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### **STATE AND PROBLEMS OF TRANSFER OF INNOVATIONS IN LAND USE OF AGRICULTURAL ENTERPRISES**

*As a result of the marketing research it was determined the status and most essential issues that hamper the transfer of innovation in the field of protection and rational use of soil in agricultural production. Based on the results of the survey it was found that agricultural enterprises implement predominantly product-technical innovations, much less they use soil protecting innovations, it does not support the reproduction of soil fertility. Economic factors that hinder the implementation of innovations, were supplemented with institutional ones, leading among them is a sociocultural psychological type of owners and managers of agribusiness. The insufficient level of interaction of scientific institutions with agricultural enterprises is ascertained, the directions of activating this cooperation were identified. It is defined the need for periodic of such surveys to form the appropriate informational support about state and trends of innovation activities that will serve as a foundation for making management decisions at different levels.*

*Keywords: marketing of innovations, transfer of innovations, innovative activity, soil protection, soil fertility, land use, agricultural enterprises.*

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**Formulation of the problem generally.** Accelerated development of agricultural biotechnology and agricultural economic activity is an objective global trend, which, though not powerful enough but nevertheless affects the scope of domestic agricultural production. The innovation process in the agricultural sector of Ukrainian economy at present has the following characteristics: 1) significant limitations in introduction of innovative technologies, the prevalence of the practice of agribusiness resource of consumables schemes of production. Thus, according to information of NAAS, in 2005 only 2.9% of domestic agricultural enterprises used breakthrough technologies of world level, and now the number of such enterprises does not exceed 15%; 2) lack of sophistication of leading areas of innovation in the agricultural sector, which is the development and implementation of resource saving and environmental protection technologies); 3) the real absence of biotechnology research in agriculture; 4) not formed holistic vision of organizational structure of the innovation process in the agricultural sector [1].

The international community is taking measures for the development of countries which do not exercise such investments, because a significant number of countries are in the agricultural phase of social transformation. There is a discussion about free access to the intellectual property objects (hereinafter – IPO) in the field of biotechnology to achieve sustainable development in developing countries [2]. Japanese researchers confirm that international specialization has deepened so that there is protection as IPO even research tools, developing countries have no chance to have full access to them [3]. However, investors and scientists should also have financial incentives to continue studies. To overcome this internal contradiction of modern IPO protection system there is implementing international

projects to provide access to certain IPO concessional or free. Examples of initiatives for free access to IPO for developing countries in biotechnology include public IP resources for agriculture (PIPRA), projects CAMBIA (Centre for the Application of Molecular Biology to International Agriculture), the African Agricultural Technology Foundation (AATF), International HapMap Project of forming haplotype map of the human genome (International HapMap) [3]. The urgency of development initiatives for free access to IPO for developing countries in biotechnology is caused by the fact that about 86% of poor people in these countries depend for survival on agriculture [4].

The experience of China needs special attention. Now the Chinese provinces give funding for research specific industry features of the IPO use, particularly in agriculture. An example is the study on «Standardization and management of intellectual property», conducted at the expense of the Research Institute of Humanities and Social Sciences, which established the key provincial universities Zhejiang [5]. In some countries there are carried out targeted actions in this area. For example, Brazil's Ministry of Science and Technology promotes the science to the countryside with traveling exhibitions [6]. All this requires further in-depth study of marketing and transfer of innovation in the field of protection and rational use that determines the relevance of the chosen research topic.

**Analysis of recent researches and publications.** In economic literature, in various aspects of transfer of innovations and innovation development problems of agricultural enterprises there were engaged the following scientists: A.A. Adenle, S.K. Sowe, G. Parayil, O. Aginam [3], S.E. Cozzens, E. Kallerud, L. Ackers, B. Gill, J. Harper, T.S. Pereira, N. Zarb-Adami [6], O.V. Goncharenko [9], T.P. Kalna-Dubiniuk, A.M. Lytovchenko [14, 15], I.V. Kalachova, O.V. Shubravska, K.O. Prokopenko [10], Yu.A. Kuznetsova [11], W. Ma [5], V.V. Shyrma [12, 13] and other. However, the issue of marketing of innovations in land use of agricultural enterprises in the context of transfer of soil protection innovation in the agricultural sector is not sufficiently studied in the scientific literature, and needs more detailed consideration.

