

THE CONTEMPORARY TRENDS IN THE DIGITALIZATION OF THE AGRICULTURAL SECTOR AND THE SOCIO- ECONOMIC SPHERE

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Abstract. *The rapid development of digital technologies is bringing about a transformative paradigm shift in the agricultural sector, linking it closely with the fields of bioeconomics and social development. This article explores the modern trends of digitization in the agricultural domain, highlighting technology's convergence with traditional sectors and its profound impact on sustainable development and societal well-being. The digitization revolution in the agricultural sector, encompassing areas such as agribusiness, healthcare, and biotechnology, is underway. Similarly, in the realm of social development, online learning platforms, telemedicine services, and digital communication tools are witnessing significant growth, encapsulating education, healthcare, and community development. Despite promising advancements, challenges persist, including digital divide, data privacy concerns, and the complexity of governance and regulation. Inclusive innovations, ethical AI, and digital literacy initiatives offer pathways to address these challenges and harness the full potential of digitization for creating just, sustainable, and prosperous societies.*

Keywords: *Digitization, bioeconomy, social sphere, digital technologies, sustainable development.*

1. Introduction

In today's rapidly evolving digital landscape, the convergence of technology with traditional sectors such as agriculture, bioeconomics, and social spheres is becoming increasingly evident. The development of digital innovations tailored to these domains, characterized by the integration of various processes and services of digital technologies, holds great potential for enhancing efficiency and addressing societal challenges. This article aims to explore the contemporary trends of digitization in bioeconomics and social domains, highlighting the transformative impact of digital technologies in these critical areas.

In the agricultural sector, bioeconomics encompasses a wide range of economic activities that utilize biological resources for the production of goods and services, including farming, livestock, fisheries, healthcare, and biotechnology [1]. It emphasizes the value of biological assets and ecotourism in promoting sustainable economic growth and societal well-being, advocating for sustainable production systems that preserve resources and biodiversity. Meanwhile, the social sphere encompasses various aspects of human society, including education, healthcare, social services, and community development. Digitizing the social sphere involves leveraging digital technologies for access, delivery, and enhancement of social programs and services [2].

The integration of digital technologies into the agricultural sector, bioeconomics, and social domains has been facilitated by artificial intelligence, big data analytics, the Internet of Things (IoT), and blockchain, among other areas experiencing rapid advancement. These technologies offer new opportunities to enhance efficiency, optimize resource allocation, and broaden possibilities for individuals and communities. Furthermore, the COVID-19 pandemic has

accelerated digitization in both sectors, emphasizing the importance of digital solutions in addressing global challenges and ensuring sustainability [3].

From this perspective, this article examines the current state of digitization in agriculture, bioeconomics, and social domains, exploring emerging trends, challenges, and opportunities. By highlighting the intersection of technology with these critical domains, we aim to understand how digitization can manage sustainable development, promote inclusive growth, and improve societal outcomes.

2. The role of bioeconomy in the social sphere in the agrarian direction

Bioeconomics in the agricultural sector encompasses a wide range of economic activities that utilize biological resources for the production of goods and services, as noted by the European Commission (2018). This includes fields such as agribusiness, forestry, fisheries, healthcare, and biotechnology, all of which rely on biological sources for their operations. Bioeconomics in agriculture emphasizes sustainability, resource efficiency, and the responsible utilization of biological resources to maximize economic value while minimizing negative impacts on ecosystems and the environment.

On the other hand, the social sphere encompasses various aspects of human society, including education, healthcare, social services, and community development. It embodies collective efforts aimed at promoting social well-being, equality, and solidarity among individuals, organizations, and governments. Digitizing the social sphere involves incorporating digital technologies for the delivery of social programs and services, enhancing accessibility, utilization, and effectiveness, as highlighted in [2].

In recent years, technological advancements in the agricultural sector have been increasingly influenced by the demands of bioeconomics and societal needs. Digital technologies play a pivotal role in facilitating this convergence, aiding the integration of biological and societal observations into decision-making processes. For instance, digital platforms and tools are utilized to optimize agricultural practices, monitor environmental parameters, and enhance medical assistance in remote areas [4].

The COVID-19 pandemic has once again emphasized the importance of digitizing bioeconomics and the social sphere. The rapid spread of the virus necessitated innovative solutions to address healthcare challenges, ensure food security, and support vulnerable populations. In this context, digital technologies emerged as crucial tools for remote work and learning, telemedicine, contact tracing, and vaccine distribution (UNCTAD, 2021). Consequently, there has been renewed attention to leveraging digitization opportunities for fostering resilient and inclusive societies [3, 5].

