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IMPROVEMENT OF THE MECHANISM OF TECHNOLOGY TRANSFER WITHIN THE CONTEXT OF THE INNOVATIVE DEVELOPMENT OF THE AGROINDUSTRIAL COMPLEX OF RUSSIA

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Abstract

The article reveals the problems of the development and improvement of the activity of entities of agricultural consulting in Russia in the period of the large-scale modernization of the agroindustrial complex. Special attention is paid to the problem of participation of the educational institutions subordinated to the Ministry of Agriculture in the consulting activity and to promoting the innovative activity of the participants in the innovative process. The current state of the institute of agricultural consulting, the main results of the activity in 2017 and the proposals for its development for the mid-term perspective are described. The priority directions and the strategy for the development of agricultural consulting are formulated in regard to the modernization of agricultural production, structural changes in its organization and the development of the system of agricultural consulting. The main directions of development of the institute of agricultural consulting, the main performed functions and the expected results are represented, as well as their impact on improving the quality of the informational and consulting support of agricultural production. The necessity of corrections of the conceptual essentials of the complex development of the institute of agricultural consulting is grounded including the ones organized with participation of educational institutions.

Key words**:** *innovative development, modernization of agro-industrial production, agricultural consulting*

INTRODUCTION

The objective of the present article is to show the possible ways of development of the system of agricultural consulting on the base of the research of the ways of development and functioning of the institute of informational and consulting support of agricultural production, changes in the structure of consumers of informational and consulting services and organizational changes in the system of agricultural consulting. Special attention is paid to the increase in the significance of the promotion of innovative products into agro-industrial production, as well as to the problems of attracting branch educational institutions to the participation in the consulting process.

The urgency of research is determined by the growing role of the institute of agricultural consulting in the modernization of the agro-industrial sector of the economy of Russia and the insufficient use of the potential of educational institutions subordinated to the Ministry of Agriculture of Russia in the development of this system.

MATERIALS AND METHODS

During the research, the authors studied the materials of the annual "Monitoring of consulting assistance to agricultural manufacturers and rural population in the Russian Federation" organized by the "Federal Center of Agricultural Consulting and Personnel Development of the Agro-industrial Complex", the materials of the Ministry of Agriculture of the Russian Federation on the participation of branch educational institutions in the development of agricultural consulting, the works by national and foreign researchers [3, 4, 5, 6, 7, 14, 18, 21], the materials of thematic research-to-practice conferences and other congress events. The empiric, inductive and deductive and statistical methods were used, as well as comparative and abstract-logical analysis and psychological research.

RESULTS AND DISCUSSIONS

Institute of agricultural consulting in the modernization of agro-industrial production

On December 15, 2017, the cooperation agreement was signed between the Ministry of Agriculture of the Russian Federation and the Russian Academy of Sciences, which provides support of the scientific and technical development of agriculture and reduces the technological risks in the production field. This is the most important document for the modernization of the agro-industrial complex, if for no other reason than according to the words of the former Minister of Agriculture A.N. Tkachev: "unfortunately, the technological development still relies upon the achievements of foreign science".

Among the total number of scientific and technical developments, completed, accepted and recommended for the implementation into production, up to 40-50 percent are left non-demanded. Furthermore, agricultural enterprises use less than 10% of technological innovations. Not more than 12 percent of agricultural manufacturers use intensive resource-saving technologies. In this regard, the use of inefficient technologies is, according to the scientists, the reason for the annual short supply of agricultural products for the amount of 200-250 bln roubles [8, 19].

The currently implemented strategy of innovative development of the agro-complex is aimed at modernization of production including:

•maximal use of national scientific developments;

•creation of innovative products on the basis of foreign analogs;

•accelerated implementation of foreign innovative technologies.

Among the specified directions, the most preferable is modernization using national innovative products due to their adaptability to the local conditions, the absence of dependence upon all kinds of international political factors, and the cost.