**The aim of this article** is based on marketing research to determine the status and most essential problems that hamper the transfer of innovation in the field of protection and rational use of soil in agricultural production.

**Basic material.** It should be noted, that one of the macroeconomic problems that hamper innovation is insufficient financing of scientific and technical work in the agricultural sector, which leads to negative trends in the dynamics of human capacity of science and production innovation. To demonstrate this point let's show one example. Thus, according to the Ministry of Education and Science of Ukraine, real costs on science now amount to 4.2 billion UAH, i.e. less than 200 million USD, representing just 0.25% of Ukrainian GNP.

The Minister said that 60% of this amount accounted for the National Academy of Sciences of Ukraine and 10% – for all Ukrainian universities. The minister also said the figures to compare science funding in other countries. It turned out that the funds for science of a leading European university in more than spending across our country. In Poland, there are 5 billion USD, Russia – 20, China – 80 in the United States – 350 billion USD. «In fact, we do not funding research in the modern sense of the word. The funds that we spend only to support the livelihoods of the system», – said the Minister [7]. However, according to M. Strikha, Ukraine remains one of the leading scientific countries. Our country is capable of producing primary fundamental scientific results, although science funding remains insufficient. «Despite the support, our researchers publish articles about six thousand a year in journals, which are known Scientometrics database Web of Science, and are 10 times more efficient than their American counterparts», – M. Strikha noted [8].

Thus, despite the chronic underfunding Ukrainian science continues to create research products. The recently adopted by Parliament Law of Ukraine «On Scientific and Scientific-Technical Activity», though predicts that in 2025 funding of research areas from all sources should reach the level of 3% of

GNP, but this idea does not inspire optimism given at least a adoption of the State budget of Ukraine for 2016, which has once again significantly reduced the amount of budgetary funds allocated for science. However the new Law of Ukraine «On Scientific and Scientific-Technical Activity» provides for the creation of new approaches to the management and financing of science, namely:

- Ensuring efficiency and transparency in the implementation of research and developments and on their financing;

- Improving the efficiency of interaction between members of the scientific community, governmental agencies and the real economy in the formation and implementation of state policy in the field of scientific and technical activities;

- Legal framework for the commercialization of basic research, applied research, scientific and technical (experimental) developments that public research institutions provide.

The specified Law also provides some innovation in terms of commercialization of research, including research institutions may enter into business partnerships with its intellectual property; Law proposes mechanism to stimulate targeted research results quickly starts working in specific areas of the real economy. We hope that these and other provisions and innovations not just remain declarations and take their practical implementation and appropriate financial support, because otherwise hope for a radical solution of the existing problems is unjustified optimism. It should be borne in mind that, according to American experts in marketing, even in the USA, on average, eight out of 10 innovations lose in the market or do not reach it at all, but two innovations that introduce, cover all incurred charges.

Obstacles to innovation of agricultural enterprises are inefficient legal, law enforcement, judicial authorities, their asymmetry; existing economic order which creates additional costs and innovation is unfavorable to innovation; high transaction costs of innovation; the dominance of short-term interests over the long term in businesses; lack of infrastructure and personnel for innovation. However, the existing problems of innovation of domestic enterprises cannot be reduced only to a shortage of financial resources, a significant part of their institutional problems caused by the micro and macro levels. To exit the «institutional trap» that prevents the switch to an innovative path of agrarian sector, we should create conditions for obtaining innovation rents, motives and incentives for innovation development and innovation to limit alternative ways to increase profits [9].

According to a survey, I.V. Kalachova, O.V. Shubravska, K.O. Prokopenko set the basic characteristics of the innovation process in enterprises of the agricultural sector: limited use of their innovation enterprises; the degree of interdependence of innovation activity the enterprise and its profitability; diversification of innovation of effective businesses; absolute predominance of own funds of financing sources of innovation; low level of enterprises institutional sources of information on innovation; lack of availability of positive effects on the environment from the introduction of agro innovations. Also there were identified the major causes of inhibition of innovation processes in agriculture – insufficient financial provision of enterprises, low access to credit and government support for modernization of sector, lack of information system provision of innovation process [10].

