable location in relation to the markets and procurement of material resources; • favorable climatic conditions for production; • high fertility of soils; • large scale of production; • certain types of equipment correspond to the best world models; • availability of free production capacities; • ability to produce new products and diversification of activity	• low level of foreign and domestic investments, low level of exports; • low purchasing power of the population; • limited financial resources for the development of enterprises; • lack of awareness of potential consumers about the company's products; • low level of the production's diversification; • lack of experience on the foreign markets; lack of experience of attracting resources on the foreign markets; • inefficient system of credit support; • insufficient promotion of the company's products due to limited funding
Possibilities	**Threats**
• diversification of production and development of new markets for selling crop products; • the use of new advanced technologies and equipment of agricultural production; • the use of the innovative potential of agricultural science for the modernization of material and technical basis; • expansion of the basis of investment provision of innovative activity through preferential loans; • increased demand for food on the world market, which stimulates the development of agro-industrial complex. growing demand for environmentally friendly agricultural products; • increased volumes of production through the introduction of advanced technologies for the processing of products of agricultural raw materials (bioethanol, biogas); • favorable state policy towards liberalization of tax legislation; • expansion of the network of suppliers of raw materials and renewal of the technical base	• lack of systemic structural reforms in Ukraine; • outflow of skilled professionals from Ukraine; • rising energy costs raise the cost of production and lower profitability; • instability of the national currency; • lack of stable economic and political situation in the country and regions; • insufficient development of the regional infrastructure of the food markets; • high level of competition from foreign agricultural producers; low level of legal and antitrust protection of agricultural enterprises; • environmental degradation in agriculture and in the system of renewal of soil fertility; • lack of international certificates about the compliance of quality of agricultural products with international standards; • unstable pricing policy on fuel and energy carriers

- preliminary assessment of the efficiency of the selected investment projects; financial, economic, scientific and technical examination of programs (projects);
- identification of the necessary financial resources for investment projects; study of the possibilities for the formation of investment resources through alternative sources of funding;
- selection of ways to finance investment projects; optimization of the structure of sources for the formation of investment resources of enterprises;
- coordination of innovative investment projects with the existing development plans; post-audit, monitoring and control over the implementation of the chosen strategy.

As we see, during the stages of development of the strategy of innovative development of enterprises it is necessary to carry out the relevant analytical, planning and organizational procedures with the introduction of innovative changes in the activity of enterprises and substantiation of mechanisms to ensure the commitment to and gradual implementation of such changes.

We will outline the main strategic measures aimed at improving the efficiency of innovative and investment activity of agricultural enterprises (Figure 1).

The transition of agricultural enterprises to innovative ways of development and further adaptation of economic activities in agriculture to