One of the reasons for the unsatisfactory state of branch modernization using national scientific and technical developments is the necessity of improvement of infrastructure, forms and methods of innovative support of the agro-industrial complex [20] including the methods and technologies of formation of orders for scientific developments. Until now, the Ministry of Agriculture of the Russian Federation has not participated in the planning of scientific research of the branch subject by academic institutions. Scientific developments are made according to the view of the problem by researchers and their capabilities to develop innovative products. And as there are no potential consumers in this process, their opinion is not always taken into account. Thus, science was separated from real production and as a result, the developments of national scientists do not find any practical application.

Simultaneously, due to the necessity of competitiveness, production requires constant updating – more efficient technologies, modern machines and equipment, the introduction of new species, breeds, etc. [22]. Naturally, in the market conditions, the niche is taken by foreign companies offering innovative products that, however, do not always suit the real conditions of national production.

In this regard, the understanding of the necessity of the joint research and production activity, large-scale involvement of national science into the innovative process, determined by the above-stated agreement of the branch ministry with the Academy of Science, can become the start of the major reconstruction of the principles of scientific and technical modernization, the basis of which is the formation of orders for scientific developments.

The first and, in the authors' opinion, the most important stage of the process of order formation is the determination of production problems that require a scientific solution. The main mechanism of realization of such problems is the regional structures of agricultural consulting.

The technology of participation of the entities of agricultural consulting in the innovative support of production [15] assumes that:

•consulting centers reveal the availability of applicable innovative proposals in the region and determine the demand of agricultural manufacturers for new developments in situ that can serve as the basis for the government R&D order organization.

•the innovative products developed by scientific and other organizations of Russia are added to a general database [6]. The distribution of innovative resources is performed using the Internet, arrangement of congress and exhibition events, training of consultants, managers and specialists of agricultural organizations, farmers.

•consultants assist during the process of implementation of innovations and can provide the monitoring of the use of scientific and technical achievements in the agro-industrial complex.

Thus, the developing structure of the system of agricultural consulting shall play an important role in the provision of the process of modernization of agro-industrial production mainly on the base of national innovation products [20].

Development of the system of agricultural consulting

By the end of 2017, the institute of agricultural consulting functioned in 63 regions of the Russian Federation [12].

In these regions, 93 regional and 162 district information and consulting services of agricultural consulting are rendered.

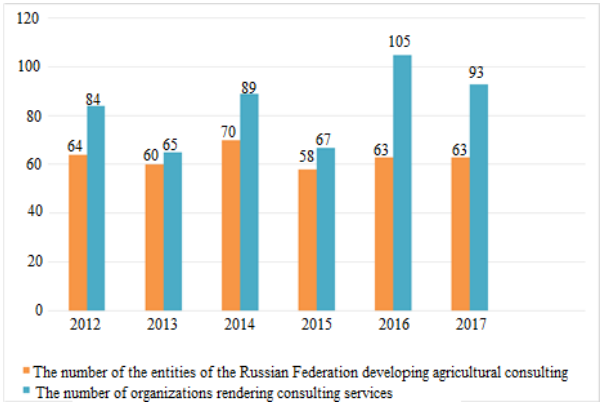

Fig.1. Dynamics of development of agricultural consulting in the regions of the Russian Federation
Source: Information Regarding the State of the Continuing Professional Education, 2018b

The regional level is represented by 44 consulting organizations (governmental, commercial and non-profit) and 49 educational institutions subordinated to the Ministry of Agriculture of Russia: 37 institutions of higher education, 12 institutions of continuing professional education.

The district level is represented by 162 organizations, 79 of which are structural subdivisions of the regional centers, 36 organizations are subdivisions of the district authorities of the agri-food complex; there are also 47 independent organizations (Figure 2).

Currently, 1,613 consultants work at consulting centers. More than 1,300 employees of mainly educational institutions and authorities of the agro-industrial complex render consulting services part-time. In total, 2,951 specialists were engaged in the consulting activity in 2017.

In total, about 2,950 specialists were involved in consulting activities in 2017, including 638 livestock specialists and veterinarians, 452 agronomists, 294 engineers, 413 economists, 221 accountants, 122 lawyers, 101 IT specialists, 908 other specialists of a different profile (Figure 3).

In 2017, agricultural advisory services provided agricultural producers and the

population more than 250 thousand consulting services.

