Hungarian Association of Agricultural Informatics
European Federation for Information Technology in Agriculture, Food and the Environment

Journal of Agricultural Informatics. Vol. 15, No. 2
journal.magisz.org

Integrating Artificial Intelligence in agricultural higher education: Transforming learning and research

Péter Lengyel[1], Emese Felvégi[2], István Füzesi[3]

I N F O
Received 22/01/2025
Accepted 31/01/2025
Available on-line 04/02/2025
Responsible Editor: László Várallyai

Keywords:
Artificial Intelligence, agricultural education, generative AI, interdisciplinary research
JEL: I23

A B S T R A C T

The integration of Artificial Intelligence (AI) in agricultural higher education is transforming the landscape of agricultural practices and research. This paper explores the multifaceted applications of AI technologies in the curriculum and pedagogical approaches of agricultural institutions. By enhancing data analysis, predictive modeling, and decision-making processes, AI empowers students and researchers to tackle complex agricultural challenges such as crop management, pest control, and resource optimization. Furthermore, the study examines the implications of AI on student engagement, skill development, and interdisciplinary collaboration. As agricultural sectors increasingly rely on data-driven solutions, the incorporation of AI in higher education not only prepares future professionals with essential competencies but also fosters innovation in sustainable agricultural practices. This article underscores the critical role of AI in shaping the future of agricultural education and its potential to revolutionize the industry.

1. Introduction

The integration of Artificial Intelligence (AI) in agricultural higher education is a pivotal development that is reshaping the methodologies and practices within the agricultural sector. AI, which broadly refers to computational systems capable of learning and decision-making, has gained prominence in numerous industries, including education. As the global demand for food continues to rise due to population growth and climate change, the need for innovative solutions in agriculture becomes increasingly urgent (Sethi et al., 2021). Digitalization plays a crucial role in achieving sustainable agricultural development, contributing to both business efficiency and environmental sustainability (Várallyai et al., 2024). AI technologies, which encompass machine learning, data analytics, and predictive modeling, offer transformative opportunities for addressing complex agricultural challenges, such as crop management, pest control, and resource optimization (Diwaker et al., 2021). Recent studies also highlight the role of agile methodologies in implementing AI-driven farm management solutions, ensuring adaptability and efficiency in agricultural processes (Al Jafa & Várallyai, 2023). Beyond these applications, the role of AI in higher education is equally crucial, as it equips future professionals with the necessary digital competencies to navigate an evolving agricultural landscape.

In recent years, educational institutions have begun to recognize the importance of incorporating AI into their curricula, thereby equipping students with the necessary skills to navigate an evolving

[1] Péter Lengyel
Department of Agricultural and Business Digitalization, Faculty of Economics and Business, University of Debrecen
lengyel.peter@econ.unideb.hu
[2] Emese Felvegi
Department of Decision and Information Sciences, C. T. Bauer College of Business, University of Houston
efelvegi@bauer.uh.edu
[3] István Füzesi
Department of Agricultural and Business Digitalization, Faculty of Economics and Business, University of Debrecen
fuzesi.istvan@econ.unideb.hu

agricultural landscape (Diwaker et al., 2021). This shift not only enhances student engagement and interdisciplinary collaboration but also promotes the development of competencies that align with the demands of modern agricultural practices (Sethi et al., 2021). By fostering a data-driven approach to agriculture, AI empowers future professionals to make informed decisions that contribute to sustainable agricultural practices and increased productivity (Crompton & Song, 2021).

As the agricultural sector increasingly relies on technology to improve efficiency and sustainability, the role of AI in agricultural education will be crucial. This paper aims to explore the multifaceted applications of AI in agricultural higher education, examining its implications for curriculum development, skill acquisition, and the overall impact on the agricultural industry.

The following questions will be addressed in the article:

1. How is Artificial Intelligence (AI) being integrated into agricultural higher education curricula?

2. What are the implications of AI on student engagement and skill development in agricultural studies?

3. How does the incorporation of AI technologies foster interdisciplinary collaboration among students and researchers?

4. How does the integration of AI in education prepare future professionals for the demands of the agricultural industry?

