



Use of crowdsourcing in agricultural consulting services for the sustainable development of agricultural enterprises

Uso del crowdsourcing en servicios de consultoría agrícola para el desarrollo sostenible de empresas agrícolas

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Received: 02/02/2019 • Approved: 09/04/2019 • Published 13/05/2019

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ABSTRACT:

The paper defines the importance of agricultural consulting services in the technical and technological upgrade of agroindustry for the sustainable development of agricultural enterprises. We have detected the problems in consulting services operations, which can be partly eliminated with the help of crowdsourcing technologies. The structure of regional agricultural advisory organizations, which is one of the key elements of the innovation infrastructure of the agrarian sector of the Russian economy, has been studied. The features of financing of activities of the Russian agricultural advisory services are presented. We have determined the most significant stages of a crowdsourcing project: preparation, initiation, information gathering, assessment, and use. Crowdsourcing has been considered a tool for the development of consulting services which makes it possible to receive a significant amount of new knowledge, improve the quality of task performance, and reduce costs. We have justified the relevance of crowdsourcing for the three areas of development of innovative agricultural consulting services: identifying needs;

RESUMEN:

El documento define la importancia de los servicios de consultoría agrícola en la mejora técnica y tecnológica de la agroindustria para el desarrollo sostenible de las empresas agrícolas. Hemos detectado problemas en las operaciones de servicios de consultoría, que pueden eliminarse en parte con la ayuda de las tecnologías de crowdsourcing. Se ha estudiado la estructura de las organizaciones regionales de asesoramiento agrícola, que es uno de los elementos clave de la infraestructura de innovación del sector agrario de la economía rusa. Se presentan las características de la financiación de las actividades de los servicios de asesoramiento agrícola rusos. Hemos determinado las etapas más significativas de un proyecto de crowdsourcing: preparación, iniciación, recopilación de información, evaluación y uso. El crowdsourcing se ha considerado una herramienta para el desarrollo de servicios de consultoría que permite recibir una cantidad significativa de nuevos conocimientos, mejorar la calidad del desempeño de las tareas y reducir los costos. Hemos justificado la relevancia del crowdsourcing para las tres áreas de desarrollo de servicios innovadores de consultoría

developing/improving innovative products (goods, services, technologies, etc.); reporting the results of research and development. The main advantage of crowdsourcing is revealed, which is that when using it, the work of one consultant is performed by "collective intelligence", which is known to be much more effective.

Keywords: sustainability, agricultural sector, consulting services, information services, crowdsourcing, respondents.

agrícola: identificación de necesidades; desarrollo / mejora de productos innovadores (bienes, servicios, tecnologías, etc.); Informando los resultados de investigación y desarrollo. Se revela la principal ventaja del crowdsourcing, que es que al usarlo, el trabajo de un consultor se realiza mediante "inteligencia colectiva", que se sabe que es mucho más efectiva.

Palabras clave: sostenibilidad, sector agrícola, servicios de consultoría, servicios de información, crowdsourcing, encuestados.

1. Introduction

The solution of the problem of increasing the competitiveness of agro-industrial enterprises and their sustainable development on an innovative basis is one of the strategic goals of the agrarian sector of the economy. In the competitive struggle for markets for agricultural products, innovation, new types of management, and better management methods play a crucial role. All this stimulates the search for new organizational forms, which ensure accelerated development and mastery of innovations.

In modern conditions, the task of improving the organizational and economic mechanism of innovative development of the agrarian sector, forecasting and planning this process, development and implementation of various types of programs aimed at its implementation is particularly acute. The organizational and economic mechanism of innovative and sustainable development is a set of forms (links) and methods for implementing innovation activities that are interrelated and coherently functioning and ensuring the promotion of the results of intellectual activity. The organizational and economic mechanism is a complex of organically related organizational and economic measures that ensure the necessary conditions for the organization and functioning of the innovation development system, that is, the unity of purpose, synchronism, proportionality and rhythm of all components of a single mechanism for mastering innovation.

The main condition for the effective and sustainable operation and competitiveness of the agricultural sector is using the achievements of scientific and technological progress as well as the relevance, completeness, and reliability of information, and the profoundness and quality of its analysis. However, rural commodity producers, as a rule, cannot independently apply the necessary innovations in their farms nor understand the information that they obtain in large amounts from various sources. International experience shows that one of the factors contributing to the solution of this problem is consultation work, as it significantly accelerates the development, introduction of new and advanced technologies, and the acquisition of rational methods of economic management by rural commodity producers. The demand for agricultural consultation work in Russia is very high due to the underdevelopment of information technologies in the agricultural industry, the lack of qualified staff and reliable sources of information, poor communication quality, and other problems.