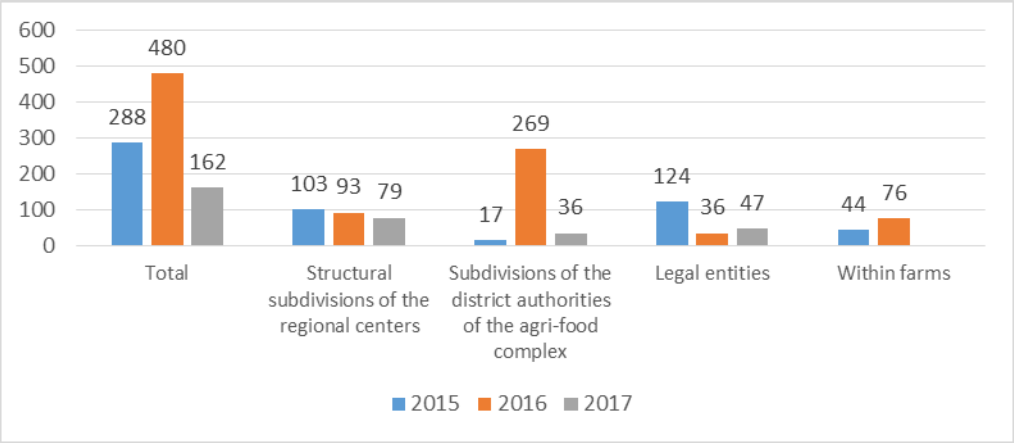

Fig.2. Dynamics of the development of district agricultural consulting

Source: Report of the Monitoring of Consulting Assistance to Agricultural Manufacturers and Rural Population in the Russian Federation in 2017

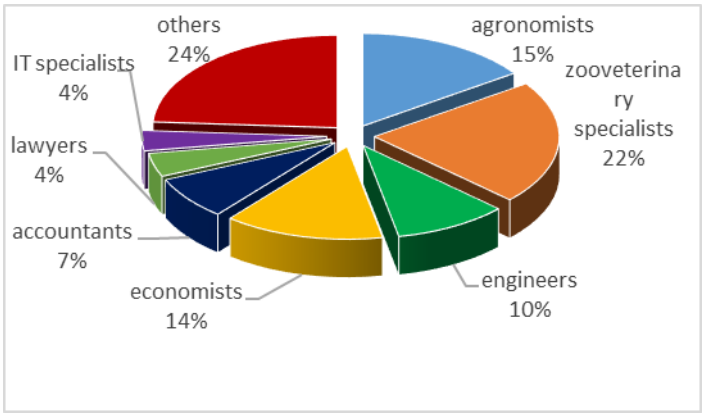

Fig.3. Structure of consulting staff

Source: Information Regarding the State of Higher Education, 2018a; Information Regarding the State of the Continuing Professional Education, 2018b