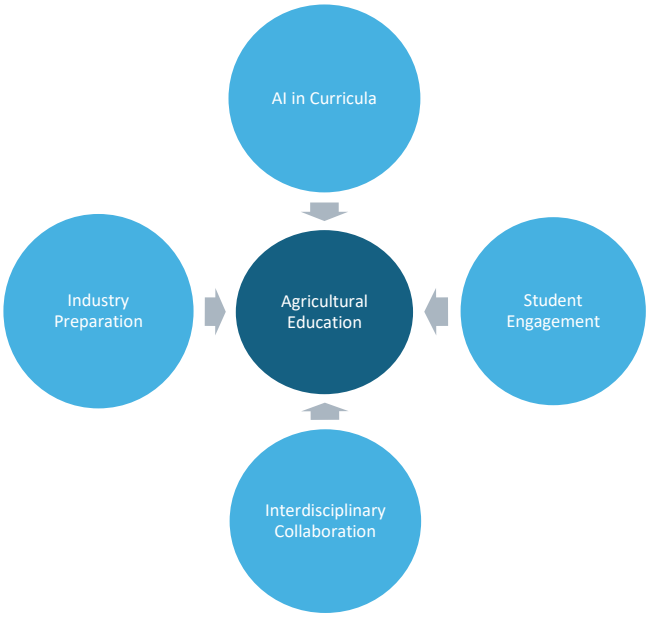

Figure 1. Key Aspects of AI Integration in Agricultural Higher Education

2. Methodology

This literature review employs a systematic approach to analyze the integration of Artificial Intelligence (AI) in agricultural higher education. The review process involves several key steps to ensure a comprehensive understanding of the topic and to synthesize relevant findings from existing literature.

1. Literature Search: A thorough search of academic databases, including Google Scholar, JSTOR, and Scopus, was conducted to identify peer-reviewed articles, conference papers, and relevant reports published from 2010 to 2023. A systematic search yielded 75 peer-reviewed studies, which were analyzed for their relevance to AI integration in agricultural education. Following a title and abstract screening process, 32 studies were deemed highly relevant and included in the final synthesis. Keywords

such as "Artificial Intelligence in agriculture," "AI in agricultural education," "machine learning in farming," and "data-driven agriculture" were utilized to capture a broad spectrum of literature (Bezci, 2019).

2. Inclusion and Exclusion Criteria: Articles were included if they discussed the application of AI in agricultural education or its implications for agricultural practices. Studies focusing solely on AI technologies without a direct link to agricultural education or those that were not peer-reviewed were excluded. This criterion ensured that the selected studies directly addressed AI's role in educational settings rather than its general applications in agriculture. This ensured the review focused on high-quality, relevant sources (Talaviya et al., 2020).

3. Data Extraction: Key information from selected articles was extracted, including the authors' names, publication year, research objectives, methodologies, findings, and implications for agricultural education. This structured extraction process facilitated the organization of information and highlighted recurring themes and gaps in the literature (Elbasi et al., 2022).

4. Thematic Analysis: A thematic analysis was conducted to identify and categorize the main themes emerging from the literature. Key themes included the integration of AI technologies in curricula, the impact of AI on student engagement and skill development, enhancements in decision-making processes, and the promotion of interdisciplinary collaboration. This analysis helped to elucidate how AI is reshaping agricultural education and its potential to address complex agricultural challenges (Alfer'ev, 2018).

5. Synthesis of Findings: The findings from the thematic analysis were synthesized to provide a coherent narrative on the current state of AI in agricultural higher education. This synthesis highlighted the transformative potential of AI in enhancing data analysis, predictive modelling, and decision-making processes, ultimately preparing future professionals for the demands of the agricultural industry (Sahoo & Sharma, 2023, Karmaoui, 2022).

6. Critical Evaluation: A critical evaluation of the literature was performed to assess the strengths and limitations of existing studies. This evaluation addressed the methodological rigor of the research, the diversity of perspectives presented, and the applicability of findings to real-world agricultural practices (Wakchaure et al., 2023).

7. Identification of Gaps and Future Research Directions: Finally, the review concluded with the identification of gaps in the current literature and suggestions for future research. This included the need for longitudinal studies to assess the long-term impact of AI integration in agricultural education and the exploration of specific AI technologies that could further enhance agricultural practices (Zawacki-Richter et al., 2019).

