

COST-EFFECTIVENESS OF THE INTRODUCTION OF INNOVATIVE TECHNOLOGIES IN AGRICULTURE IN THE ERA OF END-TO-END DIGITALIZATION

K.F. KRAI, M.I. KHADZHIEVA

FSBSE “Federal scientific center
«Kabardino-Balkarian Scientific Center of the Russian Academy of Sciences”
360002, KBR, Nalchik, 2, Balkarova street
E-mail: kbncran@mail.ru

One of the most necessary conditions for global competition in agricultural production is to improve the productivity and competitiveness of products. The long-term Russian experience in robotics and the development of the material and technical base in the agricultural sector makes it possible to make the transition from building up energy capacities to raising the technical level, namely to automated and robotic technologies. In this article, we describe the practice of using already developed robotic technologies and those being developed now that perform not only certain types of activities, but also have end-to-end robotization. The article also discusses effective digital technologies used in agriculture abroad, analyzes the direction of innovative digital technologies in agriculture, particularly, in crop production. The prospects for the use of robotic technologies in agriculture of the KBR and RI, namely the use of an octo-copter for spraying agricultural crops, have been identified.

Keywords: agriculture, robotic technologies, the agricultural sector, the use of an octo-copter, efficient technologies, increasing yields, crop production.

REFERENSES

1. *Prognоз в области народонаселения* [Population forecast] [Electronic resource] // Departament po ekonomicheskim i sotsial'nym voprosam OON. URL: <https://news.un.org/ru/story/2013/06/1224001>.
2. *Spasti mir ot goloda: tekhnologii pozvolyat Zemle prokormit' 10 mlrd chelovek* [Save the world from hunger: technology will allow the Earth to feed 10 billion people.] [Electronic resource] // Forbes. URL: <https://www.forbes.ru/tehnologii/354705-spasti-mir-ot-goloda-tehnologii-pozvolyat-zemle-prokormit-10-mlrd-chelovek>.
3. *Obzor tsifrovyykh tekhnologiy dlya agropromyshlennogo kompleksa: ot GIS do interneta veshchey* [Review of digital technologies for the agro-industrial complex: from GIS to the Internet of things] [Electronic resource] // RPC INTEGRAL Ltd. URL: <https://integral-russia.ru/2020/07/30/tsifrovaya-platforma-razvitiya-agropromyshlennogo-kompleksa-kontsepsiya-i-osnovnye-tezisy/>
4. Smart Farming, or the Future of Agriculture [Electronic resource] // SciForce. URL: <https://medium.com/sciforce/smart-farming-or-the-future-of-agriculture-359f0089df69>.
5. GLONASS в агропредприятии на сельскохозяйственных технологиях [GLONASS In an agricultural enterprise using agricultural machinery]. [Electronic resource] // URL: <https://ruglonass.ru/kontrol-topliva/opisanie/glonass-dlya-agro-predpriyatij/>
6. *Sistema upravleniya agroproizvodstvom Cropio* [Cropio agricultural production management system]. [Electronic resource] // Cropio service. URL: <https://about.cropio.com/ru/>
7. The complete digital agronomy solution. [Electronic resource] // Taranis company. URL: <https://taranis.ag/>
8. Skvortsov E.A., Skvortsova E.G. *Neobkhodimost' innovatsionnogo razvitiya sel'skogo khozyaystva na osnove primeneniya robototekhniki* [The need for innovative development of agriculture based on the use of robotics] // Vestnik VNIMZH./Institute of animal breeding mechanization Herald, 2016. No. 1 (21). Pp. 85-90.
9. *Katalog avtonomnykh sel'skokhozyaystvennykh robotov dlya raboty v pole, v sadu ili teplitse* [A catalog of autonomous agricultural robots for working in the field, garden or

greenhouse]. [Electronic resource] // Robotrends. URL: http://robotrends.ru/robopedia/katalog-avtonomnyh-robotov-dlya-raboty-v-selskom-hozyaystve#google_vignette.

10. A Growing Presence on the Farm: Robots. [Electronic resource] // New York Times. URL: <https://www.nytimes.com/2020/02/13/science/farm-agriculturerobots.html?auth=link-dismiss-google1tap>.

11. The Future of Farming. Robotic solutions for row crop agriculture. [Electronic resource] // Rowbot Systems. URL: <https://www.rowbot.com/>

12. Fendt puts the new robot ‘Xaver’ to use. [Electronic resource] // AGCO GmbH. Fendt News. URL: <https://www.fendt.com/int/fendt-xaver>.

13. *V KBR zapustyat proizvodstvo unikal'nogo robota-dachnika* [KBR will launch the production of a unique robot-summer resident]. [Electronic resource] // FGBU «Redaktsiya «Rossiyskoy gazety». URL: <https://rg.ru/2016/01/15/reg-skfo/robot.html>

14. *Robot dlya uborki ogurtsov* [Cucumber harvesting robot]. [Electronic resource] // Zhurnal "Agromaks". URL: <https://agro-max.ru/novosti/robot-dlya-uborki-ogurcov-pojavitsja-v-prodazhe-v-2021g/>

15. Robot uses machine learning to harvest lettuce. [Electronic resource] // ScienceDaily. URL: <https://www.sciencedaily.com/releases/2019/07/190707215819.htm>

16. Strawberry picking robot could harvest enough fruit for Wimbledon. [Electronic resource] // Mark Allen Engineering Limited. URL: <https://www.theengineer.co.uk/strawberry-picking-robot-wimbledon/>

17. *Ekologicheskiye problemy sel'skokhozyaystvennogo ispol'zovaniya zemli* [Environmental problems of agricultural land use]. [Electronic resource] // Agroxxi.ru. URL: <https://www.agroxxi.ru/zhurnal-agromir-xxi/stati-rastenievodstvo/yekologicheskie-problemy-selskohozjaistvennogo-ispolzovaniya-zemli.html>

18. *V KBR dron nachnet sam raspylyat' udobreniya i izuchat' rasteniya v polyakh* [In KBR, the drone will start spraying fertilizers by itself and studying the plants in the fields]. [Electronic resource] // Severo-Kavkazskiye novosti. URL: https://sk-news.ru/news/selhoz/62763/?month=11&year=2019&mul_mode=

19. Timofeev A.V. *Robots i iskusstvennyy intellekt* [Robots and artificial intelligence] // *Glavnaya redaktsiya fiziko-matematicheskoy literatury izdatel'stva «Nauka».* /Main editorial office of physical-mathematical literature of “Nauka” Publishing house M., 1978. P. 192.

Information about the author:

Krai Karina Faezovna, Junior researcher of the Center of Engineering of the Federal Scientific Center “Kabardin-Balkar Scientific Center of the Russian Academy of Sciences”.

360000, KBR, Nalchik, I. Armand street, 37-a.

E-mail: kraykarina@mail.ru

Khadzhieva Mariam Ilyasovna, Trainee researcher of the Engineering Center, Federal Scientific Center “Kabardin-Balkar Scientific Center of the Russian Academy of Sciences”.

360000, KBR, Nalchik, I. Armand street, 37-a.

E-mail: mariam9248@mail.ru