Analysis of the main components of the innovation potential of agricultural enterprises showed in many of them low level. By the analysis of innovation of agricultural enterprises of Lugansk region, Yu.A. Kuznetsova found that the main hinder innovation, economic factors, is the lack of own funds, the high cost of innovation, lack of financial support from the state. The main internal factors that impede innovation: lack of information about new technologies, lack of qualified staff, low innovation capacity of enterprises lack information about markets, lack of cooperative relations. According to the survey results revealed that 19.7% of respondents and 60% of those engaged in innovative activities are of «active innovators»; the «passive innovators» classified 13.2 and 40% respectively. 67.1% of enterprises do not carry out innovation, including the «potential innovators» - 46.1% of all respondents or 68.6% of those not engaged in innovation and the rest – «conservatives». The most attractive form of innovation for most

managers of agrarian enterprises is cooperation. It allows accumulating financial resources for purchasing agro innovations and allows agricultural enterprises to diversify such a high risk investment [11].

According to the survey of heads of enterprises in the field of crop production in the Zhytomyr oblast V.V. Shyrma found that the types of innovation that enterprises often implement in this industry include the cultivation of new varieties of crops, improve production (of fertilizers, chemicals, cleaning, etc.) and administrative processes. The main reasons for rejection of the implementation of innovation over 65.5% of respondents believe a lack of financial resources, 24.1% – do not understand the need for innovation, and the lack of qualified scientific personnel, unsatisfactory range of scientific research and innovation unfounded types that implement enterprise [12, p. 8].

Summarizing the results of research by A.V. Goncharenko, I.V. Kalachova, Yu.A. Kuznetsova, K.O. Prokopenko, V.V. Shyrma, O.V. Shubravska, we note that the key but not the only obstacle for transfer innovations in agricultural production is the lack of financial resources in agricultural enterprises. It is not less important, in our view, the lack of institutional prerequisites for the commercial transfer of agricultural innovation. The effectiveness of the formation of these preconditions is largely dependent from informal institutions, primarily from sociocultural psychological type of owners of agribusiness, who is now inherent insufficient level of investment demand for innovations in the field of protection and rational use of soils through the possibility of extracting and appropriation of differential rent primarily land rent of the first kind and global rent (or «export-price quasi rent»). Such informal institutions often have access to economic and political power, influence on the formation (and/or braking depending on their economic interests) of formal institutions, so-called «rules of the game».

At the initiative of author it was firstly conducted a sample survey of agricultural enterprises for their innovation in the field of protection and rational use of soil resources, allowing us to draw some conclusions about the main trends and problems that hinder the development of innovation in this area.

The basis of the survey was the specially prepared questionnaire, formed by author based on modifications and amendments of the questionnaire, which was developed in the work of V.V. Shyrma [13, p. 202–205]. Key figures mentioned questionnaire were completed with specific areas of research, namely the protection and sustainable use of soil. Learning process of innovation farms that specialized in plant growing field study was conducted on the basis of the results of sociometric survey of key experts and specialists. The proposed question to respondents conventionally divided into several types: 1) general questions about crops that are grown, the status of respondents during the operation of the business, sources of financing economic activity etc.; 2) issue of enterprises introduced the main types of innovation; 3) selection reasons implementing certain types of innovations or reject them; 4) other questions about effectiveness.

Typically, there are used the following methods for determining the sample size:

1. Free approach. For example, generally stipulate that a sufficient number of respondents are 25 enterprises, or 5% of the totality.
2. Similar to other studies.
3. From the value of costs when the amount can be used for research, determined in advance.
4. Based on the statistical analysis. When the sample size is determined based on the terms of reliability and credibility of the results.

