PARTICULARITĂŢLE DE DEZVOLTARE A FERMELOR-PILOT DE TESTARE ŞI PREGĂTIRE DIN LITUANIA

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Funcţia principală a fermelor-pilot de testare şi pregătire este de a permite instituţiilor de învăţământ şi de formare în domeniul agrar de a efectua experimente de precizie cu plante şi animale în condiţii de mediu naturale şi artificiale, de a oferi un cadru cercetările teoretice şi aplicative, de a stimula inovaţiile şi de a promova cele mai recente realizări ştiinţifice în agricultură.

Fermele-pilot dispun de baze de cercetare şi aplicarea şi implementarea noilor tehnologii. Sarcina lor este de a promova cunoaşterea ştiinţifică, folosind o varietate de mass-media: de a organiza conferinţe, seminare, ateliere de lucru în teren, de a participa la evenimente, prezentarea inovaţiilor în agricultură. Din păcate, nu toate aceste ferme îndeplinesc aşteptările asociate cu destinaţia lor. Din cauza unor circumstanţe diferite, multe dintre ele acordă prioritate activitatăţii economice – producţia agricolă inovatoare, dar rezultatele lor sunt diferite. Domeniul de cercetare-dezvoltare a fermelor pilot este prea îngust sau şi-a pierdut din relevanţă. Realizarea diseminării rezultatelor cercetării este nesistematică, spontană şi nu este garantat feedback-ul cu beneficiarii acestor rezultate.

Acest lucru ridică necesitatea de a evalua informaţia cu privire la activitatea fermelor pilot din Lituania, de a dezvălui specificul activităţilor lor, priorităţile şi de a determina motivele acestor deficienţe. Scopul acestui articol este de a oferi recomandări pentru fermele pilot în dezvoltarea afacerilor agricole.

În timpul cercetării au fost analizate documentele fermelor pilot lituaniene şi au fost efectuate interviuri cu managerii lor. În baza analizei şi a evaluărilor efectuate, sunt prezentate recomandări de dezvoltare a afacerilor pentru fermele-pilot.

Cuvinte cheie: *pilot, formare, ferme de testare ferme-pilot de testare şi pregătire, agricultură.*

DEVELOPMENT PECULIARITIES OF LITHUANIAN PILOT, TRAINING AND TESTING FARMS

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The main function of Lithuanian pilot, training and testing farms (hereinafter – PTT farms) is to enable the agricultural education and training institutions to carry out precision experiments with plants and animals in natural and artificial environmental conditions, provide a framework for theoretical and applied research, to develop innovation and to promote the latest scientific achievements in agriculture.

PTT farms have bases for research and new technologies application and implementation. Their task is to promote scientific knowledge, using a variety of media: to organize conferences, seminars, workshops, field days, to participate in events, presenting the innovations in agriculture. Unfortunately not all of these PTT farms fulfil the expectations, associated with their destination. Due to different circumstances, many of them gives priority to economic activity – the innovative agricultural production, but their results are different. PTT farms scientific and experimental development research areas are too narrow or have lost their relevance. Carried out dissemination of research results is unsystematic, spontaneous and not guaranteed feedback with the beneficiaries of these results.

*This raises the need to evaluate Lithuania PTT farms activity data, to reveal specifics of their activities, priorities and determine the reasons of these weaknesses. The **aim** of this article is to provide recommendations for PTT farm business development.*

During the investigation there have been analyzed Lithuanian's PTT farms documents and conducted expert interviews with their managers. On the basis of carried out analysis and evaluation, there were presented business development recommendations for PTT farms.

Keywords: *pilot, training, test farm, PTT farms, agriculture.*

JEL Classification: D4, D41, H2, L26, L32, M1

Introduction. Scientific research and experimental development is one of the main factors for economic growth and competitiveness increasing [5]. In such research and development of agricultural sector in Lithuania there are engaged universities, research institutes, and both – private and state-owned farms.