Through this systematic literature review, the study aims to provide a comprehensive understanding of the role of AI in agricultural higher education, its implications for student learning, and its potential to revolutionize agricultural practices.

2. Results

The literature review conducted on the integration of Artificial Intelligence (AI) in agricultural higher education yielded significant insights across several key themes, addressing the research questions outlined in the study.

2.1. Integration of AI into Agricultural Higher Education Curricula

The integration of Artificial Intelligence (AI) into agricultural higher education curricula is a growing trend, driven by the need to equip students with the skills necessary to address modern agricultural challenges. AI technologies are being incorporated into educational programs to enhance learning and prepare students for the evolving demands of the agricultural sector. This integration involves the use of AI for various applications, including precision agriculture, predictive modelling, and supply chain optimization, which are crucial for sustainable agricultural practices.

AI in Curriculum Design

- AI is being used to tailor educational content, providing personalized learning experiences that cater to individual student needs and learning paces (Alqahtani et al., 2023).
- Curricula are incorporating AI-driven tools for data analysis and interpretation, enabling students to engage with real-world agricultural data and scenarios (Alqahtani et al., 2023).

Practical Applications in Agriculture

- AI technologies such as machine learning and neural networks are being taught to optimize crop cultivation practices, including disease identification and crop monitoring (Pandey & Mishra, 2024, Zhang et al., 2023).
- Students are learning to apply AI in supply chain management, enhancing their understanding of logistics, storage, and quality assurance in the agricultural sector (Zatsu et al., 2024).

Research and Innovation

- AI is fostering innovation in agricultural research, with students being trained to use AI for predictive analytics and smart inventory management, which are essential for reducing food loss and waste (Pandey & Mishra, 2024, Zatsu et al., 2024).
- Educational programs are emphasizing the development of AI-based solutions for sustainable agriculture, preparing students to contribute to global food security efforts (Pandey & Mishra, 2024).

While the integration of AI into agricultural education is promising, it also presents challenges such as ethical concerns and the need for transparency in AI applications. Addressing these issues is crucial to ensure that AI technologies are used responsibly and effectively in agriculture, ultimately leading to improved educational and agricultural outcomes.

Table 1. Key Publications on AI Integration in Agricultural Education

authors	***title***	***doi***	***year***	***journal***
Zhang et al.	Editorial: Machine learning and artificial intelligence for smart agriculture	10.3389/fpls.2022.1121468	2023	Frontiers in Plant Science
Zatsu et al.	Revolutionizing the food industry: The transformative power of artificial intelligence-a review	10.1016/j.fochx.2024.101867	2024	Food Chemistry
Alqahtani et al.	The emergent role of artificial intelligence, natural learning processing, and large language models in higher education and research.	10.1016/j.sapharm.2023.05.016	2023	Research in Social & Administrative Pharmacy
Pandey & Mishra	Towards sustainable agriculture: Harnessing AI for global food security	10.1016/j.aiia.2024.04.003	2024	Artificial intelligence in agriculture
Zhang et al.	Editorial: Machine learning and artificial intelligence for smart agriculture, volume II	10.3389/fpls.2023.1166209	2023	Frontiers in Plant Science

2.2. Implications of AI on Student Engagement and Skill Development

The integration of AI in agricultural studies has significant implications for student engagement and skill development. AI technologies, particularly generative AI, offer innovative ways to enhance learning experiences by fostering critical thinking, creativity, and knowledge creation. These technologies can transform traditional educational practices, making them more interactive and

engaging for students. The use of AI in agricultural studies not only aids in understanding complex concepts but also prepares students for future challenges in the agri-food sector. Below are the key implications of AI on student engagement and skill development in agricultural studies.

Enhanced Student Engagement

- AI tools, such as generative AI, can sustain student discourse and knowledge building, making learning more interactive and engaging (Lee et al., 2023).
- In courses like Domesticated Livestock Behavior and Meat Science, AI assignments have been shown to boost creativity and provide unique learning experiences, helping students visualize complex concepts (Hoffmann et al., 2024).

Skill Development

- AI fosters critical thinking and hypothesis generation, essential skills for students in agricultural studies (DeForest, 2024).
- The use of AI in agriculture, such as precision agriculture and predictive analytics, equips students with practical skills relevant to modern agricultural practices (Taneja et al., 2023).

