

INFORMATION SUPPORT OF AGRICULTURAL ADVISORY ACTIVITY IN UKRAINE AS A KEY COMPONENT OF ITS DEVELOPMENT

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Broyaka A. A. The Information Support of Agricultural Information-Advisory Activity in Ukraine as the Key Component of Its Development

The article is concerned with information technologies usage in the agricultural information-advisory activity in Ukraine and organization of its information support. The main aim of the research is to reveal the role of information technologies in agricultural information-advisory activity and analyze current approaches of information support in order to determine the application areas in further development. The dialectical method of knowledge, systematic approach to studying economic processes, observation, generalization, and other research methods are used to achieve the tasks set. It is summarized that adoption of innovative methods of telecommunication, WEB-technologies, modern software, data bases, the Decision Support Systems provides new opportunities for information and consultation delivering in Ukraine that will lead to an increase of welfare of agricultural producers and rural population. In addition, distance education and E-extension are recognized as the perspective directions of the further development of the national agricultural information-advisory services network.

Keywords: agricultural information-advisory (consultative) services, agricultural information-advisory activity, information technologies.

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Брояка А. А. Інформаційне забезпечення сільськогосподарської дорадчої діяльності в Україні як ключова складова її розвитку

Стаття присвячена використанню інформаційних технологій у сільськогосподарській дорадчій діяльності в Україні та організації її інформаційного забезпечення. Основна мета дослідження полягає у виявленні ролі інформаційних технологій у сільськогосподарській дорадчій діяльності та аналізі існуючих підходів інформаційної підтримки з метою визначення сфер їх застосування в подальшому розвитку. Для досягнення поставлених завдань використовуються діалектичні методи пізнання, системний підхід до вивчення економічних процесів, спостереження, узагальнення та інші методи наукового дослідження. Підсумовується, що впровадження інноваційних способів телекомунікації, WEB-технологій, сучасного програмного забезпечення, баз даних, систем підтримки прийняття рішень відкриває нові можливості для постачання інформації та надання консультацій в Україні, що приведе до підвищення добробуту сільськогосподарських виробників та сільського населення. Крім того, дистанційна освіта та E-дорадництво визнані перспективними напрямками подальшого розвитку національної мережі сільськогосподарських дорадчих служб.

Ключові слова: сільськогосподарські інформаційно-консультаційні (дорадчі) послуги, сільськогосподарська дорадча діяльність, інформаційні технології.

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Брояка А. А. Информационное обеспечение сельскохозяйственной информационно-консультационной деятельности в Украине как ключевая составляющая ее развития

Статья посвящена использованию информационных технологий в сельскохозяйственной информационно-консультационной деятельности в Украине и организации её информационного обеспечения. Основная цель исследования состоит в выявлении роли информационных технологий в сельскохозяйственной информационно-консультационной деятельности и анализе существующих подходов информационной поддержки для определения сфер их применения в дальнейшем развитии. Для достижения поставленных задач используются диалектический метод, системный подход к изучению экономических процессов, наблюдение, обобщение и другие методы научного исследования. Сделаны выводы, что внедрение инновационных способов телекоммуникации, WEB-технологий, современного программного обеспечения, баз данных, систем поддержки принятия решений открывает новые возможности для доставки информации и консультирования в Украине, что приведет к повышению благосостояния сельскохозяйственных производителей и сельского населения. Кроме того, дистанционное образование и E-консалтинг признаны перспективными направлениями дальнейшего развития национальной сети сельскохозяйственных информационно-консультационных служб.

Ключевые слова: сельскохозяйственные информационно-консультационные (советающие) услуги, сельскохозяйственная информационно-консультационная деятельность, информационные технологии.

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The effective and rational functioning of Ukrainian agricultural producers and rural communities under current market conditions highly depends on their awareness of modern technologies in agricultural production and processing, economic trends, market prices for products and resources, the legislation framework, etc. Therefore, agricultural advisory service has become the important infrastructure element of the domestic agricultural

market, which gives opportunity to adults for continuing education, increasing knowledge level, and improving professional skills. The effectiveness of agricultural advisory activity depends on how quickly and effectively modern scientific achievements in all areas of agriculture can be processed and used, whether it would be animal husbandry or crop production, legal or economic services, enterprise strategy development or marketing problems solving, etc. Farmers

in collaboration with agricultural advisors can handle and solve all such questions only in case of effective application of information systems and technologies. Consequently, the problem of developing a proper information support of agricultural advisory activity in Ukraine is relevant.