Despite these advancements, challenges persist in fully harnessing the opportunities of digitization in agricultural bioeconomics and the social sphere. Issues such as digital divide, data privacy, cybersecurity, and regulatory concerns pose significant hurdles to widespread and equitable utilization of digital technologies, according to the European Parliament (2020). Addressing these challenges requires concerted efforts from policymakers, industry stakeholders, and civil society to create an enabling environment for digital innovations and inclusion.

3. Current state of digitization

The current state of digitizing bioeconomics in the agricultural sector is characterized by the extensive integration of digital technologies across various fields. For instance, in agribusiness, farmers increasingly utilize IoT sensors, drones, and artificial intelligence imagery to optimize crop management practices, leading to greater efficiency in agricultural techniques (Gómez-

Barbero & Rodriguez-Cerezo, 2019). These technologies enable real-time monitoring of soil moisture levels, nutrient status, and crop health, empowering farmers to make data-driven decisions and maximize yield while minimizing inputs.

Similarly, the healthcare sector has witnessed significant strides in digitization through the adoption of electronic health records (EHRs), telemedicine platforms, and wearable health devices [7]. These technologies facilitate remote patient monitoring, teleconsultations, and personalized medical interventions, enhancing access to healthcare services and improving patient outcomes. Furthermore, breakthroughs in genomics and precise medicine are supported by large-scale data analysis and machine learning algorithms [8], driving advancements in personalized treatment approaches. Additionally, achievements in synthetic biology are fueling innovations in bio-manufacturing and bioengineering. Computer-aided design software, automation, and robotics, among other digital technologies, streamline the production and fabrication of bio-based products, including pharmaceuticals, biofuels, and biomaterials (Dell et al., 2019). The convergence of biology and digital technologies, often termed "bioinformatics," facilitates rapid prototyping, iteration, and scale-up of bio-products with unprecedented precision and efficiency.

In the social sphere, digital technologies are reshaping service delivery and community development efforts. Online learning platforms democratize access to educational resources, enabling individuals to acquire new knowledge and skills regardless of geographic location [9]. Social networking platforms facilitate collaboration and knowledge exchange among researchers, policymakers, and practitioners, facilitating collective problem-solving and innovation [10].

However, challenges persist in fully harnessing the opportunities of digitization in agricultural bioeconomics and the social sphere. Issues such as digital divide, data privacy, cybersecurity, and regulatory complexities pose serious challenges to the widespread and equitable adoption of digital technologies [11]. Addressing these challenges requires collaborative efforts among policymakers, industry stakeholders, and civil society to create an enabling environment for digital innovations and inclusion.

4. Modern problems

In the realm of agricultural development, a series of challenges lie ahead that cannot be overcome solely through traditional economic and social measures, but rather require forward-looking achievements with subsequent innovations and growth opportunities. For instance, the disparity in utilizing digital technologies and the digital divide described by unequal access to and use of digital technologies remain crucial obstacles to achieving inclusive digitization. Marginalized communities, rural areas, and developing regions often lack reliable internet connectivity, affordable devices, and digital literacy, exacerbating societal inequalities. Moreover, the expansion of digital data is accompanied by concerns about breaches of privacy, misuse of information, and cybersecurity threats. Safeguarding private data, ensuring data sovereignty, and fostering trust in digital platforms are essential for enhancing secure and ethical digital ecosystems. Furthermore, the regulatory and legal frameworks governing the management of digital technologies and data vary by jurisdiction, presenting challenges for collaboration, data exchange, and cross-border partnerships. Aligning regulations, advancing standards, and enhancing regulatory oversight are crucial for streamlining responsible digitization and innovation.

Conclusion

When expressed thoroughly, digitizing in the agricultural sector presents challenges as well as opportunities for sustainable development and societal prosperity. Mitigating digital divide, ensuring data privacy and security, and resolving complexities in regulation and governance are

primary challenges that demand collaborative efforts from beneficial stakeholders across sectors and regions. However, embracing inclusive innovations, promoting ethical AI practices, and investing in digital literacy can unlock the full potential of digitization to create a more just, sustainable, and prosperous future for all.