Knowledge and Awareness

- Students gain a solid understanding of AI technologies, including their limitations and potential inaccuracies, which is crucial for developing a balanced perspective on technology use (Hoffmann et al., 2024).
- Exposure to AI tools helps students appreciate the synergy between AI and human expertise, promoting innovative problem-solving skills (Ebtehaj, 2024).

While AI offers numerous benefits, there are concerns about over-reliance on technology and the potential overshadowing of traditional methods. Some students express concerns about AI limiting social interactions and the development of transferable skills (Hoffmann et al., 2024). Additionally, the accuracy of AI-generated content remains a challenge, necessitating a strong foundation in critical thinking to interpret AI outputs effectively (DeForest, 2024). Despite these challenges, AI remains a valuable ally in enhancing educational outcomes in agricultural studies.

Table 2. AI Tools and Their Impact on Agricultural Education

authors	***title***	***doi***	***year***	***journal***
DeForest	Mitigating Generative AI Inaccuracies in Soil Biology	10.1016/j.soilbio.2024.109510	2024	Soil Biology & Biochemistry
Taneja et al.	Artificial Intelligence: Implications for the Agri-Food Sector	10.3390/agronomy13051397	2023	Agronomy
Lee et al.	Designs and practices using generative AI for sustainable student discourse and knowledge creation	10.1186/s40561-023-00279-1	2023	Smart Learning Environments
Hoffmann et al.	PSLBI-25 Students' perceptions of an artificial intelligence photo generation tool in upper-level animal science curriculum	10.1093/jas/skae234.733	2024	Journal of Animal Science
Ebtehaj	Editorial: Application of artificial intelligence in environmental, agriculture and earth sciences	10.3389/feart.2024.1382457	2024	Frontiers in Earth Science

2.3. Promotion of Interdisciplinary Collaboration

The incorporation of AI technologies significantly fosters interdisciplinary collaboration among students and researchers by bridging gaps between diverse fields and enhancing the integration of varied expertise. AI serves as a catalyst for interdisciplinary research by providing tools and methodologies that facilitate the convergence of different academic disciplines, thereby enabling the tackling of complex societal problems. This integration is crucial for addressing challenges that do not fit neatly within traditional academic boundaries. The following sections elaborate on how AI technologies promote such collaborations.

Enhancing Team Synergy

- AI technologies can maximize team synergy by standardizing interaction processes within interdisciplinary groups. This is achieved through methodologies like ethics-by-design and value-sensitive design, which help in building a common lexicon and scenario-building among team members (Oliver, 2022)

- Real-time feedback tools, such as the Meeting Mediator, enhance group dynamics by providing immediate feedback, thus promoting effective collaboration and sustainable growth in educational and corporate settings (Porter & Grippa, 2020).

Facilitating Interdisciplinary Fusion

- AI research, particularly in fields like natural language processing (NLP), has accelerated interdisciplinary fusion by integrating technology with various fields and organizations. Network analysis of NLP research shows how AI facilitates community formation and topic transition, which are essential for interdisciplinary collaboration (Yamazaki & Sakata, 2023).

Addressing Complex Societal Problems

- AI assists in interdisciplinary research by overcoming cognitive challenges associated with integrating diverse disciplines. Tools like search engines and automated content analysis help manage the vast bodies of literature and epistemic divides, making it easier to transfer insights across different problems (Baum, 2021).

While AI technologies offer significant benefits for interdisciplinary collaboration, challenges remain. For instance, the success of such collaborations often depends on the diversity of knowledge harnessed rather than the mere interdisciplinary nature of the team. Moreover, impactful research outcomes are not guaranteed, as seen in the case of AI and COVID-19 research, where many collaborations resulted in low visibility and impact (Abbonato et al., 2024).