The methodological and information base for the study is represented by research papers, periodicals materials, legislative acts, official statistical publications, departmental materials, and online resources. The theoretical and methodological principles of organizing information and consultation support for agricultural producers and rural population are explicated in studies of many Ukrainian and foreign scientists, in particular M. Bezkrivnyi, O. Borodina, O. Galych, T. Kalna-Dubinyuk, O. Nedbalyuk, O. Shaman-ska; J. Aker, D. Aleksanov, A. Van den Ban, C. I. Houseman, V. Koshelev, S. Mushtaq, B. Seevers, K. Vignare, and others. The functioning of agricultural advisory services in Ukraine has been analyzed by such national researchers as I. Kryvoruchko, M. Kropyvko, R. Korinets, I. Kudinova, M. Lobanov, V. Samsonova, R. Schmidt. Nevertheless, not enough attention has been paid to the issue of application of modern information systems and technologies into the practical advisory activity in agriculture.

The *tasks* of the study are: providing a brief review of development of agricultural advisory services in Ukraine defining the role of information technologies in agricultural advisory activity, analyzing the methods of its delivery and the information recourses used in consulting agricultural producers, determining main problems of providing proper information support of agricultural advisory activity in Ukraine and prospects for their solution.

The research *subject* is the organizational and economic mechanism of performing agricultural advisory services in Ukraine. The research *methods* used are the dialectical method of knowledge, system approach to studying economic processes, observation, generalization, etc.

The reformation process of the agricultural sector in Ukraine has set forward the task of developing a new system of information delivery to agricultural producers and rural communities. Agricultural advisory services began to arise in Ukraine in the middle of 1990s under support of the international community, foremost the European Union and North American countries. The main objective was spreading and implementing modern scientific technologies, increasing skills and level of knowledge on profitable farming issues (as in other countries), and also forming agricultural market infrastructure (in particular rural cooperatives, regional agro-trade houses, wholesale markets, livestock and poultry auctions, commodity exchanges, processing enterprises, retail sales and food institutions, etc.), providing assistance in getting access to credit recourses through creation of the credit union and cooperative bank, preparation of business plans, development of green tourism, etc. [14]. Unfortunately, after the donors had completed their projects, the majority of the established with their help services stopped or reduced the information and consulting activities [11]. The reasons for this were the following: firstly, the gaps in the foreign partners understanding of specific Ukrainian conditions and needs for information and con-

sulting assistance; secondly, the Ukrainian agricultural producers were not willing or not able to pay for provision of information and advice; finally, the issue of agricultural advisory services in most regions of Ukraine was to be solved by the state authority that did not fully recognized their significance. The situation improved after enacting the Law of Ukraine "On Agricultural Advisory Activities" in 2004 [12] and the initiated funding in 2007 of the socially-directed agricultural advisory services from the state budget within the "State Program of Development of Ukrainian Village for the Period until 2015" [7] in the part of the agricultural advisory activity support. In total, for the specified purpose of this program there were actually used 10.2 million UAH of budget funds (approximately 1.5 million USD in accordance with the average annual exchange rates in 2007-2012), or 10.5 % of the projected volume (97.3 million UAH). It did not contribute to a proper rendering of advisory services for ensuring effective agricultural production by small farms, introduction of the latest achievements in science and technology and improvement of product competitiveness, or application of modern information technologies in agricultural advisory activity. In 2011 the state funding of agricultural advisory services was insufficient, and since 2013 the funds were not allocated at all, which again resulted in slowing down of this activity [10]. Thus, lack of a sufficient government support, resource limitation and low level of information technologies has constrained rapid development of agricultural advisory activity in Ukraine.

The agricultural market transformation and the progressive process of informatization call for improvement of functioning of agricultural advisory services as a significant component of organizational mechanism of agribusiness in Ukraine. The development of computers and improvements in telecommunications offer many new opportunities to obtain technical, market, economic, legal, and other information quickly and use it effectively for better decision-making [5]. Currently many domestic farmers and villagers feel an urgent need to master and adopt modern information technologies for successful business and household practice, since they have realized that useful information obtained in time is valuable for their success. Unfortunately, the analysis of the current capacity of information technologies utilization in agricultural advisory activity indicates that a great number of agricultural producers (especially small farmers) as well as agricultural advisors are deprived of access to computing and informational resources due to their high costs, undeveloped telecommunication network in rural areas, as well as lack of necessary user skills.