Lithuanian Ministry of Agriculture (hereinafter – LMA) is responsible for the agricultural development policy. In order to ensure a sustainable and modern agricultural development based on science and innovation, Minister of LMA issued an order No. 3D-434, where pilot, training and testing farms in Lithuania have been identified, whose primary purpose is to create conditions for agricultural education and training institutions to perform precision experiments with plants and animals in natural and artificial environmental conditions, to provide a framework for theoretical and applied research perform, to promote the development of innovation and the latest scientific advances in agriculture [2].

PTT farms have bases for research and new technologies application and implementation. Their primary task is to promote scientific knowledge and achievements by using a variety of dissemination tools: to organize conferences, seminars, workshops, field days, to be involved in events, presenting the innovations in agricultural sector [3].

Unfortunately, not all of these PTT farms fulfil these days' expectations with the main purpose of the PTT [4]. Due to circumstances, many of them give priority to economic activity –innovative agricultural production, but here results are also different. Executed research and directions of development areas for the part of PTT farms are too narrow or have lost today's relevance. Ongoing dissemination of research results is unstructured, spontaneous, very often without feedback from beneficiaries of these results.

Analysis of PTT farms activities allows to make recommendations for the LMA for the future development of PTT farms, by setting basic directions of their research, necessary investments and ways of their financing, research results dissemination system creation.

The **aim** of the article is to evaluate Lithuanian PTT farm activity data, to reveal their activity peculiarities, priority areas, perspectives and to present recommendations for the PTT farms future development and their scientific results dissemination.

Objectives:

1. To evaluate Lithuania PTT farms business characteristics and perspectives (financial, economic, social etc.).
2. To reveal possible ways of dissemination of research results of PTT farms for wide range of farmers.
3. The set recommendation of the PTT farms operating in Lithuania priority business prospects and results dissemination opportunities.

Methods. There were conducted PTT farms activity analysis and evaluation. Analyses were carried out in financial, economic and social aspects. The PTT farms were divided into 3 groups: limited liability companies; branches of Lithuanian Agriculture and Forestry Sciences Centre (hereinafter – LAFSC) and test stations and structural units of educational institutions:

1. LLC „Dotnuvos eksperimentinis ūkis", LLC „Upytės eksperimentinis ūkis", LLC „Šilutės veislininkystė", LLC „Šeduvos avininkystė".
2. LAFSC Test department, LAFSC SDI experimental base, LAFSC Joniškėlis testing station, LAFSC Vokė branch, LAFSC Vėžaičiai branch, LAFSC Rumokai testing station, LAFSC Upytės testing station, LAFSC Elmininkai testing station LAFSC Perlojos testing station.
3. Aleksandras Stulginskis University (hereinafter – ASU) Research Station, ASU training farm, Lithuanian University of Health Sciences (hereinafter – LUHS) Institute of Husbandry Experimental Development and Testing Department, LUHS practical training and testing center, Zemaitija College training farm.

Such categorization of PTT farms allowed to apply different methods of analysis and evaluation for individual groups of farms, according to their goals and made possible to properly compare the obtained results and to offer solutions on the basis of them.

Data on the PTT farms, their specialization, research directions and the main functions are presented in Table 1.

