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Special Issue: The Future of Agriculture and Food Industry – Trends and Challenges Guest Editorial

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Introduction

Agriculture and the food industry are facing unprecedented challenges caused by population growth, climate change, and resource constraints. Global demand for food is expected to increase by nearly 50% by 2050, while arable land and freshwater resources continue to decline (FAO, 2022). These dynamics require innovative and sustainable solutions to ensure food security for all while preserving environmental integrity.

At the same time, digital transformation, biotechnology, and consumer awareness are reshaping the agri-food sector. Digital technologies, including blockchain, artificial intelligence (AI), and precision farming, are enhancing transparency and efficiency in agricultural value chains (Rana *et al.*, 2021; Fiore *et al.*, 2021). Moreover, the COVID-19 pandemic revealed the vulnerability of global supply chains and emphasized the need for resilient and localized food systems (OECD, 2021).

Recent studies emphasize that innovation in the agri-food sector must be framed within a broader paradigm of sustainability and circular economy. According to Galati *et al.* (2024a, 2024b), the transition toward sustainable food systems requires not only technological innovation but also organizational and social changes that promote resource efficiency, waste reduction, and value co-creation among stakeholders. The integration of circular business models – whereby by-products and waste streams are transformed into new resources – represents a strategic pathway to enhance

competitiveness while reducing environmental impacts. In this context, the alignment between digital innovation and circular strategies promotes the development of smart, sustainable agri-food networks that can respond dynamically to global challenges.

Furthermore, the rise of "conscious consumption" and the demand for traceable, high-quality, and ethically produced food are encouraging firms to adopt transparent and data-driven practices (Galati *et al.*, 2024). Through digital tools such as AI, blockchain, and the Internet of Things (IoT) systems, consumers are increasingly integrated into the value creation process, influencing production choices and sustainability strategies. This participatory model not only strengthens trust and brand reputation but also contributes to building resilient food ecosystems rooted in innovation, responsibility, and shared value creation.

Undoubtedly, blockchain, IoT, and AI technology have been recognized as drivers of innovation in various fields, contributing to the creation of a more sustainable world. Indeed, they contribute to reducing bureaucracy and incentivizing environmentally friendly behavior among customers (Rana *et al.*, 2019). However, these technologies should be used carefully since they could contribute to increasing unsustainable activities. For instance, Bitcoin, a cryptocurrency based on blockchain technology, appears to be environmentally unsustainable due to its high energy consumption (Giungato *et al.*, 2017). Moreover, the production and application of AI technology significantly contribute to the exploitation of natural resources and the release of substantial carbon emissions (Bux *et al.*, 2024).

Although these problems, blockchain, IoT, as well as IA, have great potential to improve the sustainability of the agricultural supply chain. However, their diffusion requires some improvements to infrastructure and connectivity, as well as digital literacy among the agricultural stakeholders in the supply chain. Clearly, public administrations, in conjunction with intergovernmental organizations and scholars, play a crucial role in providing guidance toward sustainable agriculture (Rana *et al.*, 2021).

This Special Issue, titled "The Future of Agriculture and Food Industry – Trends and Challenges", was conceived to provide a platform for sharing new insights into how innovation, digitalization, and sustainability interact in shaping the future of agri-food systems. It collects theoretical and empirical research that highlights the interplay between economic growth, environmental protection, and technological change, particularly in emerging economies such as Vietnam (Nguyen & Pham, 2023).

Furthermore, the transition toward sustainable food systems requires behavioral, managerial, and policy innovations. The integration of green human resource management (Yong & Fawehinmi, 2020), sustainable investment (OECD, 2023), and responsible consumption patterns (Sharma

et al., 2021) is essential for achieving the Sustainable Development Goals (SDGs), particularly 2, 9, 12, and 13. By emphasizing these dimensions, this Special Issue aims to contribute to the global debate on sustainable agricultural transformation and the transition toward greener and more inclusive food systems (Fiore *et al.*, 2019; Jayanama *et al.*, 2021).

An Overview of Papers Presented in the Special Issue

This Special Issue comprises four selected papers that explore diverse aspects of the transformation of the agri-food sector toward sustainability, innovation, and resilience. Together, these studies offer new insights into how consumers, organizations, and policymakers can drive the transition toward a more sustainable and technology-driven food economy.

1. Non-nutritive Sweeteners: Factors Influencing the Choice of University Students in Vietnam write by Thao Nguyen *et al.* This paper examines the behavioral and socio-demographic factors influencing Vietnamese university students' choices regarding non-nutritive sweeteners. Using survey data and multivariate analysis, it identifies perceived health benefits, peer influence, and lifestyle orientation as key determinants of health. Findings suggest that greater awareness and nutrition education can foster healthier consumption choices among young people in developing countries.

2. A Proposed Framework for Blockchain Technology in Vietnamese Domestic Pepper Supply Chain Regarding Authenticity and Traceability write by Le *et al.* Focusing on the pepper industry – a strategic export sector of Vietnam – this article proposes a blockchain-based framework for enhancing authenticity and traceability. The model integrates stakeholders, including farmers, exporters, and certification authorities, demonstrating how blockchain reduces fraud, enhances transparency, and fosters consumer trust. The study emphasizes the significance of digital technologies in ensuring food safety and enhancing market competitiveness.

3. Green Human Resource Management Practices and Sustainable Performance in Vietnam's Agriculture: The Mediating Role of Green Innovation and Green Culture write by Nhung *et al.* This study examines the role of green human resource management (GHRM) in enhancing sustainable agricultural performance, with a focus on the mediating effects of green innovation and organizational culture. Using structural equation modeling (SEM), the authors confirm that GHRM practices promote environmental responsibility and innovation-driven growth. The paper highlights the crucial role of human capital and corporate culture in facilitating green transformation.

4. Agricultural Development versus Environmental Sustainability: FDI, Carbon Emissions, and Global Warming in Vietnam's Economy

write by Toai Doan *et al*. This macroeconomic analysis investigates the relationship between agricultural growth, foreign direct investment (FDI), and environmental degradation. The study finds that while FDI enhances productivity and modernization, it can increase carbon emissions if not aligned with green policies. Results underscore the need to integrate climate-conscious investment frameworks to ensure that Vietnam's agricultural expansion remains both economically viable and environmentally sustainable.

Collectively, these contributions demonstrate how Vietnam's agri-food sector reflects broader global trends toward balancing growth with sustainability, highlighting opportunities for innovation, policy reform, and capacity building.

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