Further improvement of agricultural advisory activity in Ukraine requires expanding information technologies application. Information technology is a system of methods and forms of collection, accumulation, keeping, searching, data processing, and dissemination of information through the use of software, computer technology and communication that ensure transition of management practice, production regulation, and scientific research to higher organizational levels [8].

The quantity and quality of information technologies are growing rapidly, but not all of them are available and af-

fordable in rural areas. Basic information technologies that are recommended to use (and to extend usage for those that are already introduced) in agricultural advisory activity in Ukraine are the following:

- ✦ *technologies resulting from the technical capabilities of modern computer technology* (portable data medium of high information capacity: CD-R, CD-RW, flash drives instead of floppy disks; easy portable liquid-crystal screens, laptops for training organization; cheap inkjet printers that can be filled up with ink without computer specialists; modern modems adapted for using in poor quality and “slow” telephone networks in rural areas);
- ✦ *telecommunication technologies* (progressive but rarely used because of their expensiveness satellite communication technologies provided by JSC “UkrSat”; nationwide fiber-optic communication provided by “Ukrtelecom”; mobile / wireless connection, Radio Ethernet technology for organizing local networks with connection to the Internet, WAP-enabled cell phones and smart phones that can use GPRS, EDGE and 3G connection to the Internet);
- ✦ *system, tool and application computer software* (mostly Microsoft Windows); econometric methods and models of planning (based on Microsoft Excel, LPX88, MathCAD);
- ✦ *database technologies* for creating reference and information funds of agricultural scientific, technical and market information as well as Decision Support Systems;
- ✦ *Web/Internet technologies* (e-mail and mailing lists that give opportunities to send messages, newsletters to one or more recipients; interactive chats that provide possibilities of information exchange between the advisor and the farmer in real time; voice and video conferences that allow two or more subscribers to hear and see each other; the World Wide Web that distributes by interlinked web-pages a significant amount of useful for farmers and villagers information).

Information technology affords an opportunity “to enhance the communication process by selecting the technology that makes the information more understandable to the receiver” [6]. Modern information technology can give agricultural producers and rural population rapid access to a vast amount of information, help them to select from the large bulk of data the exact information they need for their decision-making. Modern computers have become much more “user friendly”. The user does not need to know how to program them but only should answer questions displayed on the screen by pressing buttons [5]. Information technologies directly affect the management effectiveness of both agricultural production and advisory activity. They change the administrative work conditions and involve information as the subject of work. Thus, the use of information technologies significantly reduces management costs, expands access of agricultural producers and rural populations to information sources, fundamentally changes opportunities of obtaining, storage, dissemination of information,

and increases the efficiency of economic contacts between members of the agricultural market [13].

Information and communication technologies for agricultural extension need “to integrate into a continuing flow of information using strategic design and best practices” [6]. The development of modern information and communication technologies and the expansion of accessibility to them for rural population in Ukraine put forward additional claims for the implementation and efficiency of agricultural advisory services, since they should allow not only access to the service through convenient and cheap way, but also make it possible to clarify the questions concerning photo and video materials as well as getting answers in a convenient manner and in due time that is dictated by technological, economic and production requirements. The experience of solving operational issues needs to be systematically collected and organized for the following use with the significant time reduction in searching or preparing a response. Besides, agricultural advisory activity is characterized by considerable amount of information that should be processed and also by complicated informational communication among managerial and functional levels. This requires developing a specialized multilateral system of information support of advisory activity in agriculture.

Information support of agricultural advisory activity presupposes:

- ✦ creation of a database of agribusiness in the region, country, comprising achievements in agricultural science and technics, etc.;
- ✦ interaction of agricultural advisory services with scientific, educational institutions and other suppliers of information resources;
- ✦ integration of knowledge from different sources in order to develop practical recommendations to help producers in solving different kind of problems;
- ✦ creation of Decision Support Systems and expert systems;
- ✦ formation of a regional and national network of gathering, analyzing and dissemination of market information;
- ✦ organization of the process of supplying information to regional advisory services;
- ✦ identification and resolution of the issues concerning interest of agricultural producers and different target groups of rural communities for further analysis of information and consultation needs;
- ✦ organization of training events, including preparation and provision of distance courses;
- ✦ creation of a system for monitoring and evaluating agricultural advisory services effectiveness and efficiency at the local, regional and national levels.