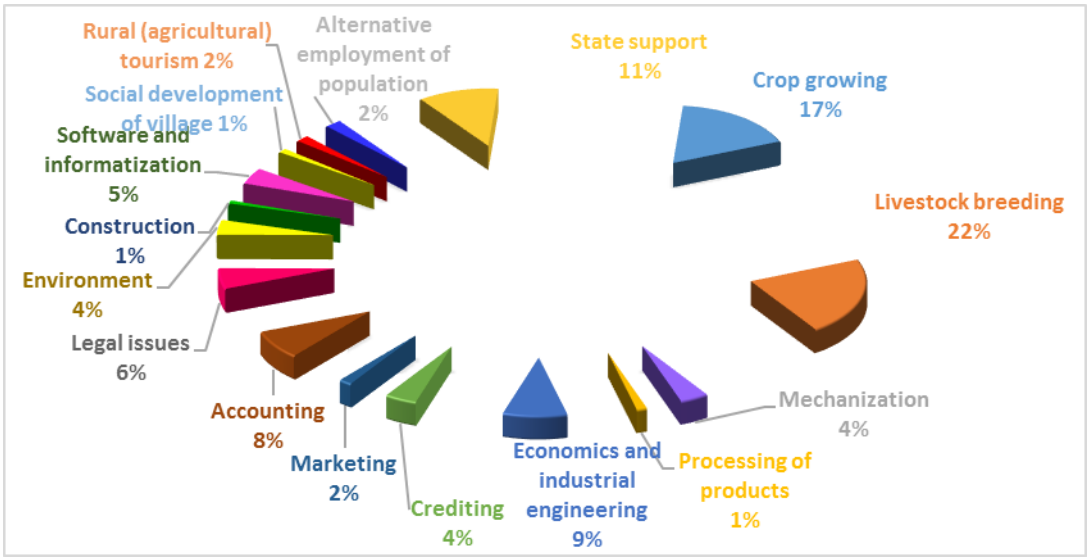

Fig.4. Structure of the rendered consulting services

Source: Report of the Monitoring of Consulting Assistance to Agricultural Manufacturers and Rural Population in the Russian Federation in 2017, 2017; Ministry of Agriculture of the Russian Federation, 2002

As the monitoring of consulting activities shows, there is a stability in the structure of consultations provided. At the same time, in 2017 technological consultations in the field of crop production, animal husbandry, government support, the economy and production organization were the most popular (Figure 4).

Among the recipients of consulting services, peasant (farm) holdings lead by a large margin, followed by agricultural enterprises and personal subsidiary farms (Figure 5). Significantly less consultants are approached by the management bodies of the agri-food complex, processing enterprises and agricultural cooperatives.

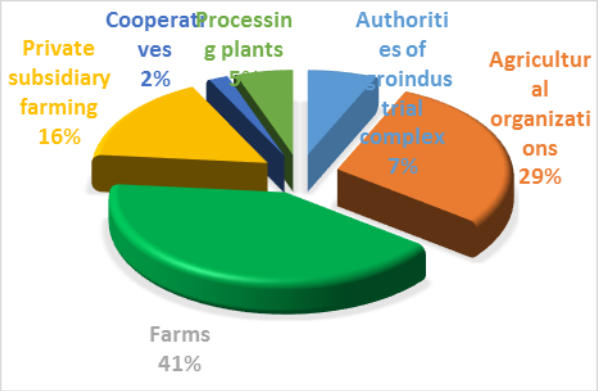

Fig.5. Distribution of consulting services according to the groups of users

Source: Report of the Monitoring of Consulting Assistance to Agricultural Manufacturers and Rural Population in the Russian Federation in 2017, 2017

Table 1. Exhibition events

Name of event	Total, unit	including			
		Interregional level	Regional level	District (interdistrict) level	According to the contract with enterprises (businessmen)
Demonstrational objects (land lots, farms, etc.)	434	21	106	137	170
Events held	1565	157	479	851	78
- including exhibition and demonstration events	494	101	257	137	0
- including Days of field	155	21	85	47	2
- including other events	915	35	137	667	76

Source: Report of the Monitoring of Consulting Assistance to Agricultural Manufacturers and Rural Population in the Russian Federation in 2017, 2017

Information and consulting centers and consulting subdivisions of educational institutions organized 434 demonstration objects, 649 exhibition and demonstration events, including 155 "Days of field" and 494 exhibitions, 915 other events were held (Table 1).

Also, the monitoring gives the reason to mention the sustainable growth and a tendency for the organization of innovative exhibition and demonstration events (Table 2).

Table 2. Dynamics of the number of exhibition and demonstration events

Name of event	2014	2015	2016	2017
Demonstration objects	42	217	378	437
"Days of field"	13	No info	334	155
Exhibition and demonstration events	78	387	474	494

Source: Report of the Monitoring of Consulting Assistance to Agricultural Manufacturers and Rural Population in the Russian Federation in 2017, 2017

The organizations participating in the information and consulting provision published more than 4,413 titles of printed materials, 1,400 articles, posted about 1,100 materials on the Internet, organized 1,160 programs on the radio and plots shown on television and posted on the Internet (Table 3).