According to the Food and Agriculture Organization of the United Nations (FAO), agricultural consulting services are successfully aiding in the development 154 countries, where more than 600,000 consultants work with 1.2 billion agricultural workers [1]. Russia is one of the first countries where agricultural consultation work started at the end of the 19th century, at which time the "...agricultural consulting service in Russia was at the highest level in the world" [2]. Currently, the agricultural consulting system in the agricultural sector is developing and forming slowly. The reasons for this are a lack of sustainability, legal status, financial support, and system for training consultants. All this combined with extremely low investment opportunities of agro-industrial enterprises significantly limits the conditions for activating innovative activities.

2. Methods

The conducted research is based on work by scientists which has made a significant contribution to the study of the agrarian sector as a complex social and economic system.

The issues that concern the effectiveness of consulting activity to provide the sustainable development of agricultural enterprises are elaborated in publications by Van Den Ban A.W. [2], H.S. Hawkins [3], Ameer C. [4], and Purcell D. [5]. Various aspects of informational support for agricultural commodity producers are exposed in the work of H. Buermann [6], J. Adler [7], Bennett C. [8], and Anderson J.R. [9].

A significant contribution to the development of the theoretical and methodological foundations of agricultural consultation work has also been made by Christensen J., Pedersen D.E., Jacobsen B.H. [10], and Hoffman V. [11]. Publications by Steele F. [12], Greiner L.E., and Metzger R.O. [13] are devoted to the research issues of the development of the consulting services market. Significant contributions to the scientific foundations for crowdsourcing development have been made by Howe J. [14], Brabham D. C. [15], Rouse A.C. [16], Saxton D. G., Oh O., and Kishore R. [17].

The set tasks were solved using systematic approach methods that make it possible to study the agricultural consulting system in relation to other social and economic systems which constitute the sustainability of agricultural sector.

3. Main Part

3.1. The meaning of crowdsourcing. The current state of affairs in Russia

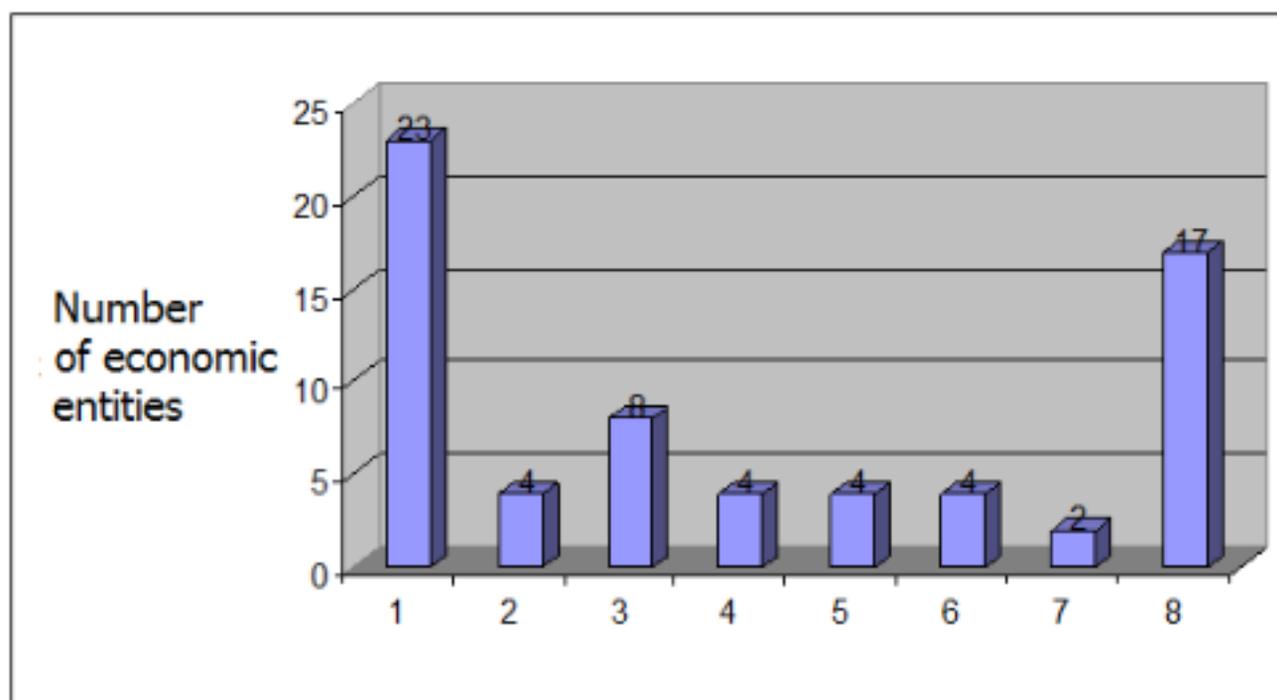
Agricultural consultation work is the most effective means for increasing the competitiveness of the agrarian sector, as it impacts the main factors that determine competitiveness: the intellectual potential and efficiency and sustainability of agricultural production. Therefore, the states that paid great attention to the development of effective information and consulting services (the USA, the Netherlands, Denmark, the United Kingdom, Canada, Australia, and New Zealand) are now the world's leading agrarian exporters. It is also noteworthy that, as a rule, such services were established in many countries in a time of deep food and financial crises, when the nation could not meet its food requirements (Ireland), the agrarian sector underwent structural reorganization (the Netherlands, Denmark), and the state refused to support inefficient agricultural production (the USA, Canada, Great Britain) [18].