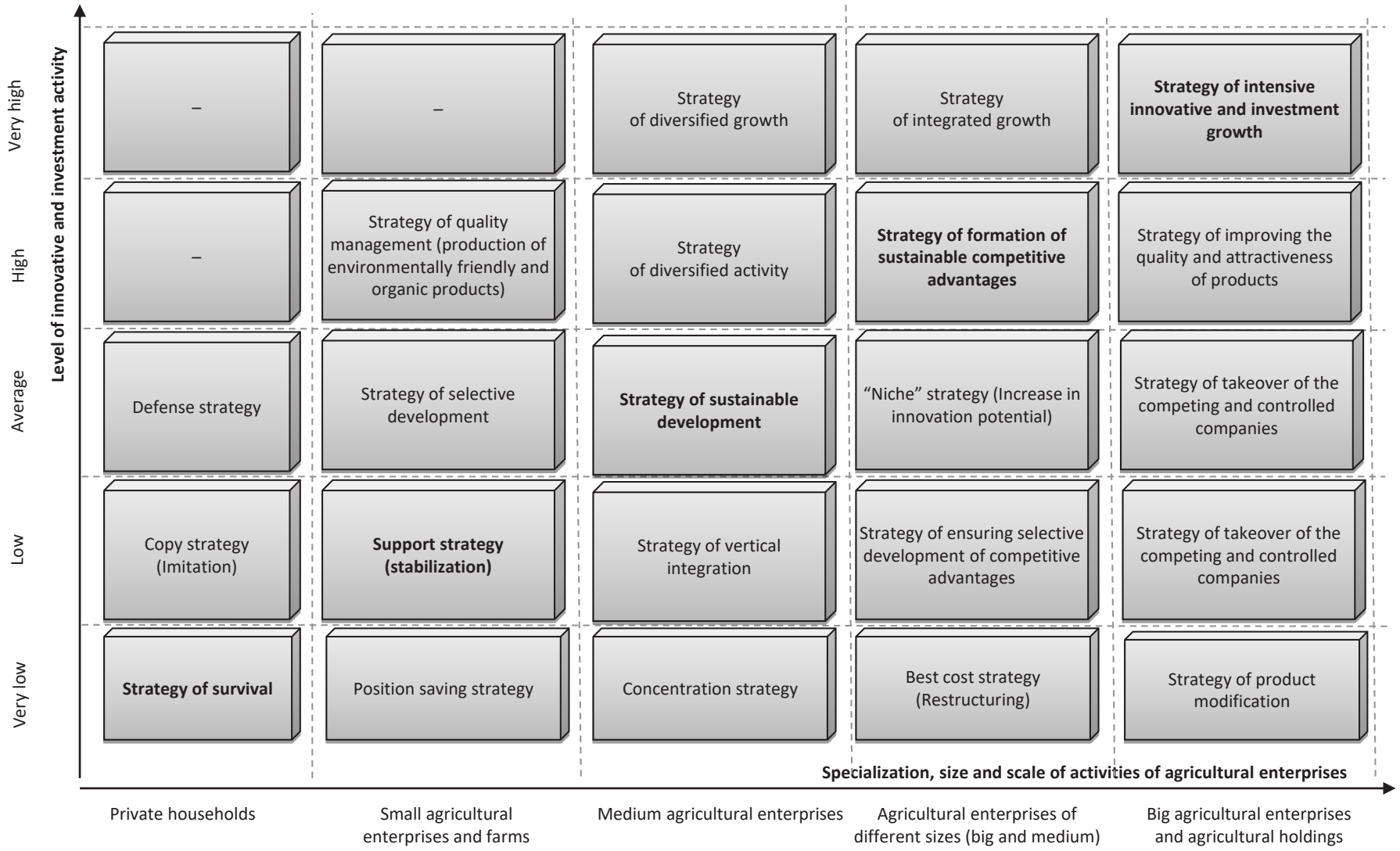

Figure 1. Alternative strategies for innovative activities of agricultural enterprises

the European and global conditions as well as increasing the efficiency of the agricultural sector of the economy require the realization of the state agrarian policy according to the following priorities:

- improvement of the investment climate and development of diversified mechanisms of attracting investment resources in the country taking into account specific features of agricultural production in every region of Ukraine;
- increase in the investment attractiveness of agro-industrial complex, information support, promotion of the benefits and production potential in order to modernize the technical and technological basis, intensification of the transfer of modern technologies in agricultural production on the Ukrainian market;
- improvement of the legal and regulatory provision for the functioning of agricultural enterprises, closing the gap between the national agrarian legislation and the principles of the Common Agricultural Policy of the EU countries as well as the regulations regarding the requirements of ISO;
- improvement in financial and credit provision of agricultural producers, creation of modern infrastructure and industry of attracting foreign direct investments (implementation of financial leasing, non-bank lending, insurance of agricultural risks, expansion of factoring and venture operations in agriculture), development of financial infrastructure of the agricultural sector;
- de-monopolization of the agrarian market of Ukraine and introduction of innovations into the activities of agricultural producers based on their improved access to financial resources and markets of the EU member states; search of opportunities to increase the volume of exports of agricultural products over the tariff quotas set within the "Association Agreement between Ukraine and the European Union";
- formation of cross-border agrarian clusters and agricultural techno-parks together with business partners from the neighboring EU countries, farmers from Poland, Hungary, Slovakia, Romania;
- development of organic agricultural production through the development of national rules of organic production based on the international requirements and standards, regulation of the issues of accreditation of authorized bodies regarding certification of organic production as well as certification and inspection of the process of organic production;
- development of logistical infrastructure and facilities for agricultural producers (creation of a network of modern control laboratories, unification of approaches to the identification of cattle, procurement centers, silos, elevators, logistics centers, improvement of their accessibility), creation of independent certified centers for the testing of food quality and safety, which on the basis of proper analysis would be able to label products with the quality mark in accordance with EU legislation;
- formation of effective mechanism of financial support of agricultural enterprises based on the target allocation of adequate financial resources, establishment of clear criteria for financing and conducting open competitive procedures by the same rules for all agricultural producers;
- optimization of taxation of agricultural enterprises, provision of subventions and subsidies by moving from direct support of agricultural producers to the financing of joint large-scale infrastructure projects;
- organization of training for the managers of agricultural enterprises, development of typical business plans for the implementation of innovative projects, formation of consultative school of business trainers on the issues of organization and management of innovative activities, which would consist of representatives of research institutions, advisory consulting services, state run public authorities.

CONCLUSIONS

The main problem to be solved to ensure the efficiency of agricultural production is the transfer of agricultural enterprises towards innovative development. As we have noted, the process of investing into the development of new technologies, production facilities and new products in agriculture is long (duration of developments may be 5–15 years and requires a lot of resources). Therefore, the success of realization of innovative strategy in the development of agricultural enterprises significantly depends on the state support of innovative processes. Activation of innovative processes, in turn, depends on the inflow of direct investments as well as the state's macroeconomic policy. Realization of the innovative potential of enterprises will depend on the chosen development strategy and the willingness and ability of management to implement innovations, institutional support and mechanisms to transfer scientific developments in the production processes, stable macroeconomic environment and state policy. In this regard it is important to determine the priorities of the state innovation policy in the agricultural sector of the economy.

The priority measures of the state innovation policy in the field of agriculture should include: adequate financial support for agricultural science, especially of the priority areas of research; initiation of formation of innovative agro-industrial clusters as units of the national innovation system; reimbursement of interests on loans for priority innovation projects; improvement of the legislative base for the protection and realization of intellectual property rights, facilitating the creation of non-bank financial institutions to finance innovative projects; facilitating the development of scientific and technical products, marketing of innovations; attracting international grants and financial institutions to participate in the financing of innovative projects.

Under the present conditions the priorities include: the strategy of intensive innovative and investment growth, the strategy of formation of stable competitive advantages, the strategy of improving the quality and attractiveness of products and the strategy of integrated innovative growth since all of them are aimed at ensuring a sustainable development of agricultural enterprises and increasing their innovative potential.

However, in view of the above, it should be noted that for successful implementation of the chosen strategies of innovative development of any area and level of activity it is necessary to provide adequate state support for agriculture and motivation of investors to finance and implement innovative production. This support should be based on the experience of the developed countries regarding innovative and technological development.

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