Table 3. Prominent Studies on Interdisciplinary Collaboration Using AI

authors	***title***	***doi***	***year***	***journal***
Baum	Artificial Interdisciplinarity: Artificial Intelligence for Research on Complex Societal Problems	10.1007/S13347-020-00416-5	2021	Philosophy & Technology
Oliver	Maximizing team synergy in AI-related interdisciplinary groups: an interdisciplinary-by-design iterative methodology	10.1007/s00146-022-01518-8	2022	Ai & Society
Abbonato et al.	Interdisciplinary Research in Artificial Intelligence: Lessons from COVID-19	10.1162/qss_a_00329	2024	Quantitative science studies
Yamazaki & Sakata	Exploration of Interdisciplinary Fusion and Interorganizational Collaboration With the Advancement of AI Research: A Case Study on Natural Language Processing	10.1109/tem.2023.3327209	2023	IEEE Transactions on Engineering Management

Porter & Grippa	A Platform for AI-Enabled Real-Time Feedback to Promote Digital Collaboration	10.3390/SU122410243	2020	Sustainability

2.4. Preparation for Industry Demands

The integration of AI in education is crucial for preparing future professionals to meet the demands of the agricultural industry. AI technologies are transforming agriculture by enhancing efficiency, sustainability, and productivity, which necessitates a workforce skilled in these technologies. Educational programs that incorporate AI training can equip students with the necessary skills to leverage AI for optimizing agricultural processes, improving crop yields, and ensuring food security. This preparation is vital as AI continues to revolutionize the agri-food sector through applications in predictive analytics, smart farming, and supply chain management. The following sections detail how AI integration in education supports these advancements.

AI in Agricultural Education

- AI technologies such as machine learning, neural networks, and deep learning are being integrated into educational curricula to prepare students for roles in the agri-food industry (Nath et al., 2024).
- Training in AI applications like predictive analytics and agricultural robotics is essential for future professionals to manage soil and crop monitoring effectively (Elbasi et al., 2022).

Enhancing Agricultural Productivity

- AI education enables students to understand and apply AI tools for crop yield optimization, disease identification, and efficient resource use, which are critical for sustainable agriculture (Pandey & Mishra, 2024)
- Knowledge of AI-driven systems for quality control and sensory evaluation in food processing is crucial for maintaining high standards in the agri-food supply chain (Nath et al., 2024, Zatsu et al., 2024).

Addressing Global Food Security

- AI education prepares students to tackle global challenges such as food security by equipping them with skills to reduce food loss and waste through smart inventory management and post-harvest loss reduction (Pandey & Mishra, 2024).
- Understanding AI's role in optimizing supply chain operations and storage management is vital for ensuring efficient food distribution (Pandey & Mishra, 2024).

While AI integration in education is pivotal for advancing agricultural practices, it is also important to address challenges such as ethical concerns, data security, and the high costs associated with AI technologies. These issues must be considered to ensure that AI's transformative potential is realized responsibly and sustainably in the agricultural sector (Zatsu et al., 2024).

Table 4. AI Applications for Meeting Industry Demands in Agriculture

authors	***title***	***doi***	***year***	***journal***
Zatsu et al.	Revolutionizing the food industry: The transformative power of artificial intelligence-a review	10.1016/j.fochx.2024.101867	2024	Food Chemistry
Elbasi et al.	Artificial Intelligence Technology in the Agricultural Sector: A Systematic Literature Review	10.1109/ACCESS.2022.3232485	2022	IEEE Access

Pandey & Mishra	Towards sustainable agriculture: Harnessing AI for global food security	10.1016/j.aiia.2024.04.003	2024	Artificial intelligence in agriculture
Nath et al.	Recent advances in artificial intelligence towards the sustainable future of agri-food industry.	10.1016/j.foodchem.2024.138945	2024	Food Chemistry

3. Conclusions and Future Research Directions

In conclusion, the integration of Artificial Intelligence (AI) in agricultural higher education represents a transformative shift that not only enhances learning and research but also equips future professionals with the necessary skills to address the complexities of modern agriculture. The systematic literature review highlights the significant implications of AI across various dimensions, including curriculum development, student engagement, interdisciplinary collaboration, and preparation for industry demands. As educational institutions embrace AI technologies, they foster an environment conducive to innovation and sustainable agricultural practices, ultimately contributing to global food security. However, it is essential to address the challenges associated with AI, such as ethical considerations and data security, to ensure that its integration is responsible and beneficial for the agricultural sector. The findings underscore the critical role of AI in shaping the future of agricultural education and its potential to revolutionize practices within the industry, paving the way for a more efficient and sustainable agricultural landscape. Future research should continue to explore the long-term impacts of AI integration and identify specific technologies that can further enhance agricultural education and practices.