Table 1

PTT farms specialization, research directions and the main functions of activity

PTT farm	Specialization	Directions of main research / experimental development	Main activity funkcions
LLC „Dotnuvos eksperimentinis ūkis"	Dairy and beef livestock, crops, perennial grasses and other seed production	feed and seed production, livestock breeding	Innovative economic activities
LLC „Šeduvos avininkystė"	Sheep farming	Storage of sheep gene pool	Economic activity, science
LLC „Šilutės veislininkystė"	Cattle Breeding	Cattle productivity control	Economic activity, science
LLC „Upytės eksperimentinis ūkis"	Dairy and beef livestock	Cattle breeding, crop farming	Innovative activities
LAFSC Vokė branch	Crop farming on poor soils	Targeted and applied research of agricultural sciences, potato, lupine and buckwheat breeding and propagation of new varieties	Science, economic activity
LAFSC Vėžaičiai branch	Crop garming in hilly lands	Soil surveys, crop rotations and long-term grassland establishment, updating and use; ecological studies. Introduction of energy crops and cultivation techniques for acid soils	Science
LAFSC Joniškėlis testing station	Crop production in the karst region, organic crop production	Crop farming systems for spring barley, winter and spring wheat, oat, pea and perennial herb growing, organic seed production	Science, the innovative activities
LAFSC Rumokai testing station	Crop, specialization – sugar beet cultivation	Sugar beet and cereal agrotechnical improvement	Science, economic activity
LAFSC Upytės testing station	Crop, specialization – fiber crops	Fibrous plant technology research	Science, economic activity
LAFSC Elmininkai testing station	Crop, specialization – potato seed production	Agrobiological and agrotechnological research of potatoes and other crops	Science, economic activity
LAFSC Perlojos testing station	Crop farming on poor soils	Basic farming systems research. Sandy soil and agroecological research	Science, economic activity

LAFSC SDI experimental base	Crop production, horticulture, gardening	Research of plants biology and biotechnology	Science, the innovative activities
LAFSC Test department	Crop farming	Soil testing, plant genetics	Science, the innovative activities
ASU Research Station	Crop farming	Research of agro-ecosystem sustainability and intensification	Education, training
ASU training farm	A dairy cattle breeding and seed production	Cattle breeding and seed production	Innovative activities, training
LUHS practical training and testing center	Livestock, dairy	Cattle breeding	Training and innovative activities
LUHS Institute of Husbandry Experimental Development and Testing Department	Livestock, dairy	Cattle breeding	Training, economic activity
Zemaitija College training farm	Crop farming	Cereal cultivation technology	Training, economic activity

The following methods were applied: analysis of scientific, economic literary and legal documentation of pilot farms regulatory issues, analogous application, documents and statistical data analysis techniques, and expert interviews with company managers.

Results. PTT farms characteristics. The main PTT farms characteristics are presented in Table 2.

Table 2

PTT farms main characteristics [8, 9, 10, 11]

PTT farm	Arable land, ha	Number of Employees	Scientific staff + doctoral students	Profit priority goal	Research state funding, per cent.	Material and technical base condition
LLC „Dotnuvos eksperimentinis ūkis“	1078	60	0+0	Priority, main	0	70% good, 30% outdated
LLC „Šeduvos avininkystė“	375	15	0+0	Priority, main	0	Outdated
LLC „Šilutės veislininkystė“	149,7	8	0+0	Priority, main	0	Outdated
LLC „Upytės eksperimentinis ūkis“	1334	68	0+0	Priority, main	0	70% good, 30% outdated
LAFSC Vokė branch	336	29	8+3	Irrelevant, to cover costs	30-35	30% good, 70% outdated
LAFSC Vėžaičiai branch	183	37	9+3	Irrelevant, to cover costs	45-47	Outdated
LAFSC Joniškėlis testing station	360	35	6+1	Irrelevant, to cover costs	15-20	80% good, 20% outdated
LAFSC Rumokai testing station	138	12	2+1	Irrelevant, to cover costs	5-6	Outdated
LAFSC Upytės testing station	35	7	2+0	Irrelevant, to cover costs	70-75	Outdated
LAFSC Elmininkai testing station	84	8	2+0	Irrelevant, to cover costs	25-30	Outdated
LAFSC Perlojos testing station	132	10	3+1	Irrelevant, to cover costs	25-30	Outdated
LAFSC SDI experimental base	398	70	25+0	Priority, but not main	31-35	Outdated
LAFSC Test department	138	25	4+2	Irrelevant, to cover costs	40-45	Outdated
ASU Research Station	150	30	7+0	Irrelevant, to cover costs	65-70	50% good, 50% outdated
ASU training farm	434	31	0+0	Priority, but not main	0	70% good, 30% outdated
LUHS practical training and testing center	767	48	1+0	Priority, but not main	0	50% good, 50 outdated
LUHS Institute of Husbandry Experimental Development and Testing Department	650	30	0+0	Irrelevant, to cover costs	0	Outdated
Zemaitija College training farm	70	2	0+0	Irrelevant, to cover costs	0	30% good, 70% outdated