Until recently, the absolute majority of commodity producers in the agricultural sector in Russia were large enterprises with a qualified staff of managers and experts in various fields who actually acted as consultants. On the whole, the existing system of scientific and technical information exchange met the requirements of that time. Its main drawback was dissociation of information and consulting activities, as these activities were independent, and there was no appropriate coordination and connection between them. Such disconnection hampered further development of the system and called for the integration of information and consulting activities.

The Ministry of Agriculture and the state administrative bodies of the agricultural sector of federal subjects establishes information and consulting services (ICS) for agro-industrial enterprises in accordance with the resolution of the Government of the Russian Federation of February 10, 2000, № 117 On improving the staffing of the agricultural sector. The state program for the development of agriculture and regulation of markets for agricultural products, raw materials, and food in 2013-2020 makes it possible to establish regional information and consulting centers (ICS) in the AS in those areas where they lack, and the improvement of their activities where they already function.

The agricultural advisory system, established in Russia, has significant regional characteristics due to various organizational and legal forms of the ICS. Fig.1 shows the distribution of regional ICS in organizational and legal forms.

Fig. 1
Organizational and legal forms of ICS



1- government institutions; 2 - state unitary enterprises;
 3 - consulting centers of universities; 4 - consulting centers at the DPOS institutions;
 5 - consulting non-profit organizations; 6 - consulting activities in the management of the AIC;
 7 - commercial consulting organizations; 8 - consulting centers for farming entities.

To varying degrees, consultancy is conducted by 65 organizations in 50 constituent entities of the Russian Federation. The generalized structure of subjects of consulting activity in the Russian Federation and features of their development in 2010-2016 are presented in Table 1.

Table 1
 Structure and dynamics of development of regional systems of agricultural counseling in the Russian Federation for 2010-2016.

Organizations providing advice to commodity producers and rural population		Years						
		2010	2011	2012	2013	2014	2015	2016
Number of subjects of the Russian Federation developing agricultural counseling		54	58	62	64	64	64	50
including regional (rural) counseling centers		29	31	41	44	42	49	36
Number of regional centers of agricultural counseling, in total:		52	56	60	64	73	84	65
	state institutions, state autonomous institutions, state autonomous educational institutions	19	22	26	28	25	24	23
	number of them having district (rural) units	12	15	17	19	15	14	14
	state unitary enterprises	5	5	5	5	5	5	4
	number of them having district (rural) units	4	4	5	4	5	5	4
	in the structure of educational institutions of higher professional education (FGBU HPE)	9	9	9	7	11	11	8
	number of them having district (rural) units	1	1	2	4	4	4	2

including:	in the structure of educational institutions of additional professional education (FGBU APE)	7	5	5	4	9	9	4
	number of them having district (rural) units	0	0	0	1	0	1	0
	farmer associations and formations (regional offices)	1	1	1	1	5	17	17
	number of them having district (rural) units	1	1	1	1	5	6	6
	other non-profit organizations (funds, non-profit partnerships, autonomous non-profit organizations)	4	4	6	7	7	7	4
	commercial organizations of regional level	1	5	3	7	6	7	2
	subdivisions in the management bodies of the agro industrial complex	6	5	5	5	5	4	3

