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SIGNS OF EXPEDIENCY AND TIMELINESS OF AGRICULTURAL INDUSTRY ROBOTIZATION

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The results of a study of the problems facing agricultural producers making decisions on the introduction of advanced (digital) technologies in real production operations are presented. For this, primary taxonomic representations of research tasks are formed, aimed at robotizing various agricultural sectors. Estimates of the severity of the problems of providing benign food products to the world's population in its current and future numbers are presented. The mechanisms of occurrence of losses of produced food products and their long-term environmental consequences are analyzed. The gap between the widely practiced simulation and emulation modeling of advanced agricultural machines and the general agricultural plan and the real results of attempts to robotize the agricultural industry is revealed. In particular, justifications of non-obvious causal relationships between the occurrence of adverse consequences for the development of human nutrition of food products using traditional agrotechnical technologies are presented. The advantages of the transition to the production of essential food products using multi-agent robotic systems in the habitat and human life are formulated. The result of the systematization of the types of agricultural production by the nature of the algorithmic and kinematic tasks to be robotized associated with the implementation of production operations is presented. The structure of the basic conditions for robotization of the agricultural industry is considered.

Keywords: agrarian industry, robotics, unitary system, multi-agent complex, food products, greening, algorithmic, kinematic.

REFERENCES

1. Arshinov V.I., Budanov V.G. *Paradigma slozhnostnosti i sotsiogumanitarnyye proyektsii konvergentnykh tekhnologiy* [Complexity paradigm and socio-humanitarian projections of convergent technologies] // *Voprosy filosofii* [Questions of philosophy]. 2016. No1. S. 59-70.
2. Arshinov V.I. *Konvergentnyye tekhnologii v kontekste postneklassicheskoy paradigmy slozhnostnosti* [Converged technologies in the context of the post-non-classical complexity paradigm] // *Slozhnost'. Razum. Postneklassika* [Difficulty. Mind. Postclassics]. 2015. No 3. P. 42-54. DOI: 10.12737 / 13564.
3. Knyazeva E.N. *Transdistsiplinarnyye strategii issledovaniy* [Transdisciplinary research strategies]. Bulletin of TPGU. 2011.10 (112). P. 193-201.
4. Garnett T., Appleby M.C., Balmford A., Bateman I.J., Benton T.G., Bloomer P., Burlingame B., Dawkins M., Dolan L., Fraser D., Herrero M., Hoffmann I., Smith P., Thornton P.K., Toulmin C., Vermeulen S.J., Godfray H.C.J. Sustainable Intensification in Agriculture: Premises and Policies // Science. 2013. Vol. 341. July. Pp. 33-34.
5. Sundmaeker H., Verdouw C.N., Wolfert J., Freire Perez L. Internet of Food and Farm 2020 // In O. Vermesan, & P. Friess (Eds.). Digitising the Industry: Internet of Things Connecting the Physical, Digital and Virtual Worlds. 2016. Pp. 129-150.
6. Ebeling Werner, Engel Andreas, Feistel Rainer. *Fizika protsessov evolyutsii Per. s nem. YU. A. Danilova* [Physics of the processes of evolution. Per. with him. Yu.A. Danilova]. M.: Editorial URSS, 2001. 328 p. C. 74-82.
7. Vasconez J.P., Kantor G.A., Auat Cheein F.A. Humane robot interaction in agriculture: A survey and current challenges // Biosystems Engineering. 2019. № 179. Pp. 35-48.

8. Kunz C., Weber J.F., Gerhards R. Benefits of Precision Farming Technologies for Mechanical Weed Control in Soybean and Sugar Beet-Comparison of Precision Hoeing with Conventional Mechanical Weed Control // Agronomy. 2015. № 5. Pp. 130-142.

9. Lampridi M.G., Kateris D., Vasileiadis G., Marinoudi V., Pearson S., Sørensen C.G., Balafoutis A., Bochtis D. A Case-Based Economic Assessment of Robotics Employment in Precision Arable Farming // 2019. Vol 9(4), # 175. Pp. 1-14.

10. Widely accepted vision for agriculture may be inaccurate, misleading. - https:// news.psu.edu/ story/452218/2017/02/22/widely-accepted-vision-agriculture-may-be-inaccurate-misleading

11. Mandyck J.M., Schultz E.B. Food stupidity: the hidden link between food waste, hunger and climate change. 2015, 198 p.

12. Bodrunov S.D. *Ekonomicheskoye vozrozhdeniye Rossii* [Economic Revival of Russia]. 2018. № 2 (56). Page 5-14.

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