For an effective operation of agricultural advisory services, it is necessarily to pay particular attention to the creation and maintenance of regional databases of scientific, technical and market information. The bases should become the reference-information fund of diverse information: prospective (prognostic), current (operative) and retrospective (archive) information and should meet the prescribed criteria:

- ✦ be timely updated (actualized);
- ✦ ensure easy access to information;
- ✦ be a tool for prompt dissemination of information (first of all on the market conditions);
- ✦ include generally used information (legislative, normative-reference, etc.) as well as specific information (agricultural production technologies, plant protecting means, veterinary preparations, etc.)

“Many agriculture websites now rely on some type of database running in the background, which allows users to search using either a search tool or navigation” [6]. A large number of websites where agricultural producers can find diverse legislative, commercial information, price monitoring, analytical information, economic and statistical indicators, prognoses of agricultural production and market tendency (www.minagro.gov.ua, www.zacon.gov.ua, www.rada.gov.ua, www.ukrstat.gov.ua, www.agroperspectiva.com, www.proagro.com.ua, www.apk-inform.com, and some others) have recently appeared in the Ukrainian segment of the Internet. But the digital databases of these sites do not enclose sufficient agricultural scientific and technological information necessary for farmers to make effective decisions. In order to support agricultural advisory activity in Ukraine the Ukrainian National Association of Agricultural Advisory Services with the help of domestic and international partners (in particular USAID) have launched their own site (www.dorada.org.ua), which includes practical information: from institutional aspects of the organizing and functioning of agricultural advisory services to agricultural technological issues they face daily. The Register of Agricultural Advisory Services and the Register of Agricultural Advisors and Expert Advisors, the schedule of advisory events, professional publications are presented on the site. It also proposes e-consulting service and some distance educational courses on agricultural extension.

The web-portal “Agricultural sector of Ukraine” is another Internet recourse that is worth mentioning; it was created by scientists and specialists of the National Agrarian University and its development is being continued (www.agroua.net). The information on the portal is presented mostly with databases. Users have access to the databases on plant cultivation (agricultural crops, pests, diseases, weeds, chemicals, plant protection, etc.), animal husbandry (pedigree breeds, breeders, technological information on meat and dairy cattle breeding, swine breeding, horse breeding, sheep breeding, poultry raising, veterinary pharmacy, etc.), agribusiness mechanization (tractors, cultivating machines, sowing and planting machines, machines for chemical plant protection, fertilization, harvesting machines, transportation and lifting machines, machines and equipment for livestock mechanization, irrigation equipment, machines and equipment for agricultural processing, etc.), agricultural economics (fundamentals of agribusiness, analytical and statistical information, price monitoring) as well as data on agricultural companies, stock and commodity exchange, banks. There are materials about quality of agricultural products and food safety. The Internet catalogues of different domestic and international publication and other digital recourses on agricultural application are

also submitted on the site. The databases are permanently updated, supplemented and corrected. The forum is hosted on the portal for teleconferencing and views exchanging. Users can make their comments and express concerns in the guest book that is studied and considered for future improvements and feedback. A public bulletin board is provided for advertising (products sale and purchase, business propositions, etc.). In addition, some other opportunities are offered: weather forecast, exchange rates, news calendar, search service, e-mail, and others.

However, the on-line resources mostly provide survey information, because this information is easy to collect and disseminate. “Projects that provide information on agricultural practices and inputs are relatively rare, because such information is more nuanced and difficult to convey” [1]. But the analysis of requirements of subjects in agrarian markets shows that simple informing of representatives of agrarian sphere is insufficient. There is a great demand for consulting services and especially for the support of rational decision making. Therefore, only realizing, on the one hand, the need for application of system approach to building constituents of information technologies and their operation as a whole, and applying advanced approaches and methods of obtaining, handling and delivery of information, on the other hand, can help solve the task of providing qualitative and timely consultation in the field of agriculture. In this way agricultural advisory activity can support a uniform chain: information — advice — decision making — education. Implementation of effective operation of the chain implies formulation and solution of a complex of interconnected practically significant tasks realized on the basis of developing the integrated information environment that presents: the information environment on the basis of data and knowledge, elements of reference systems, expert systems, geo-information systems and Decision Support Systems [9]. Such Decision Support Systems should be constructed in such a manner that they might work in the local mode when one person is involved in providing consultations by an advisory service, or in the distributed (network) mode when several advisers by particular counseling areas are involved in the service.