REFERENCES

1. European Commission. (2018). A sustainable bioeconomy for Europe: Strengthening the connection between economy, society and the environment. Publications Office of the European Union.
2. Nambisan, S., Wright, M., Feldman, M. (2017). The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes. *Research Policy*, 47(8), 1450-1458.
3. UNCTAD. (2021). Digital economy report 2021. United Nations Conference on Trade and Development.
4. Smolker, R. The New Bioeconomy and the Future of Agriculture. *Development* 51, 519–526 (2008).
5. Nordine A., Mehdi El H., Sahra S. Digitalization and resilience during the COVID-19 pandemic. *Telecommunications Policy* 47 (4), 102522 (2023).
6. Gomez-Barbero, M., & Rodriguez-Cerezo, E. (2019). Digital agriculture in the European Union. JRC Technical Reports. European Commission, Joint Research Centre.
7. Luana C.S., Blanda M., Cristiano A., Rodolfo S.A., Sandro J.R., Gabriel de O.R., Rodrigo da R.R., Juliana Nichterwitz Sch., Bruna D. A rapid review of machine learning approaches for telemedicine in the scope of COVID-19. *Artificial Intelligence in Medicine*. 129, 102312 (2022).
8. Topol, E. J. High-performance medicine: The convergence of human and artificial intelligence. *Nature Medicine*, 25(1), 44-56 (2019).
9. Quadri N.N., Heena Ch., Naim A., Jarallah A. Adel I.Q. Mobile Learning in Higher Education: A Systematic Literature Review. *Sustainability* 2023, 15(18)
10. Yardi, S., & Boyd, D. (2010). Dynamic debates: An analysis of group polarization over time on Twitter. *Bulletin of Science, Technology & Society*, 30(5), 316-327.
11. European Parliament. (2020). Digitalisation and the digital divide. Directorate-General for Internal Policies, Policy Department for Economic, Scientific and Quality of Life Policies.
12. Kadirova, Maral Matyakubovna. "POTENTIALS OF QUEST TECHNOLOGY IN THE DEVELOPMENT OF STUDENTS'ECONOMIC SKILLS." *Berlin Studies Transnational Journal of Science and Humanities* 2.1.5 Pedagogical sciences (2022).
13. KADIROVA, Maral. "TALABALARDA IQTISODIY KO'NIKMALARNI TAKOMILLASHTIRISH ASOSLARI." *EDAGOGIK AHORAT*: 15.
14. Kadirova, Maraljan Matyakubovna. "THE CULTURE OF USING THE INTERNET BY CHILDREN." *Multidisciplinary Journal of Science and Technology* 3.3 (2023): 365-368.
15. Кадирова, Маралжон Матякубовна. "ЗАМОНАВИЙ ТАЪЛИМ ТЕХНОЛОГИЯЛАРИ ВОСИТАЛАРИ ОРҚАЛИ ТАЛАБАЛАРДА ИҚТИСОДИЙ КЎНИКМАЛАРНИ РИВОЖЛАНТИРИШ МОДЕЛИ." *INTEGRATION OF SCIENCE, EDUCATION AND PRACTICE. SCIENTIFIC-METHODICAL JOURNAL* (2022): 376-378
16. Турובה, Нулкар. "Биоэкономика: возможности рационального использования сельскохозяйственных площадей бухарской области." центр научных публикаций (buxdu.uz) 8.8 (2021).

17. Болтаева, Шахноз. "WASTE PROBLEM, SECOND LIFE OF WA DEVELOPMENT OF AGRICULTURE ROLE OF MARKETING." *ЦЕНТР НАУЧНЫХ ПУБЛИКАЦИЙ (buxdu.uz)* 45.45 (2024).
18. Qudratov, Azizjon. "The state and prospects of development of the livestock sector in Uzbekistan." *Центр научных публикаций (buxdu.uz)* 1.1 (2020).
19. Narziyeva, D. M. "The Experience of the Countries of the World on the Development of the Stock Market." *EUROPEAN JOURNAL OF INNOVATION IN NONFORMAL EDUCATION* 3.12 (2023): 37-40.
20. Dilafiruz, Narziyeva. "Qishloq xo'jaligi tarmoqlarida klasterlar tashkil etish-iqtisodiy o'sishning innovatsion usuli." *ЦЕНТР НАУЧНЫХ ПУБЛИКАЦИЙ (buxdu.uz)* 9.9 (2020).
21. Boltayeva, Sh B. "DEVELOPMENT OF AGRICULTURE ROLE OF MARKETING." *Galaxy International Interdisciplinary Research Journal* 11.5 (2023): 428-431