Data in table 1 and 2 show that according to specialization, PTT farms can be classified into the crop, livestock, and mixed. Their research areas are different and various enough. Many PTT farms develope researches which had become traditional according to an object of research, taking into consideration the changing environment. PTT farm functions can be divided into the four main categories – science, training, innovative production and other commercial uses, very different as well. LAFSC branches and test stations are focused on research and the development of scientific results, but due to poor technical base, being enable to demonstrate innovative production, simply provide additional economic activity. Structural units of educational institutions are focused on training function, while demonstrating innovative production examples (though not all). The main business function of the LLC farms is to organize properly innovative production and other economic activity, creating conditions for scientists to carry out research work and production tests. There are also different opportunities for LLC farms, because of peculiarities of conducted research areas and characteristics and the available material-technical base condition.

Because of the number of PTT farms, available material-technical base is depreciated or morally obsolete, and demonstration of innovative production or execution of a comprehensive research and training activities are not possible. Especially this difficult situation is due to the material-technical base in many LAFSC test stations and branches. Significant impact on this is made by the former restrictions to participate in absorption of EU support to compensate investments in agriculture. For some PTT farms determination of the operational priorities is to carry out scientific and educational activities, by financing it by the received production income, and also to not allow to accumulate the required amount of financial funds for investments.

Those PTT farms which have benefited from EU support for investment and bought the latest technology, as part of updating their material-technical base can now demonstrate innovative agricultural technologies for educational purposes, to conduct reliable research (better tillage, seeding, fertilizing, and etc.) and to achieve higher production results. Meanwhile, those PTT farms which for a variety of reasons have not resumed their material-technical base are forced to work with the physically and morally outdated, often breakable technique. This reduces productivity, reliability of scientific results, decreases harvest duo to the work performed out of time because of failure of machinery, increasing repair costs, negative effecting prestige and image of the farm against the business and social partners.

According to their size (cultivated area) PTT farms are significantly different – some farms use land area 15 times more than others. However, most of the PTT farms are 150-400 hectares in size, which corresponds to the present commercial realities of the economy in Lithuania.

PTT farms are quite different in the number of employees (from 8 in Elmininkai test station and LLC „Šilutės veislininkystė“ to 68 in LLC „Upytės eksperimentinis ūkis“). The number of scientific staff in PTT farms is another important indicator of research and innovation capacity in the farm. Without them, coherent scientific-experimental and innovative activities can not be carried out and is much more difficult to organize and conduct the dissemination of the results, to develop innovation and to promote their latest scientific achievements in agricultural production. However, the PTT farms (especially livestock or mixed specialization) for which the main objective and priority is profit, do not have scientific staff. These farms allow using their production base for scientific research, experiments, educational practices purposes, but do not invest into researchers themselves. Scientific staff and doctoral students have only those PTT farms, which get state funding to cover part of the researchers operating costs (salaries of scientists). The other part of the costs must be covered by the farms incomes from production realization. So, their income generation is the tool of covering productions and other costs, rather than a profit objective.