Table 3. Information activity

Directions	Quantity	
	Names	Printed copies
1. Printed products prepared for publishing, including:	4,413	424,756
- books, brochures	623	79,227
- magazines	133	33,574
- articles in the journals of other organizations	1430	140,137
- booklets	1916	49,361
- others	311	100,542
2. Media materials prepared and issued, including	2547	
- radio and TV broadcasting	400	
- videos on DVD (CD)	632	
- videos on the Internet	129	
- articles, reviews on the Internet	1154	
- articles, reviews in the regional and local press	232	
3. Site maintenance (section of consulting activity)	114	

Source: Report of the Monitoring of Consulting Assistance to Agricultural Manufacturers and Rural Population in the Russian Federation in 2017, 2017

670 innovative products (Table 6) were implemented with the participation of consulting centers into the real sector of agro-industrial production; 750 innovative projects were developed with the expected economic effect for the total sum of 594.7 mln roubles (actual economic effect in 2017 was 365.1 mln roubles) (Figure 6).

The total economic effect from the innovative activity of organizations rendering consulting services to agricultural manufacturers and rural population was approximately 2.4 bln roubles in 2017 (Table 4).

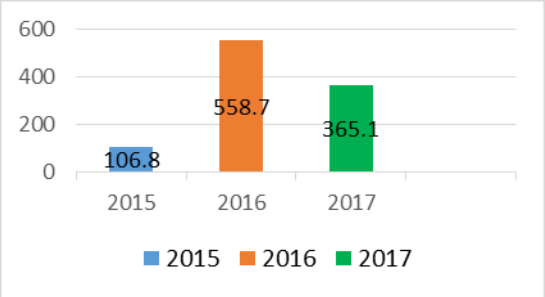

Fig.6. Dynamics of economic efficiency from the implementation of the innovative projects developed by consulting centers, mln roubles
Source: Report of the Monitoring of Consulting Assistance to Agricultural Manufacturers and Rural Population in the Russian Federation in 2017, 2017

The largest number of innovative products was implemented in livestock breeding – 305 innovations. Then in the descending order, there are crop growing – 262 innovations, the field of economy and industrial engineering – 103 innovations.
The total volume of implementation of innovative products in 2017 had a tendency to growth (670 innovations in 2017 in comparison with 634 innovations in 2016).
Innovative products were more actively used by agricultural enterprises – 394 innovations, by farmers – 144 innovations, by private subsidiary farms – 64 innovations.

Table 4. Innovative activity of organizations rendering consulting services

Innovations, implemented by means of consultants	**Receivers of services**				**Economic effect, thousand roubles**
	Agricultural organizations	**Farms**	**Private subsidiary farms**	**Others**	
Innovations implemented into crop growing, qty	148	58	37	19	1,955,191
Innovations implemented into livestock breeding, qty	199	40	21	45	58,189
Innovations implemented in the field of economy and industrial engineering, qty	47	46	10	0	8,080
Total	394	144	68	64	2,021,460

Source: Strategy of the Innovative Development of the Agro-industrial Complex of the Russian Federation for the Period till 2020, 2011

Agricultural enterprises increased their activity of implementation of innovations in 2017 by one third but farmers and private subsidiary farms maintained the same activity. The situation with the order of innovative projects is not so good. Agricultural enterprises decreased orders by 23%, farmers decreased them by 8% and the owners of private subsidiary farms decreased them by 47%.
Organizations of agricultural consulting performed 2,698 thousand trainings attended by 22 thousand listeners (Figure 7).

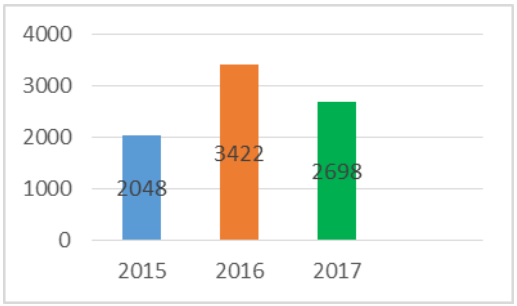

Fig.7. Dynamics of performed trainings, units
Source: Information Regarding the State of Higher Education, 2018a

The topics of learning of new technologies in crop growing and livestock breeding, organization and economy of production were the most popular among agricultural manufacturers and rural population.
The information and consulting activity was financed in 2017 from the budgets of different levels and from non-budgetary sources (Figure 8).
In addition to the general increase in the level of funding for consulting activities, there is an increase in the volume of financing regional budgets. This demonstrates the increasing role of regional agricultural advisory systems.
Agricultural manufacturers earned approximately 2.4 bln roubles from the design and implementation activity at the total costs for the whole system of 860 mln roubles. One more positive fact is the maintaining of the volume of consulting services paid by agricultural manufacturers, which, on the one hand, is the confirmation of their demand and, on the other hand, it is the proof of the professionalism of consultants.