The decision-making process should be completed on the basis of constructing appropriate informational, logical and econometrics models. According to the frameworks of Decision Support Systems, agricultural producers should make a decision by using typical scientifically based solutions or work out a unique solution taking into consideration individual conditions, recourses and expectations by utilizing the system abilities. “Decision Support Systems require low risk solutions with proven technologies with justification based solely on tangible return on investment with optimal use of resources” [2]. The frameworks of Decision Support Systems allow selecting the attributes of decision making such as farming timeliness, acceptance and implementation, rationality, realizability, flexibility, and controllability.

Application of Decision Support Systems frameworks set organizational procedures in decision making. First of all, it enables to proceed to the continuous situation analysis and operation planning, ensures realization of correction

(re-planning) of the decision-making process without disturbance of its technological integrity and coherence, offers multi-variant approach to solution options and capability of their obtaining by various criteria and models, establishes the interconnected system for framing and selecting solutions both for the given problem, and those concerning its interaction with other problems and tasks.

Such software was developed in the Ukrainian branch of the International Center of Scientific Culture — World Laboratory by experts of the Cybernetic Center of the National Academy of Sciences of Ukraine together with experts of the National Agrarian University within the framework of the USAID funded project “Improving Income of Private Ukrainian Agricultural Producers through Agricultural Extension” [14]. The developed software embraces 1800 databases and was installed in 3 regional agricultural advisory centers and 67 areas advisory offices of Vinnytsia, Cherkasy and Khmelnytskyi regions. Here is an example of how it works. The Decision Support System from the point of view of plant-growing offers the farmer together with agricultural advisory agents to work some technological way from the analysis of natural and climatic conditions and requests of crops to developing technologies and the economic analysis of farmer activity. At first, the farmer with the assistance of the adviser can select a set of the most acceptable crops for growing with regard to local conditions and needs of the market. The further step is the development of the growing technology. The farmer decides on the crop plant and its variety to be grown and the plot to be used. The crop variety should be selected considering its resistance to the most widespread local insects and diseases. The farmer with the adviser can also calculate a set of fertilizers for each crop on each plot. The adviser may recommend an acceptable integrated pest management or select the most appropriate chemicals (herbicide, fungicide, insecticide, etc.). Before this, if necessary, they identify harmful organisms with the assistance of simple expert resources that work according to the principle of “look and select”. Based on the gained information, the farmer with the help of the adviser can develop technological process charts of plant-growing and evaluate them with the help of costs and economic indexes. Eventually, the farmer with the adviser can compose and print out statistical and tax reports using a simplified form for submission to regional state offices. Another option is to work out the own balance sheet and analyze the financial state of the farm. Thereby, the agricultural advisor is capable to assist agricultural producers with financial and management accounting.

Thus, it is possible to draw a conclusion that within the framework of such software environment, agricultural advisory activity can cover all subsystems of agricultural subject operation: administrative, technical, technological, economic, and financial (accounting) one. In spite of its expensiveness and considerable time expenditure on its development and installation, it is necessary to continue developing Decision Support System and adapting it to agricultural advisory activity in Ukraine, since the software is tailored to the traits of the domestic economy (taxation, inflation rate), the geographical and climate conditions, and considers the national experience. It helps evaluate project opportunities

and effectiveness quickly by making rational decisions, visualizes solutions, reduces the time spent on searching necessary information and guaranties its reliability.

Another prospective option of using the innovative method of telecommunication and information technologies in agricultural advisory activity is distance education, which can solve the problem of farmers with lack of time. Distance education as a learning tool has emerged in Ukraine relatively recently. While the farmer using the system of distance education and the teacher (expert-adviser) are space separated from each other, they stay in constant interaction organized via the Internet. Distance education allows eliminating complexity in teaching, training and retraining of agriculture specialists, farmers, plots owners, rural youth and women. Agricultural advisory services can order the developing of such courses to agricultural universities and scientific institution of Ukraine and abroad, and then make them available to the general public, especially rural communities. Distance education is becoming the most valuable in the world way to get professional education, which is increasingly used mainly by remote regions or those who want to study at schedules convenient for them. After completing the course the certificate is usually issued. Didactic qualities of information technologies used in distance education provide information exchange between Internet users, offer information in different forms and volumes, allows interoperability (for example, exchange of files via FTP (File Transfer Protocol) and e-mail) and compatibility (simultaneous use) of various technologies, and their didactic versatility.