PPT farms activity

1. In evaluation of PTT farms assigned to the first group, an important aspect is the assessment of their economic conditions, as their priority is the best possible production outcomes and profit. Their achieved production results are substantially different, because they operate in different business areas and have unequal activity conditions and opportunities. The economic activity analysis carried out showed, that despite the fact that all the activities of the PTT farms are associated with agricultural production and/or services, the contribution to education, training or innovative production and dissemination of the results achieved are not the same. First of all, it depends on the set of operational priorities, funding sources, farm specialization. The first group of PPT farms is primarily focused on the development of production and economic improvement of the financial results and profit of their own. The research-experimental work is fragmental (mostly reproductions of the highest quality seed or dairy and meat cattle breeding), and is mainly used to improve PTT farm's activity results. Since in this group of PTT farm there is no scientific staff, dissemination of innovation and activity results is mainly executed by farm directors by conducting field days, workshops and demonstration tests. Dissemination of scientific results obtained in PTT farms is fragmented, often available only for certain specific specialized contingent.

2. While evaluation activities of PTT farms are assigned to the second group, there should be highlighted their main features – specialization in crop production, where scientific research are done by scientists. The analysis of this PTT farms group revealed two trends – fundamental and applied research, performed by LAFSC branches and test stations - Joniškėlis, Vokes, Vėžaičiai, Perlojos, LAFSC test department, while other are specialized in testing for certain crops cultivation, harvesting and/or processing studies – Elmininkai, Rumokai, Upytė, SDI experimental base. Fundamental research is less interesting to a wide range of farmers. Farmers are interested in the pursuit of personal results, and tend to cooperate with PTT farms only in case of any problem. PTT farms specialized in certain crops research, receives more attention from the farmers working in this area, there is co-operation and at the same time feedback.

In addition, it was observed that in this PTT farms group significantly deteriorated material-production base. It has a double negative effect on their activities: first, the farmers are in doubt about PTT farms research activities and their production results, when farmers in their activity use much more innovative technologies and techniques. This has a negative impact on the PTT farms image and reputation. Second, without a good new technique, PTT farms can not make modern research and extend it wide on the scale. Deteriorated material-production base makes an impact in obtaining lower production results, which in turn does not allow accumulating finance funds for future investment.

3. Evaluation of the third PTT farms group shows that they are mainly focused on training, because their departments of educational institutions and students have practical access to the features of the agricultural production and innovation in these PTT farms. These PTT farms partly renewed material-technical base and try to demonstrate innovative technologies and techniques not only for students but also for farmers by organizing a variety of events. Most of these PTT farms work in close cooperation with the technical, chemical and equipment suppliers and have long-term research contracts with them. The obtained research results are presented in a wider range of farmers in various forms.

Dissemination and promotion of research results, innovative technologies and decision, obtained by PTT farms must be a very important part of activities for all PTT farms. This can be a variety of events, cooperation with other institutions, training organization. Unfortunately, implementations of the dissemination, for various reasons, in PTT farms are very different.

All PTT farms reported involvement in operating results and innovation promotion and dissemination, but their intensity varies. PTT farms of the second and the third groups put the largest contribution in the dissemination. The main reason is that they have scientific staff. One of the scientific staff performance assessment criteria is the dissemination of research results, which occur by scientific and popular article writing, conferences and field days organization, seminars conducting. In this case there is another problem – the highest scoring of scientists output are measured for articles in international journals ISI WOS, which are difficult reachable for Lithuanian farmers, in addition in English.

In summary of Lithuania PTT farms performance analyzes can be stated that farms operate in very different conditions in their specific sectors. Their legal status and the related decision-making process are significantly different. The aims of their activity are substantially different – some are profit-driven, the others are oriented to scientific development and results dissemination. PTT farms vary by considerably size, number of employees and scientific staff, the available material-technical base, and other indicators. All of these factors influence PTT farms achievements and intensity of innovation dissemination.

Dissemination of innovation

Based on the characteristics of innovations in agriculture can be said that not all PTT farms may create innovations, but they can try them and in the future to develop innovative technologies. According to the Dutch experience in this innovative technological innovation and development process should attract not only EBM farms, but the leading farmers [6]. To Lithuanian conditions adjusted innovation implementation in the farms scheme is presented in Figure.