Currently, the agricultural sector of the economy is represented mainly by the two types of economy management. One can say about the gradual formation of the dualistic model of the commodity agrarian sector of Russia. On the one hand, there are large holdings; on the other hand, there are rather small farms [2].

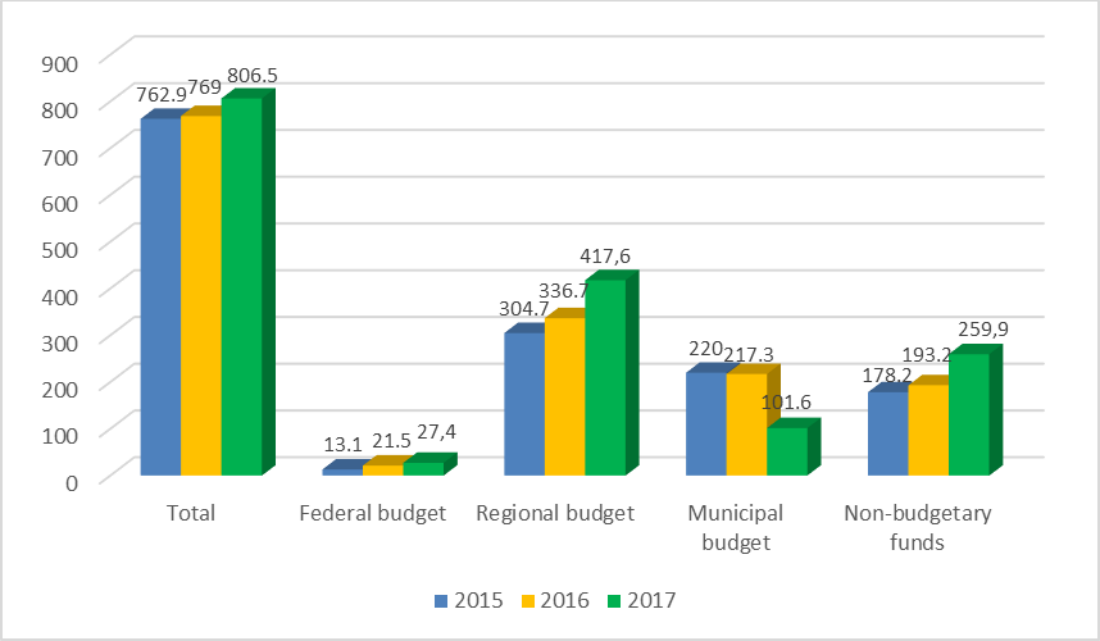

Fig.8. Dynamics of financial support of consulting activity (mln roubles)
Source: Report of the Monitoring of Consulting Assistance to Agricultural Manufacturers and Rural Population in the Russian Federation in 2017], 2017

Together with these two opposite forms of organizations of agricultural business in the country, households of other legal forms transformed from the former state farms and collective farms are engaged in agriculture to a different degree of efficiency that can be referred to large as well as to small forms according to different criteria.

Large agricultural enterprises use the services of consulting structures, as a rule, for the selection of modern highly intensive technologies, selective results, business planning, and supervision of investment projects. Specialists of agroholdings are visitors and participants of exhibition and demonstration and congress events organized by consulting centers; they actively attend seminars and conferences, order projects, implement scientific and technical achievements. All of this can provide the innovative development of enterprises.

There are many highly profitable households among the farms but in its lump, they are yet weak, technically poor equipped, insufficiently developed households that have more problems than capabilities. As a rule, they do not order large projects but they are ready to pay for single consultation services.

In this regard, the two main directions of activity are determined – innovative due to the constant demand for modernization of production, and consulting – to solve the urgent problems.