Therefore, in the study it was interviewed key professionals and experts of 25 agricultural enterprises of Kharkiv region. At the time of the survey in the region in the field of agriculture 500 agricultural enterprises operated. The fraction of the sample is 5%. The selection of respondents was conducted randomly: one respondent filled application form only once. Justification of respondents was carried out by analyzing the maximum permissible error, which is typical for the selected sample (25 economic entities):

$$\Delta = \sqrt{\frac{t^2 \omega(1-\omega)N}{n}}, \quad (1)$$

where  $\Delta$  – the maximum permissible error of representative sample;  $\omega$  – the degree of variation of distribution;  $t$  – normal deviation, which corresponds to a given value of reliable probability that usually take at more than 0.95%;  $N$  – the volume of the general totality;  $n$  – the volume of the selected sample.

Since the degree of variation of responses to questions proposed within the general totality is unknown, the value  $\omega$  taken at 0.05, which allows taking into account the highest possible degree of variation of responses. Reliable probability -at 0.95 ( $1 - \omega$ ), for which the deviation is normal  $t = 1,96$ . On the basis of the maximum permissible error of representativeness will be equal to:

$$\Delta = \sqrt{\frac{1,96^2 \cdot 0,5 \cdot (1 - 0,5) \cdot 500}{25}} = 4,38$$

The obtained value limit of error means that within the general totality responses deviate from the answers of selected respondents less than 4.4%. This value bias is appropriate to transfer the results of sociometric survey on the general totality, ie all agricultural enterprises of Kharkiv region. Now consider the results of the survey author.

In order to assess the level of innovation activity of respondents, and to establish the degree of understanding the conceptual essence of «innovation», the study determined whether respondents engaged in this activity. On this question 68% of respondents answered positively, and 20% indicated that their enterprises do not carried out innovation activities. The negative trend is that 12% of respondents could not answer the question, indicating the lack of understanding the essence of innovation and it reflects their sociocultural psychological type.

Among the types of innovations that the enterprises introduce the most, respondents identified the introduction of new means of mechanization of production (70.6%), improving methods of soil cultivation (64.7%), the use of new fertilizer types and improve the system of fertilization (52.9%) (Fig. 1). Nearly half of respondents (47.1%) use new types of plant protection products, slightly less (41.2%), other manufacturing processes improve, a third of the studied subjects (29.4%) engaged in the cultivation of new crop varieties and improving management processes.

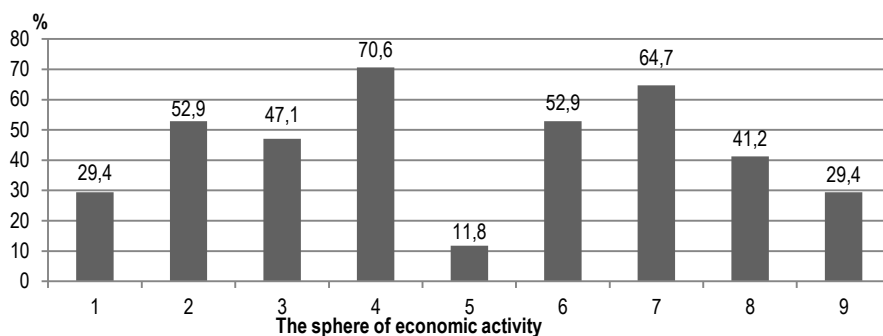
The main reasons for refusal of innovative activity is the lack of financial resources- 40% of main agronomists and experts believe in this, a fifth of respondents do not see the need in implementing innovative activity, which, again, is the result of manifestation of sociocultural psychological type. The same number of respondents does not conduct innovation due to low staff qualifications and significant risks associated with the implementation of innovative projects.

One of the main obstacles to the development of innovative enterprises in crop production is not harmonization their interaction with the scientific area as a major source of innovation (28% of agricultural enterprises do not cooperate with research institutions), of which the vast majority (71.4%) do not cooperate because of the absence of such needs, 14.3% – due to lack of information on the development of research institutions.

Given that 68% of respondents engaged in innovative activities, and 72% – interact with the scientific sphere, we can conclude that the enterprises (at least 4%) collaborate with research organizations for example, in consulting services and more. At the same time it should be borne in mind that some of the enterprises in innovation can cooperate with private organizations.