Product innovation – the goods and services that have certain properties or intention to use significantly different from the ones existing in the market [1]. Actually, only test and research stations (testing farms) can produce innovative products in agriculture, by developing new plant varieties. While developing product innovation in test and research stations, they must be tested, adapted and later implemented in the pilot farms. If product innovation is successful, later it can be adjusted to a wide range of the pilot and the most advanced farms (replacing the standard products and under the strict control of agro-ecological and socio-economic conditions, with adaptation to the real situation). The last stage involves the distribution of such products to other commercial farms (wide application). Of course, during the introduction of product innovation there can be collaboration between several groups from very beginner of this process.

Technological innovation – new and innovative production methods, using new equipment or new production techniques can be developed and tested in the pilot farms, as well as in the most advanced farms. When the pilot farms test the system under realistic conditions, the results clearly make influence on their colleagues of the same production field. This creates a prototype of the technological innovations, in which specialists from different fields are involved, from agronomists to politicians in the first stage to external consultants and communication specialists in the final stage. Value of this process increases involvement of farmers and agricultural organizations. Production efficiency, automation and quality improvement achieved through technological innovations can be conveyed to the primary fitter for adaptation. If technological innovation is justified, they will be in demand and will be introduced to a number of farms operating in same area [7].

In Lithuania there are still existing a significant gap between practice and research system. On the one hand, only a relatively small part of farmers can take advantage by using innovations developed by scientists, on the other hand, the most progressive farmers are far in advance of PTT farms of its material-technical base and the technologies, so, to have benefit from the practical advices of PTT farms scientist they can expect a little.

Nowadays, in Lithuania there is developed the agricultural advisory and innovation structure, with properly coordination that make them able to ensure the functioning of the network of knowledge. The most for that could serve Integrated Science, Studies and Business Centre (Valley) "Nemunas" (hereinafter - the Nemunas valley) and its members. The purpose of the Nemunas valley – to concentrate on land, forest and food scientific research, education and knowledge, having a common network and developed infrastructure to contribute to agriculture, forestry and food sector development, knowledge economy, Lithuanian economic competitiveness.

To be a member of Nemunas valley can be any scientific, study, business or other institution (or even individuals) which expressed the wish to participate in this movement and if their activities are related to the Nemunas valley program and can contribute to the improvement of performance of organization.

The members of Nemunas valley today are most of the PTT farms – LAFSC, ASU and LUHS owned farms, as well as a number of other entities, which can make a significant contribution to the network of knowledge – Lithuanian Agricultural Advisory Service, Lithuanian Institute of Agrarian Economics.