The first innovative direction is related, to a great extent, to the competitiveness of the branch on the whole and it should be the point of the state agrarian policy. The main forms of promotion of innovations into production by the state structures are informational, exhibition and demonstration and educational activity [17]. Such events shall be planned and financed by the federal ministry and regional authorities of the agro-industrial complex. Their organization is given to the subordinated institutions and large regional consulting centers. The successful examples of such activity are the "Information and Consulting Service of the Agro-industrial

Complex " of the Yaroslavl Region, "Voronezh Regional Center of Informational Support of the Agro-industrial Complex ", "Centre of Agricultural Consulting of the Republic of Bashkortostan", "AgroInnovatsia" in the Chuvash Republic, "Samara – Agrarian Information System" and some other regional authorities that work by an order or the consulting centers that won the contests for the government orders.

State consulting shall be developed. But the state cannot cover all the directions, because all manufacturers of agricultural products are entrepreneurs. And, as is known, an entrepreneur is a person who builds his/her business at his/her own risk. Therefore, the state is not obliged to render services or consult him. In this case, consultations shall be a paid service. And it is real as the system of agricultural consulting came into the period of demand by agricultural manufacturers and even now it provides its maintenance by one third by means of the payment of its services by the consumers.

The confirmation of capability of self-dependence is the activity of some commercial consulting structures. For example, the consulting center "Assistant" in Kalmykia, commercial centers in Smolensk, Irkutsk, Vladimir, Leningrad, Yaroslavl Regions and some other regions.

This became possible because the group of professional consultants was formed in the country [18], which is ready and capable to provide high-quality consulting services that the client is ready to pay for (he is satisfied with the quality and prices). The economic efficiency from the implementation of innovative projects is an example of it. As is known, more than 800 mln roubles are spent on the activity of the whole system annually, and from the implementation of the innovative projects developed by the centers in 2017, the profit was approximately 2.4 bln roubles.

The further development of the two main directions of the development of consulting service can be presupposed:

- governmental (federal institutions and regional organizations) with the main function of innovative support. This category shall include also the municipal centers, the purpose of which is to fulfill the municipal tasks and implement the municipal projects (which earlier was the task of the district authorities of agriculture).
- private organizations with the consulting functions, rendering various consulting services (technological consulting, business planning, execution of documentation, accounting and legal support, etc.) and this cannot be paid by the budget funds (Figure 9).

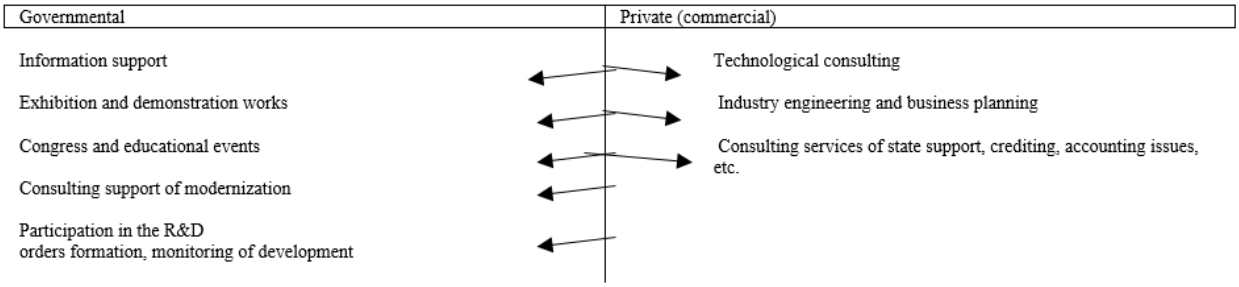

Fig.9. Differentiation of functions of governmental and private (commercial) consulting centers
Source: Sandu and Ryzhenkova, 2017a

The first governmental direction of the development of the consulting institute shall contain the inclusion of educational institutions subordinated to the Ministry of Agriculture of Russia into the consulting activity.

Participation of educational institutions in the consulting activity

The Ministry of Agriculture of Russia coordinates the activity of 54 federal state budgetary educational institutions of higher education and subordinates also 22 institutions of continuing professional education [9, 10].

All educational institutions, to some extent, along with the direct educational activity,

consult specialists and participate in exhibition and demonstration innovative events. As of December 2017, 43 institutions performed the consulting activity (29 at higher education institutions and 14 in the system of continuing professional education). 1,252 tutors gave consultations part-time.