So, one of the activities of research institutions should be establishing relationships with enterprises. For this it is necessary, first, to study demand and the further organization of the same in terms of the most important consumer innovations objects. Secondly, it is necessary to form a pricing policy that

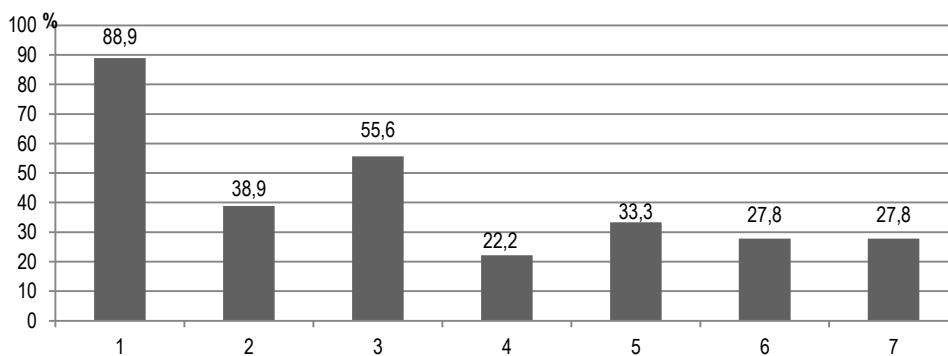
would suit both research organizations and agricultural enterprises. It is important also the formation of a complete provision information system of potential consumers about the activities of research institutions, as well as implementation works directly on demand enterprises.



Note: 1 – Growing of new varieties of agricultural crops; 2 – the use of new fertilizers` types; 3 – the use of new types of plant protection ways; 4 – introduction of new means of production mechanization; 5 – the conquest of new markets; 6 – the improvement of fertilization system; 7 – the improvement of cultivation methods; 8 – the improvement of other production processes (plant protection, harvesting, etc.); 9 – the improvement of management processes.

**Figure 1 – Distribution of respondents` answers on areas of economic process, which implements innovations (author`s research)**

Among those enterprises that collaborate with research institutions, priority areas of cooperation are: purchasing new, more productive varieties of plants (88.9%); purchase of new agricultural machinery (55.6%); acquisition of new chemicals (38.9%); improvement of system of fertilization (33.3%); analysis of soil, agrochemical survey (27.8%); business plans, process maps, cost estimates and other documentation (27.8%); development and crop rotation study (22.2%) (Fig. 2).



Note: 1 – purchasing new, more productive varieties of plants; 2 – the purchase of new chemicals; 3 – the acquisition of new advanced technique for agricultural purposes; 4 – development and justification of rotation; 5 – improvement of system of fertilization; 6 – business plans, process maps, cost estimates and other documentation; 7 – analysis of soil, agrochemical examination

**Figure 2 – Distribution of respondents` answers on areas of cooperation of enterprises with research organizations (author`s research)**

Therefore, the main focus in the interaction of enterprises with research organizations is purchasing of new, more productive crop varieties that are dominated by product-technical innovations, while the share of services is much lower. At the same time, such measures to promote the reproduction of soil fertility as the use of scientifically based of crop rotation, improved of system of fertilization, soil analysis and agrochemical survey in collaboration with research institutions engaged less than one third of those of enterprises who cooperates. However in general, the activities on monitoring and improving soil quality are typical for more than half of the surveyed enterprises (Fig. 3). However, the part of respondents has not cooperated with research organizations, but cooperates with the private sector of the economy, which confirms previous findings about not established contacts of subjects of scientific sphere with agricultural producers. However, a significant portion of enterprises, especially those that are part of the holdings have their own sophisticated agrochemical laboratory and can independently carry out laboratory tests of soil. It was found that 40% of respondents do not conduct laboratory tests of soil, while 80% use measures to improve soil quality, 56% use a new system of fertilization. One of the questions concerns of how scientifically based and can be effective measures to improve soil quality and fertilization systems changes, if they are carried out without prior examination of the soil.