Future research should focus on several key areas to build on the findings of this study. First, there is a need for longitudinal studies that evaluate the long-term impacts of AI integration in agricultural education, with particular emphasis on student learning outcomes and career readiness. Such research would provide valuable insights into the sustainability and efficacy of these educational innovations.

Second, comparative analyses of AI tools used in both educational and agricultural contexts are essential to determine the most impactful and practical solutions. This would involve benchmarking different AI applications and exploring their scalability and adaptability in diverse environments. Third, the role of AI in facilitating interdisciplinary collaborations should be further investigated. Detailed case studies highlighting successful examples of AI-driven research partnerships between academia and industry could offer a roadmap for future initiatives.

Finally, advanced applications of generative AI in personalized learning and precision agriculture require deeper exploration. These innovations hold the potential to revolutionize traditional methods and create more efficient, targeted approaches to both education and farming practices. Alongside these technological advancements, ethical considerations such as data privacy, equity, and accessibility must be prioritized to ensure that the benefits of AI are distributed fairly across different demographic and geographic groups.

By addressing these research areas, future studies can contribute to a more comprehensive understanding of AI's role in transforming agricultural education and practice, paving the way for sustainable and inclusive advancements.

References

Abbonato, D., Bianchini, S., Gargiulo, F., & Venturini, T. (2024). Interdisciplinary Research in Artificial Intelligence: Lessons from COVID-19. Quantitative Science Studies. https://doi.org/10.1162/qss_a_00329

Al Jafa, H., Várallyai, L. (2023): Using Agile in Implementing Agriculture AI Projects and Farm Management. Agrárinformatika / Journal of Agricultural Informatics 14(1) pp. 1-12. (2023). https://doi.org/10.17700/jai.2023.14.1.684

Alfer'ev, D. (2018). Artificial intelligence in agriculture. Agricultural Technologies. https://doi.org/10.15838/ALT.2018.1.4.5

Alqahtani, T., Badreldin, H. A., Alrashed, M. A., Alshaya, A., Alghamdi, S. S., Saleh, K. B., Alowais, S. A., Alshaya, O. A., Rahman, I., Yami, M. S. A., & Albekairy, A. M. (2023). The emergent role of artificial intelligence, natural learning processing, and large language models in higher education and research. Research in Social & Administrative Pharmacy. https://doi.org/10.1016/j.sapharm.2023.05.016

Baum, S. D. (2021). Artificial Interdisciplinarity: Artificial Intelligence for Research on Complex Societal Problems. Philosophy & Technology. https://doi.org/10.1007/S13347-020-00416-5

Bezci, E. (2019). Use of Artificial Intelligence in Sustainable Agriculture - A Preliminary Analysis. Journal of Agricultural Informatics. https://doi.org/10.46397/JAIH.4.3

Crompton, H., & Song, D. (2021). The Potential of Artificial Intelligence in Higher Education. Review of Virtual University Research. https://doi.org/10.35575/RVUCN.N62A1

DeForest, J. L. (2024). Mitigating Generative AI Inaccuracies in Soil Biology. Soil Biology & Biochemistry. https://doi.org/10.1016/j.soilbio.2024.109510

Diwaker, C., Sharma, A., & Tomar, P. (2021). Artificial Intelligence in Higher Education and Learning. In Advances in Educational Technologies. https://doi.org/10.4018/978-1-7998-4763-2.CH004

Elbasi, E., Mostafa, N. B., AlArnaout, Z., Zreikat, A. I., Cina, E., Varghese, G. H., Shdefat, A. Y., Topcu, A. E., Abdelbaki, W., Mathew, S., & Zaki, C. (2022). Artificial Intelligence Technology in the Agricultural Sector: A Systematic Literature Review. IEEE Access. https://doi.org/10.1109/ACCESS.2022.3232485

Hoffmann, C., Kelley, S. F., & Nicholson, K. (2024). PSLBI-25 Students' perceptions of an artificial intelligence photo generation tool in upper-level animal science curriculum. Journal of Animal Science. https://doi.org/10.1093/jas/skae234.733