3.2. Analysis of the functioning of the centers of agricultural counseling for the sustainable development

Consulting activity aims, first and foremost, to offer practical, qualified assistance in organizing and improving the efficiency of production and processing of agricultural products, selling the end product, and improving the social and economic conditions of life in rural areas. However, centers of agricultural consultation work function with certain difficulties, caused by a number of issues which can be partly eliminated with the help of crowdsourcing technologies. The word crowdsourcing is a neologism formed by the words "crowd" and "sourcing", which describes possibilities of using human resources in solving various tasks. Crowdsourcing is a means to solve the problems of business, state, and society which is based on the ability of online communities of respondents to generate new knowledge.

A crowdsourcing project has five stages:

1. Preparation. Before the project starts, it is necessary to outline the desired result; however, the actual results of crowdsourcing projects are not always predictable.

There are many intermediaries who follow the principles of crowdsourcing and are willing to provide appropriate IT-platforms. However, some companies prefer to develop their own platform and, thus, their own community of respondents.

2. Initiation. After the decision has been made to utilize crowdsourcing and choose an appropriate platform, the next step is to formulate the question. It is necessary to ask meaningful and precise questions.

3. Information gathering. Depending on the project type and subject matter, significant amounts of information can be collected. The number of responses can reach several thousand, especially when online platforms for brainstorming are used. Thus, it would be helpful to resort to external assistance to carry out initial analysis and integrate ideas, and thus more easily obtain the final assessment.

4. Assessment. After all possible solutions have been obtained, the project can be finished. Now it is time for the work to be done within the company that initiated the project. Problem solutions are selected according to the criteria that must be clearly stated before the start of the project, and the company's employees should carefully assess the ideas in accordance with these criteria.

5. Use. After the ideas have been collected and assessed, the next and often the most

difficult stage is using the obtained ideas in the company's practical activity.

Crowdsourcing is engaging a group of people to achieve a common goal or to solve an existing problem, especially to provide the sustainable development of agricultural enterprises. It is equipped with new technologies and social networks. The areas of crowdsourcing application are diverse. New ideas constantly appear on the Internet, which forces modern organizations to use crowdsourcing and learn to take maximum advantage of it, including obtaining new knowledge. The Internet facilitates communication with respondents, and, if properly applied, can provide new ideas and knowledge to solve incipient problems. Crowdsourcing makes it possible to choose the best ideas offered by a large number of respondents instead of relying on the qualifications and experience of one person.