Considering the objective necessity of ecologization of agricultural land use urgent is the development of organic farming. The survey found that 24% of agricultural enterprises practicing organic farming. However, these results contradict the real statistics by Organic Federation of Ukraine, according to which in 2013 in Ukraine were registered 175 «organic» agricultural enterprises, which is 0.29% of the total, and the total area of certified organic agricultural land was 393.4 thousand ha. These results indicate a lack of awareness of specialists of enterprises about the nature and characteristics of organic farming.

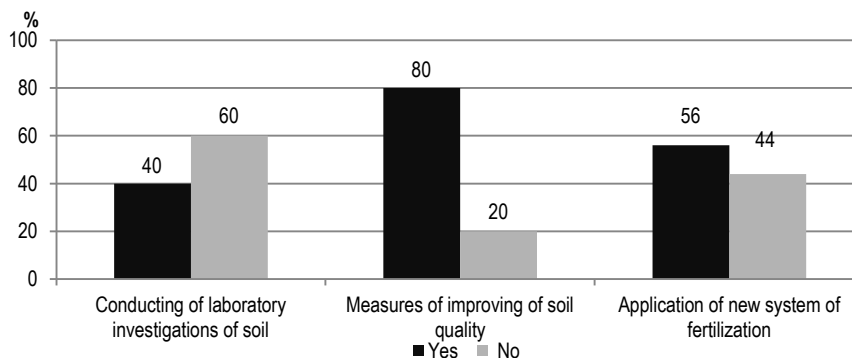


Figure 3 – Distribution of respondents' answers on the activities on monitoring and improving soil quality (author's research)

At the same time, the main reasons that agricultural enterprises do not introduce organic farming are: lack of financial resources (38.9%), insufficiency of information on organic farming (11.1%), economic ineffectiveness (5.6%), and other reason (11.1%). Thus 27.8% of respondents could not answer that may be indicative for their insufficiency awareness of organic farming and uncertainty about the expediency of introducing its basic principles.

Summarizing the results of the research status and the most significant problems that impede the transfer of innovation in the field of protection and rational use of soil in agricultural production, it should be noted that typically sociocultural psychological type of Ukrainian agricultural producers is inherent conservativeness and insufficient of motivation to conducting the innovative activity. The fact, that the dissemination of innovation happens slowly due to conservativeness and risk-averse of farmers, noted by other researchers [14].

By A.M. Lytovchenko studies it was established that from 100% of the specialists conditionally

covered with information on innovations, only 40% take it positively during familiarization. However, only 10% test innovation, of those who took the information. Of those who tested the innovation, only 50% on average are able to track results and identify it. So we have only 2% of innovators that are already in the first year of introduction of innovation determine the outcome and receive a positive economic effect. Among the main reasons for the low rate of diffusion of innovation in crop it is noted conservative management of the entities on innovation, low level of profitability in most crop producers, limited access to information, insufficient training of consultants to explain the complexity of impacts and economic effects of innovation, etc. [15, p. 8].

Among the organizational characteristics of transfer of innovation in crop production on the microeconomic level it was marked preference of interaction with the experts, which was set by personal contact or contact which took place on the advice of friends after receiving effect in their work. There is also the flexibility of management entities concerning the choice of organizational innovation agenda in case of awareness of benefits of their use. Manufacturers quickly agreed with the proposals to attend events where they could clearly see the results of innovation in other farms. In general, they are likely to go to informal arrangements, although not accept contractual cooperation with experts of consulting services as a problem. There is a perception of the process of contracting with the appropriate paper design as excessive spending time [15, p. 8].

Thus, based on the results of the survey we may indicate a lack of scale transfer of innovation in the protection and rational use of soil in agricultural production, due to both objective and subjective factors. The need for periodic inspections of such importance predetermined enhance innovation in agricultural production, which requires appropriate management decisions to develop innovative policies based on factual information about the characteristics of innovation and its inhibition causes. Obviously, such investigations must periodically carry out by State Statistics Service of Ukraine in scales of entire country. For this it would be worth to carry out state statistical observation of innovative activity of agricultural enterprises by methodology similar to that which currently service uses during research of innovative activity of industrial enterprises.