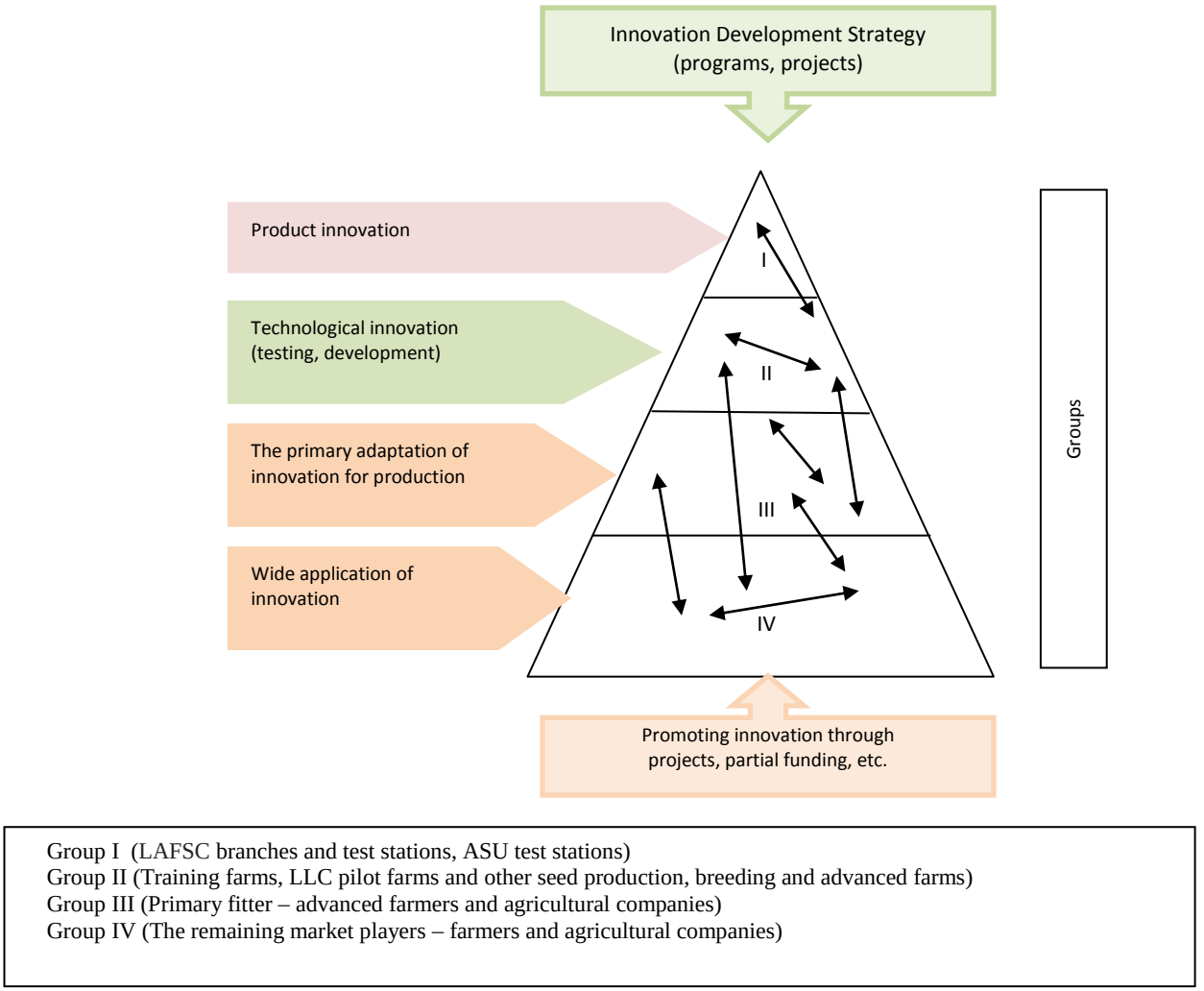

Fig. 1. Scheme of introduction innovations to the farms in Lithuania

Conclusions

1. Lithuanian PTT farm specialization, areas of research and the basic functions are quite different. LAFSC branches and test stations focused on the development of scientific results, but due to poor technical base, are not able to demonstrate innovative production. They are simply providing agricultural economic activity while are partially engage in scientific research. Academic institutions owned farms are acting as the structural units and are focused on ensuring training function, while demonstrating innovative production models. For LLC farms which are owned by LMA, the main business function is to organize innovative production and profitable economic activity, while allowing to exterior scientists to carry out research work and production tests in their farms.

Only a few PTT farm benefited from EU support to investments and bought the newest technology. They can display innovative agricultural technologies for educational purposes and conduct reliable research (better tillage, seeding, fertilizing and so on).

With new innovative technologies they can achieve better economic results. Meanwhile, these PTT farm which for a variety of reasons have not renewed their material-technical base, are forced to work with the physically and morally outdated, often breakable technique, which reduces labour productivity, scientific results reliability, increased repair costs and yield losses. Outdated material base of these PTT farms makes an impact on the falling of prestige and image against the business and the social partners.

2. In Lithuania, there still exists a significant gap between practice and research system. Nemunas valley can ensure proper functioning and coordination of the network of knowledge in Lithuania today. All PTT farms have become members of Nemunas valley with their contribution to Nemunas valley aim and use of the offered innovation, dissemination and feedback opportunities.

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