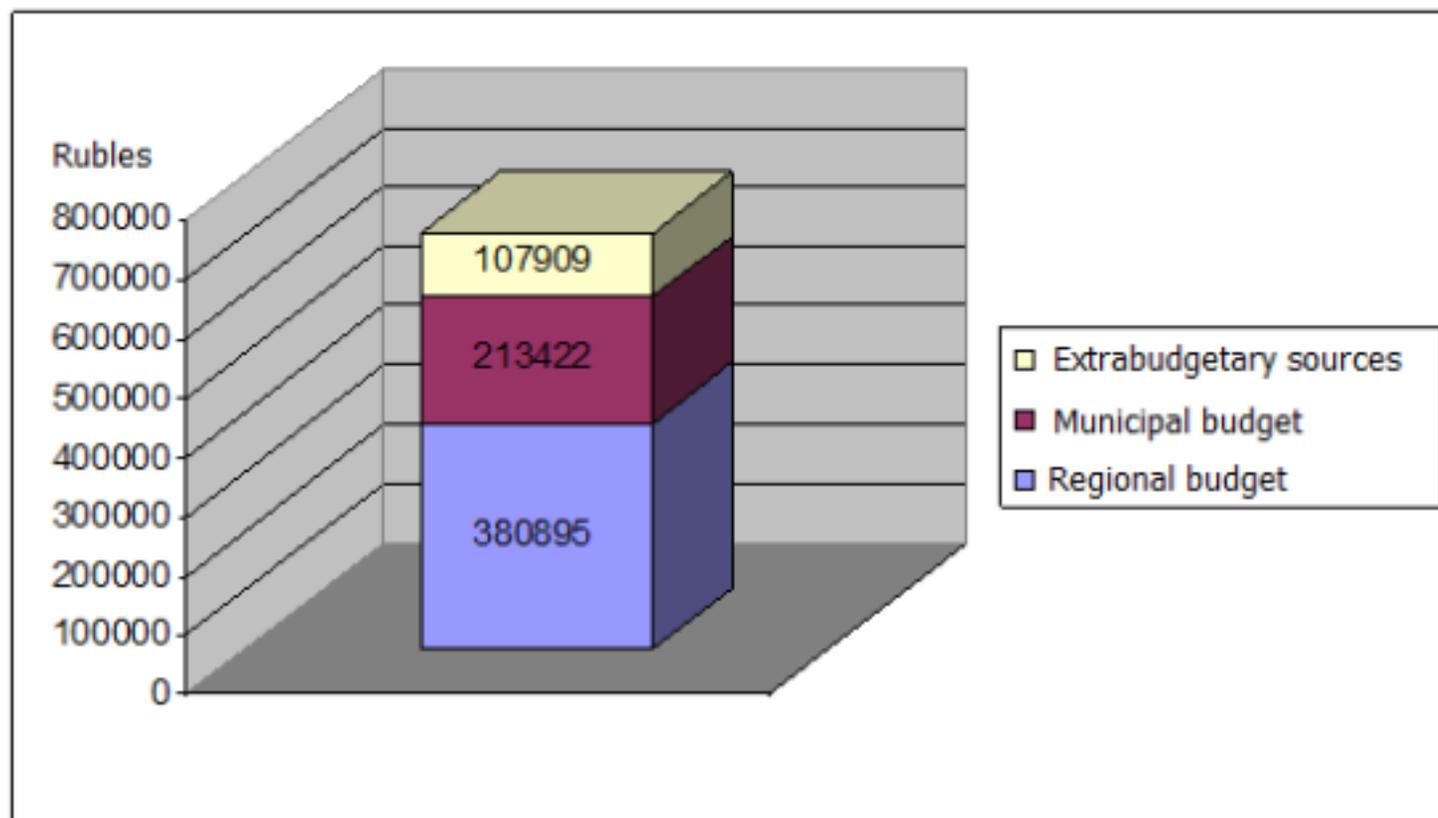
To implement crowdsourcing projects, agricultural consulting services can use existing crowdsourcing platforms or create their own platforms and remotely enlist experts from all over the world.

3.3. The main problems in the activity of ICS

Let us consider some problems in ICS activity which can be solved with the help of crowdsourcing.

The main problem in the development of agricultural consulting organizations in regions of Russia is unstable funding for their activity. Due to the lack of federal funding for consulting services for agricultural commodity producers and rural population, funding for consulting organizations rests entirely upon regional and municipal authorities. The financial condition of regional agricultural consulting organizations partially owned by the state is largely determined by the interest which regional and municipal authorities have in this issue (Fig.2) [18].

Figure 2
Distribution of financing sources for ICS in Russia in 2016



The involvement of respondents and experts who participate in a crowdsourcing project is one of the key conditions of its success. Personal involvement is personal willingness to participate in a particular activity, which consists of three components: knowledge, interest, and effectiveness. The opportunity to be remunerated fades into the background in this case. When a problem has been solved as a result of a crowdsourcing project, the respondents whose ideas have been used should be remunerated, even though this is not required by law. Regardless of the amount of remuneration, the participants should have a clear idea of how their ideas have been used. Crowdsourcing project costs include the costs

of development and maintenance of a crowdsourcing platform, but when considering that dozens of tasks can be discussed on a platform at the same time, the cost of one project will not increase significantly and will remain relatively low.

Not all ICSs are fully staffed with highly qualified experts in the full range of agricultural production activities. The problems that arise in those areas of knowledge in which there are no ICS experts can be submitted for discussion by a respondents' community. The demand for consulting services is unstable throughout the year, which leads to forced downtime in the work of full-time consultants. An Internet community of respondents is involved into the work only when there is a new task on the crowdsourcing platform. An important advantage of crowdsourcing is that the work of one consultant is carried out by the collective mind, which is known to be much more effective. This collective mind can be formed by respondents from all over Russia and from abroad. Wide coverage is an absolute advantage of crowdsourcing which does not have any limitations.

Currently, ICSs fail to organize enough retraining and advanced training courses, and there are not enough experienced and highly qualified experts. One of the most important results of ICS participation in crowdsourcing projects is that members of staff have an opportunity to learn from respondents and acquire invaluable knowledge that can be used for professional advancement. The activity of most ICSs is hampered by inadequate technical equipment. While all the necessary funds for task completion within the framework of a crowdsourcing project are attracted by the respondents themselves, ICSs do not incur any overhead costs. Liberalization of knowledge management is the key to success in a constantly changing marketplace. It is clear that, in the future, crowdsourcing will become a strategic asset for growth-oriented organizations, especially due to its ability to quickly create and implement innovations and solve complex problems. Crowdsourcing, as a new and progressive form of activity arrangement, should be introduced into the work of ICSs, not replacing the existing forms of operation, but complementing and improving them.