**Conclusions.** The study determined the status and most essential issues that hamper the transfer of innovation in the protection and rational use of soil in agricultural production. According to the survey, 68% of surveyed enterprises engaged in crop innovation, 20% do not exercise, and 12% of respondents are undecided on the issue, which may indicate a lack of understanding of the essence of the innovation. The main reasons for refusal of innovative activity is the lack of financial resources – 40% of main agronomists and experts believe in this fact, a fifth of respondents does not see the need in implementing innovation, which is the result of manifestation of sociocultural psychological type. The same number of respondents does not conduct innovation due to low staff qualifications and significant risks associated with the implementation of innovative projects. One of the main obstacles to the development of innovative enterprises in crop is harmonization of their interaction with the scientific area as a major source of innovation (28% of farms do not cooperate with research institutions), of which the vast majority (71.4%) do not cooperate due to the lack of such requirements. Among those companies that collaborate with research institutions, priority areas of cooperation are: purchasing new, more productive varieties of plants (88.9%); acquisition of new agricultural machinery use (55.6%); new acquisition of chemicals (38.9%); improvement of fertilization (33.3%); analysis of soil agrochemical survey (27.8%); business plans, process maps, cost estimates and other documentation (27.8%); development and crop rotation study (22.2%). One of the strategic areas of research in the field of protection and rational use of the soil should be nano- and nanobiotechnology reproduction of soil fertility and increase their productivity, corresponding technological structure VI (2010–2050). Working in this direction, you can create breakthrough innovation, the use of which can provide innovative and proactive qualitatively new model of agricultural production.

The obtained results develop scientific basis of transfer of agricultural innovations in the part of identification of problems and supplement by institutional factors that prevent implementation of soil protection innovations. **Further research** should aim at justification of institutional basis of activating transfer of agricultural innovations.



## Розділ 1 Маркетинг інновацій

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#### **Стан і проблеми трансферу інновацій у землекористуванні аграрних підприємств**

*За результатами маркетингового дослідження визначено стан і найістотніші проблеми, які перешкоджають трансферу інновацій у сфері охорони й раціонального використання ґрунтів в агровиробництво. На основі результатів проведеного опитування з'ясовано, що аграрні підприємства запроваджують переважно продуктово-технічні інновації, значно рідше застосовують ґрунтоохоронні інновації, що не сприяє відтворенню родючості ґрунтів. Економічні чинники, що стримують запровадження інновацій, доповнено інституційними, провідним серед яких є соціокультурний психотип власників і менеджерів агробізнесу. Констатовано недостатній рівень взаємодії наукових установ з аграрними підприємствами, визначено напрями активізації цієї співпраці. Визначено необхідність періодичного проведення таких обстежень для формування належного інформаційного забезпечення про стан і тенденції інноваційної діяльності, що слугуватиме підґрунтям для прийняття управлінських рішень на різних рівнях.*

Ключові слова: маркетинг інновацій, трансфер інновацій, інноваційна діяльність, охорона ґрунтів, родючість ґрунтів, землекористування, аграрні підприємства.

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#### **Состояние и проблемы трансфера инноваций в землепользовании аграрных предприятий**

*По результатам маркетингового исследования определено состояние и существенные проблемы, которые препятствуют трансферу инноваций в сфере охраны и рационального использования почв в агропроизводстве. На основе результатов проведенного опроса выяснилось, что аграрные предприятия внедряют преимущественно продуктово-технические инновации, значительно реже применяют почвоохраняющие инновации, что не способствует воспроизводству плодородия почв. Экономические факторы, сдерживающие внедрение инноваций, дополнены институциональными, ведущим среди которых является социокультурный психотип владельцев и менеджеров агробизнеса. Констатировано недостаточный уровень взаимодействия научных учреждений с аграрными предприятиями, определены направления активизации этого сотрудничества. Определена необходимость периодического проведения таких обследований для формирования надлежащего информационного обеспечения о состоянии и тенденциях инновационной деятельности, что послужит основой для принятия управленческих решений на разных уровнях.*

Ключевые слова: маркетинг инноваций, трансфер инноваций, инновационная деятельность, охрана почв, плодородие почв, землепользования, аграрные предприятия.

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