

Strategies to Overcome Barriers to the Implementation of Agriculture 4.0 Technologies in the Brazilian Agri-food System

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INTRODUCTION & AIM

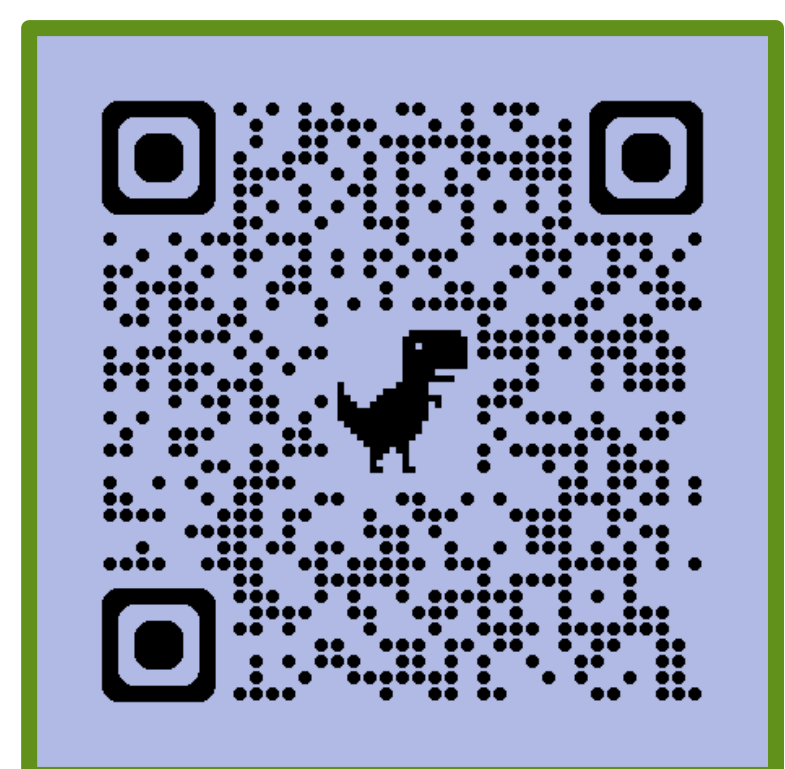
Agriculture 4.0 represents a new phase of agricultural modernization, characterized by the integration of emerging technologies such as the Internet of Things (IoT), artificial intelligence (AI), remote sensing, big data analytics, robotics, and blockchain. These technologies promise to enhance productivity, optimize resource use, and increase the sustainability and resilience of agri-food systems. However, their large-scale adoption remains limited, particularly in developing countries like Brazil, where producers face a complex combination of technical, economic, social, and institutional barriers, including high investment costs, limited infrastructure, low levels of digital literacy, and fragmented innovation ecosystems. *This study aims to identify and propose comprehensive strategies to overcome these challenges and foster the effective implementation of Agriculture 4.0 technologies in the Brazilian agri-food sector.*

METHOD

The methodology combines a systematic literature review, case study analysis, and expert consultation, while considering the heterogeneity of producer profiles, production systems, and regional conditions.



- **PAPER 1 - Behavioral profile of farmers in the adoption of agriculture 4.0 technologies in the agri-food system: a case study in Brazil.** AIM: This study analyzes the behavioral profile of 198 farmers from Rio Grande do Sul (RS), Brazil, regarding perceived barriers to adopting Agriculture 4.0 technologies, comparing adopters and non-adopters.



- **PAPER 2 - Exploring the drivers of responsible scaling of Agriculture 4.0 technologies for transformative impact in the modern agri-food ecosystem: An ISM-based analysis.** AIM: This research, therefore, explores this context by identifying the key drivers for the adoption of Agriculture 4.0 technologies in the modern agri-food ecosystem. Additionally, it identifies the interrelationships and hierarchical structures among these drivers, providing insights to tackle the challenges of complex agri-food systems and prioritize key issues for their modernization.

RESULTS & DISCUSSION

The findings emphasize the importance of integrated **public policies, investment in technical education and training, the formation of collaborative innovation networks, and the development of context-sensitive digital solutions.** Additionally, the study highlights the role of multistakeholder engagement in facilitating the adoption and scaling of technological innovations.



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CONCLUSION

By presenting a set of feasible and inclusive strategies, this work contributes to the sustainable advancement of Agriculture 4.0 in Brazil, with a focus on promoting digital inclusion, increasing productivity, and supporting equitable rural development.

FUTURE WORK / REFERENCES

- **PAPER 3 - Future research will undertake international comparative analyses (Latin America, the United States, and Greece) to identify barriers to the adoption of Agriculture 4.0 and systematically compare them with the Brazilian context.**

Da Silveira, F., Lermen, F.H., Amaral, F.G., 2021. An overview of Agriculture 4.0 development: Systematic review of descriptions, technologies, barriers, advantages, and disadvantages. *Computers and Electronics in Agriculture*. 189, 106405. <https://doi.org/10.1016/j.compag.2021.106405>

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