In 2017, specialists of educational institutions rendered 29.4 thousand consulting services (12% of the total volume), which does not correspond to their capabilities (on the average, one part-time consultant of an educational institution gives 22 consultations when one full-time consultant gives on the average more than 150 consultations annually).

But the development of the consulting activity at educational institutions is perspective:

Firstly, it means the available highly qualified academic staff performing the scientific research of masters and postgraduate students;

Secondly, it is the material and technical resources that allow performing the consulting activity in all its forms – group and mass educational congress events; provision of conditions for consultants' work; the possibility to arrange the exhibition and demonstration events in the scientific-experimental subdivisions of the institutions, the publishing and polygraphic base allows providing the listeners and clients with the necessary handout.

The main task of institutions of continuing professional education is the professional retraining and advance training of specialists, that is, a transfer of new knowledge that corresponds completely to the functions of consulting centers.

On the base of continuing professional education, using the academic staff and administrative methods (making changes (additions) into the statutory documents), it is reasonable to develop the complete state consulting centers in the regions with the functions of implementation of the state agrarian policy, support of modernization of the branch and development of the rural territories. And the educational functions will be maintained completely but will be complemented by the real content and the significant financial resources will not be required.

At the same time, the participation in the consulting activity increases the level of knowledge and competence of the teachers, as the consultations "in general" do not satisfy the client and the consultant-teacher shall improve his/her professional knowledge, to offer services that can satisfy completely the demands of clients.

Thus, the organization of regional information and consulting centers on the base of continuing professional education has a structural character and can be solved within the framework of the Ministry of Agriculture of Russia using the administrative methods. It can be solved in two ways: the creation on the basis of an educational institution of an autonomous consulting center, one of the founders will be the educational institution itself, or the creation of a special structural unit within the institution.

The importance of the problem of improvement of the quality of information and consulting support of agricultural manufacturers and the development the rural territories is confirmed by the scientific discussion, the agenda of which includes the issues of searching for the new forms and methods of consulting services according to the changes occurred in the organization of the agricultural business [2], urgent necessity of modernization of the processes of management of technologies and innovations [1, 7, 11, 13], and also due to the development of the institute of agricultural consulting, development of the new forms and methods of rendering consulting services and improvement of the existing ones [16].

The solution of the growing problems in the information and consulting support of the branch requires scientific grounding and expert estimation. Researchers offer to use the existing forms of organization of agricultural consulting that were tested by time and practice, to complement them with the new innovative content, to have a more clear distinction of the functions of state and private structures, to provide the large-scale involvement of branch educational institutions

into the consulting process, development of the expert society of consultants-experts [18].

CONCLUSIONS

As a result of the performed research of the activity of the system of agricultural consulting, one can determine the two main directions of its development: innovative, due to the constant demand for production modernization, and consulting. The first innovative direction is related to a great extent to the competitiveness of the branch on the whole and shall be the point of the state agrarian policy. The main forms of promotion of innovations into production in the governmental structures are informational, exhibition and demonstration and educational activities. This direction should be implemented by state information and consulting centers, as well as by private organizations with the functions of consulting, assistance in the development of innovations and rendering of various consulting services (technological consulting, business planning, execution of documentation, accounting and legal support, etc. that cannot be paid by the budget funds).

The first governmental direction of the development of the consulting institute shall contain the inclusion of branch educational institutions into the consulting activity.

It is reasonable to give a status of federal informational and consulting centers to all institutions of continuing professional education with the functions of implementation of the state innovative policy and staff retraining for its support.

The problem of increasing the level of participation of branch institutions of higher education in the consulting activity can be solved by developing an independent consulting center on the base of the educational institution, the founder of which can be the educational institution itself.

Due to the fact that the system of agricultural consulting is not provided with the expert staff and specialists capable to estimate the innovative proposals analytically, it is offered to determine the consultants-experts for the main directions of agro-industrial production from the academic staff of the universities for the assistance to the practicing consultants in the selection of the innovations potential for implementation, participation in the development of the innovative projects at agricultural universities.

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