Karmaoui, A. (2022). Network Analysis on Artificial Intelligence in Agriculture, a Bibliometric Review. In Sustainable Agriculture Technologies. https://doi.org/10.1007/978-3-031-15420-1_20

Lee, A. V. Y., Tan, S. C., & Teo, C. L. (2023). Designs and practices using generative AI for sustainable student discourse and knowledge creation. Smart Learning Environments. https://doi.org/10.1186/s40561-023-00279-1

Nath, P., Bhunia, B., Mishra, B., Tiwari, A., Nayak, P. K., Bhuyan, T., Kaushal, S., Mohanta, Y. K., & Sridhar, K. (2024). Recent advances in artificial intelligence towards the sustainable future of agri-food industry. Food Chemistry. https://doi.org/10.1016/j.foodchem.2024.138945

Oliver, C. (2022). Maximizing team synergy in AI-related interdisciplinary groups: An interdisciplinary-by-design iterative methodology. AI & Society. https://doi.org/10.1007/s00146-022-01518-8

Pandey, D. K., & Mishra, R. (2024). Towards sustainable agriculture: Harnessing AI for global food security. Artificial Intelligence in Agriculture. https://doi.org/10.1016/j.aiia.2024.04.003

Porter, B., & Grippa, F. (2020). A Platform for AI-Enabled Real-Time Feedback to Promote Digital Collaboration. Sustainability. https://doi.org/10.3390/SU122410243

Sahoo, P. K., & Sharma, D. (2023). Economic impact of artificial intelligence in the field of agriculture. International Journal of Horticulture and Food Science. https://doi.org/10.33545/26631067.2023.v5.i1a.152

Sethi, K., Chauhan, S., & Jaiswal, V. (2021). Artificial Intelligence in Higher Education: First Attempt. In Innovative Pedagogies for 21st Century Learning. https://doi.org/10.4018/978-1-7998-4763-2.CH001

Talaviya, T., Shah, D., Patel, N., Yagnik, H., & Shah, M. (2020). Implementation of artificial intelligence in agriculture for optimization of irrigation and application of pesticides and herbicides. Artificial Intelligence in Agriculture. https://doi.org/10.1016/J.AIIA.2020.04.002

Taneja, A., Nair, G., Sharma, S. D., Jambrak, A. R., Roselló-Soto, E., Barba, F. J., Castagnini, J. M., Leksawasdi, N., & Phimolsiripol, Y. (2023). Artificial Intelligence: Implications for the Agri-Food Sector. Agronomy. https://doi.org/10.3390/agronomy13051397

Várallyai, L.; Botos, Sz. Bálint, L.P., Kovács, T., Szilágyi, R. (2024) Agricultural and business digitalisation degree in achieving sustainable development goals. International Journal of Sustainable Agricultural Management and Informatics 10 (3) pp. 327-345. https://doi.org/10.1504/IJSAMI.2024.139725

Wakchaure, M., Patle, B. K., & Mahindrakar, A. (2023). Application of AI Techniques and Robotics in Agriculture: A Review. Artificial Intelligence in the Life Sciences. https://doi.org/10.1016/j.ailsci.2023.100057

Yamazaki, T., & Sakata, I. (2023). Exploration of Interdisciplinary Fusion and Interorganizational Collaboration With the Advancement of AI Research: A Case Study on Natural Language Processing. IEEE Transactions on Engineering Management. https://doi.org/10.1109/tem.2023.3327209

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators? International Journal of Educational Technology in Higher Education. https://doi.org/10.1186/S41239-019-0171-0

Zatsu, V., Shine, A. E., Tharakan, J. M., Peter, D., Ranganathan, T. V., Alotaibi, S. S., Mugabi, R., Muhsinah, A. B., Waseem, M., & Nayik, G. A. (2024). Revolutionizing the food industry: The transformative power of artificial intelligence-a review. Food Chemistry: X. https://doi.org/10.1016/j.fochx.2024.101867

Zhang, C., Park, D. S., Yoon, S., & Zhang, S. (2023). Editorial: Machine learning and artificial intelligence for smart agriculture. Frontiers in Plant Science. https://doi.org/10.3389/fpls.2022.1121468