Information consulting activity integrates three main directions: innovation, information, and consulting. The innovative direction includes structures that contribute to the creation and development of innovations, allowing consumers to upgrade their production. Agricultural consulting services should become the basis for the system of innovation development, which unites scientific and educational institutions, various innovative organizations, and production with the aim to promote innovations in agricultural production and improve the efficiency of the agrarian sector. It is important that employees of agricultural consulting services at all levels systematically and purposefully work with rural commodity producers to explain to them the necessity of mastering a specific innovation and to prove its economical profitability. If they confine themselves only to providing information on innovations, which is a common practice, potential consumers of low-cost innovation projects usually reject the offers, because they fail to see the real potential benefit, i.e. the growth in economic output, reduction in costs per unit of output, increase in labor productivity, etc.

The Institute of Agricultural Consultation Work should integrate the activities of scientific and educational institutions using ICSs to create a complete and effective mechanism for the development of innovative activity, the integral part of which should be crowdsourcing.

3.4. Areas of application of crowdsourcing technologies

To develop the innovative activity of agricultural consulting services, crowdsourcing technologies can be used in three ways:

1. Identifying needs.
2. Developing/improving innovative products (goods, services, technologies, etc.).
3. Reporting the results of research and development.

An important advantage of crowdsourcing projects is the ability to determine the needs and desires of customers that will give new market impulses to agricultural consulting services. Customers and other respondents want to be heard, to be involved in the innovation process, and to know that their vote influences industrial processes. Crowdsourcing is

focused on creating customer-centered innovations. At the same time, customers and other respondents are willing to communicate their ideas to agricultural consulting services to see how they will be used for their own benefit and for the benefit of other customers. Experience shows that ideas generated in crowdsourcing projects are especially valuable at the early stages of innovative development/upgrade of products (goods, services, technologies, etc.). The problem can be usually solved much faster, more efficiently, and less expensively than in the case when only internal resources are used.

Crowdsourcing platforms make it possible to post information about intellectual property objects developed in ICSs or other organizations and ask the target audience for feedback. Crowdsourcing is a means to present an innovative product and increase the awareness of the target audience about how agricultural consulting services contribute to its development. The success of a crowdsourcing project depends on its preparation, which is especially difficult, since the project itself develops in a virtual environment. It is important not to join a crowdsourcing project blindly, but to make informed decisions about who should be involved in crowdsourcing projects as well as when and how they should be developed. A clear understanding of what agricultural consulting services want from a crowdsourcing project and who is responsible for it contributes to the whole project. This makes it easier to understand why a project is being completed, helps assess expectations, and helps make sure that there is at least one person who feels responsibility for and acts as a representative of the project within the ICS.

4. Conclusions

The activation of innovative activity, including the creation of a system for commercializing the results of intellectual activity, should contribute to the arrangement of conditions for the sustainable development of the agrarian sector. Under these conditions, agricultural consulting services gain importance as a coordinating and organizing center which integrates the scientific, educational, and industrial areas for the innovative support of agricultural production. It becomes the main element in the system of innovation commercialization, and acts as an intermediary between the developer (owner) of an intellectual property object and the agro-industrial enterprise, as well as a source of scientific and technical information.

All agricultural consulting services differ in the types of services provided as well as their range and quality; therefore, each agricultural consulting service can select the types of tasks to be solved with the help of crowdsourcing. State agricultural consulting services can monitor state policy in the agrarian sector. Private services can explore the demand for new consulting and information services and assess their commercial success.

Crowdsourcing and open innovations are capable of solving the most difficult problems that agricultural enterprises encounter in the innovation sphere. Crowdsourcing is a tool for attracting talented people with creative potential who are willing to sacrifice their own time. When agricultural consulting services turn to crowdsourcing, they gain the opportunity to involve the intellectual assets of an online community in the solution of tasks set by the clients, which allows them to receive a significant amount of new knowledge, to provide the sustainability and to improve the quality of task performance, and to reduce costs.

Acknowledgments

The work was supported by Act 211 Government of the Russian Federation, contract № 02.A03.21.

Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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