A distinctive feature of distance education is to provide learners with the possibility to obtain the necessary knowledge using advanced information resources provided by modern information technologies. Information resources, such as information and knowledge databases, computers and multimedia educational and control systems, video and audio clips, digital libraries together with traditional textbooks and teaching aids create a unique distributed learning environment accessible to a wide audience. Distance education allows agricultural specialists, advisors and producers to learn and improve their skills in a convenient location, and at their convenience using available computer tools to communicate with the teacher and other participants of the training programs. Unfortunately, currently only several educational institutions in Ukraine provide distance courses. Among them there are the National University of Life and Environmental Sciences of Ukraine, the State Agrarian and Engineering University in Podilya. However, the growing number of users is demonstrating a great interest in the existence of such an information resource and the need for its further development.

Modern informational technologies stimulate appearance of alternative advisory methods; in particular e-consulting is gaining popularity. “Recent advances in distance learning and e-learning on digital platforms indicate significant opportunities for the development of cost-effective agricultural e-extension systems” [4]. On the basis of Internet technologies (World Wide Web, e-mail) and using database systems, methods of econometric modeling, and special application software, the advisory activity connect the lead-

ing professionals of universities or research centers without involving them in long-time and relatively expensive farm trips and not inviting every farmer to provide them with relevant information. One of the key elements of the system of e-consulting is consolidation of the specialists into communities by fields of study. The Community of practitioners is defined as the virtual subject network that consists of experienced professionals of different organizational structures of Ukraine who have the knowledge and skills in the relevant subject area and are ready to provide advisory services and spread own knowledge and information [3]. Thus, e-consulting and distance education technologies belong to means of effective dissemination of agricultural knowledge considering the diversity in geographic placement of numerous subjects of agricultural production.

CONCLUSIONS

Dynamic changes in the development of the agricultural market put forward new requirements to style and methods of the advisory service activity. Currently, the development of most areas including the area of agricultural advisory activity is determined by appropriateness of planning and organizing their information support. The conducted study of the use of informational recourses by agricultural advisory services in Ukraine has revealed several problems: low level of information awareness of rural producers and villagers, which is associated with lack of a proper access to the system of dissemination of knowledge and technology, especially for geographically remote clients; insufficient provision of advisory services with all necessary facilities and information technology; low level of consulting informatization; insufficient competence of agricultural advisors in using modern information technologies; poor information resources integration of agricultural advisory services with educational, research institutions, and international centers of agricultural information, etc.

For further improvement of the information support of agricultural advisory activity in Ukraine and increase of its efficiency we offer the following:

- ✦ introduce new technologies of agricultural information and knowledge dissemination in the work of economic subjects in rural areas, use intellectual software and Internet technologies widely in order to improve the quality of consulting and ensure solving problems of agricultural producers and rural communities;
- ✦ use information resources of local, regional, national and global networks taking into consideration strategies of development of agricultural advisory services in Ukraine;
- ✦ invite professionals for planning and organizing the adoption of the innovation information system and technologies in the Ukrainian agricultural advisory network;
- ✦ attract international technical assistance and establish cooperation with the international community in the field of implementation of modern computer systems and technologies in agricultural advisory services in Ukraine;

- ✦ apply modern methods of agricultural advisory activity such as distance education, e-consulting, etc.

As a result of the conducted study it should be summarized that there are several advantages of application of innovative information technologies in agricultural advisory activity in Ukraine, in particular provision of a continuous process of data collection; analysis and assessment of relevant information, including the situation on the domestic and foreign markets; acceleration and facilitation of the spread of modern knowledge and experience, achievements in science and technologies, market conditions analytics; ensuring access of agricultural producers and rural population to electronic information sources including web-technologies; solving a number of calculation and technological tasks that previously could not be solved without computer equipment; immediate information exchange between consultants, advisory services and agricultural producers with the help of e-mail; automation of office activities of agricultural advisory services, etc. Development of adult distance education is one of the prospective directions in the practical use of information technologies in agricultural advisory activity in Ukraine, since the majority of Ukrainian farmers do not have a university degree in agriculture. Another useful opportunity of application of information technologies in agricultural advisory activity that is necessary to be developed is forming of a digital database such as computer-aided directories of agricultural crops, pests, diseases, machinery, technologies, other inputs, and interactive programs targeting to increase income of rural population and private producers.

The use of innovative telecommunication technologies, web-technologies, and modern application software based on digital technologies and distance education in agricultural advisory activity creates appropriate conditions for a significant expansion of its audience at local, regional and national levels. It creates unlimited opportunities to attract professionals and use agricultural information databases that reflect the results of research and accumulates new knowledge. The introduction of computer information systems contributes to an effective operation of agricultural advisory services by rapid, high-quality processing of digital information; guaranties credibility of the information received by advisors and agricultural producers; reduces risks and improves the reliability of the used facts and assessments for making valid decisions.

Therefore, it is necessary to continue developing the agricultural advisory service activity based on tools of the e-extension system and attracting new communities of professionals to different fields, create for them interactive advisory systems using modern software, technologies and informational support. ■

LITERATURE

1. **Aker, J. C.** Dial "A" for agriculture: A Review of Information and Communication Technologies for Agricultural Extension in Developing Countries. Working paper No. 269. Washington, DC: Center for Global Development, 2011. 39 p. URL: <https://www.cgdev.org/publication/dial-agriculture-review-information-and-communication-technologies-agricultural>

2. Houseman, C. I. Role and Potential of Information Technology in Agricultural Extension Services. In: Proceedings of the Second European Conference for Information Technology in Agriculture, Food and the Environment (Role and Potential of IT, Intranet and Internet for Advisory Systems). Bonn, Germany, September 27–30, 1999. P 3–12. URL: <http://www.efita.net/apps/accesbase/dbsommaire.asp?d=6063&t=0&identobj=10PhgU5i&uid=57305290&sid=57&idk=1>

3. Kalna-Dubinyuk, T. P., Shapoval, O. and others. Information Technologies in Extension Service Consulting Activities. *European Cooperation*. 2016. Vol. 1. Issue 8. P. 62–70.

4. Mushtaq, S., Reardon-Smith, K., Ostini, J. and others. Can Digital Discussion Support Tools Provide Cost-Effective Options for Agricultural Extension Services? *Information Technologies & International Development*. 2017. Vol. 3. P. 52–68. URL: <http://itidjournal.org/index.php/itid/article/view/1453>

5. Van den Ban, A.W. & Hawkins, H. S. Agricultural Extension. Oxford: Blackwell Science, UK, 1996. 294 p.

6. Vignare, K. Options and Strategies for Information and Communication Technologies within Agricultural Extension and Advisory Services. MEAS Discussion Paper. Michigan State University, USA, 2013. 27 p. URL: <http://meas.illinois.edu/wp-content/uploads/2015/04/Vignare-K-2013-ICT-and-Extension-MEAS-Discussion-Paper.pdf>

7. Державна цільова програма розвитку українського села на період до 2015 р. (затв. Постановою Кабінету Міністрів України від 19 вересня 2007 р. № 1158). URL: <http://zakon3.rada.gov.ua/laws/show/1158-2007-п>

8. Сільськогосподарська дорадча діяльність: навч. посіб./Т. П. Кальна-Дубинюк, І. П. Кудінова та ін. Ніжин: ПП Лисенко М. М., 2010. 360 с.

9. Марусей Т. В. Інформаційні системи і технології в інформаційно-консультаційному забезпеченні АПК. *Наукові праці Полтавської державної аграрної академії*. 2012. Вип. 1 (4). Т. 1. С. 201–205.

10. Про результати аудиту ефективності використання коштів державного бюджету, спрямованого на виконання Державної цільової програми розвитку українського села на період до 2015 р. Київ: Рахункова палата України, 2015. URL: http://www.ac-rada.gov.ua/doccatalog/document/16747613/Bul_rozv_ukr_sel.pdf

11. Стратегічні напрями інституційного забезпечення розвитку аграрного сектора в Україні: аналітична доповідь. Київ: НІСД, 2014. 45 с.

12. Закон України «Про сільськогосподарську дорадчу діяльність» від 17.06.04 р. № 1807-IV. URL: <http://zakon3.rada.gov.ua/laws/show/1807-15>

13. Шаманська О. І. Застосування інформаційних систем та технологій як пріоритетного напрямку ефективного функціонування та розвитку дорадчої діяльності в Україні. *Ефективна економіка*. 2015. № 4. URL: <http://www.economy.nayka.com.ua/?op=1&z=4010>

14. Основи сільськогосподарського дорадництва в Україні: навч. посіб./Р. М. Шмідт, М. Ф. Кропивко, М. Ф. Корінець та ін. Львів: Українські технології, 2004. 680 с.

REFERENCES

Aker, J. C. "Dial "A" for agriculture: A Review of Information and Communication Technologies for Agricultural Extension in Developing Countries". <https://www.cgdev.org/publication/dial-agriculture-review-information-and-communication-technologies-agricultural>

Houseman, C. I. "Role and Potential of Information Technology in Agricultural Extension Services". Proceedings of the Second European Conference for Information Technology in Agriculture,

Food and the Environment (Role and Potential of IT, Intranet and Internet for Advisory Systems). <http://www.efita.net/apps/accesbase/dbsommaire.asp?d=6063&t=0&identobj=10PhgU5i&uid=57305290&sid=57&idk=1>

Kalna-Dubinyuk, T. P. et al. "Information Technologies in Extension Service Consulting Activities". *European Cooperation*. Vol. 1, no. 8 (2016): 62–70.

Kalna-Dubiniuk, T. P. et al. *Silskohospodarska doradcha diialnist* [Agricultural advisory activity]. Nizhyn: PP Lysenko M. M., 2010.

[Legal Act of Ukraine] (2007). <http://zakon3.rada.gov.ua/laws/show/1158-2007-п>

[Legal Act of Ukraine] (2004). <http://zakon3.rada.gov.ua/laws/show/1807-15>

Mushtaq, S. et al. "Can Digital Discussion Support Tools Provide Cost-Effective Options for Agricultural Extension Services?" *Information Technologies & International Development*. 2017. <http://itidjournal.org/index.php/itid/article/view/1453>

Marusei, T. V. "Informatsiini systemy i tekhnolohii v informatsiino-konsultatsiinomu zabezpechenni APK" [Information systems and technologies in the informational and consulting support of the agroindustrial complex]. *Naukovi pratsi Poltavskoi derzhavnoi ahrarnoi akademii*. Vol. 1, no. 1 (4) (2012): 201–205.

"Pro rezultaty audytu efektyvnosti vykorystannia koshtiv derzhavnogo biudzhetu, spriamovanoho na vykonannia Derzhavnoi tsilyovoi prohramy rozvytku ukrainskoho sela na period do 2015 r." [On the results of the audit of the effectiveness of the use of state budget funds aimed at implementing the State target program for the development of the Ukrainian village for the period until 2015]. http://www.ac-rada.gov.ua/doccatalog/document/16747613/Bul_rozv_ukr_sel.pdf

Stratehichni napriamy instytutsiinoho zabezpechennia rozvytku ahrarnoho sektora v Ukraini: analitychna dopovid [Strategic directions of institutional support for the development of the agrarian sector in Ukraine: an analytical report]. Kyiv: NISD, 2014.

Shamanska, O. I. "Zastosuvannia informatsiinykh system ta tekhnolohii yak priorytetnoho napriamu efektyvnoho funktsionuvannia ta rozvytku doradchoi diialnosti v Ukraini" [Application of information systems and technologies as a priority direction of effective functioning and development of advisory activity in Ukraine]. *Efektyvna ekonomika*. <http://www.economy.nayka.com.ua/?op=1&z=4010>

Shmidt, R. M. et al. *Osnovy silskohospodarskoho doradnytstva v Ukraini* [Fundamentals of agricultural advisory services in Ukraine]. Lviv: Ukrainski tekhnolohii, 2004.

Van den Ban, A. W., and Hawkins, H. S. *Agricultural Extension*. Oxford: Blackwell Science, UK, 1996.

Vignare, K. "Options and Strategies for Information and Communication Technologies within Agricultural Extension and Advisory Services" MEAS Discussion Paper. <http://meas.illinois.edu/wp-content/uploads/2015/04/Vignare-K-2013-ICT-and-Extension-MEAS-Discussion-Paper.pdf>